PTO-1390 (05-13)
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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371		Attorney Docket No. BEZINGE.00101 U.S. Application No. (if known, see 37 CFR 1.5)
International Application No. PCT/EP2012/070273	International Filing Date 12 October 2012	Priority Date Claimed 18 October 2011
Title of Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE	
First Named Inventor	Alex BEZINGE et al.	

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). NOTE: The express request under 35 U.S.C. 371(f) will not be effective unless the requirements under 35 U.S.C. 371(c)(1), (2), and (4) for payment of the basic national fee, copy of the International Application and English translation thereof (if required), and the oath or declaration of the inventor(s) have been received.

2. ☒ A copy of the International Application (35 U.S.C. 371(c)(2)) is attached hereto (not required if the International Application was previously communicated by the International Bureau or was filed in the United States Receiving Office (RO/US)).

3. An English language translation of the International Application (35 U.S.C. 371(c)(2)).
   a. ☐ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).

4. An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
   a. ☐ is attached.
   b. ☐ was previously filed in the international phase under PCT Rule 4.17(iv).

Items 5 to 8 below concern amendments made in the international phase.

PCT Article 19 and 34 amendments

5. ☐ Amendments to the claims under PCT Article 19 are attached (not required if communicated by the International Bureau) (35 U.S.C. 371(c)(3)).

6. ☐ English translation of the PCT Article 19 amendment is attached (35 U.S.C. 371(c)(3)).

7. ☐ English translation of annexes (Article 19 and/or 34 amendments only) of the International Preliminary Examination Report is attached (35 U.S.C. 371(c)(5)).

Cancellation of amendments made in the international phase

8a. ☐ Do not enter the amendment made in the international phase under PCT Article 19.

8b. ☐ Do not enter the amendment made in the international phase under PCT Article 34.

NOTE: A proper amendment made in English under Article 19 or 34 will be entered in the U.S. national phase application absent a clear instruction from applicant not to enter the amendment(s).

The following items 9 to 17 concern a document(s) or information included.

9. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.

10. ☒ A preliminary amendment.

11. ☒ An Application Data Sheet under 37 CFR 1.76.

12. ☒ A substitute specification. NOTE: A substitute specification cannot include claims. See 37 CFR 1.125(b).

13. ☐ A power of attorney and/or change of address letter.

14. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.3 and 37 CFR 1.821–1.825.

15. ☐ Assignment papers *(cover sheet and document(s))*. Name of Assignee:

16. ☐ 37 CFR 3.73(c) Statement *(when there is an Assignee)*.

Petitioner Samsung Ex-1004, 0001

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U.S. APPLN. No. (if known - see 37 CFR 1.5)	INTERNATIONAL APPLICATION No. PCT/EP2012/070273	ATTORNEY DOCKET No. BEZINGE.00101

17. ☐ Other items or information:

The following fees have been submitted.	CALCULATIONS	PTO USE ONLY
18. ☒ Basic national fee (37 CFR 1.492(a)) **$280**	$ 280.00	
19. ☒ Examination fee (37 CFR 1.492(c)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... **$0** All other situations **$720**	$ 720.00	
20. ☒ Search fee (37 CFR 1.492(b)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... **$0** Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority ..... **$120** International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB ..... **$480** All other situations **$600**	$ 480.00	
TOTAL OF 18, 19, and 20 =	$ 1,480.00	

☐ Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing in compliance with 37 CFR 1.821(c) or (e) in an electronic medium or computer program listing in an electronic medium) (37 CFR 1.492(j)).
Fee for each additional 50 sheets of paper or fraction thereof **$400**

Total Sheets	Extra Sheets	Number of each addition 50 or fraction thereof (round **up** to a whole number)	RATE	
- 100 =	/50 =		**x $400**	$

Surcharge of **$140.00** for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1.492(h)).	$	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	17 - 20 =	0	x **$80**	$	
Independent claims	2 - 3 =	0	x **$420**	$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ **$780**	$	

Processing fee of **$140.00** for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i)). +	$	
TOTAL OF ABOVE CALCULATIONS =	$ 1,480.00	
☒ **Applicant asserts small entity status.** See 37 CFR 1.27. Fees above are reduced by ½.	- 740.00	
☐ **Applicant certifies micro entity status.** See 37 CFR 1.29. Fees above are reduced by ¾. Applicant must attach form PTO/SB/15A or B or equivalent.		
TOTAL NATIONAL FEE =	$	740.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property. +	$	
	$	
TOTAL FEES ENCLOSED =	$	740.00
	Amount to be refunded:	$
	Amount to be charged:	$

134404.00101/36365341v.1

Petitioner Samsung Ex-1004, 0002

a. ☐ A check in the amount of $ _____ to cover the above fees is enclosed.

b. ☒ Please charge my Deposit Account No. 23-2185 in the amount of $ 740.00 to cover the above fees.

c. ☒ The Director is hereby authorized to charge additional fees which may be required, or credit any overpayment, to Deposit Account No. 23-2185 as follows:

i. ☒ any required fee.

ii. ☐ any required fee except for excess claims fees required under 37 CFR 1.492(d) and (e) and multiple dependent claim fee required under 37 CFR 1.492(f).

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038. The PTO-2038 should only be mailed or faxed to the USPTO. However, when paying the basic national fee, the PTO-2038 may NOT be faxed to the USPTO.

ADVISORY: If filing by EFS-Web, do **NOT** attach the PTO-2038 form as a PDF along with your EFS-Web submission. Please be advised that this is **not** recommended and by doing so your **credit card information may be displayed via PAIR**. To protect your information, it is recommended to pay fees online by using the electronic payment method.

NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the International Application to pending status.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File)Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013, and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: A U.S. national stage application may not claim priority to the international application of which it is the national phase. The filing date of a U.S. national stage application is the international filing date. See 35 U.S.C. 363.

Correspondence Address

☒ The address associated with Customer Number: 27557 **OR** ☐ Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone			
Email					

Signature	/Peter S. Weissman/	Date	April 18, 2014
Name (Print/Type)	Peter S. Weissman	Registration No. (Attorney/Agent)	40,220

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: April 18, 2014 Electronic Signature for Peter S. Weissman: /Peter S. Weissman/

134404.00101/36365341v.1

Petitioner Samsung Ex-1004, 0003

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: April 18, 2014
Electronic Signature for Peter S. Weissman: /Peter S. Weissman/

Docket No.: BEZINGE.00101
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Alex BEZINGE et al.

Application No.: National Stage of PCT/EP2012/070273

Confirmation No.: N/A

Filed: Herewith

Art Unit: N/A

For: A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

Examiner: Not Yet Assigned

INFORMATION DISCLOSURE STATEMENT (IDS)

MS PCT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

Pursuant to 37 C.F.R. § 1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement accompanies the new patent application submitted herewith.

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

Petitioner Samsung Ex-1004, 0004

In accordance with 37 C.F.R. § 1.97(g), the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made or that no other material information as defined in 37 C.F.R. § 1.56(a) exists. In accordance with 37 C.F.R. § 1.97(h), the filing of this Information Disclosure Statement shall not be construed to be an admission that any patent, publication or other information referred to therein is "prior art" for this invention unless specifically designated as such.

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references.

Dated: April 18, 2014

Respectfully submitted,

Electronic signature: /Peter S. Weissman/
Peter S. Weissman
Registration No.: 40,220
BLANK ROME LLP
Correspondence Customer Number: 27557
Attorney for Applicant

Petitioner Samsung Ex-1004, 0005

PTO/SB/08a (07-09)
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	Not Yet Assigned
Filing Date	
First Named Inventor	Alex BEZINGE
Art Unit	N/A
Examiner Name	Not Yet Assigned
Attorney Docket Number	BEZINGE.00101

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A*	US-2009199130	08-06-2009	Tsern et al.	
	B*	US-2002118605	08-29-2002	Born et al.	
	C*	US-2009102669	04-23-2009	LIN	
	D*	US-2010235667	09-16-2010	Mucignat et al.	
	E*	US-2012092383	04-19-2012	HYSEK et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	F	EP-1324159-A1	07-02-2003	Asulab Sa [ch]		√
	G	WO-09120292-A2	10-01-2009	Lee, Shu		
	H	WO-11000893-A1	01-06-2011	Hysek, Joerg et al.		√
	I	EP-2315101-A1	04-27-2011	Research In Motion Ltd [ca]		
	J	EP-1785808-A1	05-16-2007	Research In Motion Ltd [ca]		

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. * CITE NO.: Those application(s) which are marked with an single asterisk (*) next to the Cite No. are not supplied (under 37 CFR 1.98(a)(2)(iii)) because that application was filed after June 30, 2003 or is available in the IFW. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: April 18, 2014 Electronic Signature for Peter S. Weissman: /Peter S. Weissman/

Petitioner Samsung Ex-1004, 0006

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 2

Complete if Known	
Application Number	Not Yet Assigned
Filing Date	
First Named Inventor	Alex BEZINGE
Art Unit	N/A
Examiner Name	Not Yet Assigned
Attorney Docket Number	BEZINGE.00101

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	K	K. TUCK et al., "MMA8450Q Single/Double and Directional Tap Detection," Freescale Semiconductor, Inc., 2010, 16 pages.	
	L	BMA180 Digital, Triaxial Accleration Sensor," Data Sheet, Bosch Sensortec, Dec. 10, 2009, pp 1-69.	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

Petitioner Samsung Ex-1004, 0007

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEZINGE.00101
	Application Number	
Title of Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Alex		BEZINGE	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Saviese	Country of Residence [i]	CH

Mailing Address of Inventor:

Address 1	Prafirmin 213		
Address 2			
City	Saviese	State/Province	
Postal Code	CH-1965	Country [i]	CH

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Adrian		MOHNI	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	St-Gallen	Country of Residence [i]	CH

Mailing Address of Inventor:

Address 1	Boppartshofweg 12		
Address 2			
City	St-Gallen	State/Province	
Postal Code	9014	Country [i]	CH

Inventor 3 Remove

Legal Name

Petitioner Samsung Ex-1004, 0008

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEZINGE.00101
	Application Number	
Title of Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE	

Prefix	Given Name	Middle Name	Family Name	Suffix
	Daniel		PFEIFER	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Anton Am Arlberg	Country of Residence [i]	AU

Mailing Address of Inventor:

Address 1	Pfarriweg 33		
Address 2			
City	Anton Am Arlberg	State/Province	
Postal Code	6580	Country [i]	AU

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Musa		DOGAN	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Heerbrugg	Country of Residence [i]	CH

Mailing Address of Inventor:

Address 1	Karl-Volker-Strasse 10		
Address 2			
City	Heerbrugg	State/Province	
Postal Code	9435	Country [i]	CH

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	27557		
Email Address		Add Email	Remove Email

Petitioner Samsung Ex-1004, 0009

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEZINGE.00101
	Application Number	
Title of Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE	

Application Information:

Title of the Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE		
Attorney Docket Number	BEZINGE.00101	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)		**Suggested Figure for Publication (if any)**	

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	27557		

Petitioner Samsung Ex-1004, 0010

PTO/AIA/14 (12-13)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEZINGE.00101
	Application Number	
Title of Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	a 371 of international	PCTEP2012070273	2012-10-12

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
01689/11	CH	2011-10-18	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Petitioner Samsung Ex-1004, 0011

PTO/AIA/14 (12-13)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEZINGE.00101
	Application Number	
Title of Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE	

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date o f filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	Slyde Watch SA

Petitioner Samsung Ex-1004, 0012

PTO/AIA/14 (12-13)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEZINGE.00101
	Application Number	
Title of Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE	

Mailing Address Information For Applicant:			
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Country i	CH	Postal Code	1184
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

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Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:			
Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Petitioner Samsung Ex-1004, 0013

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEZINGE.00101
	Application Number	
Title of Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE	

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.					
Signature	/Peter S. Weissman/			Date (YYYY-MM-DD)	2014-04-18
First Name	Peter	Last Name	Weissman	Registration Number	40220
Additional Signature may be generated within this form by selecting the Add button.					

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Petitioner Samsung Ex-1004, 0014

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: April 18, 2014 Signature: /Peter S. Weissman/ (Peter S. Weissman)

Docket No.: BEZINGE.00101 (PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Alex BEZINGE et al.

Application No.: National Stage of PCT/EP2012/070273

Confirmation No.: N/A

Filed: Concurrently Herewith

Art Unit: N/A

For: A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

Examiner: Not Yet Assigned

FIRST PRELIMINARY AMENDMENT UNDER 37 C.F.R. 1.115

MS Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

Prior to examination on the merits, please amend the above-identified U.S. patent application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Abstract begin on page 3 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 4 of this paper.

Amendments to the Drawings begin on page 8 of this paper and include an attached replacement sheet .

Remarks/Arguments begin on page 9 of this paper.

An **Appendix** including amended drawing figures is attached following page 9 of this paper.

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AMENDMENTS TO THE SPECIFICATION

A substitute specification is enclosed herewith, including a clean copy and a marked-up version of the application. The substitute specification corrects formal matters of the application. No new matter is entered.

Petitioner Samsung Ex-1004, 0016

AMENDMENTS TO THE ABSTRACT

Please substitute the following paragraph for the abstract now appearing in the currently filed specification:

An electronic wristwatch operable in two power modes. The wristwatch has an inertial sensor for detecting a gesture on a cover glass of the wristwatch. A touch panel is provided underneath the cover glass for detecting the gesture. Gesture detection by the inertial sensor is combined with gesture detection by the touch panel for triggering a switch from a first power mode to a second power mode.

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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method combining gesture detection by an accelerometer and gesture detection with a touch panel for switching a wristwatch ~~(1)~~ from a first power mode to a second power mode, comprising:

using an accelerometer ~~(23)~~ with embedded signal processing capabilities for generating an acceleration signal used for detecting a gesture on a cover glass ~~(3a)~~ of said wristwatch;

discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal, and/or the slope of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer,

waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer,

using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from a touch panel underneath said cover glass

~~using a touch panel (3b) underneath said cover glass (3a) for detecting said gesture;~~

~~combining gesture detection by the accelerometer (23) and gesture detection with the touch panel (3b) for triggering a switch from said first power mode to said second power mode,~~

~~said method comprising a step of discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and/or the slope of said acceleration signal~~.

2. (Original) The method of claim 1, wherein the discrimination between gesture and no gesture is also based on the duration of said acceleration signal.

3. (Currently Amended) The method of ~~one of the claims 1 to~~ claim 2, wherein the discrimination between gesture and no gesture is also based on the amplitude of said acceleration signal.

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4. (Currently Amended) The method of ~~one of the claims 1 to 3~~claim 1, said step of discriminating between gesture and no gesture comprises determining said frequency and determining that there is no gesture if said frequency is not in a predetermined frequency range compatible with a tap.

5. (Currently Amended) The method of ~~one of the claims 1 to 3~~claim 1, said step of discriminating between gesture and no gesture comprises determining said ~~slope~~ direction and determining that there is no gesture if said ~~slope is not in a predetermined slope range compatible with a tap~~direction is not substantially perpendicular to said cover glass.

6. (Canceled.)

7. (Currently Amended) The method of ~~one of the claims 1 to 6~~claim 1, wherein said touch panel ~~(3b)~~ comprises a plurality of touch areas, said method comprising a step of applying a power supply sufficient for detecting a gesture to only a first subset of said touch areas.

8. (Currently Amended) The method of ~~one of the claims 1 to 7~~claim 1, wherein discrimination between gesture and no gesture ~~is based~~ depends on the duration ~~($t_5 - t_3$)~~ between a detection signal from said accelerometer ~~(23)~~ and a detection signal with said touch panel ~~(3b)~~.

9. (Currently Amended) The method of ~~one of the claims 1 to 8~~claim 1, wherein said accelerometer ~~(23)~~ is powered on when said wristwatch ~~(1)~~ is in said first power mode, said method comprising a step of at partially waking up said touch panel ~~(3b)~~ upon detection of a gesture by said accelerometer ~~(23)~~.

10. (Currently Amended) The method of claim ~~9~~7, comprising a step of waking up only a subset of the complete area of said touch panel ~~(3b)~~ upon detection of a gesture by said accelerometer ~~(23)~~.

11. (Currently Amended) The method of ~~one of the claims 1 to 10~~claim 1, comprising a step of waking up a microcontroller ~~(21)~~ in said wristwatch upon detection of a gesture by said accelerometer ~~(23)~~ and with said touch panel ~~(3b)~~.

12. (Canceled.)

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13. (Currently Amended) The method of ~~one of the claims 1 to 12~~claim 1, said gesture being a tap or a double tap.

14. (Currently Amended) The method of ~~one of the claims 1 to 13~~claim 1, further comprising a step of detecting a wristturn with said accelerometer ~~(23)~~, and switching said wristwatch ~~(1)~~ from said first power mode to said second power mode when a wristturn has been detected.

15. (Currently Amended) The method of claim 14~~1~~, said step of detecting a wristturn comprising:

detecting that the ~~wristwatch in a first~~ orientation of the wristwatch is in a first range;

detecting that the orientation of the wristwatch is then in a second range, different from said first range,

detecting that the ~~displacements of the~~ wristwatch remains ~~under a predetermined threshold~~ substantially immobile during a predetermined duration.

16. (Currently Amended) A wristwatch ~~(1)~~ which can be operated in a plurality of power modes including a first power mode and a second power mode, comprising:

a display ~~(4)~~;

a touch panel ~~(3b)~~ underneath a cover glass ~~(3a)~~ of said wristwatch for detecting a gesture on said cover glass ~~(3a)~~;

an accelerometer ~~(23)~~ with embedded signal processing capabilities, said accelerometer being arranged for generating an acceleration signal and for discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal as measured by said accelerometer ~~(23)~~ being a three dimensional accelerometer, and/or the slope of said acceleration signal,

a microcontroller ~~(21)~~ commanded so as to be switched to said second power mode upon gesture detection by said accelerometer ~~(23)and~~ and for discriminating between gesture ~~detection by~~ and no gesture based at least on signals from said touch panel.

17. (Currently Amended) The wristwatch of claim 16, wherein said touch panel ~~(3b)~~ comprises a plurality of touch areas and powering means arranged for powering only a first subset of said touch area upon detection of a gesture by said accelerometer ~~(23)~~, and for powering a larger subset in said second power mode.

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18. (New) A method for switching a wristwatch from a first power mode to a second power mode, comprising:

using an accelerometer for detecting a wristturn, and

switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected.

19. (New) The method of claim 14, said step of detecting a wristturn comprising:

detecting that the orientation of the wristwatch is in a first range;

detecting that the orientation of the wristwatch is then in a second range, different from said first range,

detecting that the wristwatch remains substantially immobile during a predetermined duration.

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AMENDMENTS TO THE DRAWINGS

The attached sheets of drawings include replacement drawings. No new matter is submitted.

Attachment: Replacement sheet

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REMARKS

In view of the above amendment, applicant believes the pending application is in condition for examination.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 23-2185, under Order No. 134404.00103 from which the undersigned is authorized to draw.

Dated: April 18, 2014

Respectfully submitted,

By /Peter S. Weissman/
Peter S. Weissman
Registration No.: 40,220
BLANK ROME LLP
Correspondence Customer Number: 27557
Attorney for Applicant

Attachments

Petitioner Samsung Ex-1004, 0023

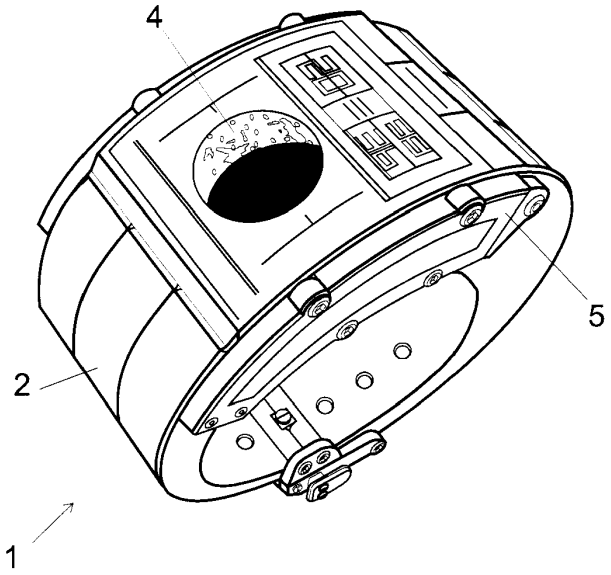


Fig. 1a

Smartc3-PCT

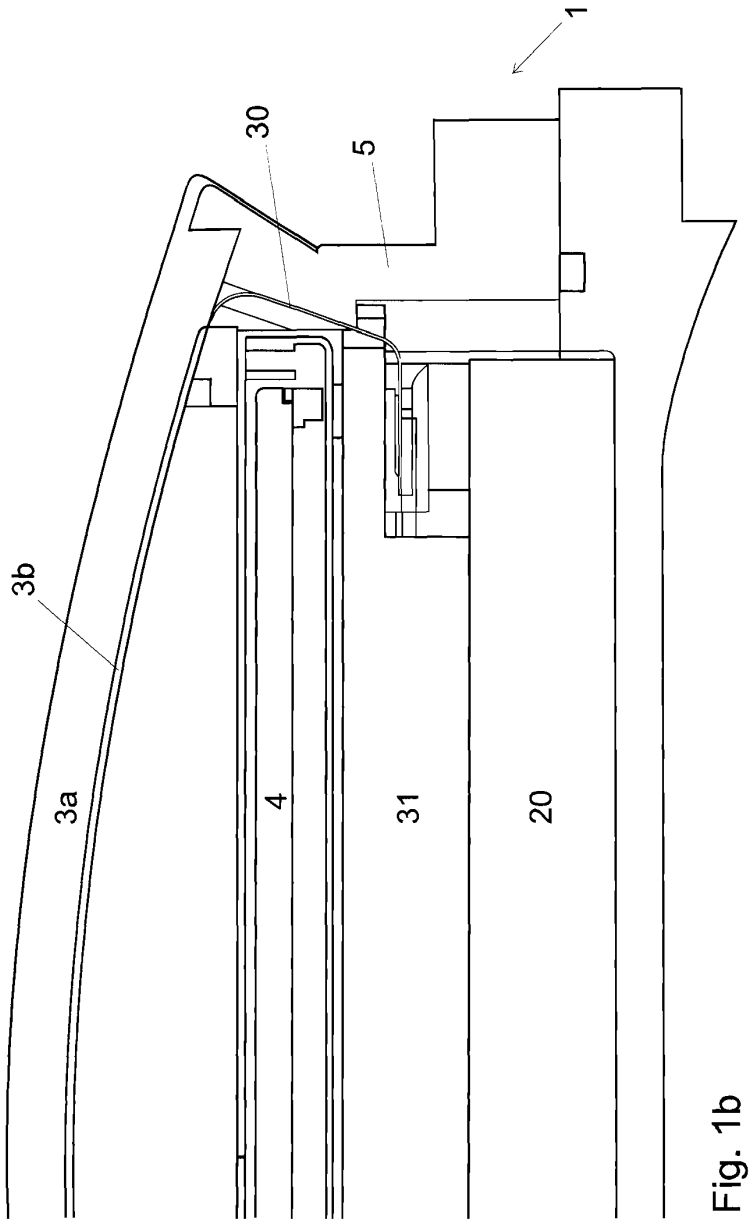


Fig. 1b

Simard-3-PCT

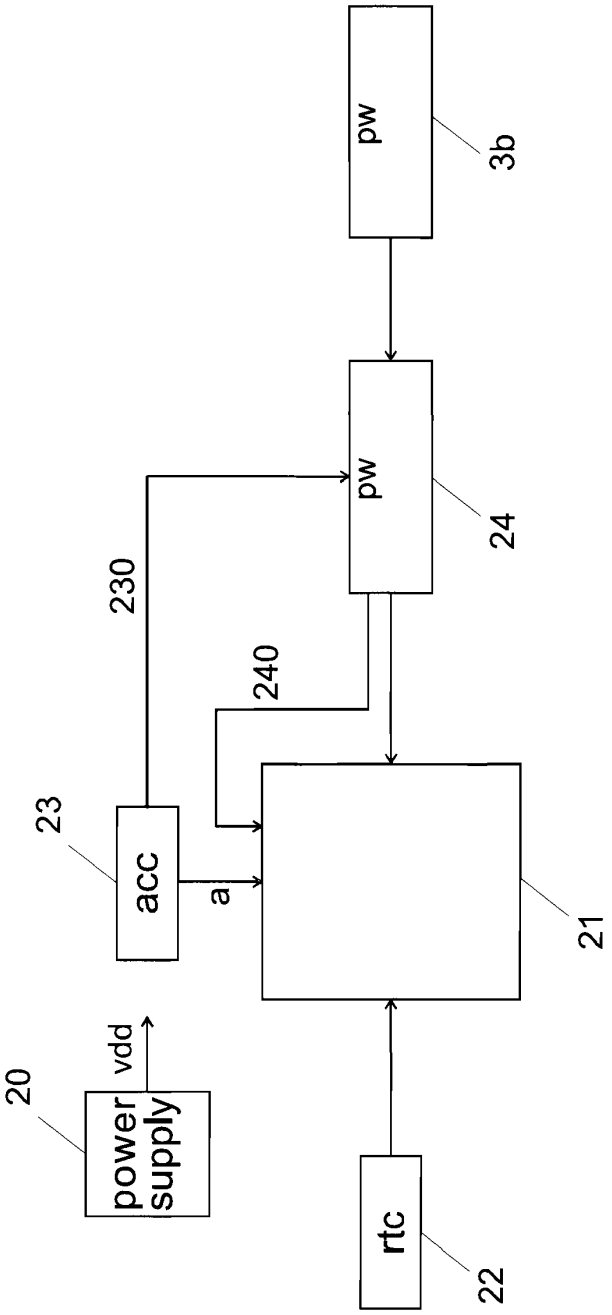


Fig. 2

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Fig. 3

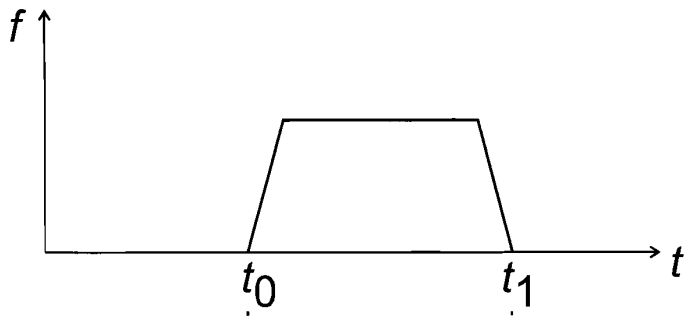


Fig. 4

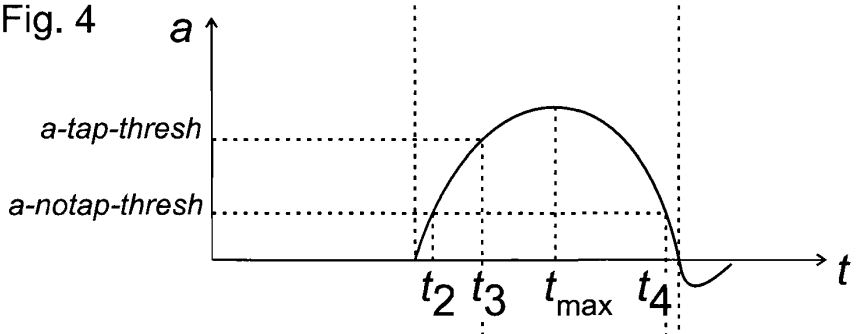


Fig. 5

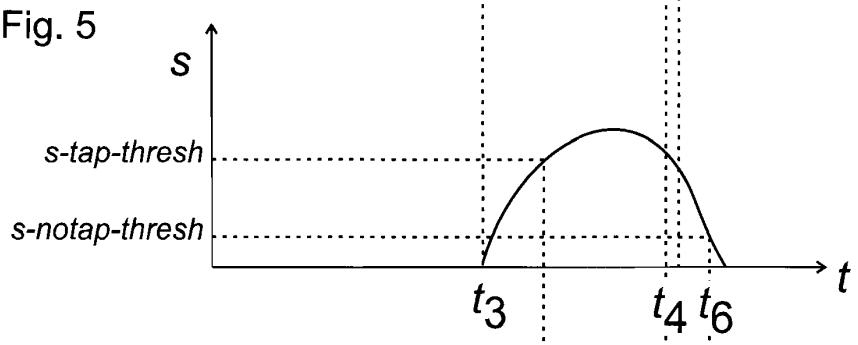
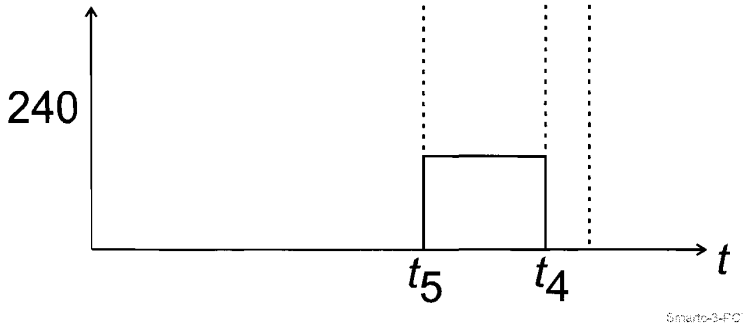


Fig. 6



Smarto3-PCT

Fig. 7a

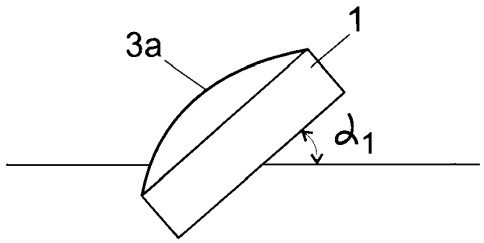


Fig. 7b

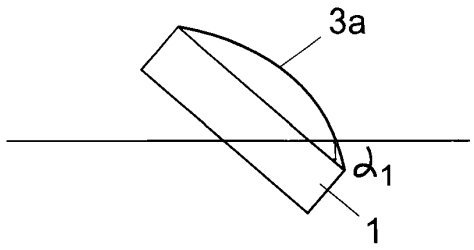
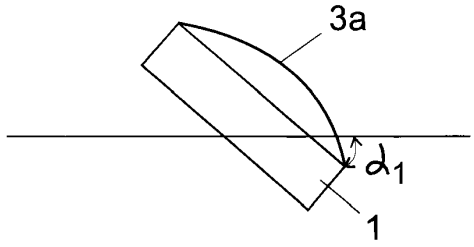


Fig. 7c



Smardo3-PCT

A method and circuit for switching a wristwatch from a first power mode to a second power mode

[0001] The present application claims priority of Swiss patent application CH2011/1689 whose contents is hereby enclosed by reference.

Field of the invention

[0002] The present invention is related to a method for switching a wristwatch from a first power mode to a second power mode, and to a wristwatch which can be switched from a first power mode to a second power mode. The present invention is also related to wristwatches with a touch panel and a plurality of power modes.

Description of related art

[0003] EP1324159 concerns a wristwatch having a touch panel. When not used, a display is switched to a sleeping mode. To avoid an accidental activation of the sensors, a press button is provided to activate the sensors and the liquid crystal display.

[0004] US2009199130 concerns a method and apparatus for receiving an input by a user on an interactive touchscreen display. The input comprises a contact gesture detected with accelerometers.

[0005] US2002118605 discloses a tactile wristwatch in which touch-sensitive keyboard keys are switched on when a user presses a touch-sensitive keyboard.

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[0006] US2009102669 discloses an alarm clock that can be stopped by the hand of a user approaching a proximity sensor.

[0007] WO09120292 concerns mobile handheld devices such as, for example, cell phones or personal digital assistants (PDAs) containing an accelerometer that sends a signal that causes the device to turn on.

[0008] WO11000893 describes a wristwatch with a touch display. The wristwatch comprises an accelerometer which is used for simulating effects of shocks or acceleration on the movement. In order to reduce the power consumption, the display is automatically switched into a sleeping mode when not used. The user can wake up the display by means of a slight pressure of the glass or with a single tap or a double tap on the touch panel. This document does not describe how taps or double taps are detected and distinguished from other gestures or manipulations of the watch.

[0009] US2010/235667 describes a device with an accelerometer for detecting gestures used to wake up the device.

[0010] EP2315101 describes a method combining use of an inertial sensor and of a touch panel for detecting taps on the touch panel of a device such as a smartphone. The detection of taps by the touch panel is mainly based on the amplitude of the acceleration signal; if this amplitude is higher than a threshold, then the touch panel will be woken up to confirm this detection. Although this process might work well in smartphones, it has been found that a more precise detection method would be needed for wristwatches. Indeed, wristwatches are often subject to high acceleration

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values, sometimes in the magnitude of 50G or higher, in normal use or during sport. The inertial system described in this document is not able to distinguish reliably between those high acceleration values in normal use and acceleration due to a tap or other gesture. This results in numerous undesirable activation of the touch panel and therefore in a decrease of the power reserve. Moreover, the user is requested to exert a strong pressure on the display in order to produce an acceleration above the detection threshold.

[0011] A similar solution is described in EP1785808.

[0012] Therefore, different methods are known in order to switch on a device in sleep mode. However, it is difficult to distinguish between intentional commands to switch a device and other gestures or accelerations which may be produced during normal use of the device. For example, undesired switch of operating mode could occur when the touch display touches a piece of cloth or in case of strong acceleration value, for example during sport.

Brief summary of the invention

[0013] It is therefore an aim of the invention to provide a better method for switching a device, such as a microelectronic device, into a different power mode.

[0014] It is another aim of the invention to provide a method for faster switching of a device into a different power mode, without causing unwanted power mode switches.

[0015] It is another aim to provide a method for switching a device into a different power mode which avoids undesired change of mode.

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[0016] According to the invention, these aims are achieved by means of a method for switching a device from a first power mode to a second power mode, comprising:

using an accelerometer (as example of inertial sensor) with embedded signal processing capabilities for generating an acceleration signal used for detecting a gesture on a cover glass of said wristwatch;

using a touch panel underneath said cover glass for detecting said gesture;

combining gesture detection by the inertial sensor and gesture detection with the touch panel for triggering a switch from said first power mode to said second power mode,

said method comprising a step of discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and/or the slope of said acceleration signal.

[0017] The gesture entered by the user to switch the power mode could be a tap, a double tap, a long tap or any other significant and recognizable gesture rarely occurring outside of normal use of the device, and which do not need important processing capabilities to be recognized.

[0018] The simultaneous and combinatory usage of an inertial sensor, such as an accelerometer, and of a touch sensor or touch panel for detecting a gesture provides a more reliable discrimination between various gestures and other manipulations. Moreover, this solution reduces the power consumption in the first power mode since only the inertial sensor needs to be switched on in this mode.

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[0019] The discrimination based on the frequency, and/or the slope of the acceleration signal is much more robust than a discrimination based on the amplitude of the acceleration signal only. It has been found that taps produce an acceleration signal in a specific relatively narrow frequency range. It has also been found that the slope of this acceleration signal, during increase and subsequent decrease, is in a specific range. Therefore, the frequency and/or the slope of the acceleration signal can both be used, alone or in combination, as a signature of an acceleration produced by taps, or by other gestures one wants to detect, allowing thus to distinguish between an acceleration caused by a tap from most other causes of acceleration.

[0020] It has been found that the acceleration caused by a tap comprises a significant component along a direction substantially perpendicular to the surface of the glass on which the tap is made, whereas most other causes produce accelerations along other directions. Therefore, a measure of the direction of the acceleration relatively to the surface of the glass could be used for distinguishing taps.

[0021] This discrimination based on the direction is even more reliable if the user is requested to make a tap on a predefined limited portion of the glass. In this case, detection of the direction of the tap is easier, especially if the glass is curved.

[0022] The first power mode could be a sleep mode, or standby mode, in which the power consumption is reduced but no indications are displayed on the display. The second power mode could be an operating mode where indications are displayed on the display.

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Brief Description of the Drawings

[0023] The invention will be better understood with the aid of the description of an embodiment given by way of example and illustrated by the figures, in which:

Figure 1a illustrates a perspective view of a buttonless wristwatch with a touch display according to the invention.

Figure 1b illustrates a transversal cut through the wristwatch of Figure 1a.

Figure 2 schematically illustrates a possible arrangement of some components within an embodiment of wristwatch.

Figure 3 is a chronogram which illustrates the force f applied to the glass of a touch panel during a tap gesture.

Figure 4 is a chronogram which illustrates the acceleration measured by an accelerometer in a direction perpendicular to the glass of a touch panel during a tap gesture.

Figure 5 is a chronogram which illustrates a signal measured by a touch sensor during a tap gesture.

Figure 6 is a signal which illustrates an example of power-on signal generated by a circuit according to the invention.

Figures 7a to 7c illustrate three successive positions of the wristwatch that are detected during a wristturn detection method.

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Detailed Description of possible embodiments of the Invention

[0024] Figures 1a and 1b illustrate an example of a wristwatch 1 according to the invention. The illustrated watch comprises notably a wristband 2 and a watch case 5 closed with a glass 3a and a touch sensor 3b covering a digital matrix display 4.

[0025] In a preferred embodiment, the watch has no crown and no push-buttons and is operated only through the touch panels and additional sensors, such as inertial sensors, inside the watch case. The water-tightness and solidity of the case is thus improved.

[0026] A luminosity sensor enabling the intensity of the screen to be automatically adapted to the surrounding luminosity can also be used as an option. The watch can switch nearly instantly from a stand-by mode, where the display is switched off or at least less luminous, to a "time reading" and/or navigation mode, for example as soon as the glass is touched or following a tap or double tap on the glass.

[0027] The watch case 5 can also include a connector (not shown) to connect the watch to an external computer, for example a micro or nano USB connector on the bottom or in one of the watch's sides. Wireless connection means, for example a ZigBee or Bluetooth module, can also be provided for connecting the watch to a personal computer and/or for supplying power to the watch and load the battery.

[0028] The watch is advantageously powered electrically by means of a rechargeable accumulator 20 (Figure 1b) through the micro or nano USB connector, through a specific or

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proprietary connector or, in a variant embodiment, through a radiofrequency interface.

[0029] The glass 3a with the touch sensor 3b underneath closes the upper surface of the watch case and covers the digital matrix display 4; there is an air gap between the touch sensor 3b and the display. The glass is preferably made of sapphire or of another scratchproof material and is coated with an anti-glare treatment. In a preferred embodiment, the glass is cylindrically, or possibly spherically curved, while the display 4 is preferably flat.

[0030] The display 4 is preferably a high-resolution digital matrix display, and fills up nearly the entire surface under the glass 3a and thus serves both as multipurpose multifunction display and as time indicator. In a preferred embodiment, the display is a color liquid crystal display (LCD) or color thin film transistor display (TFT) with at least 150x150 pixels or more than 200 dpi (dot per inch). Other types of display, including displays based on the AMOLED technology for example, can also be used. Furthermore, the watch could also have several displays, for example several digital displays, or a digital matrix display combined with hands or other mechanical indicators.

[0031] The display 4 is preferably placed on a printed circuit board 31 on which other components, such as a microcontroller, an inertial sensor etc are also mounted. A connector 30 connects the touch sensor 3b with the printed circuit board 31; in one preferred embodiment, this connector is detachable, so that the glass 3a can be replaced independently of the printed circuit board. In the illustrated embodiment, the printed circuit board 31 rests directly against the watch case 5, so that accelerations on

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the glass 3a are transmitted to the inertial sensor on the board 31 with minimal damping.

[0032] The touch sensor or touch panel 3b is laminated or deposited underneath the glass 3a. In the following, since those two components are integrated, we will use interchangeably the expression glass or touch panel or touch sensor for designating the same component, depending on the context. A touch panel integrated between the display 4 and the glass cover 3a could also be used in a sandwich configuration with a flat glass cover 3a.

[0033] The touch panel 3b has an array of transparent electrodes and is placed underneath the glass 3a in order to detect the presence of a finger or of a stylus. The detection technology preferably uses methods known in the state of the art, for example a capacitive detection, for detecting finger contact and various gestures on one or several of the electrodes. In one embodiment, transparent electrodes can be individually powered in order to put the touch panel in a low power mode with only some electrodes, for example electrodes in the middle, which are powered on and can detect finger contact on the corresponding part of the display; the remaining electrodes are not powered on in this low power mode.

[0034] The display 4 can display various indications, for example the current time, date, chrono, reverse counter, calendar, etc…or phases of the moon as shown in Figure 1. In order to extend the watch's functionalities, the user can switch from one display mode to another and for example replace the card displayed in Figure 1 with other cards. In a preferred embodiment, the user can move from one card to the other with a slide (fast) or scroll (slow) gesture for moving through and viewing a collection of available

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displays or cards. Scrolling or sliding in the horizontal or vertical direction is achieved by moving the finger on the glass in the corresponding direction.

[0035] Figure 2 schematically illustrates a possible arrangement and schematic of some components within an embodiment of wristwatch according to the invention. Only components which are necessary for the understanding of the invention have been represented, although other components and other arrangements could be provided in other embodiments of the invention.

[0036] The illustrated arrangement comprises a power supply 20, such as a rechargeable battery, for supplying power to all other components. A microcontroller 21 controls the display of indications on the matrix panel 4, depending on signals provided by the sensors 22, 23 and on commands entered by the user through the touch panel 4.

[0037] The component 22 is a real-time clock for generating a clock signal based on a quartz (not shown).

[0038] The sensor 23 is an inertial sensor, preferably an accelerometer, preferably a 3-axis mems-based accelerometer for measuring acceleration values a (Figure 4) in a direction perpendicular to center of the glass of the wristwatch and in two orthogonal directions in a plane tangential to this glass at his center. This inertial sensor can comprise signal processing capabilities embedded within the same component or chip, for determining the frequency of the measured acceleration signal, the direction of this signal in 2 or 3 directions, the duration of an event in the acceleration signal, etc.

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[0039] The component 24 is a touch panel controller (touch controller) for interpreting touch signals provided by the touch panel 3b when the user touches the glass 3a with his finger and consequently generate signals in the touch panel 3b located underneath, and for converting those signals into command signals for the microcontroller 21.

[0040] Other components, such as an input-output circuit, for example a USB decoder or a Bluetooth or ZigBee receiver, can also be integrated.

[0041] The microcontroller 21 is specifically configured to interpret the signals from the touch controller 24 and from the inertial sensor 23, to select indications from several available indications depending on these signals, and to display those indications on the digital matrix display 4; this arrangement is preferably achieved by storing in the microcontroller's memory a computer program (firmware) allowing this specific sequence of operation to be fully controlled.

[0042] At least some of the components 21 to 24 and 3b and 4 can be powered in at least two different modes. In one preferred embodiment, a power saving mode and a time display mode are provided; the whole wristwatch can thus be powered either in time display mode for displaying time or other indications on the display 4, or in power saving mode for preserving the battery 20 by switching the display 4, the touch sensor 3b and other components in a low consumption mode. In one preferred embodiment, the display 4 and the touch sensor 3b are switched off in low power saving mode.

[0043] In some embodiments, more than two power modes can be provided; for example, the real time clock 22 is

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preferably always powered on in power saving mode, so that the real time is not lost when the display 4 and the touch panel 3b are switched off; it is possible however to switch the real time clock off in a deep sleep mode in order to prevent the battery from being totally discharged. Other components, such as the microcontroller 21, the touch panel 3b etc could have more than two different power modes, for example a hot power saving mode allowing for a very fast re-start, and a cold power saving mode in which restart is possibly slower or necessitates restarting an operating system.

[0044] The device 1 can be switched from a first power mode, such as a power saving mode, to a second power mode, such as a time display mode, with a user gesture on the glass 3a / touch panel 3b. The device 1 can automatically return to the first power mode, for example after a predetermined duration, or when no acceleration and/or no activity are detected.

[0045] In one embodiment, a gesture command to switch the device into a second power mode is detected with the inertial sensor 23 for detecting a tap, a double tap or another command which can be input by the user onto the glass 3a / touch panel 3b in order to trigger a change of power mode. The inertial sensor 23 could be an accelerometer with embedded power processing capabilities and which is always powered on in the first low power mode. The embedded power processing capabilities comprise a processor or other processing means for executing programmable software code for analysing the accelerations values delivered by the accelerometer, and for generating signals or values when certain conditions are met.

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[0046] In order to avoid undesired switches to the second power mode, which would switch the display on and reduce the operating time of the battery, it is necessary to discriminate between changes in the acceleration signals which are caused by a switch on gesture, such as a tap or a double tap, and any other acceleration caused when the wristwatch is displaced or manipulated in normal use. In one preferred embodiment, the accelerometer 23 generates a power on signal 230 for powering the touch panel 3b and the touch controller 24 when the user enters a tap gesture on the glass 3a/ touch panel 3b, which can be discriminated from other signals with the following properties:

-frequency: tap signals are typically high frequency signals and can be distinguished from other signals produced by slide, rub etc and from most acceleration that occur during normal use of the wristwatch. The acceleration produced by a valid single tap is a pulse function with a first step of fast increase of the acceleration almost immediately followed by a step of fast deceleration, the duration of the whole pulse being typically in the range of 10 to 20 ms. Therefore, the bandwidth of this pulse-like function is necessarily higher than a predefined threshold, and a low pass filtering of acceleration signals can be used to cancel signals produced by gestures other than taps or by movements of the wrist. Preferably, the embedded processing capabilities of the accelerometer exclude the possibility of the tap if the frequency of the acceleration signal, in a given direction such as the direction perpendicular to the center of the glass, is not in a predefined range.

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-duration of the pulse: as indicated, a valid single tap generates a pulse with a duration within a given range, usually between 5 and 100 ms, typically between 10 and 20 ms.

-amplitude of the pulse: a valid single tap is detected only if the amplitude of the acceleration is higher than a first predefined threshold $a_{\_tap\_thresh}$. End of the tap is detected when the amplitude decreases below a second threshold $a_{\_notap\_thresh}$.

-direction of the acceleration: a tap on the glass generates a maximal acceleration in a main direction perpendicular to the center of the glass, oriented toward the bottom of the watch, and a much lower acceleration in all other directions. A 3D accelerometer can be used for discriminating valid taps based on the direction of the acceleration. For example, if the acceleration in a direction other than the main direction is higher than the acceleration in the main direction, the gesture will not be recognized as a switch on tap.

-slope of the acceleration: this feature can also be used to differentiate between a valid switch on tap and a non valid one. Taps typically generate a fast increase of the acceleration, whereas most other gestures such as swipes etc and most movements of the wrist produce a slower acceleration increase. Therefore, the system could distinguish that a tap is not valid if the slope of the acceleration is not in an expected range. It is also possible to measure the slope of acceleration in one preferential direction, for example in a

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direction perpendicular to the center of the glass, or separately in a plurality of predefined directions.
The slope may be defined by the difference between two predefined acceleration values divided by the time it takes for the acceleration signal to goes from the first of those predefined values to the second one:
slope= (a_tap_threshold - a_notap_threshold)/(t_3 - t_2) (see Figure 4).

[0047] Those discriminating criteria can also be combined in different ways. For example, the processing means within the accelerometer could use the direction of the acceleration only during a limited time window, for example a less than 100 ms time interval starting at the beginning of the pulse.

[0048] It is also possible to consider at least one of those criteria separately during the raising portion of the acceleration signal and during the decreasing portion of this signal. For example, it is possibly to verify whether the duration, the frequency, and/or the slope of the acceleration signal during the raising portion, and then during the decreasing portion, are each in predefined ranges compatibles with the gesture one wants to discriminate.

[0049] Other discriminating criteria could be used if other gestures, such as double taps or long taps, are used as command to change the power mode.

[0050] In the embodiment of the invention illustrated on Figure 2, the power on signal 230 generated by the inertial sensor 23 is used to wake up the touch panel 3b and/or the

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touch controller 24, or to switch those components from a low power mode to another power mode. Therefore, the touch panel 3b is switched off, or at least in low power mode, when the device 1 is in the first power mode, and is powered on, or at least partially powered on, after detection of a likely tap and generation of a wake up signal 230 by the accelerometer 23. In one embodiment, the wake up signal 230 generated by the inertial sensor 23 triggers a switch on command of the touch panel 3b and/or of the touch controller 24 from a low power mode in which nothing is displayed and no finger touch can be detected, to an intermediate power mode where only a subset of electrodes of the touch panel is activated, for example electrodes in the middle of the touch panel, in order detect finger contact such as taps or double taps in this limited area only and to avoid detection if a tap is made in a different area. In another embodiment, the wake up signal 230 triggers a switch on command of the touch controller 24 into a mode where all touch electrodes are activated, to detect a tap or double tap in any area of the touch panel 3b. It is also possible to activate the touch panel 3b and the touch controller 24 during only a limited duration, preferably less than 100 ms, after generation of the wake up signal 230.

[0051] The touch controller 24 generates a second wake up signal 240 to wake up the microcontroller 21, and possibly other components of the device 1, when this touch controller confirms the tap detection. The second wake up signal 240 can be input to an interrupt line or switch on line of the microcontroller 21. In one embodiment, the wake signal 230 of the inertial sensor 23 is generated very fast at the beginning of the tap, the touch controller 24 is immediately woken up, and used to confirm the finger detection on the touch sensor 3b during the remaining time

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of the tap. In another embodiment, a double tap is required, and the inertial sensor is used to detect the first tap while the touch sensor 3b, possibly in cooperation with the inertial sensor 23, is used for detecting the second confirmation tap. In yet another embodiment, a long tap is required, i.e. a tap where the finger rests against the glass during a minimal period. In all embodiments, a second wake up signal 240 is only generated if confirmation of a tap or double tap from the touch panel 3b occurs within a predetermined duration after the first wake signal, for example within a duration less than 300 ms, preferably less than 100 ms.

[0052] Discrimination of a tap by the touch controller 24 preferably depends on the location, size and duration of a touch signal generated by adjacent electrodes. A tap is usually made with the tip of a finger, i.e. on a small surface, during a short period, preferably on predetermined locations of the display.

[0053] The microcontroller 21 is only woken up by the second wake up signal of the touch controller 24. In another embodiment not illustrated hereby, the microcontroller is already woken up by the first wake up signal, and used for discriminating between tap and no tap based on signals from the touch controller 24; the second wake up signal is only used to confirm the first wake up signal and prevent the microcontroller 21 for reentering into the first power mode.

[0054] In one embodiment, a rough discrimination between a wake up gesture and no wake up gesture is made by the inertial sensor 23 and/or the touch sensor 3b, in order to wake up the microprocessor 21. The microprocessor then analyses the sequence of acceleration value delivered by

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the acceleration sensor, as well the signals delivered by the touch controller 24, to confirm or infirm the decision to wake up the device 1 and in particular the display and touch panel 3b. If the microprocessor confirms the tag detection, it remains in operating mode and wake up the display. On the other hand, if tap detection is not confirmed by the more advanced algorithms used by the microcontroller, the microcontrollers puts the touch panel 3b, touch controller 24 and itself back into the first power mode.

[0055] Figures 3 to 6 illustrate chronograms of various signals produced during a tap of the user on the glass of the wristwatch. Figure 3 illustrates the force f applied by the finger on the glass during a tap between t_0 and t_1. The force increases very suddenly from t_0, remains approximately constant at a high level, and then decreases very quickly when the user releases the finger until he left the glass at t_1. The duration between t_0 and t_1 is typically comprised between 10 and 20 ms.

[0056] Figure 4 illustrates the acceleration as measured by the accelerometer 23 in a direction perpendicular to the center of the touch panel 3b during the tap. The acceleration increases from time t_0 up to a maximum at t_{max}, and then decreases or even becomes negative until t_1. The acceleration might oscillate at low amplitude after the finger release. A tap is detected only if the amplitude of the measured acceleration reaches a first predefined threshold $a_{\_tap\_thresh}$ at time t_3. End of the tap is detected at time t_4 when the amplitude decreases below a second threshold $a_{\_notap\_thresh}$. A valid tap is discriminated based on the amplitude of the acceleration, duration between t_3 and t_4, frequency of the amplitude signal, and / or slope of the acceleration signal.

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[0057] Figure 5 illustrates a signal s produced by the touch controller 24 during a tap. This signal might be a combination between signals from different electrodes of the touch panel, or a signal processed from different signals of the electrodes. In one embodiment, the signal s is related to the probability of a tap, based on criteria like the size of the contact area, the frequency and timing of the contact signal, etc. The touch panel 3b and touch controller 24 are preferably in low power mode until time t_3 when the accelerometer 23 detects a tap and generates a first wake up signal 230. At time t_5, the signal s reaches a threshold $s_{\_tap\_thresh}$ where the touch controller 24 detects a tap. End of the tap is detected at time t_6 when the signal s decreases below the threshold $s_{\_notap\_thresh}$

[0058] Figure 6 illustrates a second wake up signal 240 generated by the touch controller 24 or by a suitable circuit for switching the microcontroller 21 from a first low power mode to a second high power mode. The wake up signal is inactive until time t_5 when a tap is detected by the inertial sensor and confirmed by the touch sensor. The microcontroller 21, and preferably the display of the touch panel 3b, is preferably activated at the rising flank of the signal 240 at time t_5. This signal becomes inactive at time t_4 or t_6, at the end of the tap, although this does not result in changing the power mode of the device 1.

[0059] Figures 7a to 7c schematically illustrate three steps of another method for switching the wristwatch 1 from a first power mode to a second power mode. This method can be used in the same wristwatch than the above described method, so that a user can decide to wake his wristwatch either with the above described method (for example with a tap on the glass 3a) or with this other method of Figures 7a to 7c.

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[0060] In this second method, a wristturn detection is performed for detecting rotation of the wrist and deciding if this rotation corresponds to predefined pattern, in which case the wristwatch should be switched to a second power mode for example in order to activate the display.

[0061] Initially, the microcontroller 21 is in a low power mode, for example completely off. The touch controller 24 to which the accelerometer 23 is connected, and which has the responsibility to wake up the microcontroller 21, is in a sleep mode (low power mode), but will wake up when an interrupt in the accelerometer 23 occurs. The accelerometer 23 is set so as to generate an interrupt when its position changes and reaches a given range that is maintained during a predetermined duration, as will be described.

[0062] The accelerometer 23 knows its position relatively to the vertical and horizontal direction. This can be determined for example by determining the direction along which the acceleration is substantially equal to 1G when the accelerometer is substantially immobile during a predefined duration.

[0063] During a first step of the wristturn detection method, illustrated on Figure 7a, the wristwatch reaches a starting position in a first defined angle range $\alpha 1$ (e.g. 25° to 155° relatively to the horizontal). This position must be held for a defined time (e.g. 50ms) otherwise the start position is not registered. This position is identified using the accelerometer 23 internal orientation detection mechanism, for which the angle range can be set. The fact that a valid start position has been reached is then registered, for example in the accelerometer 23 or alternatively in the touch controller 24 which may be quickly woken to register that a valid start position is

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reached, before it goes back to wait for the next interrupt.

[0064] During a next step of the wristturn detection method, illustrated on Figure 7b, the wristwatch has been rotated and reaches a final position in a second defined angle range α1 (e.g. -25° to -75° relatively to the horizontal). This position is a typical position for reading the time on the watch, with the display oriented toward the face of the user. This position must be held for a defined time (e.g. 50ms) other the position is not registered. This position is identified using the accelerometer 23 internal orientation detection mechanism, for which the angle range can be set. When a final position in this range is reached, the system checks if a valid start position was registered during the previous step of Figure 7a. If necessary, the touch controller 24 may be woken for this verification and/or for subsequent steps of the method.

[0065] The duration between the starting position and the final position may be measured. If this duration is not in a predefined range, the method is interrupted. Otherwise, the touch controller 24 changes to a No-movement & Angle Check mode. Alternatively, this No-movement & Angle Check detection may be performed by the embedded processing capabilities within the accelerometer 23.

[0066] On Figure 7c, the system (for example the touch controller 24, or the accelerometer 23) verifies whether this final orientation of the wristwatch is maintained during a given duration. For this, the value of the acceleration along the three axes is periodically verified. If all 3 axis show no movement above a certain threshold for a defined time (respective defined number of samples),

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and if the orientation calculated from X/Y/Z is in a defined range (e.g. -25° to -60°), then the system determines that the user is probably consulting his watch. In this case, the touch controller 24 activates the microcontroller 21 and the display 3b, so the user can read the time.

[0067] Other methods of combining indications of the inertial sensor 23 and of the touch sensor 3b could be considered by the skilled person, including methods using additional wake up circuitry for discriminating between a tap gesture and no tap based on indication of the two sensors. The described example has the advantage that the number of components which need to be in an active power mode for discriminating a tap is very limited; in fact only the inertial sensor with integrated signal processing is required. In particular, no advanced signal processing capabilities are required in order to discriminate between a tap and other gestures or displacements of the watch with the accelerometer; the limited signal processing possibilities available in current mems-based accelerometers are sufficient.

[0068] Discrimination between a gesture and no gesture could be made within the processing means of the inertial sensor, by the touch controller 24, by the microcontroller 21, by a dedicated circuit (not shown), or by any combination thereof. Hardware and/or software modules could be used for this discrimination.

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A method and circuit for switching a wristwatch from a first power mode to a second power mode

[0001] The present application claims priority of Swiss patent application CH2011/1689 whose contents is hereby enclosed by reference.

Field of the invention

[0002] ~~[001]~~The present invention is related to a method for switching a wristwatch from a first power mode to a second power mode, and to a wristwatch which can be switched from a first power mode to a second power mode. The present invention is also related to wristwatches with a touch panel and a plurality of power modes.

Description of related art

[0003] ~~[001]~~EP1324159 concerns a wristwatch having a touch panel. When not used, a display is switched to a sleeping mode. To avoid an accidental activation of the sensors, a press button is provided to activate the sensors and the liquid crystal display.

[0004] ~~[002]~~US2009199130 concerns a method and apparatus for receiving an input by a user on an interactive touchscreen display. The input comprises a contact gesture detected with accelerometers.

[0005] ~~[003]~~US2002118605 discloses a tactile wristwatch in which touch-sensitive keyboard keys are switched on when a user presses a touch-sensitive keyboard.

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[0006] ~~[004]~~US2009102669 discloses an alarm clock that can be stopped by the hand of a user approaching a proximity sensor.

[0007] ~~[005]~~WO09120292 concerns mobile handheld devices such as, for example, cell phones or personal digital assistants (PDAs) containing an accelerometer that sends a signal that causes the device to turn on.

[0008] ~~[006]~~WO11000893 describes a wristwatch with a touch display. The wristwatch comprises an accelerometer which is used for simulating effects of shocks or acceleration on the movement. In order to reduce the power consumption, the display is automatically switched into a sleeping mode when not used. The user can wake up the display by means of a slight pressure of the glass or with a single tap or a double tap on the touch panel. This document does not describe how taps or double taps are detected and distinguished from other gestures or manipulations of the watch.

[0009] ~~[007]~~US2010/235667 describes a device with an accelerometer for detecting gestures used to wake up the device.

[0010] ~~[008]~~EP2315101 describes a method combining use of an inertial sensor and of a touch panel for detecting taps on the touch panel of a device such as a smartphone. The detection of taps by the touch panel is mainly based on the amplitude of the acceleration signal; if this amplitude is higher than a threshold, then the touch panel will be woken up to confirm this detection. Although this process might work well in smartphones, it has been found that a more precise detection method would be needed for wristwatches. Indeed, wristwatches are often subject to high acceleration

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values, sometimes in the magnitude of 50G or higher, in normal use or during sport. The inertial system described in this document is not able to distinguish reliably between those high acceleration values in normal use and acceleration due to a tap or other gesture. This results in numerous undesirable activation of the touch panel and therefore in a decrease of the power reserve. Moreover, the user is requested to exert a strong pressure on the display in order to produce an acceleration above the detection threshold.

[0011] ~~[009]~~A similar solution is described in EP1785808.

[0012] ~~[0010]~~Therefore, different methods are known in order to switch on a device in sleep mode. However, it is difficult to distinguish between intentional commands to switch a device and other gestures or accelerations which may be produced during normal use of the device. For example, undesired switch of operating mode could occur when the touch display touches a piece of cloth or in case of strong acceleration value, for example during sport.

Brief summary of the invention

[0013] ~~[0011]~~It is therefore an aim of the invention to provide a better method for switching a device, such as a microelectronic device, into a different power mode.

[0014] ~~[0012]~~It is another aim of the invention to provide a method for faster switching of a device into a different power mode, without causing unwanted power mode switches.

[0015] ~~[0013]~~It is another aim to provide a method for switching a device into a different power mode which avoids undesired change of mode.

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[0016] ~~[0014]~~According to the invention, these aims are achieved by means of a method for switching a device from a first power mode to a second power mode, comprising:

using an accelerometer (as example of inertial sensor) with embedded signal processing capabilities for generating an acceleration signal used for detecting a gesture on a cover glass of said wristwatch;

using a touch panel underneath said cover glass for detecting said gesture;

combining gesture detection by the inertial sensor and gesture detection with the touch panel for triggering a switch from said first power mode to said second power mode,

said method comprising a step of discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and/or the slope of said acceleration signal.

[0017] ~~[0015]~~The gesture entered by the user to switch the power mode could be a tap, a double tap, a long tap or any other significant and recognizable gesture rarely occurring outside of normal use of the device, and which do not need important processing capabilities to be recognized.

[0018] ~~[0016]~~The simultaneous and combinatory usage of an inertial sensor, such as an accelerometer, and of a touch sensor or touch panel for detecting a gesture provides a more reliable discrimination between various gestures and other manipulations. Moreover, this solution reduces the power consumption in the first power mode since only the inertial sensor needs to be switched on in this mode.

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[0019] ~~[0017]~~The discrimination based on the frequency, and/or the slope of the acceleration signal is much more robust than a discrimination based on the amplitude of the acceleration signal only. It has been found that taps produce an acceleration signal in a specific relatively narrow frequency range. It has also been found that the slope of this acceleration signal, during increase and subsequent decrease, is in a specific range. Therefore, the frequency and/or the slope of the acceleration signal can both be used, alone or in combination, as a signature of an acceleration produced by taps, or by other gestures one wants to detect, allowing thus to distinguish between an acceleration caused by a tap from most other causes of acceleration.

[0020] ~~[0018]~~It has been found that the acceleration caused by a tap comprises a significant component along a direction substantially perpendicular to the surface of the glass on which the tap is made, whereas most other causes produce accelerations along other directions. Therefore, a measure of the direction of the acceleration relatively to the surface of the glass could be used for distinguishing taps.

[0021] ~~[0019]~~This discrimination based on the direction is even more reliable if the user is requested to make a tap on a predefined limited portion of the glass. In this case, detection of the direction of the tap is easier, especially if the glass is curved.

[0022] ~~[0020]~~The first power mode could be a sleep mode, or standby mode, in which the power consumption is reduced but no indications are displayed on the display. The second power mode could be an operating mode where indications are displayed on the display.

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Brief Description of the Drawings

[0023] ~~[0021]~~The invention will be better understood with the aid of the description of an embodiment given by way of example and illustrated by the figures, in which:

Figure 1a illustrates a perspective view of a buttonless wristwatch with a touch display according to the invention.

Figure 1b illustrates a transversal cut through the wristwatch of Figure 1a.

Figure 2 schematically illustrates a possible arrangement of some components within an embodiment of wristwatch.

Figure 3 is a chronogram which illustrates the force f applied to the glass of a touch panel during a tap gesture.

Figure 4 is a chronogram which illustrates the acceleration measured by an accelerometer in a direction perpendicular to the glass of a touch panel during a tap gesture.

Figure 5 is a chronogram which illustrates a signal measured by a touch sensor during a tap gesture.

Figure 6 is a signal which illustrates an example of power-on signal generated by a circuit according to the invention.

Figures 7a to 7c illustrate three successive positions of the wristwatch that are detected during a wristturn detection method.

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Detailed Description of possible embodiments of the Invention

[0024] ~~[0022]~~Figures 1a and 1b illustrate an example of a wristwatch 1 according to the invention. The illustrated watch comprises notably a wristband 2 and a watch case 5 closed with a glass 3a and a touch sensor 3b covering a digital matrix display 4.

[0025] ~~[0023]~~In a preferred embodiment, the watch has no crown and no push-buttons and is operated only through the touch panels and additional sensors, such as inertial sensors, inside the watch case. The water-tightness and solidity of the case is thus improved.

[0026] ~~[0024]~~A luminosity sensor enabling the intensity of the screen to be automatically adapted to the surrounding luminosity can also be used as an option. The watch can switch nearly instantly from a stand-by mode, where the display is switched off or at least less luminous, to a "time reading" and/or navigation mode, for example as soon as the glass is touched or following a tap or double tap on the glass.

[0027] ~~[0025]~~The watch case 5 can also include a connector (not shown) to connect the watch to an external computer, for example a micro or nano USB connector on the bottom or in one of the watch's sides. Wireless connection means, for example a ZigBee or Bluetooth module, can also be provided for connecting the watch to a personal computer and/or for supplying power to the watch and load the battery.

[0028] ~~[0026]~~The watch is advantageously powered electrically by means of a rechargeable accumulator 20 (Figure 1b) through the micro or nano USB connector,

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through a specific or proprietary connector or, in a variant embodiment, through a radiofrequency interface.

[0029] ~~[0027]~~The glass 3a with the touch sensor 3b underneath closes the upper surface of the watch case and covers the digital matrix display 4; there is an air gap between the touch sensor 3b and the display. The glass is preferably made of sapphire or of another scratchproof material and is coated with an anti-glare treatment. In a preferred embodiment, the glass is cylindrically, or possibly spherically curved, while the display 4 is preferably flat.

[0030] ~~[0028]~~The display 4 is preferably a high-resolution digital matrix display, and fills up nearly the entire surface under the glass 3a and thus serves both as multipurpose multifunction display and as time indicator. In a preferred embodiment, the display is a color liquid crystal display (LCD) or color thin film transistor display (TFT) with at least 150x150 pixels or more than 200 dpi (dot per inch). Other types of display, including displays based on the AMOLED technology for example, can also be used. Furthermore, the watch could also have several displays, for example several digital displays, or a digital matrix display combined with hands or other mechanical indicators.

[0031] ~~[0029]~~The display 4 is preferably placed on a printed circuit board 31 on which other components, such as a microcontroller, an inertial sensor etc are also mounted. A connector 30 connects the touch sensor 3b with the printed circuit board 31; in one preferred embodiment, this connector is detachable, so that the glass 3a can be replaced independently of the printed circuit board. In the illustrated embodiment, the printed circuit board 31 rests

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directly against the watch case 5, so that accelerations on the glass 3a are transmitted to the inertial sensor on the board 31 with minimal damping.

[0032] ~~[0030]~~The touch sensor or touch panel 3b is laminated or deposited underneath the glass 3a. In the following, since those two components are integrated, we will use interchangeably the expression glass or touch panel or touch sensor for designating the same component, depending on the context. A touch panel integrated between the display 4 and the glass cover 3a could also be used in a sandwich configuration with a flat glass cover 3a.

[0033] ~~[0031]~~The touch panel 3b has an array of transparent electrodes and is placed underneath the glass 3a in order to detect the presence of a finger or of a stylus. The detection technology preferably uses methods known in the state of the art, for example a capacitive detection, for detecting finger contact and various gestures on one or several of the electrodes. In one embodiment, transparent electrodes can be individually powered in order to put the touch panel in a low power mode with only some electrodes, for example electrodes in the middle, which are powered on and can detect finger contact on the corresponding part of the display; the remaining electrodes are not powered on in this low power mode.

[0034] ~~[0032]~~The display 4 can display various indications, for example the current time, date, chrono, reverse counter, calendar, etc…or phases of the moon as shown in Figure 1. In order to extend the watch's functionalities, the user can switch from one display mode to another and for example replace the card displayed in Figure 1 with other cards. In a preferred embodiment, the user can move from one card to the other with a slide (fast) or scroll

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(slow) gesture for moving through and viewing a collection of available displays or cards. Scrolling or sliding in the horizontal or vertical direction is achieved by moving the finger on the glass in the corresponding direction.

[0035] ~~[0033]~~Figure 2 schematically illustrates a possible arrangement and schematic of some components within an embodiment of wristwatch according to the invention. Only components which are necessary for the understanding of the invention have been represented, although other components and other arrangements could be provided in other embodiments of the invention.

[0036] ~~[0034]~~The illustrated arrangement comprises a power supply 20, such as a rechargeable battery, for supplying power to all other components. A microcontroller 21 controls the display of indications on the matrix panel 4, depending on signals provided by the sensors 22, 23 and on commands entered by the user through the touch panel 4.

[0037] ~~[0035]~~The component 22 is a real-time clock for generating a clock signal based on a quartz (not shown).

[0038] ~~[0036]~~The sensor 23 is an inertial sensor, preferably an accelerometer, preferably a 3-axis mems-based accelerometer for measuring acceleration values a (Figure 4) in a direction perpendicular to center of the glass of the wristwatch and in two orthogonal directions in a plane tangential to this glass at his center. This inertial sensor can comprise signal processing capabilities embedded within the same component or chip, for determining the frequency of the measured acceleration signal, the direction of this signal in 2 or 3 directions, the duration of an event in the acceleration signal, etc.

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[0039] ~~[0037]~~The component 24 is a touch panel controller (touch controller) for interpreting touch signals provided by the touch panel 3b when the user touches the glass 3a with his finger and consequently generate signals in the touch panel 3b located underneath, and for converting those signals into command signals for the microcontroller 21.

[0040] ~~[0038]~~Other components, such as an input-output circuit, for example a USB decoder or a Bluetooth or ZigBee receiver, can also be integrated.

[0041] ~~[0039]~~The microcontroller 21 is specifically configured to interpret the signals from the touch controller 24 and from the inertial sensor 23, to select indications from several available indications depending on these signals, and to display those indications on the digital matrix display 4; this arrangement is preferably achieved by storing in the microcontroller's memory a computer program (firmware) allowing this specific sequence of operation to be fully controlled.

[0042] ~~[0040]~~At least some of the components 21 to 24 and 3b and 4 can be powered in at least two different modes. In one preferred embodiment, a power saving mode and a time display mode are provided; the whole wristwatch can thus be powered either in time display mode for displaying time or other indications on the display 4, or in power saving mode for preserving the battery 20 by switching the display 4, the touch sensor 3b and other components in a low consumption mode. In one preferred embodiment, the display 4 and the touch sensor 3b are switched off in low power saving mode.

[0043] ~~[0041]~~In some embodiments, more than two power modes can be provided; for example, the real time clock 22 is

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preferably always powered on in power saving mode, so that the real time is not lost when the display 4 and the touch panel 3b are switched off; it is possible however to switch the real time clock off in a deep sleep mode in order to prevent the battery from being totally discharged. Other components, such as the microcontroller 21, the touch panel 3b etc could have more than two different power modes, for example a hot power saving mode allowing for a very fast re-start, and a cold power saving mode in which restart is possibly slower or necessitates restarting an operating system.

[0044] ~~[0042]~~The device 1 can be switched from a first power mode, such as a power saving mode, to a second power mode, such as a time display mode, with a user gesture on the glass 3a / touch panel 3b. The device 1 can automatically return to the first power mode, for example after a predetermined duration, or when no acceleration and/or no activity are detected.

[0045] ~~[0043]~~In one embodiment, a gesture command to switch the device into a second power mode is detected with the inertial sensor 23 for detecting a tap, a double tap or another command which can be input by the user onto the glass 3a / touch panel 3b in order to trigger a change of power mode. The inertial sensor 23 could be an accelerometer with embedded power processing capabilities and which is always powered on in the first low power mode. The embedded power processing capabilities comprise a processor or other processing means for executing programmable software code for analysing the accelerations values delivered by the accelerometer, and for generating signals or values when certain conditions are met.

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[0046] ~~[0044]~~In order to avoid undesired switches to the second power mode, which would switch the display on and reduce the operating time of the battery, it is necessary to discriminate between changes in the acceleration signals which are caused by a switch on gesture, such as a tap or a double tap, and any other acceleration caused when the wristwatch is displaced or manipulated in normal use. In one preferred embodiment, the accelerometer 23 generates a power on signal 230 for powering the touch panel 3b and the touch controller 24 when the user enters a tap gesture on the glass 3a/ touch panel 3b, which can be discriminated from other signals with the following properties:

-frequency: tap signals are typically high frequency signals and can be distinguished from other signals produced by slide, rub etc and from most acceleration that occur during normal use of the wristwatch. The acceleration produced by a valid single tap is a pulse function with a first step of fast increase of the acceleration almost immediately followed by a step of fast deceleration, the duration of the whole pulse being typically in the range of 10 to 20 ms. Therefore, the bandwidth of this pulse-like function is necessarily higher than a predefined threshold, and a low pass filtering of acceleration signals can be used to cancel signals produced by gestures other than taps or by movements of the wrist. Preferably, the embedded processing capabilities of the accelerometer exclude the possibility of the tap if the frequency of the acceleration signal, in a given direction such as the direction perpendicular to the center of the glass, is not in a predefined range.

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-duration of the pulse: as indicated, a valid single tap generates a pulse with a duration within a given range, usually between 5 and 100 ms, typically between 10 and 20 ms.

-amplitude of the pulse: a valid single tap is detected only if the amplitude of the acceleration is higher than a first predefined threshold $a_{\_tap\_thresh}$. End of the tap is detected when the amplitude decreases below a second threshold $a_{\_notap\_thresh}$.

-direction of the acceleration: a tap on the glass generates a maximal acceleration in a main direction perpendicular to the center of the glass, oriented toward the bottom of the watch, and a much lower acceleration in all other directions. A 3D accelerometer can be used for discriminating valid taps based on the direction of the acceleration. For example, if the acceleration in a direction other than the main direction is higher than the acceleration in the main direction, the gesture will not be recognized as a switch on tap.

-slope of the acceleration: this feature can also be used to differentiate between a valid switch on tap and a non valid one. Taps typically generate a fast increase of the acceleration, whereas most other gestures such as swipes etc and most movements of the wrist produce a slower acceleration increase. Therefore, the system could distinguish that a tap is not valid if the slope of the acceleration is not in an expected range. It is also possible to measure the slope of acceleration in one preferential direction, for example in a

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direction perpendicular to the center of the glass, or separately in a plurality of predefined directions.
The slope may be defined by the difference between two predefined acceleration values divided by the time it takes for the acceleration signal to goes from the first of those predefined values to the second one:
slope= (a_tap_threshold - a_notap_threshold)/(t_3 - t_2) (see Figure 4).

[0047] ~~[0045]~~Those discriminating criteria can also be combined in different ways. For example, the processing means within the accelerometer could use the direction of the acceleration only during a limited time window, for example a less than 100 ms time interval starting at the beginning of the pulse.

[0048] ~~[0046]~~It is also possible to consider at least one of those criteria separately during the raising portion of the acceleration signal and during the decreasing portion of this signal. For example, it is possibly to verify whether the duration, the frequency, and/or the slope of the acceleration signal during the raising portion, and then during the decreasing portion, are each in predefined ranges compatibles with the gesture one wants to discriminate.

[0049] ~~[0047]~~Other discriminating criteria could be used if other gestures, such as double taps or long taps, are used as command to change the power mode.

[0050] ~~[0048]~~In the embodiment of the invention illustrated on Figure 2, the power on signal 230 generated by the inertial sensor 23 is used to wake up the touch panel 3b

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and/or the touch controller 24, or to switch those components from a low power mode to another power mode. Therefore, the touch panel 3b is switched off, or at least in low power mode, when the device 1 is in the first power mode, and is powered on, or at least partially powered on, after detection of a likely tap and generation of a wake up signal 230 by the accelerometer 23. In one embodiment, the wake up signal 230 generated by the inertial sensor 23 triggers a switch on command of the touch panel 3b and/or of the touch controller 24 from a low power mode in which nothing is displayed and no finger touch can be detected, to an intermediate power mode where only a subset of electrodes of the touch panel is activated, for example electrodes in the middle of the touch panel, in order detect finger contact such as taps or double taps in this limited area only and to avoid detection if a tap is made in a different area. In another embodiment, the wake up signal 230 triggers a switch on command of the touch controller 24 into a mode where all touch electrodes are activated, to detect a tap or double tap in any area of the touch panel 3b. It is also possible to activate the touch panel 3b and the touch controller 24 during only a limited duration, preferably less than 100 ms, after generation of the wake up signal 230.

[0051] ~~[0049]~~The touch controller 24 generates a second wake up signal 240 to wake up the microcontroller 21, and possibly other components of the device 1, when this touch controller confirms the tap detection. The second wake up signal 240 can be input to an interrupt line or switch on line of the microcontroller 21. In one embodiment, the wake signal 230 of the inertial sensor 23 is generated very fast at the beginning of the tap, the touch controller 24 is immediately woken up, and used to confirm the finger detection on the touch sensor 3b during the remaining time

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of the tap. In another embodiment, a double tap is required, and the inertial sensor is used to detect the first tap while the touch sensor 3b, possibly in cooperation with the inertial sensor 23, is used for detecting the second confirmation tap. In yet another embodiment, a long tap is required, i.e. a tap where the finger rests against the glass during a minimal period. In all embodiments, a second wake up signal 240 is only generated if confirmation of a tap or double tap from the touch panel 3b occurs within a predetermined duration after the first wake signal, for example within a duration less than 300 ms, preferably less than 100 ms.

[0052] ~~[0050]~~Discrimination of a tap by the touch controller 24 preferably depends on the location, size and duration of a touch signal generated by adjacent electrodes. A tap is usually made with the tip of a finger, i.e. on a small surface, during a short period, preferably on predetermined locations of the display.

[0053] ~~[0051]~~The microcontroller 21 is only woken up by the second wake up signal of the touch controller 24. In another embodiment not illustrated hereby, the microcontroller is already woken up by the first wake up signal, and used for discriminating between tap and no tap based on signals from the touch controller 24; the second wake up signal is only used to confirm the first wake up signal and prevent the microcontroller 21 for reentering into the first power mode.

[0054] ~~[0052]~~In one embodiment, a rough discrimination between a wake up gesture and no wake up gesture is made by the inertial sensor 23 and/or the touch sensor 3b, in order to wake up the microprocessor 21. The microprocessor then analyses the sequence of acceleration value delivered by

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the acceleration sensor, as well the signals delivered by the touch controller 24, to confirm or infirm the decision to wake up the device 1 and in particular the display and touch panel 3b. If the microprocessor confirms the tag detection, it remains in operating mode and wake up the display. On the other hand, if tap detection is not confirmed by the more advanced algorithms used by the microcontroller, the microcontrollers puts the touch panel 3b, touch controller 24 and itself back into the first power mode.

[0055] ~~[0053]~~Figures 3 to 6 illustrate chronograms of various signals produced during a tap of the user on the glass of the wristwatch. Figure 3 illustrates the force f applied by the finger on the glass during a tap between t_0 and t_1. The force increases very suddenly from t_0, remains approximately constant at a high level, and then decreases very quickly when the user releases the finger until he left the glass at t_1. The duration between t_0 and t_1 is typically comprised between 10 and 20 ms.

[0056] ~~[0054]~~Figure 4 illustrates the acceleration as measured by the accelerometer 23 in a direction perpendicular to the center of the touch panel 3b during the tap. The acceleration increases from time t_0 up to a maximum at t_{max}, and then decreases or even becomes negative until t_1. The acceleration might oscillate at low amplitude after the finger release. A tap is detected only if the amplitude of the measured acceleration reaches a first predefined threshold $a_{\_tap\_thresh}$ at time t_3. End of the tap is detected at time t_4 when the amplitude decreases below a second threshold $a_{\_notap\_thresh}$. A valid tap is discriminated based on the amplitude of the acceleration, duration between t_3 and t_4, frequency of the amplitude signal, and / or slope of the acceleration signal.

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[0057] ~~[0055]~~Figure 5 illustrates a signal s produced by the touch controller 24 during a tap. This signal might be a combination between signals from different electrodes of the touch panel, or a signal processed from different signals of the electrodes. In one embodiment, the signal s is related to the probability of a tap, based on criteria like the size of the contact area, the frequency and timing of the contact signal, etc. The touch panel 3b and touch controller 24 are preferably in low power mode until time t_3 when the accelerometer 23 detects a tap and generates a first wake up signal 230. At time t_5, the signal s reaches a threshold $s_{\_tap\_thresh}$ where the touch controller 24 detects a tap. End of the tap is detected at time t_6 when the signal s decreases below the threshold $s_{\_notap\_thresh}$

[0058] ~~[0056]~~Figure 6 illustrates a second wake up signal 240 generated by the touch controller 24 or by a suitable circuit for switching the microcontroller 21 from a first low power mode to a second high power mode. The wake up signal is inactive until time t_5 when a tap is detected by the inertial sensor and confirmed by the touch sensor. The microcontroller 21, and preferably the display of the touch panel 3b, is preferably activated at the rising flank of the signal 240 at time t_5. This signal becomes inactive at time t_4 or t_6, at the end of the tap, although this does not result in changing the power mode of the device 1.

[0059] ~~[0057]~~Figures 7a to 7c schematically illustrate three steps of another method for switching the wristwatch 1 from a first power mode to a second power mode. This method can be used in the same wristwatch than the above described method, so that a user can decide to wake his wristwatch either with the above described method (for example with a tap on the glass 3a) or with this other method of Figures 7a to 7c.

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[0060] ~~[0058]~~In this second method, a wristturn detection is performed for detecting rotation of the wrist and deciding if this rotation corresponds to predefined pattern, in which case the wristwatch should be switched to a second power mode for example in order to activate the display.

[0061] ~~[0059]~~Initially, the microcontroller 21 is in a low power mode, for example completely off. The touch controller 24 to which the accelerometer 23 is connected, and which has the responsibility to wake up the microcontroller 21, is in a sleep mode (low power mode), but will wake up when an interrupt in the accelerometer 23 occurs. The accelerometer 23 is set so as to generate an interrupt when its position changes and reaches a given range that is maintained during a predetermined duration, as will be described.

[0062] ~~[0060]~~The accelerometer 23 knows its position relatively to the vertical and horizontal direction. This can be determined for example by determining the direction along which the acceleration is substantially equal to 1G when the accelerometer is substantially immobile during a predefined duration.

[0063] ~~[0061]~~During a first step of the wristturn detection method, illustrated on Figure 7a, the wristwatch reaches a starting position in a first defined angle range $\alpha 1$ (e.g. 25° to 155° relatively to the horizontal). This position must be held for a defined time (e.g. 50ms) otherwise the start position is not registered. This position is identified using the accelerometer 23 internal orientation detection mechanism, for which the angle range can be set. The fact that a valid start position has been reached is then registered, for example in the accelerometer 23 or

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alternatively in the touch controller 24 which may be quickly woken to register that a valid start position is reached, before it goes back to wait for the next interrupt.

[0064] ~~[0062]~~During a next step of the wristturn detection method, illustrated on Figure 7b, the wristwatch has been rotated and reaches a final position in a second defined angle range α1 (e.g. -25° to -75° relatively to the horizontal). This position is a typical position for reading the time on the watch, with the display oriented toward the face of the user. This position must be held for a defined time (e.g. 50ms) other the position is not registered. This position is identified using the accelerometer 23 internal orientation detection mechanism, for which the angle range can be set. When a final position in this range is reached, the system checks if a valid start position was registered during the previous step of Figure 7a. If necessary, the touch controller 24 may be woken for this verification and/or for subsequent steps of the method.

[0065] ~~[0063]~~The duration between the starting position and the final position may be measured. If this duration is not in a predefined range, the method is interrupted. Otherwise, the touch controller 24 changes to a No-movement & Angle Check mode. Alternatively, this No-movement & Angle Check detection may be performed by the embedded processing capabilities within the accelerometer 23.

[0066] ~~[0064]~~On Figure 7c, the system (for example the touch controller 24, or the accelerometer 23) verifies whether this final orientation of the wristwatch is maintained during a given duration. For this, the value of the acceleration along the three axes is periodically

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verified. If all 3 axis show no movement above a certain threshold for a defined time (respective defined number of samples), and if the orientation calculated from X/Y/Z is in a defined range (e.g. -25° to -60°), then the system determines that the user is probably consulting his watch. In this case, the touch controller 24 activates the microcontroller 21 and the display 3b, so the user can read the time.

[0067] ~~[0065]~~Other methods of combining indications of the inertial sensor 23 and of the touch sensor 3b could be considered by the skilled person, including methods using additional wake up circuitry for discriminating between a tap gesture and no tap based on indication of the two sensors. The described example has the advantage that the number of components which need to be in an active power mode for discriminating a tap is very limited; in fact only the inertial sensor with integrated signal processing is required. In particular, no advanced signal processing capabilities are required in order to discriminate between a tap and other gestures or displacements of the watch with the accelerometer; the limited signal processing possibilities available in current mems-based accelerometers are sufficient.

[0068] ~~[0066]~~Discrimination between a gesture and no gesture could be made within the processing means of the inertial sensor, by the touch controller 24, by the microcontroller 21, by a dedicated circuit (not shown), or by any combination thereof. Hardware and/or software modules could be used for this discrimination.

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(54) **Title**: A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

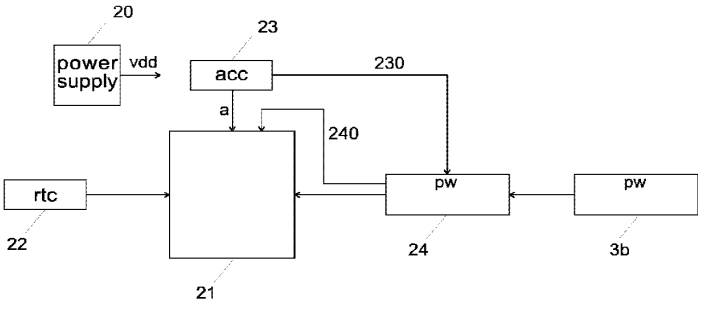


Fig. 2

(57) **Abstract**: An electronic wristwatch operable in two power modes and comprising: an inertial sensor for detecting a gesture on a cover glassof said wristwatch; a touch panel underneath said cover glass for detecting said gesture; gesture detection by the inertial sensor is combined with gesture detection by the touch panel for triggering a switch from a first power mode to a second power mode.

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A method and circuit for switching a wristwatch from a first power mode to a second power mode

Field of the invention

[0001] The present invention is related to a method for switching a wristwatch from a first power mode to a second power mode, and to a wristwatch which can be switched from a first power mode to a second power mode. The present invention is also related to wristwatches with a touch panel and a plurality of power modes.

Description of related art

[0001] EP1324159 concerns a wristwatch having a touch panel. When not used, a display is switched to a sleeping mode. To avoid an accidental activation of the sensors, a press button is provided to activate the sensors and the liquid crystal display.

[0002] US2009199130 concerns a method and apparatus for receiving an input by a user on an interactive touchscreen display. The input comprises a contact gesture detected with accelerometers.

[0003] US2002118605 discloses a tactile wristwatch in which touch-sensitive keyboard keys are switched on when a user presses a touch-sensitive keyboard.

[0004] US2009102669 discloses an alarm clock that can be stopped by the hand of a user approaching a proximity sensor.

[0005] WO09120292 concerns mobile handheld devices such as, for example, cell phones or personal digital assistants (PDAs) containing an accelerometer that sends a signal that causes the device to turn on.

[0006] WO11000893 describes a wristwatch with a touch display. The wristwatch comprises an accelerometer which is used for simulating effects

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of shocks or acceleration on the movement. In order to reduce the power consumption, the display is automatically switched into a sleeping mode when not used. The user can wake up the display by means of a slight pressure of the glass or with a single tap or a double tap on the touch panel. This document does not describe how taps or double taps are detected and distinguished from other gestures or manipulations of the watch.

[0007] US2010/235667 describes a device with an accelerometer for detecting gestures used to wake up the device.

[0008] EP2315101 describes a method combining use of an inertial sensor and of a touch panel for detecting taps on the touch panel of a device such as a smartphone. The detection of taps by the touch panel is mainly based on the amplitude of the acceleration signal; if this amplitude is higher than a threshold, then the touch panel will be woken up to confirm this detection. Although this process might work well in smartphones, it has been found that a more precise detection method would be needed for wristwatches. Indeed, wristwatches are often subject to high acceleration values, sometimes in the magnitude of 50G or higher, in normal use or during sport. The inertial system described in this document is not able to distinguish reliably between those high acceleration values in normal use and acceleration due to a tap or other gesture. This results in numerous undesirable activation of the touch panel and therefore in a decrease of the power reserve. Moreover, the user is requested to exert a strong pressure on the display in order to produce an acceleration above the detection threshold.

[0009] A similar solution is described in EP1785808.

[0010] Therefore, different methods are known in order to switch on a device in sleep mode. However, it is difficult to distinguish between intentional commands to switch a device and other gestures or accelerations which may be produced during normal use of the device. For example, undesired switch of operating mode could occur when the touch

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display touches a piece of cloth or in case of strong acceleration value, for example during sport.

Brief summary of the invention

[0011] It is therefore an aim of the invention to provide a better method for switching a device, such as a microelectronic device, into a different power mode.

[0012] It is another aim of the invention to provide a method for faster switching of a device into a different power mode, without causing unwanted power mode switches.

[0013] It is another aim to provide a method for switching a device into a different power mode which avoids undesired change of mode.

[0014] According to the invention, these aims are achieved by means of a method for switching a device from a first power mode to a second power mode, comprising:

using an accelerometer (as example of inertial sensor) with embedded signal processing capabilities for generating an acceleration signal used for detecting a gesture on a cover glass of said wristwatch;

using a touch panel underneath said cover glass for detecting said gesture;

combining gesture detection by the inertial sensor and gesture detection with the touch panel for triggering a switch from said first power mode to said second power mode,

said method comprising a step of discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and/or the slope of said acceleration signal.

[0015] The gesture entered by the user to switch the power mode could be a tap, a double tap, a long tap or any other significant and recognizable

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gesture rarely occurring outside of normal use of the device, and which do not need important processing capabilities to be recognized.

[0016] The simultaneous and combinatory usage of an inertial sensor, such as an accelerometer, and of a touch sensor or touch panel for detecting a gesture provides a more reliable discrimination between various gestures and other manipulations. Moreover, this solution reduces the power consumption in the first power mode since only the inertial sensor needs to be switched on in this mode.

[0017] The discrimination based on the frequency, and/or the slope of the acceleration signal is much more robust than a discrimination based on the amplitude of the acceleration signal only. It has been found that taps produce an acceleration signal in a specific relatively narrow frequency range. It has also been found that the slope of this acceleration signal, during increase and subsequent decrease, is in a specific range. Therefore, the frequency and/or the slope of the acceleration signal can both be used, alone or in combination, as a signature of an acceleration produced by taps, or by other gestures one wants to detect, allowing thus to distinguish between an acceleration caused by a tap from most other causes of acceleration.

[0018] It has been found that the acceleration caused by a tap comprises a significant component along a direction substantially perpendicular to the surface of the glass on which the tap is made, whereas most other causes produce accelerations along other directions. Therefore, a measure of the direction of the acceleration relatively to the surface of the glass could be used for distinguishing taps.

[0019] This discrimination based on the direction is even more reliable if the user is requested to make a tap on a predefined limited portion of the glass. In this case, detection of the direction of the tap is easier, especially if the glass is curved.

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[0020] The first power mode could be a sleep mode, or standby mode, in which the power consumption is reduced but no indications are displayed on the display. The second power mode could be an operating mode where indications are displayed on the display.

Brief Description of the Drawings

[0021] The invention will be better understood with the aid of the description of an embodiment given by way of example and illustrated by the figures, in which:

Figure 1a illustrates a perspective view of a buttonless wristwatch with a touch display according to the invention.

Figure 1b illustrates a transversal cut through the wristwatch of Figure 1a.

Figure 2 schematically illustrates a possible arrangement of some components within an embodiment of wristwatch.

Figure 3 is a chronogram which illustrates the force f applied to the glass of a touch panel during a tap gesture.

Figure 4 is a chronogram which illustrates the acceleration measured by an accelerometer in a direction perpendicular to the glass of a touch panel during a tap gesture.

Figure 5 is a chronogram which illustrates a signal measured by a touch sensor during a tap gesture.

Figure 6 is a signal which illustrates an example of power-on signal generated by a circuit according to the invention.

Figures 7a to 7c illustrate three successive positions of the wristwatch that are detected during a wristturn detection method.

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Detailed Description of possible embodiments of the Invention

[0022] Figures 1a and 1b illustrate an example of a wristwatch 1 according to the invention. The illustrated watch comprises notably a wristband 2 and a watch case 5 closed with a glass 3a and a touch sensor 3b covering a digital matrix display 4.

[0023] In a preferred embodiment, the watch has no crown and no push-buttons and is operated only through the touch panels and additional sensors, such as inertial sensors, inside the watch case. The water-tightness and solidity of the case is thus improved.

[0024] A luminosity sensor enabling the intensity of the screen to be automatically adapted to the surrounding luminosity can also be used as an option. The watch can switch nearly instantly from a stand-by mode, where the display is switched off or at least less luminous, to a "time reading" and/or navigation mode, for example as soon as the glass is touched or following a tap or double tap on the glass.

[0025] The watch case 5 can also include a connector (not shown) to connect the watch to an external computer, for example a micro or nano USB connector on the bottom or in one of the watch's sides. Wireless connection means, for example a ZigBee or Bluetooth module, can also be provided for connecting the watch to a personal computer and/or for supplying power to the watch and load the battery.

[0026] The watch is advantageously powered electrically by means of a rechargeable accumulator 20 (Figure 1b) through the micro or nano USB connector, through a specific or proprietary connector or, in a variant embodiment, through a radiofrequency interface.

[0027] The glass 3a with the touch sensor 3b underneath closes the upper surface of the watch case and covers the digital matrix display 4; there is an air gap between the touch sensor 3b and the display. The glass is preferably made of sapphire or of another scratchproof material and is

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coated with an anti-glare treatment. In a preferred embodiment, the glass is cylindrically, or possibly spherically curved, while the display 4 is preferably flat.

[0028] The display 4 is preferably a high-resolution digital matrix display, and fills up nearly the entire surface under the glass 3a and thus serves both as multipurpose multifunction display and as time indicator. In a preferred embodiment, the display is a color liquid crystal display (LCD) or color thin film transistor display (TFT) with at least 150x150 pixels or more than 200 dpi (dot per inch). Other types of display, including displays based on the AMOLED technology for example, can also be used. Furthermore, the watch could also have several displays, for example several digital displays, or a digital matrix display combined with hands or other mechanical indicators.

[0029] The display 4 is preferably placed on a printed circuit board 31 on which other components, such as a microcontroller, an inertial sensor etc are also mounted. A connector 30 connects the touch sensor 3b with the printed circuit board 31; in one preferred embodiment, this connector is detachable, so that the glass 3a can be replaced independently of the printed circuit board. In the illustrated embodiment, the printed circuit board 31 rests directly against the watch case 5, so that accelerations on the glass 3a are transmitted to the inertial sensor on the board 31 with minimal damping.

[0030] The touch sensor or touch panel 3b is laminated or deposited underneath the glass 3a. In the following, since those two components are integrated, we will use interchangeably the expression glass or touch panel or touch sensor for designating the same component, depending on the context. A touch panel integrated between the display 4 and the glass cover 3a could also be used in a sandwich configuration with a flat glass cover 3a.

[0031] The touch panel 3b has an array of transparent electrodes and is placed underneath the glass 3a in order to detect the presence of a finger

or of a stylus. The detection technology preferably uses methods known in the state of the art, for example a capacitive detection, for detecting finger contact and various gestures on one or several of the electrodes. In one embodiment, transparent electrodes can be individually powered in order to put the touch panel in a low power mode with only some electrodes, for example electrodes in the middle, which are powered on and can detect finger contact on the corresponding part of the display; the remaining electrodes are not powered on in this low power mode.

[0032] The display 4 can display various indications, for example the current time, date, chrono, reverse counter, calendar, etc...or phases of the moon as shown in Figure 1. In order to extend the watch's functionalities, the user can switch from one display mode to another and for example replace the card displayed in Figure 1 with other cards. In a preferred embodiment, the user can move from one card to the other with a slide (fast) or scroll (slow) gesture for moving through and viewing a collection of available displays or cards. Scrolling or sliding in the horizontal or vertical direction is achieved by moving the finger on the glass in the corresponding direction.

[0033] Figure 2 schematically illustrates a possible arrangement and schematic of some components within an embodiment of wristwatch according to the invention. Only components which are necessary for the understanding of the invention have been represented, although other components and other arrangements could be provided in other embodiments of the invention.

[0034] The illustrated arrangement comprises a power supply 20, such as a rechargeable battery, for supplying power to all other components. A microcontroller 21 controls the display of indications on the matrix panel 4, depending on signals provided by the sensors 22, 23 and on commands entered by the user through the touch panel 4.

[0035] The component 22 is a real-time clock for generating a clock signal based on a quartz (not shown).

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[0036] The sensor 23 is an inertial sensor, preferably an accelerometer, preferably a 3-axis mems-based accelerometer for measuring acceleration values a (Figure 4) in a direction perpendicular to center of the glass of the wristwatch and in two orthogonal directions in a plane tangential to this glass at his center. This inertial sensor can comprise signal processing capabilities embedded within the same component or chip, for determining the frequency of the measured acceleration signal, the direction of this signal in 2 or 3 directions, the duration of an event in the acceleration signal, etc.

[0037] The component 24 is a touch panel controller (touch controller) for interpreting touch signals provided by the touch panel 3b when the user touches the glass 3a with his finger and consequently generate signals in the touch panel 3b located underneath, and for converting those signals into command signals for the microcontroller 21.

[0038] Other components, such as an input-output circuit, for example a USB decoder or a Bluetooth or ZigBee receiver, can also be integrated.

[0039] The microcontroller 21 is specifically configured to interpret the signals from the touch controller 24 and from the inertial sensor 23, to select indications from several available indications depending on these signals, and to display those indications on the digital matrix display 4; this arrangement is preferably achieved by storing in the microcontroller's memory a computer program (firmware) allowing this specific sequence of operation to be fully controlled.

[0040] At least some of the components 21 to 24 and 3b and 4 can be powered in at least two different modes. In one preferred embodiment, a power saving mode and a time display mode are provided; the whole wristwatch can thus be powered either in time display mode for displaying time or other indications on the display 4, or in power saving mode for preserving the battery 20 by switching the display 4, the touch sensor 3b and other components in a low consumption mode. In one preferred

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embodiment, the display 4 and the touch sensor 3b are switched off in low power saving mode.

[0041] In some embodiments, more than two power modes can be provided; for example, the real time clock 22 is preferably always powered on in power saving mode, so that the real time is not lost when the display 4 and the touch panel 3b are switched off; it is possible however to switch the real time clock off in a deep sleep mode in order to prevent the battery from being totally discharged. Other components, such as the microcontroller 21, the touch panel 3b etc could have more than two different power modes, for example a hot power saving mode allowing for a very fast re-start, and a cold power saving mode in which restart is possibly slower or necessitates restarting an operating system.

[0042] The device 1 can be switched from a first power mode, such as a power saving mode, to a second power mode, such as a time display mode, with a user gesture on the glass 3a / touch panel 3b. The device 1 can automatically return to the first power mode, for example after a predetermined duration, or when no acceleration and/or no activity are detected.

[0043] In one embodiment, a gesture command to switch the device into a second power mode is detected with the inertial sensor 23 for detecting a tap, a double tap or another command which can be input by the user onto the glass 3a / touch panel 3b in order to trigger a change of power mode. The inertial sensor 23 could be an accelerometer with embedded power processing capabilities and which is always powered on in the first low power mode. The embedded power processing capabilities comprise a processor or other processing means for executing programmable software code for analysing the accelerations values delivered by the accelerometer, and for generating signals or values when certain conditions are met.

[0044] In order to avoid undesired switches to the second power mode, which would switch the display on and reduce the operating time of the

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battery, it is necessary to discriminate between changes in the acceleration signals which are caused by a switch on gesture, such as a tap or a double tap, and any other acceleration caused when the wristwatch is displaced or manipulated in normal use. In one preferred embodiment, the accelerometer 23 generates a power on signal 230 for powering the touch panel 3b and the touch controller 24 when the user enters a tap gesture on the glass 3a/ touch panel 3b, which can be discriminated from other signals with the following properties:

–frequency: tap signals are typically high frequency signals and can be distinguished from other signals produced by slide, rub etc and from most acceleration that occur during normal use of the wristwatch. The acceleration produced by a valid single tap is a pulse function with a first step of fast increase of the acceleration almost immediately followed by a step of fast deceleration, the duration of the whole pulse being typically in the range of 10 to 20 ms. Therefore, the bandwidth of this pulse-like function is necessarily higher than a predefined threshold, and a low pass filtering of acceleration signals can be used to cancel signals produced by gestures other than taps or by movements of the wrist. Preferably, the embedded processing capabilities of the accelerometer exclude the possibility of the tap if the frequency of the acceleration signal, in a given direction such as the direction perpendicular to the center of the glass, is not in a predefined range.

–duration of the pulse: as indicated, a valid single tap generates a pulse with a duration within a given range, usually between 5 and 100 ms, typically between 10 and 20 ms.

-amplitude of the pulse: a valid single tap is detected only if the amplitude of the acceleration is higher than a first predefined threshold $a_{\_tap\_thresh}$. End of the tap is detected when the amplitude decreases below a second threshold $a_{\_notap\_thresh}$.

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-direction of the acceleration: a tap on the glass generates a maximal acceleration in a main direction perpendicular to the center of the glass, oriented toward the bottom of the watch, and a much lower acceleration in all other directions. A 3D accelerometer can be used for discriminating valid taps based on the direction of the acceleration. For example, if the acceleration in a direction other than the main direction is higher than the acceleration in the main direction, the gesture will not be recognized as a switch on tap.

-slope of the acceleration: this feature can also be used to differentiate between a valid switch on tap and a non valid one. Taps typically generate a fast increase of the acceleration, whereas most other gestures such as swipes etc and most movements of the wrist produce a slower acceleration increase. Therefore, the system could distinguish that a tap is not valid if the slope of the acceleration is not in an expected range. It is also possible to measure the slope of acceleration in one preferential direction, for example in a direction perpendicular to the center of the glass, or separately in a plurality of predefined directions. The slope may be defined by the difference between two predefined acceleration values divided by the time it takes for the acceleration signal to goes from the first of those predefined values to the second one:
slope= (a_tap_threshold – a_notap_threshold)/($t_3 - t_2$) (see Figure 4).

[0045] Those discriminating criteria can also be combined in different ways. For example, the processing means within the accelerometer could use the direction of the acceleration only during a limited time window, for example a less than 100 ms time interval starting at the beginning of the pulse.

[0046] It is also possible to consider at least one of those criteria separately during the raising portion of the acceleration signal and during

the decreasing portion of this signal. For example, it is possibly to verify whether the duration, the frequency, and/or the slope of the acceleration signal during the raising portion, and then during the decreasing portion, are each in predefined ranges compatibles with the gesture one wants to discriminate.

[0047] Other discriminating criteria could be used if other gestures, such as double taps or long taps, are used as command to change the power mode.

[0048] In the embodiment of the invention illustrated on Figure 2, the power on signal 230 generated by the inertial sensor 23 is used to wake up the touch panel 3b and/or the touch controller 24, or to switch those components from a low power mode to another power mode. Therefore, the touch panel 3b is switched off, or at least in low power mode, when the device 1 is in the first power mode, and is powered on, or at least partially powered on, after detection of a likely tap and generation of a wake up signal 230 by the accelerometer 23. In one embodiment, the wake up signal 230 generated by the inertial sensor 23 triggers a switch on command of the touch panel 3b and/or of the touch controller 24 from a low power mode in which nothing is displayed and no finger touch can be detected, to an intermediate power mode where only a subset of electrodes of the touch panel is activated, for example electrodes in the middle of the touch panel, in order detect finger contact such as taps or double taps in this limited area only and to avoid detection if a tap is made in a different area. In another embodiment, the wake up signal 230 triggers a switch on command of the touch controller 24 into a mode where all touch electrodes are activated, to detect a tap or double tap in any area of the touch panel 3b. It is also possible to activate the touch panel 3b and the touch controller 24 during only a limited duration, preferably less than 100 ms, after generation of the wake up signal 230.

[0049] The touch controller 24 generates a second wake up signal 240 to wake up the microcontroller 21, and possibly other components of the device 1, when this touch controller confirms the tap detection. The second

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wake up signal 240 can be input to an interrupt line or switch on line of the microcontroller 21. In one embodiment, the wake signal 230 of the inertial sensor 23 is generated very fast at the beginning of the tap, the touch controller 24 is immediately woken up, and used to confirm the finger detection on the touch sensor 3b during the remaining time of the tap. In another embodiment, a double tap is required, and the inertial sensor is used to detect the first tap while the touch sensor 3b, possibly in cooperation with the inertial sensor 23, is used for detecting the second confirmation tap. In yet another embodiment, a long tap is required, i.e. a tap where the finger rests against the glass during a minimal period. In all embodiments, a second wake up signal 240 is only generated if confirmation of a tap or double tap from the touch panel 3b occurs within a predetermined duration after the first wake signal, for example within a duration less than 300 ms, preferably less than 100 ms.

[0050] Discrimination of a tap by the touch controller 24 preferably depends on the location, size and duration of a touch signal generated by adjacent electrodes. A tap is usually made with the tip of a finger, i.e. on a small surface, during a short period, preferably on predetermined locations of the display.

[0051] The microcontroller 21 is only woken up by the second wake up signal of the touch controller 24. In another embodiment not illustrated hereby, the microcontroller is already woken up by the first wake up signal, and used for discriminating between tap and no tap based on signals from the touch controller 24; the second wake up signal is only used to confirm the first wake up signal and prevent the microcontroller 21 for reentering into the first power mode.

[0052] In one embodiment, a rough discrimination between a wake up gesture and no wake up gesture is made by the inertial sensor 23 and/or the touch sensor 3b, in order to wake up the microprocessor 21. The microprocessor then analyses the sequence of acceleration value delivered by the acceleration sensor, as well the signals delivered by the touch controller 24, to confirm or infirm the decision to wake up the device 1 and

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in particular the display and touch panel 3b. If the microprocessor confirms the tag detection, it remains in operating mode and wake up the display. On the other hand, if tap detection is not confirmed by the more advanced algorithms used by the microcontroller, the microcontrollers puts the touch panel 3b, touch controller 24 and itself back into the first power mode.

[0053] Figures 3 to 6 illustrate chronograms of various signals produced during a tap of the user on the glass of the wristwatch. Figure 3 illustrates the force f applied by the finger on the glass during a tap between t_0 and t_1. The force increases very suddenly from t_0, remains approximately constant at a high level, and then decreases very quickly when the user releases the finger until he left the glass at t_1. The duration between t_0 and t_1 is typically comprised between 10 and 20 ms.

[0054] Figure 4 illustrates the acceleration as measured by the accelerometer 23 in a direction perpendicular to the center of the touch panel 3b during the tap. The acceleration increases from time t_0 up to a maximum at t_{max}, and then decreases or even becomes negative until t_1. The acceleration might oscillate at low amplitude after the finger release. A tap is detected only if the amplitude of the measured acceleration reaches a first predefined threshold $a_{\_tap\_thresh}$ at time t_3. End of the tap is detected at time t_4 when the amplitude decreases below a second threshold $a_{\_notap\_thresh}$. A valid tap is discriminated based on the amplitude of the acceleration, duration between t_3 and t_4, frequency of the amplitude signal, and / or slope of the acceleration signal.

[0055] Figure 5 illustrates a signal s produced by the touch controller 24 during a tap. This signal might be a combination between signals from different electrodes of the touch panel, or a signal processed from different signals of the electrodes. In one embodiment, the signal s is related to the probability of a tap, based on criteria like the size of the contact area, the frequency and timing of the contact signal, etc. The touch panel 3b and touch controller 24 are preferably in low power mode until time t_3 when the accelerometer 23 detects a tap and generates a first wake up signal 230. At time t_5, the signal s reaches a threshold $s_{\_tap\_thresh}$ where the touch

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controller 24 detects a tap. End of the tap is detected at time t_6 when the signal s decreases below the threshold $s_{\_notap\_thresh}$

[0056] Figure 6 illustrates a second wake up signal 240 generated by the touch controller 24 or by a suitable circuit for switching the microcontroller 21 from a first low power mode to a second high power mode. The wake up signal is inactive until time t_5 when a tap is detected by the inertial sensor and confirmed by the touch sensor. The microcontroller 21, and preferably the display of the touch panel 3b, is preferably activated at the rising flank of the signal 240 at time t_5. This signal becomes inactive at time t_4 or t_6, at the end of the tap, although this does not result in changing the power mode of the device 1.

[0057] Figures 7a to 7c schematically illustrate three steps of another method for switching the wristwatch 1 from a first power mode to a second power mode. This method can be used in the same wristwatch than the above described method, so that a user can decide to wake his wristwatch either with the above described method (for example with a tap on the glass 3a) or with this other method of Figures 7a to 7c.

[0058] In this second method, a wristturn detection is performed for detecting rotation of the wrist and deciding if this rotation corresponds to predefined pattern, in which case the wristwatch should be switched to a second power mode for example in order to activate the display.

[0059] Initially, the microcontroller 21 is in a low power mode, for example completely off. The touch controller 24 to which the accelerometer 23 is connected, and which has the responsibility to wake up the microcontroller 21, is in a sleep mode (low power mode), but will wake up when an interrupt in the accelerometer 23 occurs. The accelerometer 23 is set so as to generate an interrupt when its position changes and reaches a given range that is maintained during a predetermined duration, as will be described.

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[0060] The accelerometer 23 knows its position relatively to the vertical and horizontal direction. This can be determined for example by determining the direction along which the acceleration is substantially equal to 1G when the accelerometer is substantially immobile during a predefined duration.

[0061] During a first step of the wristturn detection method, illustrated on Figure 7a, the wristwatch reaches a starting position in a first defined angle range $\alpha 1$ (e.g. 25° to 155° relatively to the horizontal). This position must be held for a defined time (e.g. 50ms) otherwise the start position is not registered. This position is identified using the accelerometer 23 internal orientation detection mechanism, for which the angle range can be set. The fact that a valid start position has been reached is then registered, for example in the accelerometer 23 or alternatively in the touch controller 24 which may be quickly woken to register that a valid start position is reached, before it goes back to wait for the next interrupt.

[0062] During a next step of the wristturn detection method, illustrated on Figure 7b, the wristwatch has been rotated and reaches a final position in a second defined angle range $\alpha 1$ (e.g. -25° to -75° relatively to the horizontal). This position is a typical position for reading the time on the watch, with the display oriented toward the face of the user. This position must be held for a defined time (e.g. 50ms) other the position is not registered. This position is identified using the accelerometer 23 internal orientation detection mechanism, for which the angle range can be set. When a final position in this range is reached, the system checks if a valid start position was registered during the previous step of Figure 7a. If necessary, the touch controller 24 may be woken for this verification and/or for subsequent steps of the method.

[0063] The duration between the starting position and the final position may be measured. If this duration is not in a predefined range, the method is interrupted. Otherwise, the touch controller 24 changes to a No-movement & Angle Check mode. Alternatively, this No-movement & Angle

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Check detection may be performed by the embedded processing capabilities within the accelerometer 23.

[0064] On Figure 7c, the system (for example the touch controller 24, or the accelerometer 23) verifies whether this final orientation of the wristwatch is maintained during a given duration. For this, the value of the acceleration along the three axes is periodically verified. If all 3 axis show no movement above a certain threshold for a defined time (respective defined number of samples), and if the orientation calculated from X/Y/Z is in a defined range (e.g. -25° to -60°), then the system determines that the user is probably consulting his watch. In this case, the touch controller 24 activates the microcontroller 21 and the display 3b, so the user can read the time.

[0065] Other methods of combining indications of the inertial sensor 23 and of the touch sensor 3b could be considered by the skilled person, including methods using additional wake up circuitry for discriminating between a tap gesture and no tap based on indication of the two sensors. The described example has the advantage that the number of components which need to be in an active power mode for discriminating a tap is very limited; in fact only the inertial sensor with integrated signal processing is required. In particular, no advanced signal processing capabilities are required in order to discriminate between a tap and other gestures or displacements of the watch with the accelerometer; the limited signal processing possibilities available in current mems-based accelerometers are sufficient.

[0066] Discrimination between a gesture and no gesture could be made within the processing means of the inertial sensor, by the touch controller 24, by the microcontroller 21, by a dedicated circuit (not shown), or by any combination thereof. Hardware and/or software modules could be used for this discrimination.

Claims

1. A method for switching a wristwatch (1) from a first power mode to a second power mode, comprising:

using an accelerometer (23) with embedded signal processing capabilities for generating an acceleration signal used for detecting a gesture on a cover glass (3a) of said wristwatch;

using a touch panel (3b) underneath said cover glass (3a) for detecting said gesture;

combining gesture detection by the accelerometer (23) and gesture detection with the touch panel (3b) for triggering a switch from said first power mode to said second power mode,

said method comprising a step of discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and/or the slope of said acceleration signal.

2. The method of claim 1, wherein the discrimination between gesture and no gesture is also based on the duration of said acceleration signal.

3. The method of one of the claims 1 to 2, wherein the discrimination between gesture and no gesture is also based on the amplitude of said acceleration signal.

4. The method of one of the claims 1 to 3, said step of discriminating between gesture and no gesture comprises determining said frequency and determining that there is no gesture if said frequency is not in a predetermined frequency range compatible with a tap.

5. The method of one of the claims 1 to 3, said step of discriminating between gesture and no gesture comprises determining said slope and determining that there is no gesture if said slope is not in a predetermined slope range compatible with a tap.

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6. The method of claim 5, said step of determining said slope comprising determining the time it takes for said acceleration to increase from a first value to a second value.

7. The method of one of the claims 1 to 6, wherein said touch panel (3b) comprises a plurality of touch areas, said method comprising a step of applying a power supply sufficient for detecting a gesture to only a first subset of said touch areas.

8. The method of one of the claims 1 to 7, wherein discrimination between gesture and no gesture is based on the duration ($t_5 - t_3$) between a detection signal from said accelerometer (23) and a detection signal with said touch panel (3b).

9. The method of one of the claims 1 to 8, wherein said accelerometer (23) is powered on when said wristwatch (1) is in said first power mode,

said method comprising a step of at partially waking up said touch panel (3b) upon detection of a gesture by said accelerometer (23).

10. The method of claim 9, comprising a step of waking up only a subset of the complete area of said touch panel (3b) upon detection of a gesture by said accelerometer (23).

11. The method of one of the claims 1 to 10, comprising a step of waking up a microcontroller (21) in said wristwatch upon detection of a gesture by said accelerometer (23) and with said touch panel (3b).

12. The method of one of the claims 1 to 10, comprising a step of waking up a microcontroller (21) in said wristwatch upon detection of a gesture by said accelerometer (23), said microcontroller (21) being then used for discriminating between gesture and no gesture based at least on signals from said touch panel (3b).

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13. The method of one of the claims 1 to 12, said gesture being a tap or a double tap.

14. The method of one of the claims 1 to 13, further comprising a step of detecting a wristturn with said accelerometer (23), and switching said wristwatch (1) from said first power mode to said second power mode when a wristturn has been detected.

15. The method of claim 14, said step of detecting a wristturn comprising:

detecting that the wristwatch in a first orientation in a first range;

detecting that the wristwatch is then in a second range, different from said first range,

detecting that the displacements of the wristwatch remains under a predetermined threshold during a predetermined duration.

16. A wristwatch (1) which can be operated in a plurality of power modes including a first power mode and a second power mode, comprising:

a display (4);

a touch panel (3b) underneath a cover glass (3a) of said wristwatch for detecting a gesture on said cover glass (3a);

an accelerometer (23) with embedded signal processing capabilities, said accelerometer being arranged for generating an acceleration signal and for discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal as measured by said accelerometer (23) being a three dimensional accelerometer, and/or the slope of said acceleration signal,

a microcontroller (21) commanded so as to be switched to said second power mode upon gesture detection by accelerometer (23)and gesture detection by said touch panel.

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17. The wristwatch of claim 16, wherein said touch panel (3b) comprises a plurality of touch areas and powering means arranged for powering only a first subset of said touch area upon detection of a gesture by said accelerometer (23), and for powering a larger subset in said second power mode.

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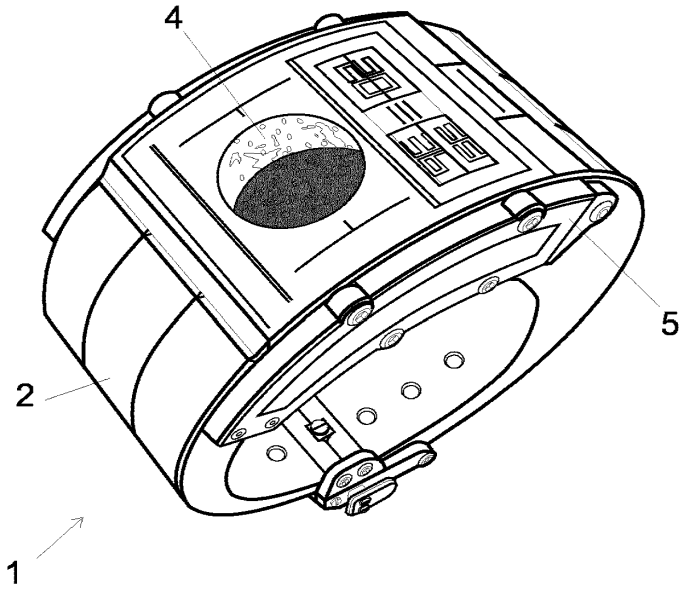


Fig. 1a

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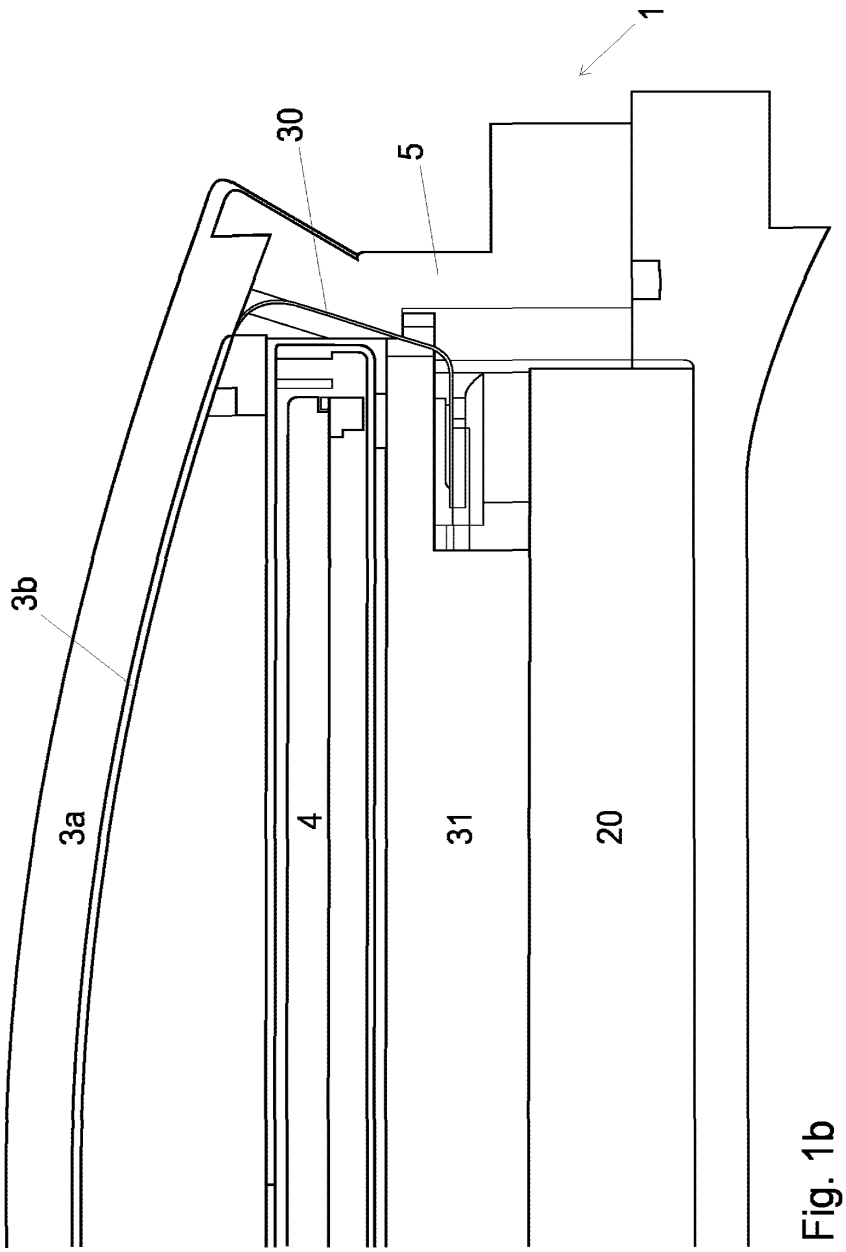


Fig. 1b

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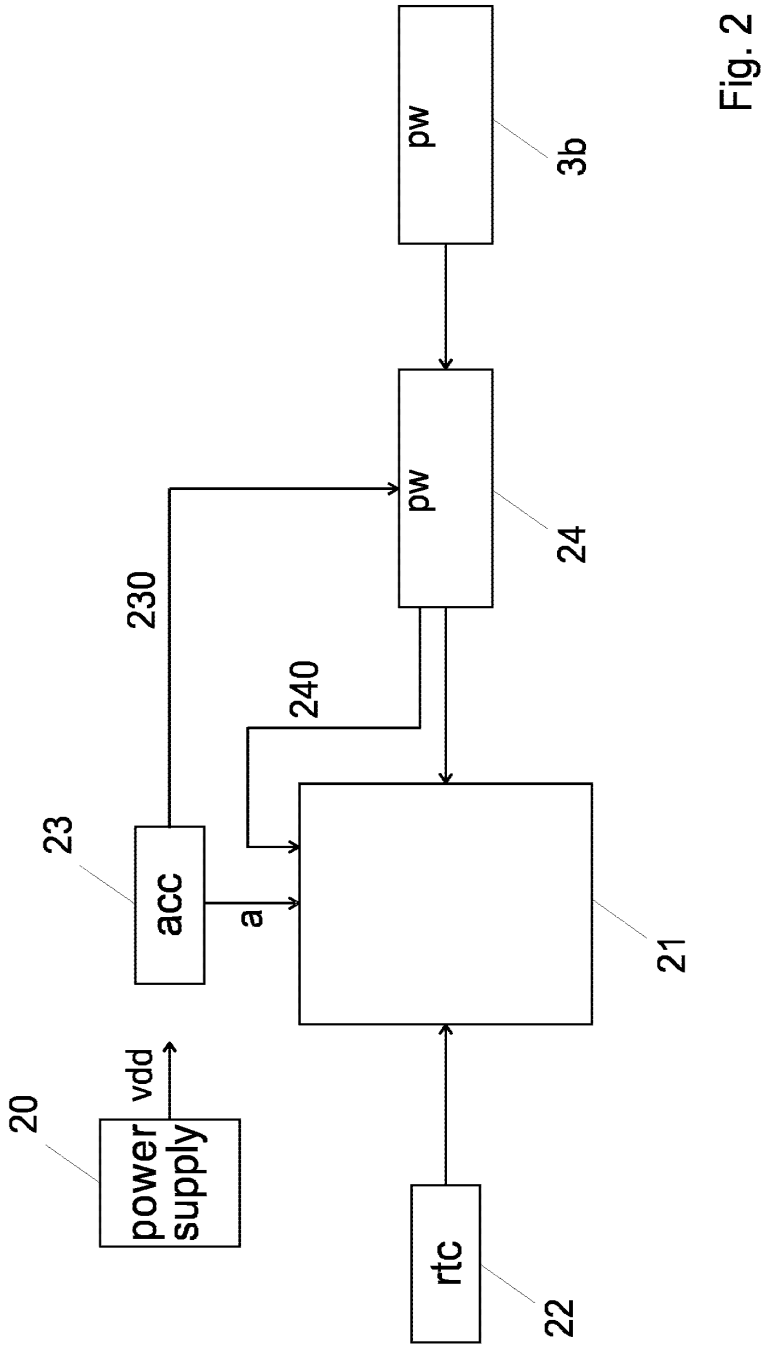


Fig. 2

Fig. 3

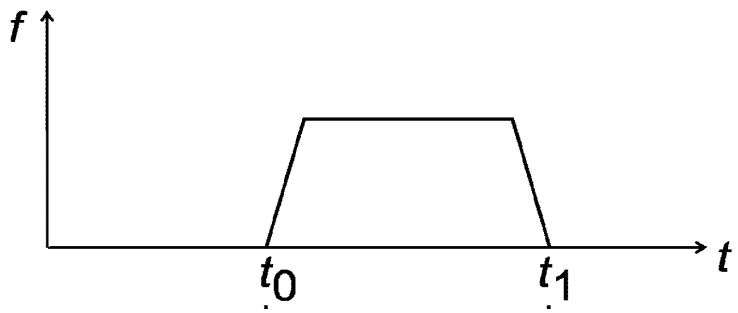


Fig. 4

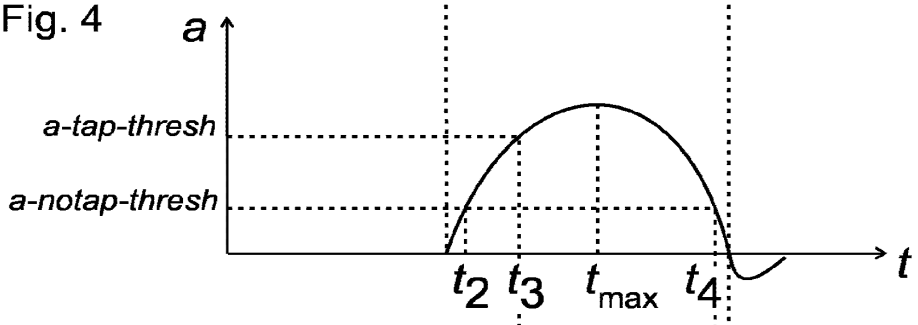


Fig. 5

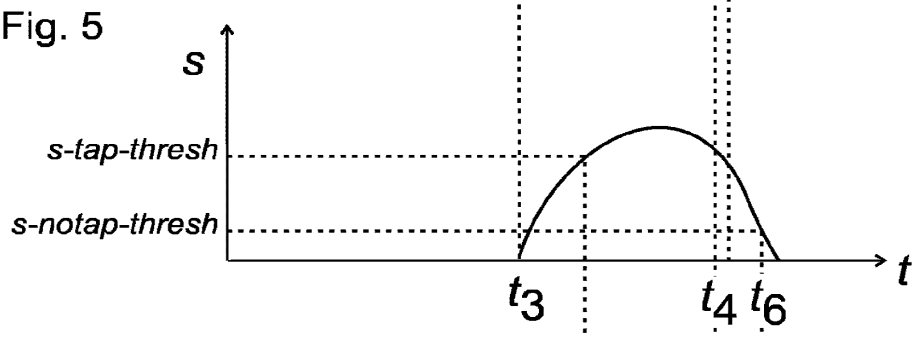
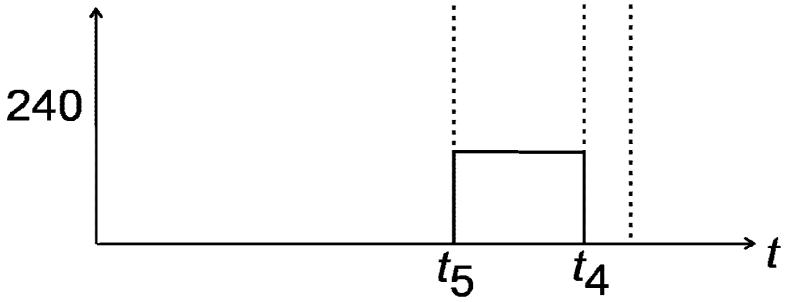


Fig. 6



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Fig. 7a

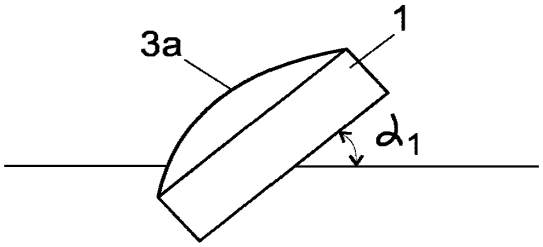


Fig. 7b

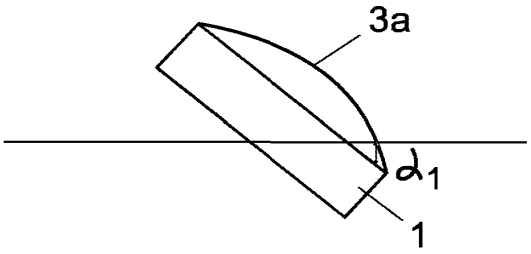
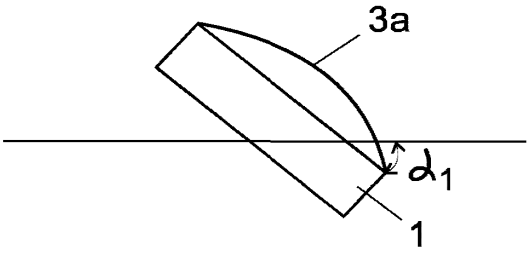


Fig. 7c



Petitioner Samsung Ex-1004, 0100

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2012/070273

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-13, 16, 17

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Petitioner Samsung Ex-1004, 0101

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/070273

A. CLASSIFICATION OF SUBJECT MATTER
INV. G04G21/08 G04G19/12 G04G17/04 G04C3/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G04G G06F G04C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 315 101 A1 (RESEARCH IN MOTION LTD [CA]) 27 April 2011 (2011-04-27) paragraphs [0002], [0003] paragraphs [0016], [0017] paragraphs [0031], [0038], [0039] paragraphs [0081] - [0092]; figure 9 paragraphs [0094] - [0098]; figure 10 paragraphs [0101] - [0104]; figure 11	1-13,16, 17
A	EP 1 785 808 A1 (RESEARCH IN MOTION LTD [CA]) 16 May 2007 (2007-05-16) paragraphs [0046] - [0050] paragraph [0060]	1-13,16, 17
A	US 2010/235667 A1 (MUCIGNAT ANDREA [US] ET AL) 16 September 2010 (2010-09-16) figures 3A-4	1-13,16, 17

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 January 2013	04/04/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Pirozzi, Giuseppe

Form PCT/ISA/210 (second sheet) (April 2005)

Petitioner Samsung Ex-1004, 0102

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/070273

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BOSCH: "BMA 180 Digital, triaxial acceleration sensor", BOSCH DATA SHEET, , no. BST-BMA180-DS000-03 12 December 2009 (2009-12-12), pages 1-69, XP007921418, Retrieved from the Internet: URL:http://www.sparkfun.com/datasheets/Sensors/Accelerometer/BST-BMA180-DS000-03.pdf [retrieved on 2013-01-09] the whole document -----	1
A	KIMBERLY TUCK: "MMA8450Q Single/Double and Directional Tap Detection", INTERNET CITATION, 1 February 2010 (2010-02-01), pages 1-18, XP007921420, Retrieved from the Internet: URL:http://cache.freescale.com/files/sensors/doc/app_note/an3919.pdf [retrieved on 2013-01-09] the whole document -----	1

Petitioner Samsung Ex-1004, 0103

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2012/070273

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2315101 A1	27-04-2011	CA 2716699 A1	02-04-2011
		EP 2315101 A1	27-04-2011
EP 1785808 A1	16-05-2007	CA 2563139 A1	10-05-2007
		EP 1785808 A1	16-05-2007
US 2010235667 A1	16-09-2010	CN 102713788 A	03-10-2012
		EP 2470975 A1	04-07-2012
		EP 2482167 A1	01-08-2012
		JP 2013506891 A	28-02-2013
		KR 20120044388 A	07-05-2012
		KR 20120055721 A	31-05-2012
		US 2010235667 A1	16-09-2010
		US 2011093729 A1	21-04-2011
		US 2012297226 A1	22-11-2012
		WO 2011028326 A1	10-03-2011

Petitioner Samsung Ex-1004, 0104

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-13, 16, 17

Method for switching a wristwatch between two different power modes based on the combined signals from an accelerometer and a touch panel, the method relying on a discrimination based upon acceleration signal frequency and/or acceleration direction and/or acceleration signal slope.

---

2. claims: 14, 15

Method for switching a wristwatch between two different power modes based on the combined signals from an accelerometer and a touch panel, the method relying on a discrimination based upon the detection of a wrist turn performed by the accelerometer.

Espacenet

Bibliographic data: EP1324159 (A1) — 2003-07-02

Command procedure for executing the functions of a clock-agenda

No documents available for this priority number

Inventor(s): GUANTER JEAN-CHARLES [CH]

Applicant(s): ASULAB SA [CH]

Classification: - international: ***G04G11/00; G04G21/00;*** (IPC1-7): G04G11/00
- cooperative: G04G11/00; G04G21/00; G04R60/10

Application number: EP20010205160 20011227

Priority number(s): EP20010205160 20011227

Abstract of EP1324159 (A1)

Method for controlling the command execution in a diary watch equipped with a number of touch sensitive sensors (C1-C7) for input of commands and data. A liquid crystal display is provided for output of diary events. The same touch sensitive sensors used for input of data and commands are used with different keystroke sequences for input of commands to those used for data input. One of the sensors (C1) acts as a validation sensor.



Last updated: 11.12.2013 Worldwide Database 5.8.15.10.92b

Petitioner Samsung Ex-1004, 0106

Espacenet

Bibliographic data: WO2011000893 (A1) — 2011-01-06

WRISTWATCH WITH A TOUCH SCREEN, AND METHOD FOR DISPLAYING ON A TOUCH-SCREEN WATCH

No documents available for this priority number

Inventor(s): HYSEK JOERG [MC]; POZZO DI BORGO PASCAL [CH] ± (HYSEK, JOERG, ; POZZO DI BORGO, PASCAL)

Applicant(s): HYSEK JOERG [MC]; POZZO DI BORGO PASCAL [CH]; COMME LE TEMPS SA [CH] ± (HYSEK, JOERG, ; POZZO DI BORGO, PASCAL, ; COMME LE TEMPS SA)

Classification: - international: ***G04G21/08; G04G9/00***
- cooperative: G04G21/08; G04G9/00

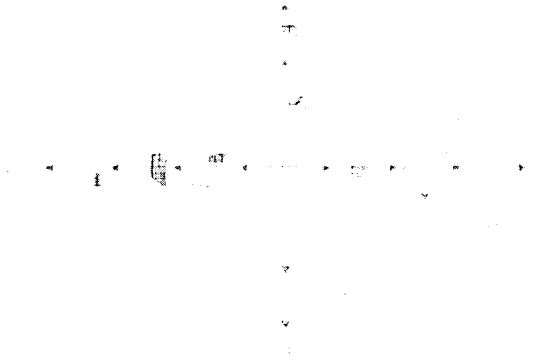
Application number: WO2010EP59323 20100630

Priority number (s): CH20090001036 20090703

Also published as: US2012092383 (A1) JP2012531607 (A) EP2449434 (A1) EP2449434 (B1) CH701440 (A2)

Abstract of WO2011000893 (A1)

The invention relates to a wristwatch (1) comprising: a digital matrix display (4); a two-dimensional sheet of touch-sensitive glass (3), provided with a plurality of electrodes (10, 11, 12) for detecting the movements of at least one finger in two different directions; a processing circuit arranged so as to interpret the signals from said electrodes and to scroll cards on said display (23, 220-225, 210-213) in order to permanently replace the initially displayed card (23) with another card; wherein the scrolling direction depends on the direction of said movement.



Petitioner Samsung Ex-1004, 0107

Last updated: 11.12.2013 Worldwide Database 5.8.15.10.92e

Petitioner Samsung Ex-1004, 0108

PATENT COOPERATION TREATY

04 AVR. 2013

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

To:
P&TS SA
Av. J.-J. Rousseau 4
P.O. Box 2848
2001 Neuchâtel
SUISSE

	Date of mailing *(day/month/year)*: 4 April 2013 (04-04-2013)
Applicant's or agent's file reference: SMARTC-3-PCT	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No.: PCT/EP2012/070273	International filing date *(day/month/year)*: 12 October 2012 (12-10-2012)
Applicant: SLYDE WATCH SA	

1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 338.82.70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 - 9.011.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	PAREDES SANCHEZ, Luis-Miguel Tel: +31 (0)70 340-3650

Form PCT/ISA/220 (July 2010)

Petitioner Samsung Ex-1004, 0109

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
SMARTC-3-PCT		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP2012/070273	12/10/2012	18/10/2011
Applicant		
SLYDE WATCH SA		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 6 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☒ **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**

☒ the text is approved as submitted by the applicant

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

☒ the text is approved as submitted by the applicant

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**

a. the figure of the **drawings** to be published with the abstract is Figure No. 2

☒ as suggested by the applicant

☐ as selected by this Authority, because the applicant failed to suggest a figure

☐ as selected by this Authority, because this figure better characterizes the invention

b. ☐ none of the figures is to be published with the abstract

Petitioner Samsung Ex-1004, 0110

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2012/070273

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos :
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-13, 16, 17

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Petitioner Samsung Ex-1004, 0111

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/070273

A. CLASSIFICATION OF SUBJECT MATTER
INV. G04G21/08 G04G19/12 G04G17/04 G04C3/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G04G G06F G04C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 315 101 A1 (RESEARCH IN MOTION LTD [CA]) 27 April 2011 (2011-04-27) paragraphs [0002], [0003] paragraphs [0016], [0017] paragraphs [0031], [0038], [0039] paragraphs [0081] - [0092]; figure 9 paragraphs [0094] - [0098]; figure 10 paragraphs [0101] - [0104]; figure 11	1-13,16, 17
A	EP 1 785 808 A1 (RESEARCH IN MOTION LTD [CA]) 16 May 2007 (2007-05-16) paragraphs [0046] - [0050] paragraph [0060]	1-13,16, 17
A	US 2010/235667 A1 (MUCIGNAT ANDREA [US] ET AL) 16 September 2010 (2010-09-16) figures 3A-4	1-13,16, 17

-/--

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 January 2013	04/04/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Pirozzi, Giuseppe

2

Form PCT/ISA/210 (second sheet) (April 2005)

Petitioner Samsung Ex-1004, 0112

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/070273

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BOSCH: "BMA 180 Digital, triaxial acceleration sensor", BOSCH DATA SHEET, , no. BST-BMA180-DS000-03 12 December 2009 (2009-12-12), pages 1-69, XP007921418, Retrieved from the Internet: URL:http://www.sparkfun.com/datasheets/Sensors/Accelerometer/BST-BMA180-DS000-03.pdf [retrieved on 2013-01-09] the whole document	1
A	KIMBERLY TUCK: "MMA8450Q Single/Double and Directional Tap Detection", INTERNET CITATION, 1 February 2010 (2010-02-01), pages 1-18, XP007921420, Retrieved from the Internet: URL:http://cache.freescale.com/files/sensors/doc/app_note/an3919.pdf [retrieved on 2013-01-09] the whole document	1

2

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

Petitioner Samsung Ex-1004, 0113

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2012/070273

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2315101 A1	27-04-2011	CA 2716699 A1	02-04-2011
		EP 2315101 A1	27-04-2011
EP 1785808 A1	16-05-2007	CA 2563139 A1	10-05-2007
		EP 1785808 A1	16-05-2007
US 2010235667 A1	16-09-2010	CN 102713788 A	03-10-2012
		EP 2470975 A1	04-07-2012
		EP 2482167 A1	01-08-2012
		JP 2013506891 A	28-02-2013
		KR 20120044388 A	07-05-2012
		KR 20120055721 A	31-05-2012
		US 2010235667 A1	16-09-2010
		US 2011093729 A1	21-04-2011
		US 2012297226 A1	22-11-2012
		WO 2011028326 A1	10-03-2011

Petitioner Samsung Ex-1004, 0114

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-13, 16, 17

Method for switching a wristwatch between two different power modes based on the combined signals from an accelerometer and a touch panel, the method relying on a discrimination based upon acceleration signal frequency and/or acceleration direction and/or acceleration signal slope.

---

2. claims: 14, 15

Method for switching a wristwatch between two different power modes based on the combined signals from an accelerometer and a touch panel, the method relying on a discrimination based upon the detection of a wrist turn performed by the accelerometer.

---

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
1 October 2009 (01.10.2009)

PCT

(10) International Publication Number
WO 2009/120292 A2

(51) International Patent Classification:
G06F 1/16 (2006.01) *G06F 1/32* (2006.01)
H04M 1/02 (2006.01)

(21) International Application Number:
PCT/US2009/001781

(22) International Filing Date:
19 March 2009 (19.03.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/070,534 24 March 2008 (24.03.2008) US
61/135,306 17 July 2008 (17.07.2008) US

(71) Applicant and
(72) Inventor: **LEE, Shu, Muk** [US/US]; 239 Spencer Road, Basking Ridge, NJ 07920 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to the identity of the inventor (Rule 4.17(i))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

— *of inventorship (Rule 4.17(iv))*

[Continued on next page]

(54) **Title**: ACCELEROMETER-CONTROLLED MOBILE HANDHELD DEVICE

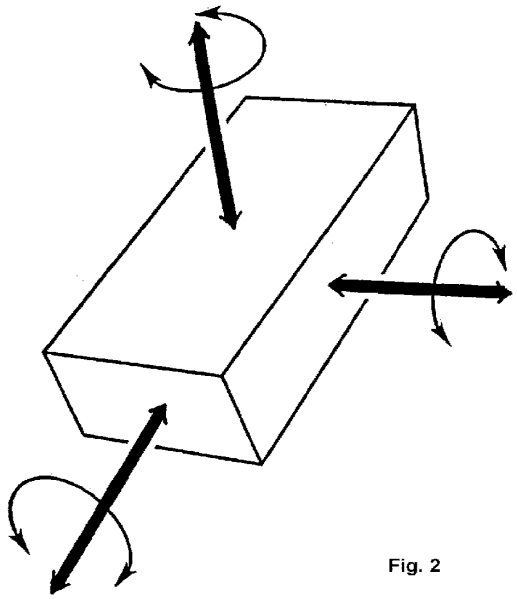


Fig. 2

(57) **Abstract**: The present invention is directed to mobile handheld devices such as, for example, cell phones or personal digital assistants (PDAs) containing an accelerometer that sends a signal that causes the device to turn on.

WO 2009/120292 A2

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TITLE OF THE INVENTION

Accelerometer-Controlled Mobile Handheld Device

This application claims the benefit of U.S. Patent Application No. 61/070,534 filed March 24, 2008, and U.S. Patent Application No. 61/135,306 filed July 17, 2008.

BACKGROUND OF THE INVENTION

(01) The present invention is directed to mobile handheld devices containing an accelerometer. In particular, the present invention is directed to mobile handheld devices such as, for example, cell phones or personal digital assistants (PDAs) containing an accelerometer that sends a signal that causes the device to turn on.

(02) Mobile handheld devices are small units, often carried in pockets or handbags, with limited power storage. Thus, inadvertently switching the unit on can lead to shortened battery life, with the device possibly running out of power at an inconvenient moment. It is an object of the present invention to do away with the need for an external power on-switch.

(03) Some mobile handheld devices cover the display and the power button with a lid hinged on a side dimension of the device (clam-shell design). Other designs swivel the covering lid about an axis to reveal the display and/or power button. It is an object of the present invention to increase convenience by doing away with the need for a lid to protect the power switch.

(04) The clam-shell design's cover lid can be opened by flicking the user's wrist while holding the lower non-lid portion of the clam-shell mobile handheld device, thereby causing the lid to swivel about the hinge and cease motion at a perturbing stop. However, while the flicking action may give the user stylish satisfaction, such action is discouraged because the delicate hinge and cover can be broken by such action. It is an object of the present invention to encourage such flicking action as a way stylishly to turn a mobile handheld device of the present invention on without subjecting the device to unintended increased wear.

(05) While certain mobile handheld devices can resize pictures according to whether the device's display is held in a vertical (portrait) position or a horizontal (landscape) position, the devices are responding to the relative position of the display to the ground, not to a change in velocity (acceleration/deceleration). It is an object of the present invention to provide a mobile handheld device that responds to changes in velocity. Such changes in velocity may include a rotational component.

(06) Accelerometers are well known in the art. An accelerometer may sense changes in velocity directly through interrogation or receipt of signal from an inertial transducer. An accelerometer may also calculate changes in velocity from data received from position sensing transducers. Accelerometers are often electromechanical devices and can measure the static gravitational force or dynamic forces caused by

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changes in speed and/or direction (changes in velocity). Presently, a few laptop computers are equipped with an accelerometer that turns of the hard drive when a sudden freefall is detected, thereby preventing the hard drive's head from crashing onto and damaging the hard drive platter.

(07) Accelerometers can utilize the piezoelectric effect and can detect acceleration in three orthogonal axis, as well as rotation about the axis. The three orthogonal axis and the rotation about each are shown in Fig. 2. Further, accelerometers can provide analog outputs or digital outputs. One in the art readily can use either type of output, and modify the output accordingly to implement the present invention.

(08) Accelerometers are commonly used in cars to trigger safety airbags when a collision occurs. The accelerometers are set so that mild decelerations do not trigger the airbag to deploy. Further, the accelerometers are commonly set to distinguish the direction or velocity of the deceleration (or acceleration) so that the airbags do not deploy inappropriately. Thus, accelerometer technology is known in the art, including how to set limits, both high and low, as well as directional, to how the signals from the accelerometer are used. However, automobiles are not battery operated handheld devices.

(09) There are handheld devices that incorporate global positioning systems (GPS). Such GPS functions can calculate speed and direction. However, the precision is limited to greater than 1 meter because GPS require interrogation of a system of orbiting satellites. Thus, unlike the devices of the present invention, which incorporate accelerometers, the GPS devices cannot respond to changes in velocity within approximately a meter of any reference position of the device. For example, waving a GPS device about at arm's length will not change the position, speed, or acceleration information sensed or calculated by the GPS.

(10) There are handheld devices that are used in video game systems, which incorporate position and motion detectors in order to communicate with a central game control computer that provides appropriate signals to a video display to show images responsive to the position and motion detectors. However, such handheld devices require a separate control computer and do not use the position and motion detectors to control a function of the handheld device itself.

(11) It is well known that, in a graphical plot of distance versus time, speed is the slope of distance versus time. Velocity is speed with a direction component (vector). Acceleration is the slope of speed versus time. Deceleration is just negative acceleration. Further, when an object is not travelling in a straight line, acceleration is also the change in velocity versus time.

(12) There are cell phones and other handheld battery powered devices made by, for example, Apple, Inc. that includes an accelerometer. However, none advantageously prevents unintended powering-on of the device by avoiding the use of a power-on button and advantageously using the accelerometer to turn the device on according to the present invention.

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(13) There are cell phones and other handheld battery powered devices made by, for example, Motorola, Inc. that has an off mode in which the device maintains negligible power in order to keep a function active such as a timed alarm. Thus, when the device is set to produce an alarm at, for example 6:00 AM and the device is turned off, the device nevertheless will appropriately turn itself on at 6:00 AM and sound an alarm as programmed. Thus, quiescent off modes in which the device is off, using negligible power, but able to keep power to a desired functionality are known in the art.

SUMMARY OF THE INVENTION

(14) The present invention is directed to mobile handheld devices such as, for example, cell phones or personal digital assistants (PDAs) containing an accelerometer that sends a signal that causes the device to turn on.

BRIEF DESCRIPTION OF THE DRAWINGS

(15) The invention may be put into practice in various ways, one of which will now be described by way of example only and with reference to the accompanying drawings in which:

(16) Figure 1 shows a block diagram of a mobile handheld device according to the disclosure; and

(17) Figure 2 shows possible axes of movement of the mobile handheld device of Figure 1.

DETAILED DESCRIPTION OF THE INVENTION

(18) The present invention is directed to mobile handheld devices containing an accelerometer. The mobile handheld device of the invention is responsive to signals from the accelerometer. The mobile handheld device of the invention includes an energy storage unit such as, for example, conveniently a battery to supply power to allow the mobile handheld device to respond to a signal from the accelerometer. Instead of a battery, the energy storage unit may be a capacitance storage unit

(19) The present invention is directed to mobile handheld devices such as, for example, cell phones or personal digital assistants (PDAs) containing an accelerometer that sends a signal that causes the device to turn on.

(20) The accelerometer may be conveniently made very small by means of manufacturing techniques found in the field of micro-electro-mechanical systems (MEMS). The field of accelerometers is well known. While the present invention can be practiced using a two-axis accelerometer, such use will limit the type of input that the device of the present invention can respond to. For more complex inputs, it is preferred that a three axis accelerometers or two two-axis accelerometers mounted at right angles be used. The accelerometer should have a dynamic range (be capable of measuring) of ±1.5g to ±5g (g is Earth's gravity at sea level). Less than ±1.5g might not provide enough headroom, while more than ±5g likely is not needed as the device itself may be damaged above that acceleration level.

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(21) The accelerometer can conveniently be capacitive, piezoelectric, piezoresistive, magnetoresistive, or utilize the Hall effect, or the tracking of heat transfer. Furthermore, the characteristics of the accelerometer such as linearity, sensitivity, input voltage, ratiometric factor, impedance, frequency response, high frequency limit, low frequency cutoff, noise, buffering needs, resonance frequency, temperature sensitivity and range, and bandwidth are readily and conveniently determinable by one in the art for suitability to the device of the invention. It is preferred that the bandwidth or sampling rate be above about 200Hz, although one in the art ready and conveniently can determine the needed bandwidth for a particular application in the device of the present invention.

(22) In one aspect, the present invention is a mobile hand-held device that comprises a visual display and an accelerometer; wherein the display is made operational by a signal from the accelerometer.

(23) In another aspect, the present invention is a mobile hand-held device that comprises an accelerometer and a computer, wherein the computer includes a program that teaches the device a movement sequence, conveniently entered by the user, that can be stored for access later as being the movement sequence required to perform a conveniently desired function, such as turning the device on, of the device.

(24) In an embodiment of the invention, a mobile handheld device has a touch screen and contains an accelerometer. When the user has finished using the device, the user touches an off icon on the screen causing the device to enter into a "quiescent off" mode. A quiescent off mode is one in which the device is essentially off, with negligible power or relatively low power consumption, maintained to allow the device to turn on in response to a signal from the accelerometer. When the user wishes to use the device, the device is caused to undergo a change in velocity sufficient to cause the accelerometer to turn the device on for use. In an "on" mode, the device has a relatively high power consumption, when compared with the "quiescent off" mode.

(25) The change in velocity required to cause purposefully the accelerometer to turn the device on should be set at a level or condition sufficient to distinguish from movement of the device not meant by the user to turn the device on. For example, the accelerometer can be set to turn the device on when a particular corner of the device is tapped on a firm surface as distinguished from a different corner of the device being tapped. In this example, the ability of accelerometers to distinguish velocity changes in one direction from changes in a different direction is utilized to differentiate a purposeful acceleration/deceleration from a non-purposeful acceleration/deceleration. Furthermore, the accelerometer can be set so that a deceleration above a predetermined value would not trigger turning the device on. Thus, accidental drops of the device – even if inadvertently in the correct direction – would not turn the device on.

(26) Advantageously, the device may be set to turn on when a particular tapping is repeated, thus distinguishing from a solo inadvertent tap.

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(27) As can be appreciated by the above example, the device of this invention can be placed in a pocket or handbag with minimal likelihood of it being accidentally turned on and inconveniently running the battery down. Furthermore, there are situations (such as a miniature hard-drive in which the drive is docked in a protected mode when off) in which having the device being off during inadvertent violent movements would be desirable. Thus, in an aspect of the invention, the accelerometer turns the device off when certain predetermined accelerations or decelerations are sensed by the accelerometer.

(28) Further, the quiescent off mode can be one in which the device nevertheless can respond to external non-mechanical signals. For example, the device can ring when a call, text message, or page is sent to it. At that point, the user may turn the device on to answer or respond by causing the accelerometer to sense a purposeful change in acceleration or deceleration.

(29) In another embodiment of the invention, a mobile handheld device contains an accelerometer. The device, in a quiescent off mode, may be turned on by causing the accelerometer to sense a flicking motion relative to an axis of the device. The flicking motion is similar to the motion one would make with a clamshell device in the art, which comprises a body and a covering lid hinged to the body at a hinge pivot, to flip open the covering lid. That is, such a clamshell device is caused to accelerate substantially about the hinge pivot of the covering lid. Then the body of the device is caused to decelerate such that the inertia of the lid about the hinge pivot opens the lid relative to the decelerated body of the device. This substantially rotational acceleration followed by deceleration can be programmed into the device of the present invention so that such flicking motion of the device causes the device to turn on. Thus, for example, the device in the quiescent off mode can ring when a call, text message, or page is sent to it. At that point, the user may turn the device on to answer or respond by causing the accelerometer to sense a purposeful change in rotational acceleration or deceleration caused by the flicking motion.

(30) Further, in another embodiment of the invention, a mobile handheld device contains an accelerometer. The device may be turned on by causing the accelerometer to sense a first sequence of velocities and velocity changes. The device may then be switched to a different function by causing the accelerometer to sense a second sequence of velocities and velocity changes.

(31) As an example, the first sequence may be a flicking motion as described above. The second sequence may be a rotation about an axis different from the flicking motion axis. Conveniently, the second sequence may be a rotation similar to what a person does in bringing a phone up to a position by the ear from a position about hip height.

(32) Referring now to Figure 1, there is shown a block diagram of a mobile handheld device 10 according to the disclosure. The device 10 comprises: an accelerometer 20; and a processor 30. The accelerometer 20 is integrated within the device 10 and generates a signal 15, based on the acceleration experienced by the

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device 10. The generated signal 15 is provided to the processor 30. When the processor 30 receives the acceleration signal 15, it processes this signal to identify whether the acceleration measured by the accelerometer meets at least one predefined criterion. Figure 2 shows the possible axes of movement of the mobile handheld device of Figure 1. The accelerometer 20 can detect motion in any of these axes.

(33) The processor 30 is also coupled to, and operative to control a display 40, a transceiver 50, one or more input devices 60 and a memory 70. If the processor determines that an acceleration meeting a criterion has been detected, it performs a functionality. This functionality may be pre-programmed. In particular, the processor 30 may be operative to switch from the "quiescent, off" mode to the "on" mode. During the "quiescent, off" mode, the processor may restrict its functionality based on signals from the input device 60 to a minimum level. The display 40, transceiver 50 and memory 70 may also have respective "quiescent, off" modes, in which their power consumption is reduced and functionality disabled. Moreover, by activation of these devices, the skilled person would understand that the device operates to perform its designated function. For example, the display 40 is activated to display information. Similarly, the transceiver 50 is activated to act as a receiver or a transmitter or both. The memory may be activated to output stored data or to store input data.

(34) In order to determine whether a predefined criterion has been met, the processor 30 compares the accelerometer signal 15 with a reference signal. The reference signal may be set by a user in an initialization step. The user causes the mobile hand-held device to undergo a specific motion, thereby generating a signal from accelerometer 20, which can then be stored in memory 70 as a reference signal. The reference signal may be stored in the memory 70.

(35) In regular operation, the processor 30 compares the acceleration signal 15 with the reference signal using a correlation. A tolerance value is used to account for the fact that it is unnecessary for a user to reproduce the reference signal exactly to allow effective operation.

(36) The skilled person will contemplate various modifications. An alternative criterion for analysis of the acceleration signal 15 is to identify one or more characteristics of the signal. Signal processing techniques, for example a Fourier analysis, can be used to identify at least one characteristic and a criterion can be set based on the characteristic. This may allow more complex motions or a range of different but related motions to be identified on the basis of the accelerometer signal. Although the preferred accelerometer 20 has been described as capable of detecting motion in any of the three axes shown in Figure 2, the skilled person will recognize that the present invention may be employed using an accelerometer capable of detecting acceleration in one or two of the three axes, or of measuring only limited directional or rotational acceleration in one or more of these axes.

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(37) The skilled person will appreciate that the display 40, transceiver 50, input device 60 are optional features of the mobile hand-held device 10, and depending on the functionality provided the mobile hand-held device 10, each of these devices may or may not be desirable. Moreover, the skilled person will recognize that the accelerometer 20 may be able to control each of these devices directly, without requirement for processor 30. For example, the skilled person will appreciate that the display 40 might comprise internal logic for automatic activation based on an accelerometer signal 15 directly from the accelerometer 20. Alternatively, a second processor may be provided for carrying out the determination steps of the invention. This processor may also be configured to control other devices within the mobile handheld device.

(38) The disclosure therefore provides a method of operating a mobile hand-held device, the method comprising: detecting an acceleration of the mobile hand-held device using an accelerometer; and activating a functionality of the mobile hand-held device in response to the detected acceleration.

(39) This method advantageously allows the mobile hand-held device to operate a function in response to a detected acceleration. Acceleration of the mobile hand-held device can therefore be used to control the device in a way that enables facilities within the device that were not previously operative. Thus, the acceleration signal is used to increase the user's range of functions for the device.

(40) Optionally, the mobile hand-held device comprises a visual display and the step of activating a functionality of the mobile hand-held device comprises activating the visual display. Additionally or alternatively, the mobile hand-held device comprises a processor and the step of activating a functionality of the mobile hand-held device comprises activating a functionality of the processor. Optionally, the mobile hand-held device comprises a user input device, and the step of activating a functionality of the mobile hand-held device comprises activating the user input device to allow an input to be provided to the processor.

(41) In the preferred embodiment, the mobile hand-held device is arranged to operate in a first mode with a first power consumption and a second mode with a second power consumption, the second power consumption being greater than the first power consumption, and wherein the step of activating a functionality comprises activating the second mode of the mobile hand-held device. Thus, the second mode provides additional functionality to the user that increases power consumption, until the user disables this functionality. Preferably, the processor is arranged to operate in a first mode with a first power consumption and a second mode with a second power consumption, the second power consumption being greater than the first power consumption, and wherein the step of activating a functionality of the processor comprises activating the second mode.

(42) Advantageously, the method further comprises: generating a signal indicative of the acceleration of the mobile hand-held device using the accelerometer; determining, using the generated signal, that the

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acceleration of the mobile hand-held device meets a predefined criterion; and activating the functionality of the mobile hand-held device in response to the said determination. More preferably, the criterion can be a predefined acceleration and the step of determining comprises determining that the acceleration of the mobile hand-held device matches a predefined acceleration. Most preferably, the step of determining comprises performing a correlation between the generated signal and a reference signal indicative of the predefined acceleration. This correlation can use mathematical correlation techniques or algorithms based on such techniques. These may be techniques in the art of signal processing.

(43) Optionally, the method further comprises, prior to the step of detecting an acceleration: causing a motion of the mobile hand-held device to generate the predefined acceleration; generating a reference signal indicative of the predefined acceleration of the mobile hand-held device using the accelerometer; and storing said reference signal. This allows the reference signal to be set by the user and the device to learn the users movements.

(44) In some embodiments, the method further comprises: determining, using the generated signal, that the acceleration of the mobile hand-held device meets a second predefined criterion; and activating a second functionality of the mobile hand-held device in response to the said second determination. In this way, more than one functionality can be activated as a result of a single acceleration signal.

(45) The disclosure also describes a computer, programmed to operate as defined in any of the above method steps. Additionally or alternatively, the disclosure also provides a computer memory element, comprising instructions, which when loaded onto a computer, cause it to operate as defined in any of the above method steps.

(46) In a further aspect, the disclosure also comprises a mobile hand-held device, comprising an accelerometer that is arranged to detect an acceleration of the mobile hand-held device and to activate a functionality of the mobile hand-held device in response to the detected acceleration.

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WHAT IS CLAIMED:

1. A method of operating a mobile hand-held device, the method comprising:
   detecting an acceleration of the mobile hand-held device using an accelerometer; and
   activating a functionality of the mobile hand-held device in response to the detected acceleration.

2. The method of claim 1, wherein the mobile hand-held device comprises a visual display and the step of activating a functionality of the mobile hand-held device comprises activating the visual display.

3. The method of claim 1 or claim 2, wherein the mobile hand-held device comprises a processor and the step of activating a functionality of the mobile hand-held device comprises activating a functionality of the processor.

4. The method of claim 1, wherein the mobile hand-held device is arranged to operate in a first mode with a first power consumption and a second mode with a second power consumption, the second power consumption being greater than the first power consumption, and wherein the step of activating a functionality of the mobile hand-held device comprises activating the second mode.

5. The method of any preceding claim, further comprising:
   generating a signal indicative of the acceleration of the mobile hand-held device using the accelerometer;
   determining, using the generated signal, that the acceleration of the mobile hand-held device meets a predefined criterion; and
   activating the functionality of the mobile hand-held device in response to the said determination.

6. The method of claim 5, wherein the step of determining comprises determining that the acceleration of the mobile hand-held device matches a predefined acceleration.

7. The method of claim 6, wherein the step of determining comprises performing a correlation between the generated signal and a reference signal indicative of the predefined acceleration.

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8. The method of claim 7, further comprising, prior to the step of detecting an acceleration:

causing a motion of the mobile hand-held device to generate the predefined acceleration;

generating a reference signal indicative of the predefined acceleration of the mobile hand-held device using the accelerometer; and

storing said reference signal.

9. The method of any one of claims 5 to 8, further comprising:

determining, using the generated signal, that the acceleration of the mobile hand-held device meets a second predefined criterion; and

activating a second functionality of the mobile hand-held device in response to the said second determination.

10. A computer, programmed to operate as defined in any preceding claim.

11. A mobile hand-held device, comprising an accelerometer that is arranged to detect an acceleration of the mobile hand-held device and to activate a functionality of the mobile hand-held device in response to the detected acceleration.

12. A mobile hand-held device comprising:

a visual display; and

an accelerometer; wherein the display is made operational by a signal from the accelerometer.

13. A mobile handheld device comprising:

a cell phone or personal digital assistant containing an accelerometer that sends a signal that causes the cell phone or personal digital assistant to turn on.

14. A mobile hand-held device comprising:

an accelerometer;

a computer, and

a computer program that teaches the device a movement sequence that can be stored by the computer for access later as being the movement sequence required to perform a function of the device.

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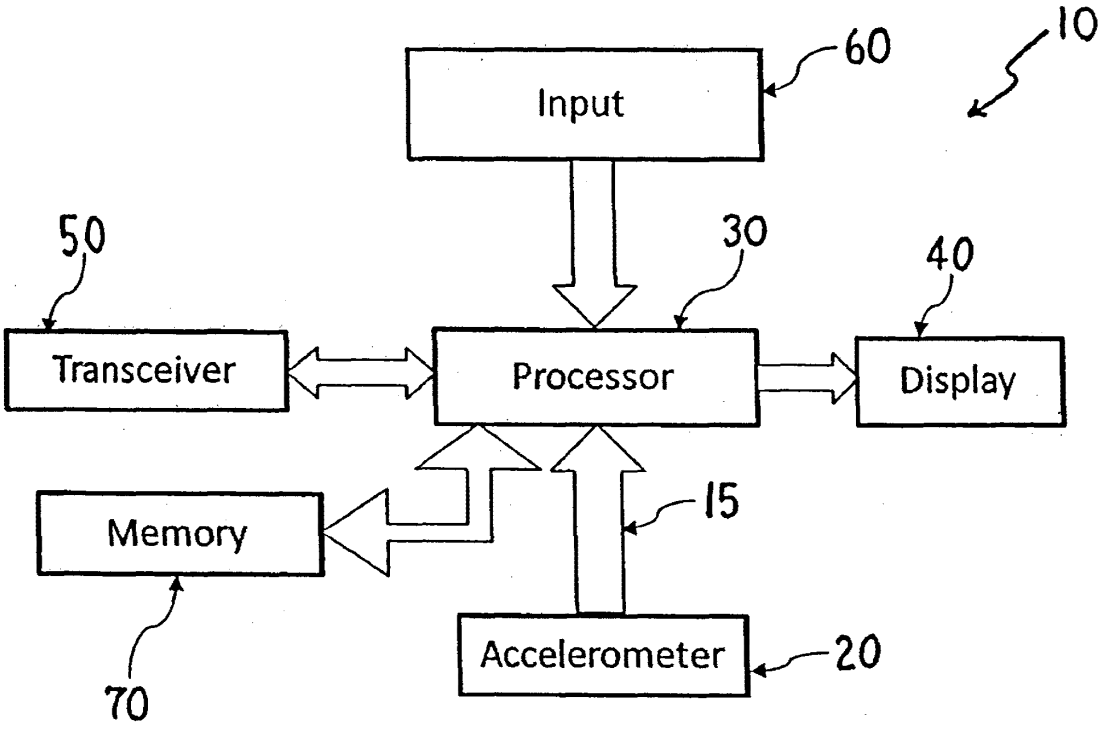


Fig. 1

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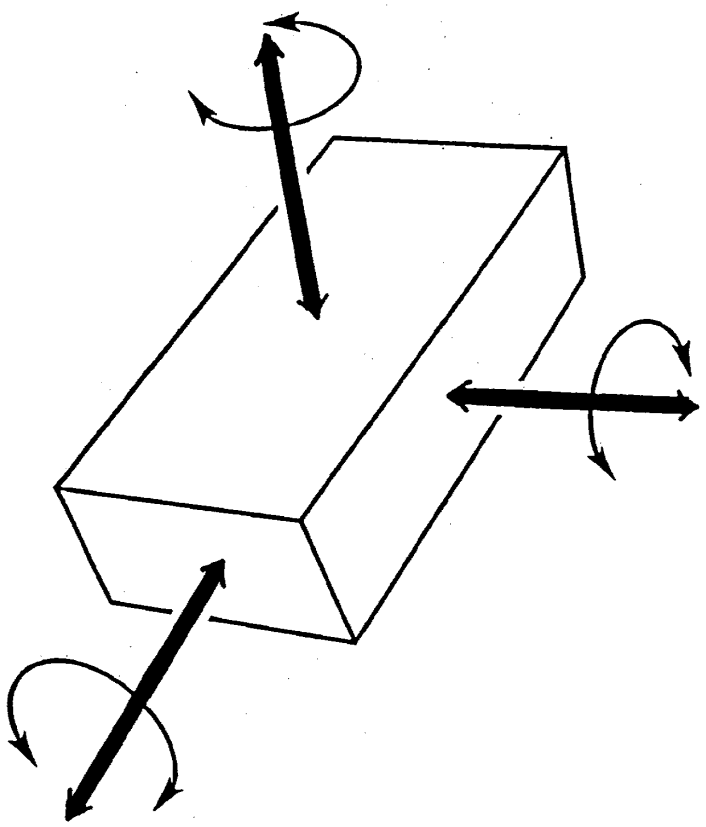


Fig. 2

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[Suite sur la page suivante]

(54) Title : WRISTWATCH WITH A TOUCH SCREEN, AND METHOD FOR DISPLAYING ON A TOUCH-SCREEN WATCH

(54) Titre : MONTRE-BRACELET A ECRAN TACTILE ET PROCEDE D'AFFICHAGE SUR UNE MONTRE A ECRAN TACTILE

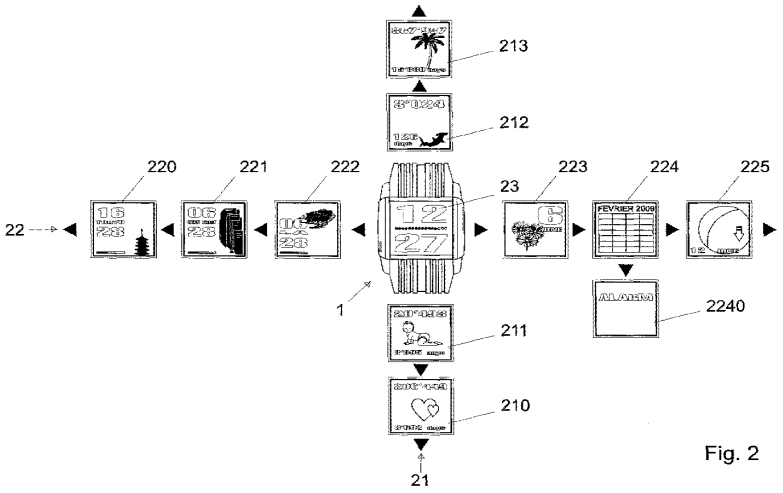


Fig. 2

(57) Abstract : The invention relates to a wristwatch (1) comprising: a digital matrix display (4); a two-dimensional sheet of touch-sensitive glass (3), provided with a plurality of electrodes (10, 11, 12) for detecting the movements of at least one finger in two different directions; a processing circuit arranged so as to interpret the signals from said electrodes and to scroll cards on said display (23, 220-225, 210-213) in order to permanently replace the initially displayed card (23) with another card; wherein the scrolling direction depends on the direction of said movement.

(57) Abrégé :

[Suite sur la page suivante]

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Montre bracelet (1) comportant : - un affichage matriciel numérique (4); - une glace tactile (3) à deux dimensions et munie d'une pluralité d'électrodes (10, 11, 12) pour détecter les déplacements d'au moins un doigt selon deux directions différentes; - un circuit de traitement agencé pour interpréter les signaux desdites électrodes et pour provoquer un défilement de cartes sur ledit affichage (23, 220-225, 210-213) afin de remplacer durablement la carte affichée initialement (23) par une autre carte, - la direction et le sens du défilement dépendant de la direction et du sens dudit déplacement.

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Montre-bracelet à écran tactile et procédé d'affichage sur une montre à écran tactile

Domaine technique

[0001] La présente invention concerne une montre bracelet, en particulier une montre bracelet électronique disposant d'un écran d'affichage à haute résolution et d'une surface tactile.

Etat de la technique

[0002] Les montres à affichage numérique usuelles comportent plusieurs segments de cristaux liquides commandés sélectivement afin d'afficher des chiffres ou des symboles correspondant par exemple à l'heure en cours. Le nombre de symboles affichables est limité par la configuration des segments.

[0003] On connait également des montres-bracelets avec un affichage matriciel, c'est-à-dire un affichage formé d'une matrice de pixels. Ces affichages sont plus flexibles que les affichages à segments, et permettent d'afficher des symboles ou des images quelconques. La présente invention est plus particulièrement concernée par de telles montres avec un affichage matriciel.

[0004] Par ailleurs, on connaît des montres bracelets avec une glace tactile qui permet de réagir au contact du doigt de l'utilisateur sur des portions clairement identifiées de la glace. Ainsi, US6967903 décrit une méthode de commande des différentes fonctions d'une montre en appuyant sur des zones tactiles prédéfinies sur la glace. Ces zones se manipulent comme des boutons pour déclencher des fonctions particulières. On parle ici de navigation à zéro dimension : la surface tactile réagit uniquement à des contacts sur des zones précises de la glace. Les zones tactiles étant généralement transparentes, il est nécessaire d'indiquer

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leur position sur le cadran ou sur la lunette ; le nombre de zones tactiles est ainsi nécessairement limité par la place requise pour ces indications.

[0005] EP1394640 décrit une autre montre à commande tactile comportant douze capteurs sur le pourtour de la glace. L'ordre dans lequel les capteurs sont activés est reconnu. Cette montre souffre des mêmes désavantages et permet tout au plus d'introduire douze commandes différentes.

[0006] WO2006111481 décrit une montre à écran tactile présentant des zones juxtaposées sélectivement affichables et sensibles au toucher. Les zones tactiles ont la forme des surfaces d'affichage, ce qui est une limitation technologique sérieuse. En pratique, on souhaite souvent favoriser des zones d'affichage de petite dimension, pour augmenter la résolution, et des surfaces tactiles beaucoup plus grande pour réduire la consommation électrique et faciliter la connexion entre la glace tactile et le mouvement.

[0007] WO03056397 concerne une montre dans laquelle l'heure est affichée de façon numérique et/ou analogique par un affichage à cristaux liquides. La montre comporte plusieurs électrodes sur la périphérie de la glace, qui peuvent être activées séparément par le doigt.

[0008] EP1544178 décrit un procédé de fabrication d'une glace de montre avec des électrodes invisibles formant les capteurs d'un écran tactile.

[0009] US6477117 décrit un dispositif portatif avec un écran tactile. L'accès à différentes applications disponibles est effectué en sélectionnant avec le doigt une icône de l'application sur un bureau virtuel – de la même façon que sur un écran d'ordinateur. La taille des icônes qui peuvent être affichées sur un écran de montre est nécessairement très limitée, ce qui pose un problème d'ergonomie particulièrement pour des personnes souffrant d'une réduction de l'acuité visuelle.

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[0010] On connaît par ailleurs des écrans tactiles à une dimension qui réagissent au déplacement ou à la position du doigt le long d'un axe linéaire. CH627615 décrit par exemple une montre avec une électrode capacitive de forme triangulaire. Le circuit électronique est capable de détecter la position du doigt le long de cette électrode. De tels écrans linéaires sont typiquement utilisés pour commander des boutons ou organes de réglage linéaires, par exemple pour déverrouiller un équipement ou pour régler un volume sonore.

[0011] On connaît enfin des écrans tactiles à deux dimensions qui sont capables de détecter et de réagir à des déplacements du doigt selon deux directions distinctes sur la surface de l'écran. Par rapport aux systèmes à zéro dimension qui réagissent à la position absolue du doigt, les systèmes tactiles détectant le mouvement et/ou la trajectoire du doigt offrent l'avantage d'une manipulation plus ergonomique. Le doigt peut ainsi être déplacé en n'importe quel endroit de l'écran ; il n'est pas nécessaire d'indiquer la zone à activer.

[0012] Les surfaces tactiles à deux dimensions emploient des électrodes très rapprochées, pratiquement contigües. Le doigt posé sur la surface tactile recouvre généralement des portions variables de plusieurs électrodes adjacentes. Un logiciel calcule le centre de gravité du doigt à partir des signaux fournis par plusieurs électrodes, et détermine le déplacement du doigt à partir de la variation de la position de ce centre de gravité dans le temps.

[0013] Les écrans tactiles à deux dimensions nécessitent donc des électrodes et un circuit de traitement de signaux nettement plus complexes que les écrans à zéro ou à une seule dimension ; ils sont généralement réservés à des appareils disposant d'une puissance de calcul et d'une alimentation suffisantes, par exemple des ordinateurs portables, des PDAs et plus récemment de nombreux téléphones portables. Ces équipements disposent d'écrans avec une surface nettement plus grande que celle d'une glace de montre; même un téléphone mobile a un affichage nettement

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plus grand que celui des plus larges montres envisageables. Ces grandes tailles d'écran permettent d'afficher des éléments d'interface graphique, par exemple plusieurs icônes, des barres de menu, etc qu'il est pratiquement impossible de représenter sur une montre bracelet. La navigation entre les différents programmes ou documents dans l'interface graphique d'une montre-bracelet pose donc des problèmes très spécifiques et différents de ceux qui se posent avec un écran même légèrement plus grand.

[0014] Les montres sont généralement considérées trop petites pour permettre ou nécessiter une détection du déplacement du doigt. En outre, un préjugé existe en horlogerie à l'encontre des écrans tactiles évolués, dont on redoute la consommation électrique, le temps de rafraichissement ou la puissance de calcul nécessaires. D'autre part, l'écran des montres est généralement considéré trop petit pour permettre une sélection de fonctions au moyen d'icones ou d'autres widgets que l'on retrouve fréquemment dans les interfaces graphiques utilisateur des ordinateurs ou téléphones mobiles.

[0015] En raison de ces préjugés, et parce que l'utilité d'une détection de déplacement sur une glace de montre à surface réduite n'est pas évidente, les montres à affichage numérique ne sont pas munies de surfaces tactiles à deux dimensions, ni de logiciels permettant de détecter un déplacement du doigt selon deux directions.

[0016] Par ailleurs, on distingue également entre des surfaces tactiles single touch (monotactile) et des surfaces multitouch (ou multitactiles). Par surface multitouch, on entend dans la présente demande une surface ou un écran tactile capable de détecter plusieurs points de contact simultanés, par exemple les déplacements simultanés de plusieurs doigts sur la surface tactile. Les électrodes de ces équipements sont généralement associées à un circuit ou à un logiciel qui interprète ces contacts simultanés et qui les convertit en commandes pour une interface graphique utilisateur.

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[0017] Ainsi, EP1808751 décrit une montre avec des touches tactiles capacitives en forme de L et qui sont dimensionnées de façon à permettre au doigt de sélectionner une ou deux touches adjacentes simultanément. Cette montre permet de détecter le contact d'un doigt sur deux électrodes adjacentes, mais pas le contact de deux doigts distincts sur des électrodes éloignées ; il ne s'agit donc pas d'un écran multitouch.

[0018] Il existe également un préjugé dans l'état de la technique à l'encontre de l'emploi d'écrans multitouch dans les montres-bracelets, dont la glace est généralement considérée comme trop petite pour permettre le contact, ou à plus forte raison le déplacement simultané de plusieurs doigts.

[0019] Un nombre limité de documents décrivent néanmoins des montres bracelets qui permettent d'introduire des commandes en déplaçant le doigt sur une glace tactile.

[0020] US7170496 décrit un système d'entrée de données pour appareil électronique compact, permettant notamment de sélectionner des caractères dans une matrice à l'aide de différents mouvements du doigt. La solution proposée permet uniquement une navigation dans un menu particulier préparé à cet effet ; l'introduction de données nécessite un apprentissage fastidieux.

[0021] US2006092177 décrit une montre avec un capteur dans chaque coin permettant d'introduire différentes commandes en sélectionnant un des capteurs ou une suite de capteurs actionnés dans un ordre particulier. Une des commandes permet d'afficher une « carte » qui présente des informations complémentaires, par exemple une liste de messages reçus, une liste d'alarmes etc. Cette carte est affichée pendant une durée limitée et disparait automatiquement après un bref délai. La disposition des électrodes non contigües qui est suggérée dans ce document rend cependant l'introduction des commandes peu intuitive ; il ne s'agit pas ici d'une surface tactile à deux dimensions. L'utilisateur doit déplacer son

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doigt précisément sur les surfaces tactiles, et un déplacement du doigt passant par le centre de la glace ne sera pas détecté. Des séquences de sélection complexes et difficiles à mémoriser doivent être utilisées pour accéder aux différentes fonctions proposées. Le nombre de fonctions connexes qui peuvent être affichées est limité par le nombre de capteurs.

[0022] Il existe donc un besoin dans l'art antérieur pour une montre bracelet munie d'une glace tactile permettant d'introduire des commandes sans devoir appuyer sur une zone particulière de la glace.

[0023] Il existe en particulier un besoin pour une montre bracelet permettant de détecter des déplacements du doigt sur l'écran tactile.

[0024] En particulier il existe un besoin pour une montre bracelet dont au moins certains éléments, y compris la surface tactile, le circuit de traitement de signaux provenant des électrodes de cette surface, le processeur et l'interface graphique, sont adaptés aux contraintes particulières d'une montre-bracelet, en particulier à la surface réduite de l'écran et aux exigences très strictes en terme de consommation électrique et de puissance de calcul disponible.

[0025] Il existe aussi un besoin pour une montre bracelet permettant d'afficher un grand nombre d'indications différentes sans pour autant encombrer l'affichage. Cette montre devrait en outre permettre d'accéder facilement et intuitivement aux différentes informations disponibles, au moyen de commandes faciles à apprendre et à introduire sur une glace tactile.

[0026] Il existe également un besoin pour une montre-bracelet permettant de personnaliser le type d'informations affichées, et la manière de présenter ces informations.

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Bref résumé de l'invention

[0027] Selon l'invention, ces buts sont atteints notamment au moyen d'une montre bracelet qui comporte :

un affichage matriciel numérique ;

une glace tactile munie d'une pluralité d'électrodes ;

un circuit de traitement agencé pour interpréter les signaux desdites électrodes, pour sélectionner une carte parmi plusieurs cartes disponibles en fonction de ces signaux, et pour afficher ladite carte sur la totalité dudit affichage matriciel numérique ;

ladite glace tactile est une glace tactile à deux dimensions permettant de détecter les déplacements d'au moins un doigt selon au moins deux directions différentes ;

le circuit de traitement étant programmé de manière à provoquer un défilement de cartes afin de remplacer durablement la carte affichée initialement par une autre carte,

la direction et le sens du défilement dépendant de la direction et du sens dudit déplacement.

[0028] Dans la présente description, le terme « carte » décrit un contrôle, ou widget, affiché sur l'interface graphique de la montre pour représenter sur la totalité de l'écran une entité telle que l'heure courante, une phase de lune, un affichage chronographe etc. Une carte comporte une image de fond d'écran qui est destinée à occuper tout l'écran de la montre ; cette image peut être fixe, par exemple pour afficher une photo, ou rafraichie périodiquement, par exemple pour afficher l'heure courante. La carte peut en outre être associée à une fonction (programme ou module informatique) déterminant les indications affichées sur le fond d'écran ; par exemple, une carte peut être associée à un programme calculant et affichant sous forme texte ou graphique une phase de lune. Une carte peut en outre définir le comportement de l'interface tactile, et les fonctions ou modules qui doivent être démarrés en fonction des déplacements du doigt sur l'écran.

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[0029] Ainsi, la navigation dans l'interface graphique de la montre se fait par défilement de cartes virtuellement juxtaposées, de manière à remplacer toute l'image d'une carte par une autre image correspondant par exemple à une carte et pour afficher autre fonction. On évite ainsi les inconvénients des interfaces graphiques conventionnelles dans lesquelles le lancement de programmes ou de fonctions se fait en sélectionnant une minuscule icône du programme sur le fond d'écran. Ici, les icones sont remplacées par des cartes qui occupent généralement la totalité de l'écran, et qui affichent l'information utile.

[0030] Ces cartes peuvent être personnalisées par l'utilisateur, qui a aussi la possibilité d'ajouter de nouvelles cartes depuis un ordinateur externe connecté à la montre, afin d'ajouter de nouvelles fonctions et/ou de modifier la façon dont une indication est affichée.

[0031] L'invention part aussi de la constatation que le nombre de mouvements différents que les utilisateurs peuvent et veulent apprendre pour manipuler une montre est limité. Dans ce but, le logiciel de la montre est avantageusement commandé principalement ou même exclusivement à l'aide de déplacements horizontaux ou verticaux du doigt sur la glace. La plupart des fonctions de la montre, voire toutes les fonctions, peuvent donc être accédées avec ces deux commandes très simples.

[0032] La glace tactile permet de détecter de manière fiable des déplacements du doigt dans une direction horizontale ou verticale, sans que l'utilisateur ne doive passer sur des électrodes particulières pour entrer une commande donnée.

[0033] Dans une variante, des commandes de « tap » (bref contact du doigt sur la glace) voire de double « tap » (deux brefs contacts rapprochés) peuvent également être introduites, par exemple pour confirmer une commande ou démarrer une fonction, de façon analogue au « clic » et « double clic » effectués avec la souris d'une interface graphique d'ordinateur. Ces commandes peuvent selon les cas être effectuées sur des

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zones clairement affichées de l'écran – par exemple sur un bouton « START » en mode chronographe – ou n'importe où sur l'écran.

[0034] La montre-bracelet présente aussi l'avantage de passer d'une carte à une autre très simplement, par de simples déplacements horizontaux ou verticaux du doigt sur la glace afin de provoquer un défilement des cartes juxtaposées.

[0035] Le défilement d'une carte à l'autre peut par exemple correspondre à un changement de mode de la montre. Par exemple, le passage d'un mode « affichage de l'heure courante » à un mode « affichage d'un autre fuseau horaire » se fait par défilement de cartes, et en remplaçant toute l'image affichée sur l'écran de la montre par l'image d'une autre carte.

[0036] La présente invention concerne aussi l'organisation des cartes, et le précédé de défilement employé afin de rendre la manipulation aussi rapide et intuitive que possible.

[0037] Dans le présent texte, la direction « horizontale » de la montre correspond à la direction {9 heures - 3 heures} sur le cadran d'une montre traditionnelle ; la direction « verticale » est parallèle à la direction {6 heures – 12 heures}.

Brève description des figures

[0038] Des exemples de mise en œuvre de l'invention sont indiqués dans la description illustrée par les figures annexées dans lesquelles :

[0039] Les figures 1a et 1b illustrent une vue en perspective de deux exemples de montre-bracelet selon l'invention, avec deux cartes différentes affichées.

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[0040] La figure 2 illustre de manière schématique l'arrangement virtuel de différentes cartes dans le menu de la montre.

[0041] Les figures 3a à 3d illustrent schématiquement l'affichage de la montre suite à l'introduction d'une commande de défilement vertical pour remplacer la carte initialement affichée par une autre carte.

[0042] Les figures 4A à 4C illustrent schématiquement l'organisation des cartes sur plusieurs niveaux de navigation dans un mode de réalisation de la montre.

Exemple(s) de mode de réalisation de l'invention

[0043] Les figures 1A et 1B illustrent deux exemples de montre-bracelet 1 selon l'invention. La montre illustrée comporte notamment un bracelet 2 et un boitier 5 muni d'une glace 3 recouvrant un affichage matriciel numérique 4.

[0044] Le boitier 5 peut comporter des organes de commande, par exemple des boutons-poussoirs, une couronne, etc., qui ne sont cependant pas indispensables à la manipulation ; dans un mode de réalisation préférentiel, la montre est dépourvue de couronne et comporte uniquement des boutons poussoirs (non représentés) pour allumer ou éteindre l'écran, ou pour régler sa luminosité. Un capteur de luminosité permettant d'adapter automatiquement l'intensité de l'écran à la luminosité ambiante peut aussi être employé en option. La montre peut passer quasi instantanément d'un mode de veille, dans lequel l'affichage est éteint ou en tout cas moins lumineux, à un mode « lecture de l'heure » et/ou navigation, par exemple dès que la glace est effleurée ou suite à un tap ou double tap sur l'écran tactile.

[0045] Le boitier 5 peut aussi comporter un connecteur pour relier la montre à un ordinateur externe, par exemple un connecteur micro- ou

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nano-USB sur le fond ou dans un des flancs de la montre. Des moyens de connexion sans fils, par exemple un module ZigBee ou Bluetooth, peuvent aussi être prévus.

[0046] L'alimentation électrique de la montre se fait avantageusement au moyen d'un accumulateur rechargeable au travers d'un connecteur micro- ou nano-USB, d'un connecteur spécifique ou propriétaire ou, dans une variante, au travers d'une interface radiofréquence.

[0047] Le bracelet 2 peut par exemple être réalisé en caoutchouc, ou dans tout autre matériau adapté. Dans un mode de réalisation, il comporte des indicateurs additionnels, par exemple des LEDs ou un écran LCD, noyés dans le matériau du bracelet et permettant d'afficher des indications complémentaires à celles de l'affichage matriciel 4. Les indicateurs sont de préférence alimentés et commandés par le circuit de traitement de la montre (non illustré) et permettent par exemple d'afficher des indications relatives à l'état de la montre (par exemple l'état de charge de la batterie), ou des indications temporelles dépendant de l'affiche en cours (par exemple un nombre de tours chronométrés, etc.). Il existe donc une liaison électrique entre les indicateurs du bracelet et le mouvement électronique de la montre.

[0048] La glace 3 ferme la surface supérieure du boîtier et recouvre l'affichage matriciel numérique 4. Elle est de préférence réalisée en saphir ou dans un autre matériau inrayable, et recouverte d'un traitement antireflet. Dans un mode de réalisation préférentielle, la glace est bombée cylindrique, ou éventuellement bombée sphérique.

[0049] Des électrodes transparentes sont déposées dans ou sous la glace 3 afin de détecter la présence d'un doigt ou d'un stylet. La technologie de détection utilise de préférence des procédés connus dans l'état de la technique, par exemple une détection capacitive.

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[0050] Un affichage matriciel numérique à haute résolution 4 occupe la quasi totalité de la surface sous la glace 3, et sert ainsi à la fois de cadran de montre et d'indicateur horaire. Dans un mode de réalisation préférentiel, l'affichage est constitué par un affichage à cristaux liquides couleur (LCD ou TFT) avec au moins 150X150 pixels. D'autres types d'affichages, y compris des affichages basés sur la technologie OLED par exemple, peuvent être employés. Par ailleurs, la montre pourrait aussi comporter plusieurs affichages, par exemple plusieurs affichages numériques, ou un afficheur matriciel numérique combiné avec des aiguilles ou d'autres indicateurs mécaniques.

[0051] Le circuit de traitement évoqué permet d'interpréter les signaux provenant des électrodes et d'afficher sur l'affichage matriciel 4 des indications qui dépendent de ces signaux. Le circuit de traitement comprend typiquement un microcontrôleur pour contrôler l'affichage matriciel, un autre microcontrôleur pour contrôler l'interface tactile, et un microcontrôleur général pour déterminer les indications à afficher en chaque instant, selon la carte sélectionnée. Ces différents microcontrôleurs peuvent aussi être regroupés autrement.

[0052] Un circuit d'entrée-sortie, par exemple un décodeur USB, ou un récepteur Bluetooth ou ZigBee, peut aussi être prévu.

[0053] Le circuit de traitement est spécifiquement agencé pour interpréter les signaux desdites électrodes, pour sélectionner une carte parmi plusieurs cartes disponibles en fonction de ces signaux, et pour afficher ladite carte sur la totalité dudit affichage matriciel numérique ; cet agencement se fait de préférence en stockant dans la mémoire du microcontrôleur un programme informatique (firmware) permettant de commander ce fonctionnement spécifique. Le firmware provoque l'affichage des cartes incluant des images stockées en mémoire et qui sont restituées sur l'affichage 4. Avantageusement, le logiciel et/ou les données utilisées par ce logiciel, peuvent être modifiés ou mis à jour par l'utilisateur, par exemple au travers de l'interface USB, Bluetooth, ZigBee, etc., évoquée

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plus haut. Cette interface permet par exemple de charger de nouvelles cartes, ou de nouvelles images utilisées sur ces cartes, et de personnaliser ainsi les cartes et les éléments graphiques représentés sur ces cartes.

[0054] La taille et la résolution de l'affichage 4 sont suffisantes pour afficher simultanément plusieurs indications sur la même carte, par exemple l'heure courante sur la figure 1A, ou l'heure courante et la phase de lune sur la figure 1B. Afin d'étendre les fonctionnalités de la montre, l'utilisateur peut passer d'un mode d'affichage à un autre, et par exemple remplacer la carte affichée sur la figure 1A par la carte de la figure 1B.

[0055] La figure 2 illustre de manière schématique un arrangement possible de cartes selon un mode de réalisation de l'invention. Chaque carte correspond à un écran virtuel et permet d'afficher des indications et/ou des images dépendant de la carte. La taille de la carte correspond à la taille de l'affichage ; la surface totale à disposition correspond donc à la somme de la surface des cartes, soit un multiple de la surface de l'affichage. L'utilisateur peut modifier l'affichage en cours en remplaçant de manière permanente, jusqu'au prochain remplacement, la carte affichée par n'importe quelle autre carte sélectionnée parmi la liste de cartes disponibles.

[0056] Dans cet arrangement, les cartes sont arrangées virtuellement de manière à constituer une rangée 22 et une colonne virtuelle 21 de cartes. L'utilisateur peut faire défiler les cartes dans la direction horizontale, afin de remplacer la carte courante 23 par n'importe quelle autre carte 220 à 225 de la rangée 22. De la même façon, l'utilisateur peut faire défiler les cartes verticalement afin de choisir une des cartes 210 à 213 de la colonne 21.

[0057] Le défilement des cartes dans la direction horizontale ou verticale est obtenu en déplaçant le doigt sur la glace dans la direction et selon le sens correspondants. Ainsi l'utilisateur peut facilement consulter les cartes disponibles, et choisir une carte particulière, avec de simples mouvements

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du doigt dans la direction horizontale ou verticale. Le nombre de cartes dans la colonne 21 et dans la rangée 22 n'est limité que par la capacité mémoire de la montre.

[0058] Avantageusement, l'utilisateur peut ajouter des cartes, supprimer des cartes, modifier l'ordre des cartes dans la rangée et la colonne, etc., depuis un menu particulier de la montre ou depuis un ordinateur personnel connecté à la carte. Chaque carte peut être associée à un programme ou module informatique pour calculer les données affichées, et à des données utilisées par ce module, par exemple une image de fond d'écran ou des préférences d'utilisateur stockées dans la montre. L'utilisateur peut aussi ajouter ses propres images comme fond d'écran ou illustration dans des cartes existantes, ou ajouter des cartes avec ses images.

[0059] Comme indiqué, chaque carte peut afficher une indication différente ou correspondre à un mode de fonctionnement particulier de la montre. Par exemple, les cartes 220, 221 et 222 sont utilisées pour afficher l'heure courante dans les fuseaux horaires de Tokyo, New York et Los Angeles. Les cartes 210, 211, 212 et 213 permettent d'afficher le nombre de jours, respectivement d'heures, depuis un instant donné, par exemple depuis la naissance, depuis le mariage, l'arrêt de la cigarette, etc. D'autres cartes peuvent être utilisées pour afficher des phases de lune, un calendrier, ou d'autres indications horaires ou non horaires. Par ailleurs, différentes cartes peuvent se distinguer uniquement par des caractéristiques graphiques, par exemple une image de fond, ou une représentation particulière des données affichées. Par exemple, une carte pourrait afficher l'heure avec des symboles alphanumériques comme sur la figure 1A, une autre carte la même heure avec des aiguilles dessinées avec des pixels sur l'affichage, et une troisième carte avec une représentation graphique au moyen de séquences de symboles colorés dont le nombre correspond à l'heure et aux minutes de l'heure courante.

[0060] L'organisation des cartes en croix facilite le défilement et la recherche des cartes. Avantageusement, lorsque les cartes de la colonne 21

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défilent successivement sur l'affichage, la rangée 22 n'est pas altérée ; l'utilisateur peut donc toujours passer à la carte 223 par un simple défilement vers la gauche, quelle que soit la carte actuellement affichée au sein de l'unique colonne verticale 21. De la même façon, l'utilisateur peut toujours accéder directement avec une seule commande verticale à n'importe quelle carte de la colonne 21, quelle que soit la carte actuellement affichée au sein de l'unique rangée 22.

[0061] Le défilement des cartes étant très rapide, cette organisation permet de retrouver facilement n'importe quelle carte, même lorsque le nombre de cartes proposées est important. Par rapport à une organisation matricielle, on évite ainsi le risque que l'utilisateur doive effectuer plusieurs défilements successifs ou qu'il ne parvienne pas à retrouver une carte particulière.

[0062] Des exceptions sont cependant possibles, par exemple si elles facilitent le passage d'une carte à une autre carte apparentée. Ainsi, sur l'exemple de la figure 2, la sélection de la carte 224 au sein de la rangée horizontale 22 permet de passer directement à la carte apparentée 2240 avec une commande de défilement vertical. Cette exception est par exemple utile pour afficher successivement différentes semaines ou différents mois d'un calendrier depuis une page particulière du calendrier.

[0063] D'autres arrangements de cartes sont aussi possibles ; par exemple, il serait aussi possible d'avoir une matrice de cartes avec par exemple toutes les fonctions liées aux anniversaires dans une colonne, toutes les fonctions liées à la lune dans une autre colonne etc et une navigation horizontale sur la rangée centrale pour le menu principal.

[0064] Dans une autre variante, le passage de la carte 224 à la carte 2240 (par exemple) se fait avec une commande tactile différente – par exemple un déplacement oblique, un tap, un double tap ou un appui long qui peut être effectué n'importe où sur la glace, ou par sélection d'une zone particulière de l'image.

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[0065] Les cartes de la rangée 22 et/ou de la colonne 21 peuvent avantageusement être organisées en boucles fermées ; la poursuite du défilement après la dernière carte permet ainsi de revenir à la première, et vice-versa. L'utilisateur a ainsi l'impression de parcourir cycliquement des cartes arrangées sur la surface d'un cylindre ou d'une sphère en rotation.

[0066] Dans un autre mode de réalisation, l'introduction d'une commande de défilement sur l'écran tactile provoque toujours un retour immédiat vers une carte de départ 23, puis un défilement depuis cette carte dans la direction de défilement donnée par la commande. Cette variante facilite encore la navigation qui se fait toujours depuis le même point et nécessite ainsi toujours les mêmes déplacements pour parvenir à la même carte de destination. On évite par ailleurs la confusion si une même carte 23 peut défiler soit horizontalement dans la rangée 22, soit verticalement dans la colonne 21.

[0067] Dans un autre mode de réalisation, le retour à la carte de départ 23 est effectué manuellement ; l'utilisateur doit tout d'abord retourner manuellement vers cette carte avant de pouvoir changer de direction de défilement et d'accéder aux autres cartes disponibles. D'autres commandes de retour à la carte de départ 23 sont imaginables, par exemple avec une zone de commande réservée à cet effet.

[0068] Les figures 3a à 3d illustrent à titre d'exemple une séquence de défilement horizontal qui permet de remplacer la carte de départ 23 affichée sur la figure 3a par la carte 213 de la figure 3d. La figure 3a montre l'affichage initial de l'heure courante au moyen de la carte 23. L'utilisateur souhaite maintenant remplacer cette carte par une autre carte 213 qui lui indique le nombre de jours et d'heures depuis sa naissance. Dans ce but, il introduit sur la figure 3b une commande de défilement vertical en déplaçant son doigt de haut en bas en n'importe quel endroit sur la glace de la montre.

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[0069] Sur la figure 3c, les cartes successives de la colonne 21 défilent automatiquement et en continu dans le sens de défilement déterminé par la direction du doigt sur la glace.

[0070] Dans le mode de réalisation avantageux qui est illustré, le processeur affiche simultanément plusieurs cartes en taille réduite pendant le défilement. Ce contre-zoom optionnel permet à l'utilisateur de mieux visualiser le défilement, et de retrouver plus rapidement la position de la carte vers laquelle il souhaite parvenir.

[0071] Le défilement se poursuit en continu même lorsque l'utilisateur a relâché le doigt. La vitesse du défilement des cartes sur la figure 3c peut avantageusement dépendre de la vitesse et/ou de l'amplitude de déplacement du doigt sur la surface tactile ; une vitesse plus importante est obtenue en donnant une impulsion de grande ampleur très rapide. Avantageusement, le microcontrôleur détermine l'énergie associée à la trajectoire du doigt sur la glace tactile, qui varie en fonction du carré de la vitesse de déplacement du doigt, et simule ensuite la rotation d'un cylindre virtuel –ou d'une sphère -portant les cartes et entraîné avec une énergie correspondante.

[0072] Pour plus de réalisme, la vitesse de défilement des cartes n'est pas constante, mais diminue progressivement, comme si un frottement ralentissait la rotation du cylindre. Il est aussi possible de ralentir le défilement à chaque passage d'une carte à l'autre, puis d'accélérer à nouveau le cylindre après ce passage – un peu à la manière d'une roue de tombola qui est freinée à chaque fois que le ressort passe sur un des clous en périphérie de la roue.

[0073] Le défilement s'arrête ensuite de lui-même après un instant déterminé ou lorsque la vitesse de défilement descend en dessous d'un seuil. L'affichage est alors à nouveau agrandi et la carte 213 qui occupe le centre de gravité de l'affichage au moment de l'arrêt est alignée avec le bord de l'affichage, et affichée sur tout l'affichage.

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[0074] De manière avantageuse, l'utilisateur peut aussi arrêter lui-même le défilement lorsque la bonne carte est affichée – par exemple en donnant un bref tap du doigt au centre de l'écran, ou au contraire en appuyant durablement sur l'écran. Des commandes de déplacement en sens opposé permettent d'inverser la direction de défilement.

[0075] Un affichage horizontal ou vertical en mode discret (image par image, à chaque fois que l'on balaye horizontalement ou verticalement) est aussi possible en option. Dans un autre mode de défilement, les cartes sont affichées en simulant de manière visuelle les pages d'un livre que l'on tourne de gauche à droite (ou inversement) lorsque l'on défile horizontalement, et de haut en bas (ou inversement) lors de déplacement vertical.

[0076] La navigation parmi les différentes informations affichables par la montre est particulièrement simple puisqu'elle est obtenue simplement par remplacement de cartes, et avec des manipulations simples sur l'écran tactile. Deux commandes – défilement horizontal ou défilement vertical - suffisent en principe pour sélectionner n'importe quelle carte et afficher ainsi toutes les indications que la montre peut afficher.

[0077] Cela n'exclut cependant pas la possibilité d'introduire d'autres commandes avec d'autres manipulations. Ainsi, l'affichage en taille réduite de la figure 3c peut avantageusement être obtenu à n'importe quel instant sans faire défiler les cartes, en introduisant une commande appropriée. Cet affichage en taille réduite constitue une sorte de table des matières graphiques qui permet à l'utilisateur de déterminer le meilleur chemin pour parvenir à la carte désirée.

[0078] Il est aussi possible d'introduire des commandes tactiles dont l'interprétation dépend de la carte actuellement affichée. Par exemple, la modification de l'heure en cours, ou l'introduction d'une alarme, peuvent être initiées depuis des cartes correspondantes à l'aide de commandes particulières, par exemple avec un double tap au centre de la glace pour

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afficher un menu ou un widget permettant d'introduire la modification souhaitée.

[0079] Une organisation particulièrement avantageuse des cartes affichées sur les écrans est illustrée à titre d'exemple en relation avec les figures 4a à 4c. Dans ce mode de réalisation, les cartes sont organisées en n niveaux, par exemple en 3 niveaux L1, L2, L3 dans cet exemple. Chaque niveau regroupe des cartes affichant des informations de même type. Dans cet exemple, le niveau L1 affiché sur la figure 4a affiche des informations de base liées par exemple à l'heure, à la date, au calendrier etc ; l'organisation de ce niveau est proche de celui illustré sur la figure 2, mais la navigation est en partie différente, et ce niveau peut en outre être quitté depuis la position centrale pour accéder à l'un des autres niveaux L2 à Ln.

[0080] Le niveau L2 illustré sur la figure 4b regroupe des cartes consacrées à différentes complications horlogères telles que chronographes, réveils, comptes à rebours, etc. Le niveau L3 regroupe quant à lui des cartes affichant des mouvements mécaniques virtuels. L'utilisateur peut ajouter des nouvelles cartes sur n'importe lequel de ces niveaux ; avantageusement, le processeur de la montre exécute un programme qui permet de placer les nouvelles cartes chargées dans la montre automatiquement au niveau le plus adapté, et au bon emplacement de ce niveau, en fonction d'attributs ou de métadonnées associés à chaque carte.

[0081] Sur chaque niveau, les cartes sont rangées principalement selon une croix avec quatre branches principales (gauche, droite, haut, bas). Des bifurcations à partir d'une branche principale sont éventuellement possibles à titre exceptionnel pour afficher plus de détails au sujet d'une carte particulière, par exemple pour passer en mode affichage semaine plutôt que affichage mois dans une carte de type calendrier. Ainsi, la navigation au sein d'un niveau se fait principalement par des opérations de défilement horizontal ou vertical, ce qui permet de minimiser le risque de se perdre dans l'arborescence des cartes. Le défilement dans une direction

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donnée se fait en déplaçant le doigt sur l'écran tactile, ce qui provoque un déplacement des cartes en continu dans la direction privilégiée du doigt ; la vitesse et l'amplitude de déplacement des cartes dépendent de l'impulsion donnée avec le doigt. L'utilisateur peut arrêter le défilement et sélectionner une carte lors du défilement par un tap sur cette carte ; la carte choisie se centre alors automatiquement.

[0082] Le passage d'un niveau à l'autre se fait en boucle, de préférence toujours à partir de la carte au centre de la croix, avec une commande appropriée. Dans un exemple, le passage d'un niveau à l'autre se fait en appuyant pendant une durée suffisante (par exemple au moins deux secondes) sur une électrode au centre de la carte centrale, ou sur une icône dédiée de cette carte. Par défaut, l'affichage retourne de lui-même à l'affichage de la carte au centre du niveau en cours, par exemple à la mise sous tension de l'affichage ou après une durée déterminée. De cette manière, la navigation est confortable même sur un écran de petite taille, et l'utilisateur ne risque pas de se perdre dans une arborescence complexe.

[0083] La figure 4a illustre un exemple d'organisation des cartes sur le niveau 1, consacré aux fonctions de base de la montre. A partir de la carte centrale 227 qui affiche par exemple l'heure courante sous forme analogique et/ou numérique, l'utilisateur peut naviguer selon un axe vertical et se déplacer pour aller sur d'autres cartes avec des images fixes ou animées 210 à 213. Dans l'exemple illustré, les cartes 212 et 213 affichées sur la branche verticale du haut correspondent à des événements futurs, par exemple des vacances prévues ou une manifestation importante ; la carte peut par exemple afficher la durée restante jusqu'à cet événement. Les cartes 211 et 210 affichées sur la branche verticale du bas correspondent à des événements passés, par exemple la naissance ou le mariage ; la carte peut par exemple afficher la durée écoulée depuis cet événement. L'utilisateur peut personnaliser les cartes de chaque événement avec ses propres images, ou ajouter de nouvelles cartes correspondant à d'autres événements via un ordinateur connecté de façon temporaire à la montre.

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[0084] Le nombre de cartes disponibles sur cet axe vertical n'est limité que par la capacité mémoire de la montre. L'image affichée en fond d'écran sur une carte particulière peut être fixe, ou changée automatiquement en mode diaporama parmi une collection de carte associée à une carte particulière. Par exemple, un utilisateur peut associer à une carte particulière un diaporama de son mariage, et à une autre cartes des images de ses vacances. D'autres cartes peuvent être associées à des images vidéo animées. Ces données sont téléchargées de préférence depuis un ordinateur connecté de façon temporaire à la montre.

[0085] L'axe horizontal du premier niveau L1 sur la figure 4a permet de changer de fuseau horaire (en se déplaçant vers la gauche en direction des cartes 220 à 222) ou d'afficher un calendrier en se déplaçant vers la droite depuis la position centrale. Les cartes 220 à 222 vers la gauche comportent de préférence une image, un texte ou un graphique illustrant un fuseau horaire particulier, par exemple avec le nom du fuseau horaire ou une image évoquant une ville de ce fuseau. L'utilisateur choisit un fuseau horaire donné simplement en défilant horizontalement ; il confirme sa sélection par exemple au moyen d'une pression longue au centre de l'écran (par exemple au moins une seconde), faute de quoi la montre retourne d'elle-même vers l'affichage de la carte centrale 227.

[0086] Le remplacement de la carte peut aussi provoquer une modification du type d'affichage de l'heure, et par exemple passer d'un affichage de l'heure analogique à un affichage numérique avec une police, une taille, une couleur et un choix des indications variable d'une carte à l'autre le long de cet axe. Dans un mode de réalisation, l'utilisateur peut choisir depuis son ordinateur la police et la couleur utilisée pour l'affichage de l'heure sur chacune des cartes, ainsi qu'éventuellement la position de cet affichage, la taille et le type d'indications affichées.

[0087] Le fond d'écran affiché sur les cartes est typiquement constitué par une image fixe ou animée préenregistrée comme fichier dans la montre. Les indications superposées, comme l'heure ou d'autres indications,

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sont de préférence constituées par des images de synthèse générées en temps réel par la montre et superposées sur le fond.

[0088] Depuis un ordinateur connecté à la montre, un utilisateur peut ajouter ou définir différentes cartes sur l'axe horizontal (et ailleurs dans l'arborescence de n'importe quel niveau), par exemple ajouter des cartes correspondant à des fuseaux horaires qui lui sont utiles. Il est aussi possible de supprimer certains fuseaux horaires moins utiles, ou de modifier la séquence des fuseaux horaires afin de regrouper les fuseaux les plus utiles près de la carte centrale 227. Depuis la carte centrale et depuis une carte de fuseau horaire particulière, par exemple depuis la carte 221, une mise à l'heure est possible en sélectionnant le chiffre des heures, des minutes ou des secondes à changer, puis en faisant tourner ou défiler le chiffre correspondant pour le remplacer par un nouveau chiffre. Il est aussi possible de déplacer des aiguilles ou d'autres indicateurs avec le doigt sur l'écran tactile afin de mettre la montre à l'heure.

[0089] L'utilisateur peut changer la carte employée par défaut comme carte centrale 227, par exemple en effectuant une commande particulière à partir d'une des cartes de la ligne 219 à 225, par exemple au moyen d'une pression longue au centre de l'écran (par exemple au moins une seconde). Le changement peut aussi être effectué depuis un ordinateur connecté à la montre.

[0090] En se déplaçant vers la droite depuis la position centrale 227, l'utilisateur peut afficher différentes cartes correspondant à différents calendriers. Le calendrier 223 affiche la date du jour devant une image sélectionnable par l'utilisateur. La carte 224 permet d'afficher en mode calendrier le mois en cours ; il est possible de passer en mode semaine, voire en mode jour, en défilant vers le haut depuis cette carte 224 dans une boucle qui revient à la carte de départ 224, ou depuis une autre carte calendrier. Depuis la carte 224, un défilement vers la droite permet d'afficher le calendrier des mois suivants. La dernière carte 225 affiche par exemple la phase de la lune.

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[0091] La figure 4B illustre à titre d'exemple une organisation possible des cartes sur le deuxième niveau de cartes L2 de l'invention. Ce niveau regroupe des écrans correspondant à différentes complications horlogères affichables par la montre. L'utilisateur parvient sur la carte 237 de ce niveau à l'aide d'une longue pression effectuée depuis la carte centrale 227 du premier niveau.

[0092] En se déplaçant horizontalement vers la gauche, l'utilisateur peut choisir plusieurs types de chronographes, par exemple un chronographe au centième de secondes (carte 240), un chronographe avec affichage simultané du temps intermédiaire 239, ou un chronographe analogique à aiguilles 238. D'autres chronographes peuvent être ajoutés par l'utilisateur en chargeant de nouvelles cartes depuis son ordinateur.

[0093] Selon une caractéristique de l'invention, le comportement par défaut lors d'un défilement sur ce niveau est différent du comportement sur les autres niveaux ; une carte choisie, par exemple un chronographe particulier, reste affichée aussi longtemps que l'utilisateur ne revient pas lui-même vers une autre carte. L'affichage ne revient donc pas par défaut vers la carte centrale 237. Un comportement particulier, différent du comportement par défaut du niveau, peut cependant être attribué à chaque carte de chaque niveau. Il est aussi possible de prévoir un retour automatique à l'image central après un temps prédéfini à la suite d'un comptage.

[0094] Depuis un chronographe particulier, par exemple depuis le chronographe 239, l'utilisateur peut démarrer le comptage du temps par un tap rapide, enregistrer un temps intermédiaire avec un nouveau tap rapide, puis interrompre le comptage avec une pression prolongée au centre. La mise à zéro du chronographe se fait par exemple avec une pression prolongée de plus d'une seconde au centre de l'écran. D'autres modes de commande sont aussi possibles, par exemple en appuyant avec le doigt sur l'un des quatre coins de l'écran tactile (avec la présence ou non

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d'un logo ou élément graphique indicateur de la commande ou de la zone active).

[0095] L'utilisateur peut aussi choisir plusieurs types de compte à rebours en se déplaçant horizontalement vers la droite depuis la position centrale 237 (écrans 241, 242, 243). Dans l'exemple, un des comptes à rebours sur la carte 241 est numérique, celui représenté sur la carte 242 est illustré par un sablier etc. Comme pour les différents chronographes, l'utilisateur peut démarrer et interrompre un compte à rebours par une action particulière depuis une des cartes 241 à 243.

[0096] D'autres complications ou outils peuvent être sélectionnés en se déplaçant verticalement depuis la carte centrale 237, afin de choisir par exemple des cartes correspondant à des films vidéo, des calendriers particuliers pour les marées, etc. L'utilisateur peut charger lui-même de nouvelles cartes depuis un ordinateur connecté à la montre.

[0097] La figure 4C illustre à titre d'exemple une organisation possible des cartes sur le troisième niveau de cartes L3 de l'invention. Ce niveau regroupe autour de la carte centrale 248 sur l'axe vertical 255 à 262 des écrans affichant différentes montres mécaniques virtuelles simulées par le processeur de la montre et affichées sur l'écran tactile. L'utilisateur peut ainsi remplacer une montre mécanique simulée par une autre montre de type différent par une simple sélection sur cet axe horizontal du troisième niveau L3. L'axe vertical 210 à 212 est dans cet exemple identique à celui du premier niveau.

[0098] Les différentes cartes 255 à 262 de mouvements mécaniques simulés peuvent par exemple correspondre au même mouvement affichant l'heure de différents fuseaux horaires, par exemple l'heure de New York sur l'écran 257 et celle de Tokyo sur l'écran 258. Elles peuvent aussi afficher et simuler des montres complètement différentes, comme sur l'écran 262. Le programme de simulation d'un mouvement particulier fait de préférence partie de la carte et est téléchargeable avec cette carte, pour être

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exécutable par le processeur de la montre lorsque la carte associée est sélectionnée.

[0099] L'affichage d'un mouvement particulier implique de préférence la simulation en trois dimensions du mécanisme horloger. Afin de réduire le temps de calcul, certains éléments affichés, par exemple des éléments statiques tels que les ponts, les platines, etc sont de préférence constitués par des images fixes ou animées, tandis que des éléments dont la position dépend du temps, tels que les engrenages, axes, échappements, aiguilles etc sont de préférence synthétisés en temps réel par le processeur de la montre en fonction de l'heure en cours, et superposés par-dessus l'image chargée.

[00100] Afin d'améliorer le réalisme de la représentation, la montre intègre de préférence un accéléromètre. Les mesures d'accélération sont utilisées par le programme de synthèse d'image afin de simuler l'effet de chocs ou d'accélération sur le mouvement. Par exemple, il est possible de simuler l'effet de la gravité sur un organe réglant ou un tourbillon.

[00101] Afin d'améliorer encore le réalisme de la représentation, l'écran tactile permet de préférence d'agir directement sur les pièces affichées, par exemple afin de déplacer directement une aiguille ou n'importe quel autre élément du mouvement.

[00102] Le programme de synthèse d'images calcule de préférence des ombres et des reflets sur les différentes pièces. Un capteur de luminosité peut être utilisé pour améliorer la représentation des ombres et des reflets. Il est aussi possible de tenir compte de l'heure courante pour modifier ces éléments.

[00103] L'heure affichée par le mouvement mécanique simulée est avantageusement un résultat des calculs de simulation, et peut être différente de l'heure déterminée par le quartz de la montre, par exemple si le dimensionnement de l'organe réglant conduit à un isochronisme

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imparfait. L'heure affichée par le mouvement simulé peut aussi être affectée par des chocs détectés par l'accéléromètre, par des manipulations de l'utilisateur sur l'écran tactile, etc. La mise à l'heure peut se faire par exemple à partir de boutons ou couronnes sur la boîte de montre, ou de façon tactile par l'écran.

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Numéros de référence employés sur les figures

1	Montre-bracelet
2	Bracelet
3	Glace
4	Affichage matriciel
5	Boîtier
21	Colonne de cartes
22	Rangée de cartes
23	Carte de départ
219	Carte concernant l'heure de lever et de coucher de soleil
220-222	Carte pour afficher l'heure dans trois fuseaux horaires différents
210-213	Cartes pour afficher le nombre de jours ou d'heures depuis un événement donné
223	Carte pour l'affichage de la date en cours
224	Carte pour l'affichage d'un calendrier
2240-2243	Cartes pour ajouter une alarme dans le calendrier / respectivement pour visualiser les semaines du mois
225	Carte pour afficher la phase de la lune
227	Carte centrale du niveau 1
237	Carte centrale du niveau 2
238-240	Cartes de chronographe sur niveau 2
241-243	Cartes de compte à rebours sur niveau 2
244-247	Cartes pour complications ou gadgets supplémentaires
248	Carte centrale du niveau 3
255-262	Cartes correspondant à des mouvements mécaniques virtuels

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Revendications

1. Montre bracelet (1) comportant :

un affichage matriciel numérique (4) ;

une glace tactile (3);

un circuit de traitement spécifiquement agencé pour interpréter les signaux de la glace tactile, pour sélectionner une carte (23, 220-225, 210-213) parmi plusieurs cartes disponibles en fonction de ces signaux, et pour afficher ladite carte sur la totalité dudit affichage matriciel numérique (4) ;

caractérisée :

en ce que la glace tactile (3) est une glace tactile à deux dimensions permettant de détecter les déplacements d'au moins un doigt selon au moins deux directions différentes ;

en ce que ledit circuit de traitement est spécifiquement agencé de manière à provoquer un défilement de cartes (23, 220-225, 210-213) afin de remplacer durablement la carte affichée initialement (23) par une autre carte,

et en ce que la direction et le sens du défilement dépendent de la direction et du sens dudit déplacement.

2. La montre de la revendication 1, dans laquelle chaque carte (23, 220-225, 210-213) comporte une image fixe ou rafraichie périodiquement, la taille de l'image correspondant à la taille dudit affichage matriciel numérique (4) de manière à ce que la carte affichée occupe tout ledit affichage matriciel numérique, chaque carte présentant une fonction particulière de la montre.

3. La montre de la revendication 2, dans laquelle chaque carte définit le comportement de l'interface tactile, et les fonctions ou modules qui doivent être démarrés en fonction des déplacements du doigt sur la carte.

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4. La montre de l'une des revendications 1 à 3, le circuit de traitement étant agencé pour détecter des contacts simultanés en plusieurs points de la glace tactile (3), de manière à constituer un écran tactile multitouch.

5. La montre de l'une des revendications 1 à 4, le circuit de traitement étant agencé pour déterminer le déplacement du centre de gravité de la zone de contact (15) du doigt sur la glace tactile.

6. La montre de l'une des revendications 1 à 5, dans laquelle lesdites cartes sont arrangées en une pluralité de niveaux, le choix d'une carte au sein de chaque niveau se faisant soit par un défilement vertical, soit par un défilement horizontal, une commande particulière permettant de passer d'un niveau à l'autre.

7. La montre de l'une des revendications 1 à 6, dans laquelle au moins une desdites cartes permet de calculer et d'afficher une simulation de montre mécanique affichant l'heure, de manière à permettre à l'utilisateur de changer de montre mécanique affichée en faisant défiler des cartes.

8. Procédé pour modifier une carte (23, 220-225, 210-213) affichée par la montre-bracelet de l'une des revendications précédentes, comportant les étapes suivantes :

détecter le déplacement d'au moins un doigt selon au moins deux directions différentes sur une glace tactile à deux dimensions (3) ;

défilement sur un affichage matriciel numérique (4) de plusieurs cartes disponibles en fonction des déplacements détectés, la direction et le sens du défilement dépendant de la direction et du sens dudit déplacement ;

affichage durable de la carte sélectionnée sur la totalité dudit affichage matriciel numérique (4).

9. Le procédé de la revendication 8, comportant en outre l'introduction d'une commande tactile de confirmation et/ou d'arrêt de défilement.

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10. Le procédé de l'une des revendications 8 ou 9, comportant la détection de contacts simultanés en plusieurs points de la glace (3).

11. Le procédé de l'une des revendications 8 à 10, comportant la détermination du déplacement du centre de gravité de la zone de contact du doigt sur la glace.

12. Le procédé de l'une des revendications 8 à 11, dans lequel les différentes cartes défilent de façon continue sur l'affichage matriciel numérique (4), le défilement étant interrompu de manière à aligner le bord d'une carte avec le bord de l'affichage matriciel numérique (4).

13. Le procédé de la revendication 12, dans lequel la vitesse et/ou l'amplitude de défilement des cartes dépend de la vitesse et/ou de l'amplitude de déplacement du doigt sur la glace tactile (3).

14. Le procédé de l'une des revendications 10 à 13, dans lequel la vitesse de défilement des cartes est variable, le défilement étant ralenti avant de s'arrêter complètement.

15. Le procédé de l'une des revendications 12 à 14, dans laquelle la vitesse de défilement des cartes est variable, le défilement étant ralenti à chaque passage d'une carte à l'autre.

16. Le procédé de l'une des revendications 8 à 15, dans laquelle la taille des cartes affichées est réduite pendant le défilement, de manière à afficher plusieurs cartes simultanément.

17. Le procédé de l'une des revendications 8 à 16, dans laquelle le défilement des cartes est interrompu par une brève pression sur la glace, de manière à provoquer la sélection et l'affichage de la carte la mieux centrée sur l'affichage au moment de cette interruption.

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18. Le procédé de l'une des revendications 8 à 17, comportant une étape d'ajout, de suppression ou de réorganisation desdites cartes.

19. Le procédé de l'une des revendications 8 à 18, comportant une étape de chargement de nouvelles cartes au travers d'une interface d'entrées sortie de la montre.

20. Le procédé de l'une des revendications 8 à 19, dans lequel lesdites cartes sont arrangées en une pluralité de niveaux, le procédé comportant une étape de défilement vertical ou horizontal, et une étape d'introduction d'une commande particulière permettant de passer d'un niveau à un autre.

21. Le procédé de l'une des revendications 8 à 20, dans lequel une pluralité desdites cartes affiche une simulation de mouvement mécanique virtuel.

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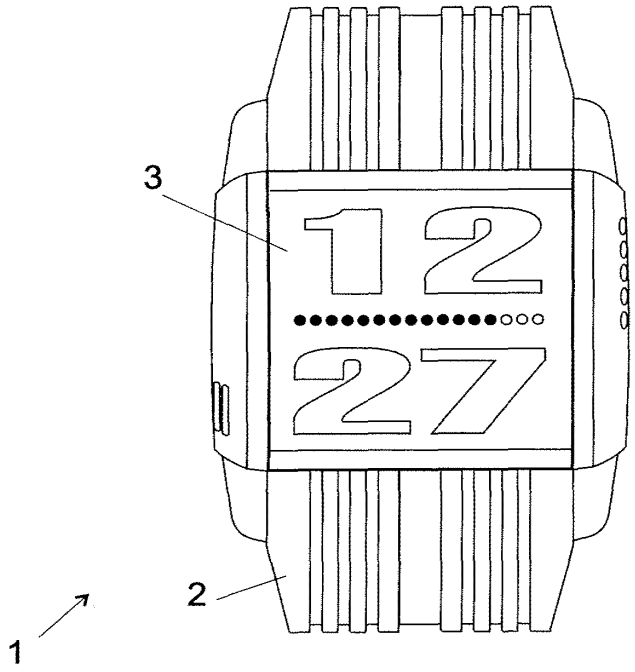


Fig. 1A

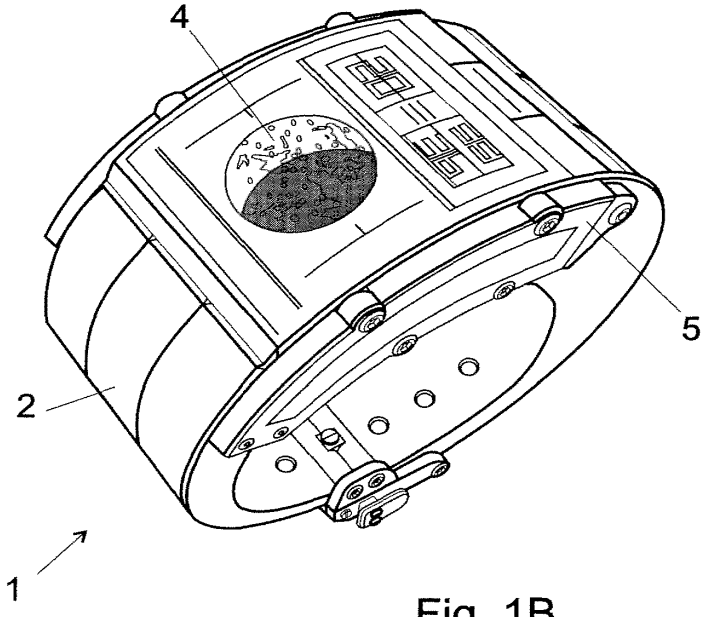


Fig. 1B

Petitioner Samsung Ex-1004, 0163

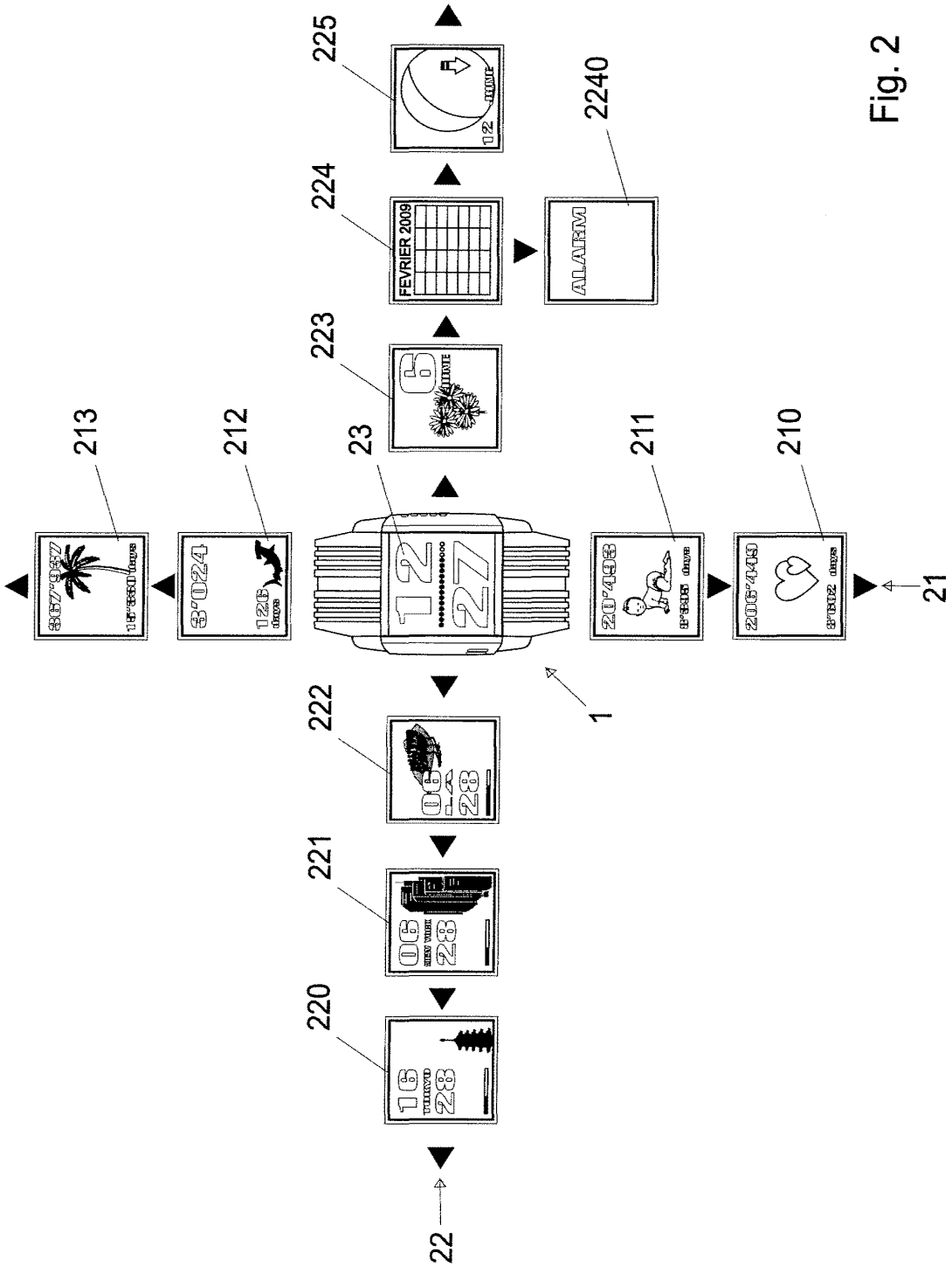
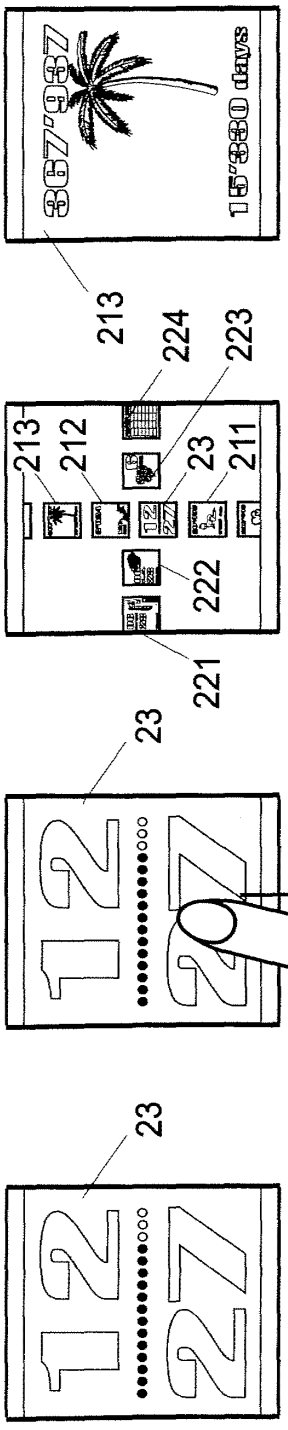

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Fig. 2



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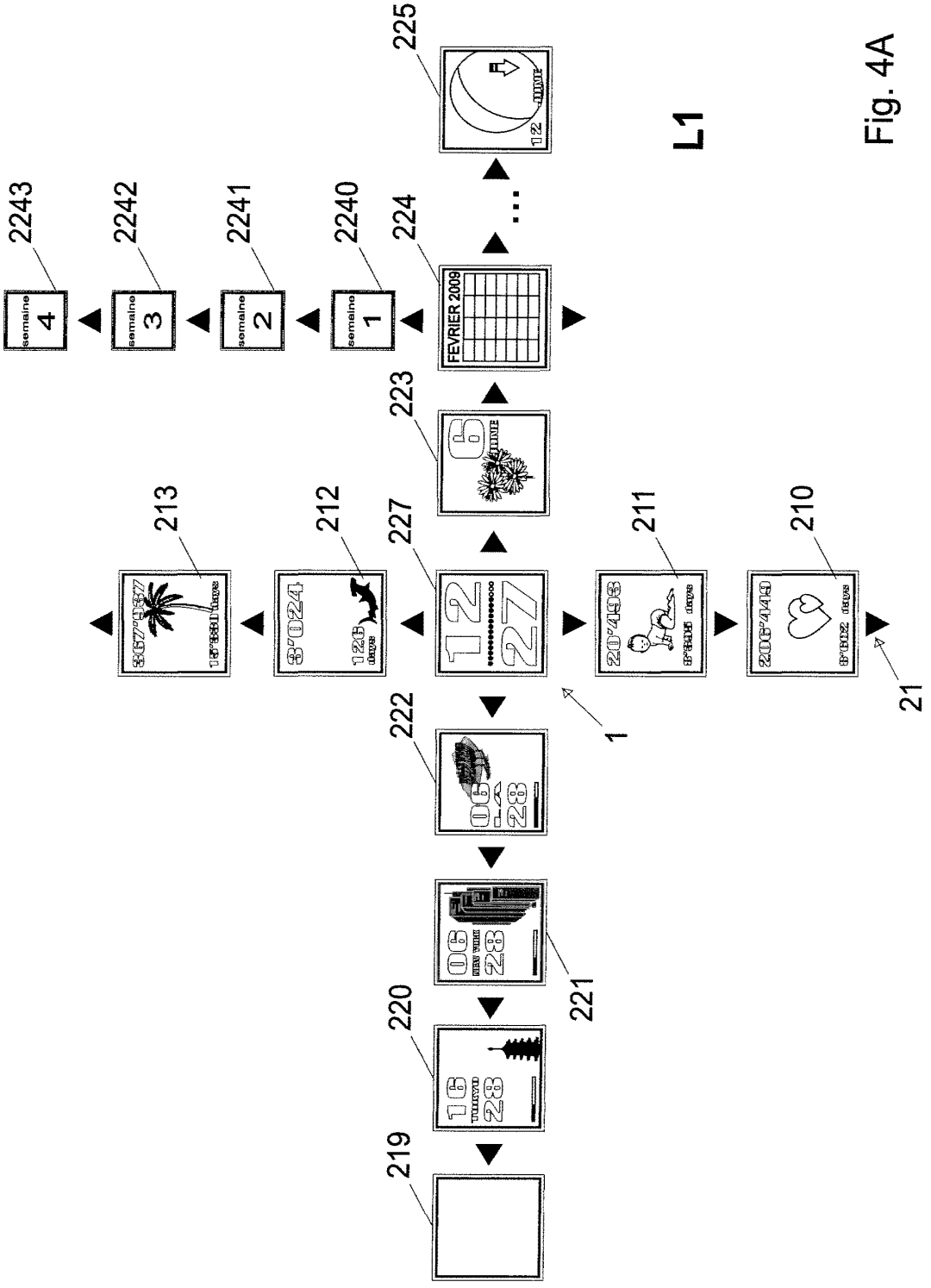


Fig. 4A

Petitioner Samsung Ex-1004, 0166

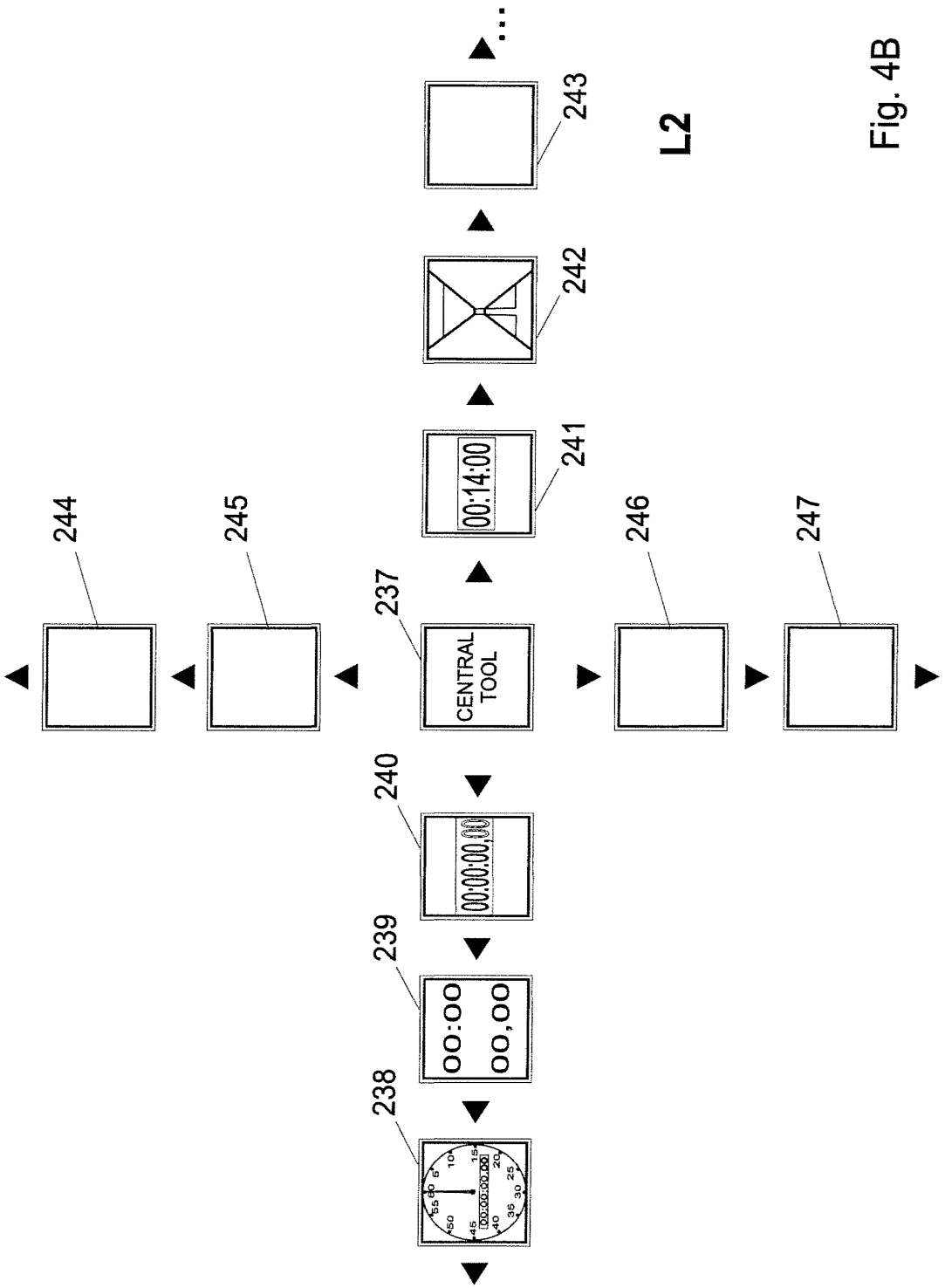


Fig. 4B

Petitioner Samsung Ex-1004, 0167

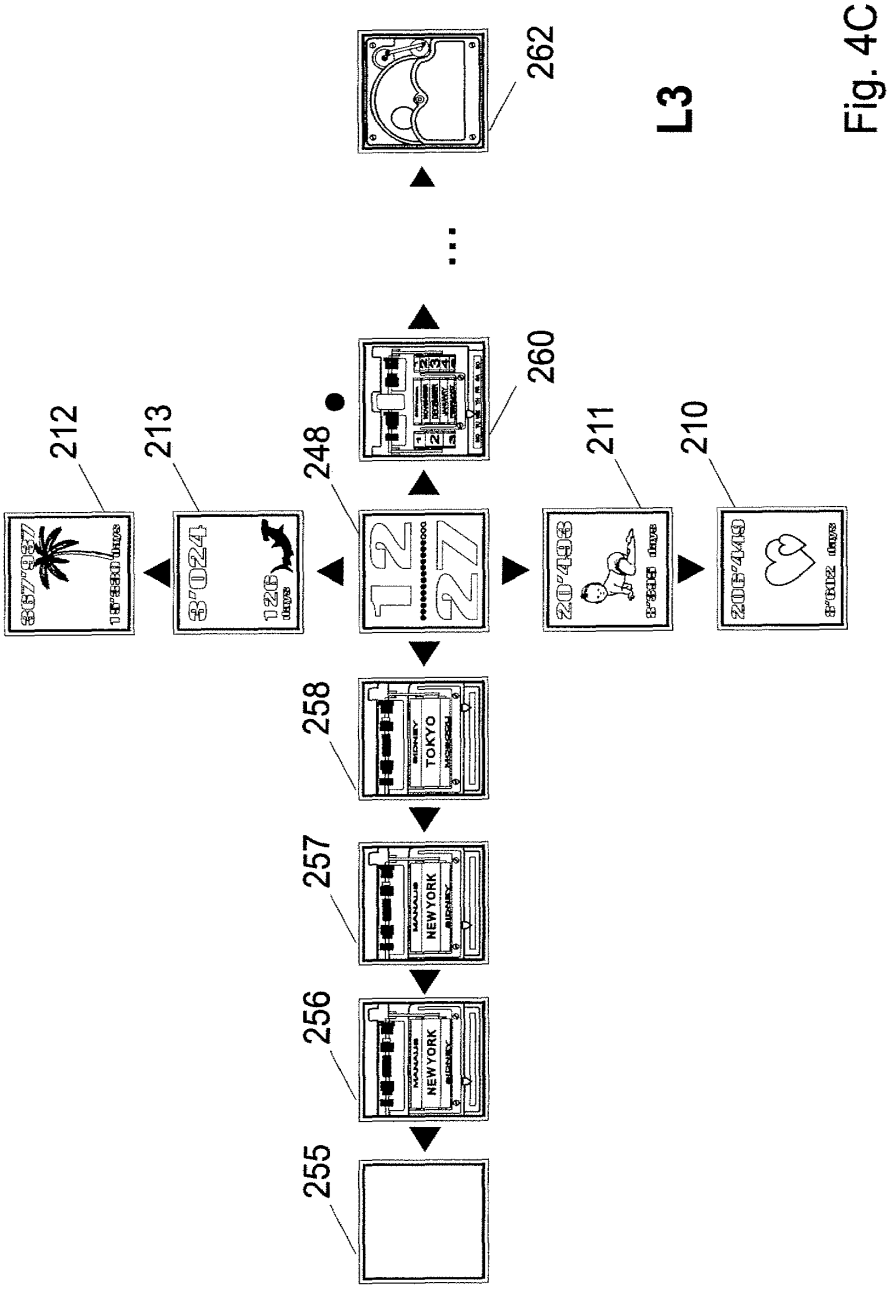

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Fig. 4C

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/059323

A. CLASSIFICATION OF SUBJECT MATTER
INV. G04G9/00 G04G21/08
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G04C G04G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2006/092177 A1 (BLASKO GABOR [US]) 4 May 2006 (2006-05-04) cited in the application paragraphs [0018] - [0023], [0026], [0044], [0046] - [0047], [0051] - [0056], [0063] - [0065]; figures 1A,1B,3,8-11	1-3,5,6, 8,9,11, 12,20,21 4,7,10, 13-19
Y	US 2008/168404 A1 (ORDING BAS [US]) 10 July 2008 (2008-07-10) paragraphs [0156] - [0181], [0233], [0242]; figure 10A	4,10, 13-17
Y	US 2005/278757 A1 (GROSSMAN JOEL K [US] ET AL) 15 December 2005 (2005-12-15) figures 1,6-14	7,19

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
4 October 2010	11/10/2010

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Bream, Philip

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Form PCT/ISA/210 (second sheet) (April 2005)

Petitioner Samsung Ex-1004, 0169

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/059323

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2004/190380 A1 (WOJCIESZAK CRAIG [US]) 30 September 2004 (2004-09-30) paragraphs [0008] - [0012]; figures 4,5	18
A	US 6 477 117 B1 (NARAYANASWAMI CHANDRASEKHAR [US] ET AL) 5 November 2002 (2002-11-05) column 1	1-21
A,P	WO 2009/097592 A1 (PILLAR VENTURES LLC [US]; TSERN ELY K [US]; MOORING DAVID J [US]) 6 August 2009 (2009-08-06) the whole document	1-21
A,P	JP 2009 250741 A (SEIKO EPSON CORP) 29 October 2009 (2009-10-29) the whole document	1-21

1

Petitioner Samsung Ex-1004, 0170

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2010/059323

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006092177 A1	04-05-2006	CN 1766824 A	03-05-2006
US 2008168404 A1	10-07-2008	AU 2008100283 A4	03-07-2008
		AU 2008201540 A1	05-06-2008
		AU 2009200366 A1	19-02-2009
		AU 2009208099 A1	03-09-2009
		AU 2009208103 A1	03-09-2009
		CA 2658177 A1	17-07-2008
		DE 112008000144 T5	26-11-2009
		DE 212008000001 U1	21-08-2008
		EP 2126678 A2	02-12-2009
		JP 2010515978 T	13-05-2010
		US 2009077488 A1	19-03-2009
		US 2009073194 A1	19-03-2009
		US 2009066728 A1	12-03-2009
		US 2009070704 A1	12-03-2009
		US 2009070705 A1	12-03-2009
		WO 2008086218 A2	17-07-2008
US 2005278757 A1	15-12-2005	NONE	
US 2004190380 A1	30-09-2004	NONE	
US 6477117 B1	05-11-2002	NONE	
WO 2009097592 A1	06-08-2009	US 2009199130 A1	06-08-2009
JP 2009250741 A	29-10-2009	NONE	

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RAPPORT DE RECHERCHE INTERNATIONALE

Demande internationale n°
PCT/EP2010/059323

A. CLASSEMENT DE L'OBJET DE LA DEMANDE
INV. G04G9/00 G04G21/08
ADD.

Selon la classification internationale des brevets (CIB) ou à la fois selon la classification nationale et la CIB

B. DOMAINES SUR LESQUELS LA RECHERCHE A PORTE

Documentation minimale consultée (système de classification suivi des symboles de classement)
G04C G04G

Documentation consultée autre que la documentation minimale dans la mesure où ces documents relèvent des domaines sur lesquels a porté la recherche

Base de données électronique consultée au cours de la recherche internationale (nom de la base de données, et si cela est réalisable, termes de recherche utilisés)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERES COMME PERTINENTS

Catégorie*	Identification des documents cités, avec, le cas échéant, l'indication des passages pertinents	no. des revendications visées
X Y	US 2006/092177 A1 (BLASKO GABOR [US]) 4 mai 2006 (2006-05-04) cité dans la demande alinéas [0018] - [0023], [0026], [0044], [0046] - [0047], [0051] - [0056], [0063] - [0065]; figures 1A,1B,3,8-11	1-3,5,6, 8,9,11, 12,20,21 4,7,10, 13-19
Y	US 2008/168404 A1 (ORDING BAS [US]) 10 juillet 2008 (2008-07-10) alinéas [0156] - [0181], [0233], [0242]; figure 10A	4,10, 13-17
Y	US 2005/278757 A1 (GROSSMAN JOEL K [US] ET AL) 15 décembre 2005 (2005-12-15) figures 1,6-14	7,19

-/--

[X] Voir la suite du cadre C pour la fin de la liste des documents

[X] Les documents de familles de brevets sont indiqués en annexe

* Catégories spéciales de documents cités:

"A" document définissant l'état général de la technique, non considéré comme particulièrement pertinent
"E" document antérieur, mais publié à la date de dépôt international ou après cette date
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"T" document ultérieur publié après la date de dépôt international ou la date de priorité et n'appartenenant pas à l'état de la technique pertinent, mais cité pour comprendre le principe ou la théorie constituant la base de l'invention
"X" document particulièrement pertinent; l'invention revendiquée ne peut être considérée comme nouvelle ou comme impliquant une activité inventive par rapport au document considéré isolément
"Y" document particulièrement pertinent; l'invention revendiquée ne peut être considérée comme impliquant une activité inventive lorsque le document est associé à un ou plusieurs autres documents de même nature, cette combinaison étant évidente pour une personne du métier
"&" document qui fait partie de la même famille de brevets

Date à laquelle la recherche internationale a été effectivement achevée	Date d'expédition du présent rapport de recherche internationale
4 octobre 2010	11/10/2010

Nom et adresse postale de l'administration chargée de la recherche internationale	Fonctionnaire autorisé
Office Européen des Brevets, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Fax: (+31–70) 340–3016	Bream, Philip

Formulaire PCT/ISA/210 (deuxième feuille) (avril 2005)

Petitioner Samsung Ex-1004, 0172

RAPPORT DE RECHERCHE INTERNATIONALE

Demande internationale n°
PCT/EP2010/059323

C(suite). DOCUMENTS CONSIDERES COMME PERTINENTS

Catégorie*	Identification des documents cités, avec, le cas échéant, l'indication des passages pertinents	no. des revendications visées
Y	US 2004/190380 A1 (WOJCIESZAK CRAIG [US]) 30 septembre 2004 (2004-09-30) alinéas [0008] - [0012]; figures 4,5	18
A	US 6 477 117 B1 (NARAYANASWAMI CHANDRASEKHAR [US] ET AL) 5 novembre 2002 (2002-11-05) colonne 1	1-21
A,P	WO 2009/097592 A1 (PILLAR VENTURES LLC [US]; TSERN ELY K [US]; MOORING DAVID J [US]) 6 août 2009 (2009-08-06) le document en entier	1-21
A,P	JP 2009 250741 A (SEIKO EPSON CORP) 29 octobre 2009 (2009-10-29) le document en entier	1-21

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RAPPORT DE RECHERCHE INTERNATIONALE

Renseignements relatifs aux membres de familles de brevets

Demande internationale n°
PCT/EP2010/059323

Document brevet cité au rapport de recherche	Date de publication	Membre(s) de la famille de brevet(s)	Date de publication
US 2006092177 A1	04-05-2006	CN 1766824 A	03-05-2006
US 2008168404 A1	10-07-2008	AU 2008100283 A4	03-07-2008
		AU 2008201540 A1	05-06-2008
		AU 2009200366 A1	19-02-2009
		AU 2009208099 A1	03-09-2009
		AU 2009208103 A1	03-09-2009
		CA 2658177 A1	17-07-2008
		DE 112008000144 T5	26-11-2009
		DE 212008000001 U1	21-08-2008
		EP 2126678 A2	02-12-2009
		JP 2010515978 T	13-05-2010
		US 2009077488 A1	19-03-2009
		US 2009073194 A1	19-03-2009
		US 2009066728 A1	12-03-2009
		US 2009070704 A1	12-03-2009
		US 2009070705 A1	12-03-2009
		WO 2008086218 A2	17-07-2008
US 2005278757 A1	15-12-2005	AUCUN	
US 2004190380 A1	30-09-2004	AUCUN	
US 6477117 B1	05-11-2002	AUCUN	
WO 2009097592 A1	06-08-2009	US 2009199130 A1	06-08-2009
JP 2009250741 A	29-10-2009	AUCUN	

Petitioner Samsung Ex-1004, 0174

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 324 159 A1

(12) DEMANDE DE BREVET EUROPEEN

(43) Date de publication:
02.07.2003 Bulletin 2003/27

(51) Int Cl.[7]: **G04G 11/00**

(21) Numéro de dépôt: **01205160.3**

(22) Date de dépôt: **27.12.2001**

(84) Etats contractants désignés:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Etats d'extension désignés:
AL LT LV MK RO SI

(71) Demandeur: **ASULAB S.A.**
2074 Marin (CH)

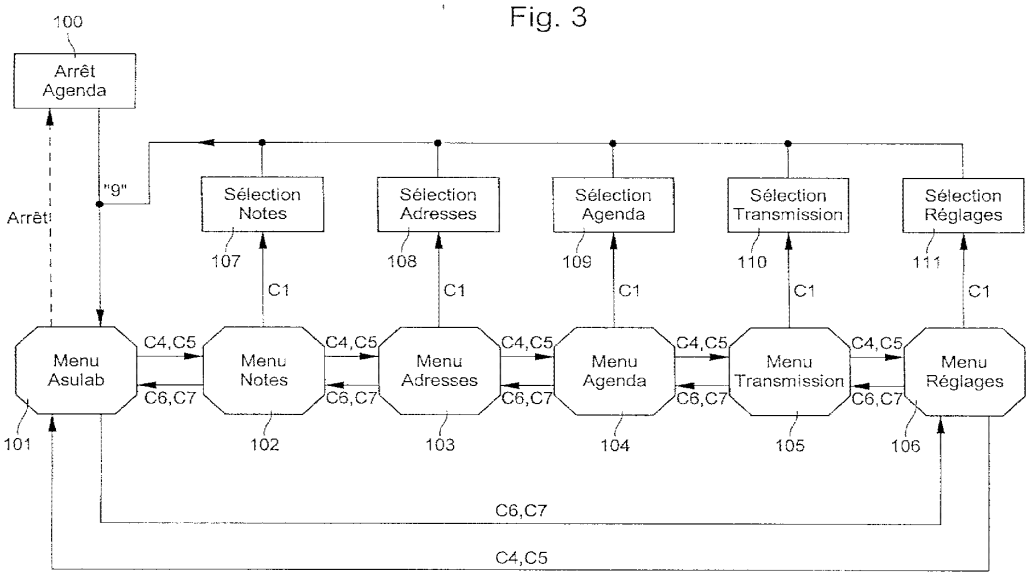
(72) Inventeur: **Guanter, Jean-Charles**
2517 Diesse (CH)

(74) Mandataire: **Ravenel, Thierry Gérard Louis et al**
I C B,
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7, rue des Sors
2074 Marin (CH)

(54) Procédé de commande pour l'exécution de fonctions dans une montre agenda

(57) Le procédé de commande permet l'exécution de diverses fonctions dans une montre agenda électronique, qui comprend dans un boîtier fermé par un verre, un circuit garde-temps et/ou un mouvement horloger alimenté par une source d'énergie, et un cadran sur lequel l'heure est affichée de manière digitale et/ou analogique. Un nombre déterminé de capteurs (C1 à C7) est prévu avec des plages sensibles au toucher disposées sur une face intérieure ou extérieure du verre. Ces capteurs sont prévus pour opérer les différentes commande du procédé lorsqu'ils sont individuellement activés par un doigt d'un utilisateur. Pour consulter des données ou des paramètres, le procédé comprend une première série d'étapes consistant à visionner différents menus (102 à 106) de la fonction agenda sur au moins un affichage à cristaux liquides en activant au moins un capteur (C4, C5) d'un groupe de capteurs (C4 à C7), et à sélectionner le menu ou la fiche à consulter (107 à 111) en activant un capteur (C1) de validation. Pour entrer des données, le procédé comprend une seconde série d'étapes consistant à activer pendant une durée déterminée ou avec une pression déterminée le capteur de validation (C1), entrer des données d'agenda en activant certains capteurs (C2 à C7) commandant chacun l'exécution d'une fonction déterminée spécifique, et valider les données introduites par l'action sur le capteur de validation.

Fig. 3



EP 1 324 159 A1

Printed by Jouve, 75001 PARIS (FR)

Petitioner Samsung Ex-1004, 0175

Description

[0001] L'invention concerne un procédé de commande pour l'exécution de fonctions dans une montre agenda. Par ce procédé, il est possible notamment d'opérer la commande pour consulter et sélectionner différents menus de la fonction agenda et pour visionner des données mémorisées ou éditées ou des paramètres de réglage.

[0002] Pour ce faire, une montre agenda électronique est utilisée pour la mise en oeuvre du procédé. Cette montre comprend notamment dans un boîtier fermé par un verre, un circuit garde-temps et/ou un mouvement horloger alimenté par une source d'énergie, un cadran sur lequel l'heure est affichée de manière digitale et/ou analogique, et au moins un affichage à cristaux liquides pour visionner des données d'agenda. Des plages sensibles au toucher de capteurs sont disposées sur une face intérieure ou extérieure du verre pour la commande de multiples opérations du procédé. Ces capteurs peuvent être activés chacun par un doigt d'un utilisateur posé sur le verre proche de la plage sensible du capteur à activer. Une unité à microprocesseur de la montre est programmée pour gérer des opérations de la fonction agenda. Cette unité peut comporter également certains modules en relation avec la base de temps. Ainsi, il est possible de consulter différents menus ou données mémorisées, ou à entrer, modifier ou supprimer des données et/ou des paramètres au moyen des capteurs reliés à l'unité.

[0003] L'exécution de fonctions de la montre concerne par exemple l'entrée de données ou de paramètres, notamment pour la composition de notes, d'adresses d'un répertoire d'adresses, pour des rendez-vous d'un agenda, ou pour le réglage de l'heure et de la date. De plus, il peut s'agir également de fonctions pour modifier ou supprimer des données ou paramètres mémorisés, pour la consultation de divers menus ou de données mémorisées, de tranches horaires à programmer, d'alarmes ou de transmission de données sans fil.

[0004] Un procédé d'introduction de données dans une montre-bracelet au moyen de capteurs sensibles au toucher a déjà été décrit notamment dans le brevet CH 635 975. Dans ce document, les moyens de commande pour les fonctions horlogères et agenda consistent en un bouton-poussoir situé sur la carrure de la boîte de montre et en un clavier ne comportant que trois touches formées sur la glace par des capteurs sensibles au toucher de type capacitif. Ces trois touches permettent d'abord de faire une sélection de fonctions pour la lecture des dates et des messages enregistrés, l'enregistrement ou la correction des dates et des messages, et la correction de l'indication horaire.

[0005] Après sélection d'une fonction, il faut ensuite effectuer des manipulations complexes sur les trois touches et le bouton-poussoir pour pouvoir utiliser ladite fonction, ce qui est un inconvénient. Par exemple en mode d'enregistrement, le choix d'une lettre dans l'alphabet pour écrire un message ne devant pas comporter plus de 9 lettres, s'effectue par sélections successives dans des groupes de lettres. Ceci demande trois manipulations au niveau des touches capteurs et une pression finale sur le bouton-poussoir ainsi qu'une bonne mémorisation de la place des lettres dans l'alphabet. Il apparaît ainsi que la conception du clavier avec un nombre réduit de touches capteurs présente un avantage au niveau esthétique. Par contre, il présente l'inconvénient de rendre l'utilisation d'une telle montre-agenda fort compliquée, tout en n'offrant que des possibilités relativement limitées. Il faudrait par exemple effectuer au moins une manipulation supplémentaire pour pouvoir disposer de plus de 27 caractères, tels que lettres majuscules et minuscules.

[0006] Il est à noter encore que lors de la composition d'un texte ou message, le bouton-poussoir doit également être utilisé ce qui complique les manipulations pour les fonctions horlogères et agenda. Il n'est pas possible avec ce nombre restreint de capteurs et le bouton-poussoir d'entrer facilement beaucoup de données pour différentes fiches de différents menus que devraient comporter une telle montre agenda.

[0007] L'invention a donc pour but principal de pallier les inconvénients de l'art antérieur en proposant un procédé de commande pour l'exécution de fonctions dans une montre agenda facilitant la consultation de différents menus ou de données de menus et l'entrée, la modification ou la suppression de données et/ou paramètres. L'emplacement des capteurs sur le verre de la montre doit permettre de lire ou d'entrer des données de la fonction agenda rapidement et de manière intuitive.

[0008] A cet effet, l'invention a pour objet un procédé de commande pour l'exécution de fonctions dans une montre agenda électronique, cité ci-devant, qui se caractérise en ce qu'il comprend une première série d'étapes dans un premier mode de consultation de la fonction agenda consistant à :

- visionner différents menus ou paramètres ou données ou fiches de données d'un menu de la fonction agenda sur l'affichage à cristaux liquides dans un ordre croissant ou décroissant en activant au moins un capteur d'un groupe de capteurs susceptibles d'opérer chacun une même fonction dans ce premier mode, et
- sélectionner un menu ou une fiche de données, d'un type parmi plusieurs types, du menu à consulter en activant un capteur de validation, et

en ce que le procédé comprend une seconde série d'étapes dans un second mode d'entrée, de modification ou de suppression de données et/ou de paramètres consistant à :

- activer pendant une durée déterminée ou avec une pression déterminée le capteur de validation afin

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d'entrer dans le second mode dans une position désirée d'un menu sélectionné,
- entrer, modifier ou supprimer des données et/ou des paramètres en activant certains capteurs commandant chacun l'exécution d'une fonction déterminée spécifique dans ce second mode, et
- valider les paramètres et/ou les données entrés, modifiés ou supprimés par l'action sur le capteur de validation.

[0009] A cet effet, l'invention a également pour objet un procédé de commande pour l'exécution de fonctions dans une montre agenda électronique, qui se caractérise en ce qu'il comprend une série d'étapes dans un mode d'entrée, de modification ou de suppression de données et/ou de paramètres de la fonction agenda consistant à :

- activer pendant une durée déterminée ou avec une pression déterminée un capteur de validation afin d'entrer dans le mode d'entrée, de modification ou de suppression de données et/ou de paramètres dans une position désirée d'un menu déterminé,
- entrer, modifier ou supprimer des données et/ou des paramètres en activant certains capteurs commandant chacun l'exécution d'une fonction déterminée spécifique dans ce mode, et
- valider les paramètres et/ou les données entrés, modifiés ou supprimés par l'action sur le capteur de validation.

[0010] Un avantage du procédé de commande pour l'exécution de fonctions, selon l'invention, est qu'il est possible de commander rapidement et de manière intuitive notamment un mode de consultation ou d'entrée de données à l'aide d'un nombre restreint de capteurs. Ce nombre de capteurs est, par exemple inférieur à 10, de préférence égal à 7. Les plages sensibles transparentes des capteurs sont disposées sur la face intérieure ou extérieure du verre de la montre, ce qui a l'avantage de ne pas nuire à l'aspect esthétique de la montre.

[0011] Pour permettre à un utilisateur de commander l'exécution de fonctions facilement et de manière intuitive, les plages sensibles sont réparties sur le verre en étant suffisamment espacées l'une de l'autre. Ainsi, il est possible de poser son doigt sur une plage sensible d'un unique capteur sans influencer d'autres capteurs avoisinants. Les plages sensibles de forme circulaire peuvent être séparées d'une distance supérieure ou égale au diamètre de chaque électrode.

[0012] Dans le cas où la montre analogique comporte sept capteurs dont un capteur au centre du verre, deux capteurs peuvent être positionnés de préférence en périphérie autour de l'indication 3h. Deux autres capteurs peuvent être positionnés de préférence en périphérie autour de l'indication 9h. Finalement, deux autres capteurs peuvent être placés en périphérie respectivement sur les indications 6h et 12h. Ainsi, il est possible de visualiser toutes les données affichées sur le ou les affichages à cristaux liquides pendant l'activation des plages sensibles, situées en périphérie du verre, par un doigt d'un utilisateur.

[0013] Dans un mode de consultation de menus ou de données ou de fiches de données d'un menu, les capteurs situés autour des indications 3h et 9h sont utilisés pour parcourir les données dans un ordre croissant ou décroissant. En activant un des capteurs autour de l'indication 3h, les menus ou données défilent sur le ou les affichages à cristaux liquides dans un ordre croissant. En activant un des capteurs autour de l'indication 9h les menus ou données défilent sur le ou les affichages à cristaux liquides dans un ordre décroissant. Ainsi, uniquement deux groupes de capteurs sont actifs dans ce mode de consultation pour visionner tous les menus ou données du menu sélectionné. La sélection d'un menu est réalisée aisément en activant le capteur situé au centre du verre.

[0014] Un autre avantage du procédé de commande, selon l'invention, est que pour entrer dans un mode d'entrée, de modification ou de suppression de données, le capteur de validation situé au centre du verre doit être activé pendant une durée déterminée ou avec une pression déterminée dans une position désirée d'un menu sélectionné. Dans ce mode d'entrée, de modification ou de suppression de données, les six capteurs autour du capteur de validation au centre du verre sont configurés chacun pour exécuter une fonction spécifique. Par exemple, les capteurs au-dessus des indications 3h et 9h permettent de sélectionner dans un sens ou dans l'autre sens un jeu de caractères (majuscules, minuscules, chiffres, symboles ou accents). Les capteurs situés au-dessous des indications 3h et 9h permettent de déplacer un curseur dans le texte édité ou modifié dans un sens ou dans l'autre sens. Finalement, les capteurs situés sur les indications 6h et 12h permettent de faire défiler les caractères d'un jeu sélectionné dans un ordre croissant ou décroissant.

[0015] Dans ce mode d'édition, un autre avantage du procédé, selon l'invention, est que la vitesse de défilement des caractères apparaissant successivement sur un des affichages à cristaux liquides peut être adaptée en fonction de la durée ou de la pression d'activation des capteurs situés sur les indications 6h et 12h.

[0016] De plus, il peut être prévu des repères disposés sur la face intérieure du verre pour indiquer à l'utilisateur la position de chaque plage sensible transparente des capteurs, et pour représenter notamment une fonction spécifique de chaque capteur. Les capteurs peuvent être du type capacitif ou résistif.

[0017] Avec le procédé de commande de la montre agenda, il est possible de compléter par exemple des champs de fiches de notes, d'adresses d'un répertoire d'adresses, d'agenda. Un champ peut comprendre par exemple jusqu'à 63 caractères alphanumériques, alors qu'une fiche peut comprendre plusieurs champs. De ce fait avec les sept capteurs à disposition, il est facile d'in-

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troduire un nombre important de champs à mémoriser pour chaque type de fiches. La mémoire de l'unité à microprocesseur peut stocker par exemple 1920 fiches note, ou 2100 fiches agenda, ou 333 fiches adresse avec des champs complétés de 12 caractères en moyenne.

[0018] Pour éviter une activation accidentelle des capteurs, la carrure du boîtier comporte de préférence un bouton-poussoir qui permet d'enclencher les capteurs et les affichages à cristaux liquides de la fonction agenda. Les capteurs et les affichages à cristaux liquides sont placés initialement et/ou après une période d'inactivité dans un mode de veille afin de réduire la consommation en énergie lorsque la fonction agenda n'est pas souhaitée ou pas utilisée. Le bouton-poussoir peut également servir pour réinitialiser la fonction agenda.

[0019] Les buts, avantages et caractéristiques du procédé de commande pour l'exécution de fonctions dans une montre agenda électronique apparaîtront mieux dans la description suivante en regard des dessins sur lesquels :

- la figure 1 représente une vue de dessus d'une montre électronique à affichage de l'heure analogique munie pour la mise en oeuvre du procédé selon l'invention,
- la figure 2 représente une coupe dans le sens 6h-12h de la montre représentée à la figure 1,
- la figure 3 représente un organigramme d'étapes du procédé, selon l'invention, pour visionner et sélectionner différents menus de la fonction agenda,
- la figure 4 représente un organigramme de différentes étapes du procédé pour l'édition d'un texte à l'aide des capteurs sensibles au toucher de la montre,
- la figure 5 représente un organigramme d'étapes du procédé, selon l'invention, pour la visualisation ou pour l'entrée, la modification ou la suppression de paramètres de la montre agenda,
- la figure 6 représente un organigramme d'étapes du procédé, selon l'invention, pour la visualisation ou pour l'entrée, la modification ou la suppression de données dans le menu notes sélectionné,
- la figure 7 représente un organigramme d'étapes du procédé, selon l'invention, pour la visualisation ou pour l'entrée, la modification ou la suppression de données dans le menu adresses sélectionné, et
- la figure 8 représente un organigramme d'étapes du procédé, selon l'invention, pour la visualisation ou pour l'édition, la modification ou la suppression de données dans le menu agenda sélectionné.

[0020] Dans l'exemple représenté aux figures 1 et 2, la montre agenda 1, pour la mise en oeuvre du procédé objet de l'invention, est du type à bracelet 10 à affichage analogique de l'heure. Elle comporte de façon connue un boîtier, délimité par une carrure-lunette 3 et un fond 3', un cadran 8 avec deux affichages à cristaux liquides 5 et 6 de type matriciel, des aiguilles 7 pour indiquer l'heure, un bouton-poussoir 9 et un verre 4 fermant le boîtier. Le verre peut être un verre saphir inrayable. Le boîtier contient sous le cadran 8 un mouvement horloger électronique 17 alimenté par une source d'énergie 15, telle qu'une pile ou un accumulateur, pour entraîner les aiguilles 7 des heures et des minutes. La source d'énergie peut être constituée par exemple de deux piles d'oxyde d'argent à 1,55 V chacune et du type RENATA 350.

[0021] Les deux affichages à cristaux liquides 5 et 6 sont de préférence de dimension équivalente situés de part et d'autre de l'axe des aiguilles. Ces affichages 5 et 6 sont par exemple fixés au dos du cadran 8 et apparaissent dans deux ouvertures du cadran 8. Les deux affichages sont utilisés principalement pour la fonction agenda afin d'afficher, dans une direction perpendiculaire à la longueur du bracelet 10, différents menus à consulter et des données éditées et mémorisées.

[0022] La montre agenda 1 comprend encore sous le cadran 8 une plaque à circuits imprimés 16, qui supporte notamment le mouvement horloger 17. Sur cette plaque 16 sont montés deux dispositifs d'entraînement 5' et 6' des affichages, qui sont reliés chacun par une bande souple de pistes conductrices 5" et 6" à chaque affichage 5 et 6, et une unité à microprocesseur 14 programmée pour la gestion de la fonction agenda. Dans la forme d'exécution présentée sur la figure 2, le pôle positif de la pile 15 ou de l'accumulateur est reliée à une borne d'alimentation positive de la plaque à circuits imprimés 16, alors que le pôle négatif GND de la pile 15 est reliée au fond 3' du boîtier métallique. Toutefois, il serait envisageable de brancher le pôle négatif de la pile à la borne d'alimentation de la plaque 16, et le pôle positif au fond 3' du boîtier.

[0023] Pour diverses manipulations de la fonction agenda qui sera expliquée en détail en référence aux figures 3 à 8, la montre agenda 1 comprend un nombre déterminé de capteurs C1 à C7 de préférence de type capacitif. Les plages sensibles des capteurs, qui sont de très fines couches conductrices transparentes, sont disposées sur une face intérieure du verre 4. Les plages sensibles des capteurs sont reliés à l'unité à microprocesseur 14 par l'intermédiaire de fils conducteurs transparents non représentés sur la face intérieure du verre et un connecteur 19. Le nombre de plages sensibles est de préférence égal à sept pour les commandes de la fonction agenda.

[0024] Les plages sensibles au toucher sont représentées sur la figure 1 par des cercles en traits interrompus. Toutes les plages sensibles C1 à C7 de forme circulaire peuvent être séparées d'une distance supérieure ou égale au diamètre de chaque plage. Ainsi, un doigt d'un utilisateur 20 peut être posé sur le verre 4 dans une zone déterminée d'une plage sensible d'un unique capteur à activer sans influencer les autres capteurs avoisinants. De plus, des repères 11 sont placés sur la face intérieure du verre 4 de manière à indiquer

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la position de chaque plage sensible, ainsi qu'une fonction de chaque capteur C1 à C7.

[0025] Une plage sensible d'un capteur C1 est placée au centre du verre 4. Ce capteur de validation C1 est utilisé en particulier pour sélectionner différents menus ou différentes fiches de données d'un menu sélectionné apparaissant sur les affichages 5, 6. De plus, ce capteur de validation sert à valider l'entrée des données dans un mode d'édition de diverses fiches de la fonction agenda. Lorsque le doigt d'un utilisateur active ce capteur C1 pendant une durée déterminée, par exemple supérieure à 2 s, le mode d'entrée, de modification ou de suppression de données et/ou de paramètres est opérant dans une position désirée du menu sélectionné. Il peut être envisagé également d'entrer dans ce mode en activant le capteur C1 par une pression supérieure à un seuil déterminé programmé dans l'unité à microprocesseur 14.

[0026] La position désirée dans un menu sélectionné peut être par exemple relative à des données et/ou des paramètres, ou à des fiches de différents types (note, adresse, agenda) placés au premier niveau du menu sélectionné, ou à des champs de fiches de données placés à un second niveau du menu sélectionné ou à d'autres données du menu sélectionné.

[0027] Deux deuxièmes capteurs C2, C3 ont leur plage sensible disposée en périphérie du verre respectivement à 12h et à 6h. Ces capteurs C2, C3 peuvent être utilisés dans un mode d'édition pour faire défiler dans un sens croissant ou décroissant les caractères alphanumériques, les symboles, les ponctuations ou les accents. En maintenant le doigt sur l'un ou l'autre des capteurs C2, C3, le défilement des caractères dans un sens ou dans l'autre sens peut se faire avec une vitesse plus élevée pour rapidement trouver le caractère désiré. Dans une variante de réalisation, une pression plus importante sur l'un ou l'autre capteurs C2 ou C3 peut permettre d'augmenter la vitesse de défilement.

[0028] La gestion de la vitesse de défilement des caractères d'un jeu de caractères sélectionné peut être faite par l'unité à microprocesseur 14. Par simplification, il peut être prévu une première vitesse lente lorsque la durée des activations du capteur C2 ou du capteur C3 est en dessous d'une valeur seuil déterminée. Une seconde vitesse rapide de défilement des caractères est effectuée si la durée d'activation du capteur C2 ou du capteur C3 est supérieure à une valeur seuil déterminée.

[0029] Pour la validation par exemple du caractère désiré, le capteur C1 peut être activé par le doigt de l'utilisateur. Si le menu agenda a été sélectionné, les capteurs C2, C3 servent à faire défiler les mois du calendrier dans un sens croissant ou décroissant. Si le menu adresses a été sélectionné, ils servent à faire défiler le premier nom de chaque lettre de l'alphabet du répertoire dans un ordre croissant avec le capteur C2 et dans un ordre décroissant avec le capteur C3.

[0030] Il est à noter que lors du choix d'un menu de la fonction agenda (notes, adresses, agenda, transmission, réglages), les seconds capteurs C2 et C3 ne fournissent aucune commande.

[0031] Deux troisièmes capteurs C4, C5 ont leur plage sensible disposée en périphérie du verre autour de l'indication 3h. Finalement, deux quatrièmes capteurs C6, C7 ont leur plage sensible disposée en périphérie du verre autour de l'indication 9h. Les capteurs C4, C5 servent à visionner différents menus successivement sur les affichages 5 et 6 dans un ordre croissant déterminé, alors que les capteurs C6, C7 servent à visionner les menus dans un ordre décroissant déterminé. En pressant sur le capteur C1, le menu désiré est sélectionné, et les capteurs C4 à C7 peuvent être activés pour consulter les données et/ou paramètres, ou les fiches de données du menu sélectionné. Si le menu agenda a été sélectionné, les capteurs C4 à C7 servent à faire défiler les jours d'un mois du calendrier dans un ordre croissant avec les capteurs C4, C5 ou dans un ordre décroissant avec les capteurs C6, C7. Si le menu d'adresses a été sélectionné, les capteurs C4 à C7 servent à faire défiler les noms du répertoire d'adresses dans un ordre croissant avec les capteurs C4, C5 ou dans un ordre décroissant avec les capteurs C6, C7. Dans un mode d'édition, les capteurs C4 à C7 permettent de choisir un jeu de caractères pour l'édition d'une note, d'une adresse ou de rendez-vous de l'agenda, et également de déplacer un curseur dans la rédaction du message.

[0032] Cette répartition des capteurs sur le verre 4 permet d'exécuter diverses commandes de la fonction agenda facilement et de manière intuitive sans qu'il soit nécessaire de consulter un mode d'emploi spécifique.

[0033] Dans l'unité à microprocesseur 14, une mémoire non volatile par exemple du type EEPROM, non représentée, sert à enregistrer toutes les fiches de données entrées à l'aide des capteurs sensibles au toucher. Le microprocesseur de ladite unité peut être par exemple le microprocesseur PUNCH à 8-bit fabriqué par la société EM Microelectronic-Marin SA en Suisse.

[0034] Des moyens d'émission et/ou de réception de signaux radiofréquences courte distance sont également prévus dans la montre agenda 1. Ils comprennent un module RF 18 fixé sur la plaque à circuits imprimés 16, et une antenne 2 reliée par un connecteur 19 au module RF 18. Une communication peut être établie par exemple avec une station d'ordinateur ou une autre montre non représentée pour la transmission bidirectionnelle de signaux de données d'agenda. Comme le boîtier de la montre est en matériau métallique dans cette forme d'exécution, l'antenne 2 est placée de préférence sous la cadran 8 à sa périphérie. Pour une transmission dans la bande ISN à 433,9 MHz par exemple, l'antenne est constituée d'une seule spire circulaire. Cette spire définit une portion d'un cercle de diamètre le plus grand possible afin de présenter le gain maximum possible dans l'encombrement donné de la montre. Toutefois, l'antenne peut être de plus grande dimen-

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sion et adaptée à la fréquence choisie des signaux radiofréquences. Cette fréquence porteuse peut être choisie jusqu'à une fréquence de l'ordre de 2,45 GHz par exemple.

[0035] Sur le cadran 8 de la montre, des icônes 13 sont placées autour de chaque affichage à cristaux liquides pour la représentation d'un menu, d'une opération ou d'une programmation à effectuer. Au moins un pointeur 12 apparaissant sur au moins un des affichages 5 et 6 est commandé par l'unité à microprocesseur 14 pour désigner une des icônes. Ainsi, l'utilisateur peut observer directement quelle opération, quel menu ou quelle programmation est effectuée ou sélectionnée. Les icônes peuvent définir par exemple une confidentialité des données, un mode d'édition, des alarmes, l'état de la pile, des menus notes, adresses, agenda, transmission et réglages, des opérations d'édition, d'annulation d'entrée de données, de suppression de données, ou d'insertion ou suppression de caractères, des jeux de caractères (majuscules, minuscules, chiffres, symboles ou accents). Sur la figure 1, trois pointeurs de l'affichage 6 indiquent la confidentialité des données, le mode d'édition et le menu agenda sélectionné, alors qu'un pointeur de l'affichage 5 indique le jeu de caractères choisi par les capteurs C4 ou C6 pour la rédaction d'un texte.

[0036] Pour réduire la consommation de la source d'énergie, les capteurs C1 à C7 sont dans un mode de repos ou de veille lorsque la fonction agenda n'est pas activée, ainsi que les affichages à cristaux liquides 5, 6 et une partie de l'unité à microprocesseur 14. Dans ce mode de veille, la montre agenda ne fournit que l'information de l'heure, et les capteurs restent inactifs.

[0037] Le bouton-poussoir 9 situé sur la carrure 3 permet d'enclencher ou de réinitialiser la fonction agenda. Dans ce mode de fonctionnement, les aiguilles 7 sont entraînées par le moteur 17 de façon à occuper une position ne perturbant pas la vision de données sur chaque affichage, ainsi que la fonctionnalité de chaque capteur. Une première aiguille peut occuper une position proche de l'indication 9h, alors qu'une seconde aiguille peut occuper une position proche de l'indication 3h. Une fois que la fonction agenda n'est plus utilisée, par exemple après une durée déterminée d'inactivité, elle est désactivée. Dès ce moment, les aiguilles 7 sont ramenées dans leur position d'indication de l'heure d'une manière bien connue par un homme du métier dans ce domaine technique.

[0038] Il est à noter qu'il peut être envisagé que la fonction agenda soit enclenchée par l'action sur au moins un des capteurs C1 à C7 pendant une durée déterminée. Toutefois, dans une ambiance particulièrement humide, les capteurs risquent d'être continuellement activés par la présence de l'eau sur le verre 4 de montre 1. De ce fait, une consommation inutile en énergie risque de décharger plus rapidement la pile ou l'accumulateur de la montre.

[0039] La montre agenda électronique peut être comparée à un organisateur traditionnel ("PDA" organizer en terminologie anglaise). Cependant, le nombre réduit de capteurs aisément manipulables offre un avantage considérable par rapport à un tel organisateur, sans nuire à l'esthétisme de la montre agenda. A titre d'exemple, il est possible de composer et d'enregistrer dans la mémoire de l'unité à microprocesseur 1920 fiches note, ou 2100 fiches agenda, ou 333 fiches adresse avec des champs complétés de 12 caractères en moyenne. Pour différents types de fiches, la mémoire peut mémoriser par exemple 100 fiches note, 1000 fiches agenda et 160 fiches adresse ce qui est considérable pour une telle montre agenda.

[0040] Il est bien entendu évident que les capteurs capacitifs de la montre agenda peuvent être configurés d'une autre manière notamment par l'unité à microprocesseur 14 pour l'exécution d'autres fonctions non décrites. De plus, les capteurs peuvent aussi être du type résistif avec leur plage sensible disposée sur la face extérieure du verre, mais avec des fils isolés de connexion à l'unité à microprocesseur. Toutefois, ces plages risquent de s'user rapidement suite aux multiples contacts du doigt d'un utilisateur sur le verre.

[0041] Pour des détails techniques complémentaires sur le traitement des signaux d'activation des capteurs, le lecteur peut se référer au document EP 0 838 737 du même Demandeur qui est cité en référence.

[0042] Les différentes étapes du procédé de commande selon l'invention seront maintenant décrites en référence aux figures 3 à 8.

[0043] La figure 3 montre une première série d'étapes du procédé de commande selon l'invention. Dans cette première série d'étapes, les différents menus sont visualisés sur les affichages à cristaux liquides lorsque la fonction agenda est opérationnelle par l'action sur le bouton-poussoir 9.

[0044] Dans un mode de veille à l'étape 100, les capteurs sont dans un état inactif, et les affichages à cristaux liquides n'affichent aucune donnée. Dès qu'une pression sur le bouton-poussoir 9 est effectuée à l'étape 101, le menu Asulab initial est présenté sur les affichages à cristaux liquides. De préférence, l'affichage à cristaux liquides placé au-dessus des indications 3h et 9h affiche "Menu", alors que l'affichage à cristaux liquides placé au-dessous des indications 3h et 9h affiche "Asulab". Il est bien clair qu'un seul affichage pourrait également être utilisé dans la montre agenda et afficher ces données par exemple sur une ou plusieurs lignes.

[0045] Dans la suite de la description, il est à noter que les cadres rognés dans les coins dans chaque organigramme des figures 3 à 8, et qui contiennent diverses données, montrent un exemple de ce qui peut s'afficher sur les affichages à cristaux liquides. Par mesure de simplification, il ne sera fait référence dans la suite de la description que d'un affichage du haut et d'un affichage du bas pour afficher les données à consulter ou à éditer.

[0046] En activant un des capteurs C4 ou C5, il est

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possible de visualiser dans un ordre croissant tous les menus de la fonction agenda. A chaque activation successive d'un des capteurs C4 ou C5 par le doigt d'un utilisateur, les menus Notes 102, Adresses 103, Agenda 104, Transmission 105 et Réglages 107 s'affichent sur les affichages à cristaux liquides à la suite du menu Asulab 101. Ces différents menus peuvent également être visionnés sur lesdits affichages dans un ordre décroissant en activant successivement un des capteurs C6, C7 comme indiqué par le sens des flèches de la figure 3.

[0047] Lorsqu'un des menus 102, 103, 104, 105 et 106 est affiché sur lesdits affichages, il est possible de sélectionner le menu affiché en activant le capteur de validation C1. Ceci permet de consulter des données mémorisées dans le menu sélectionné 107 à 111 ou d'éditer de nouvelles données dans le menu sélectionné.

[0048] Comme la montre agenda comprend des moyens d'émission et/ou de réception de signaux radiofréquences courte distance, lorsque le menu Transmission 105 est présenté, l'activation du capteur C1 opère une sélection 110 du menu Transmission. Dès ce moment, les capteurs deviennent inactifs jusqu'à ce que la transmission des données d'agenda, à communiquer à une station d'ordinateur ou à une autre montre, ait réussi ou échoué. Il est également possible de prévoir d'entrer dans ce menu Transmission par une activation d'une durée déterminée du capteur de validation C1.

[0049] Une fois qu'une sélection d'un menu a été faite par le capteur C1, il est toujours possible de revenir à la position initiale d'affichage du menu Asulab en activant le bouton-poussoir 9. De plus si aucune opération de la fonction agenda n'a été faite, l'unité à microprocesseur commande l'arrêt automatique de la fonction agenda après une période d'inactivité déterminée. L'arrêt de la fonction agenda rend les capteurs inactifs et normalement aucune information n'est affichée par les affichages à cristaux liquides.

[0050] La figure 4 montre des étapes pour l'édition ou la modification d'un texte 50 du procédé de commande selon l'invention.

[0051] Dans les menus Notes, Adresses, Agenda et Réglages sélectionnés, il est possible de rédiger ou modifier des textes. Pour ce faire, il est nécessaire d'activer le capteur de validation C1 pendant une durée déterminée, par exemple pendant 2 s, pour entrer dans ce mode d'édition de texte. Sur les figures 3 à 8, l'activation longue du capteur C1 est représentée par le signe de référence C1long.

[0052] L'exemple, présenté à la figure 4 pour l'édition d'un texte, est relative à l'édition d'un titre dans le menu Notes sélectionné. Bien entendu, ces opérations décrites sont similaires dans chaque autre menu sélectionné pour éditer un texte. Dans l'explication de cette figure, il est à noter que chaque capteur dans ce mode d'édition est configuré pour exécuter une fonction spécifique différente.

[0053] Dans le mode d'édition activé à la première étape 51, il est présenté sur l'affichage du haut l'indication TITRE et sur l'affichage du bas une ébauche de texte aB1+. Selon une configuration initiale dans le mode d'édition, les caractères alphanumériques majuscules sont désignés par un pointeur de l'affichage du bas dirigé vers une icône de caractères majuscules. De plus, le curseur se trouve positionné sur le premier caractère du message.

[0054] Les capteurs C4 et C6 permettent de sélectionner le jeu de caractères (majuscules, minuscules, chiffres, symboles et accents) dans un ordre croissant pour le capteur C4 et dans un ordre décroissant pour le capteur C6 comme indiqué par le sens des flèches dans la figure 4. Comme montré sur la figure 4, on passe successivement des caractères alphanumériques majuscules 51, aux caractères alphanumériques minuscules 52, aux chiffres 53, aux symboles 54 et aux accents 55 par l'action successive du capteur C4. Après la sélection des accents 55, l'action du capteur C4 sélectionne au moins une position d'insertion de caractères 56. Dans cette étape 56, l'activation du capteur C2 ajoute des espaces pour l'insertion de caractères. Ces espaces sont signalés chacun par une barre de curseur 66. Dans cette étape 56, l'activation du capteur C3 supprime des espaces ajoutés, voire des caractères du titre.

[0055] Depuis l'étape 56, une action sur le capteur C4 fait passer à une position d'annulation 57 et finalement un retour à la position initiale des caractères majuscules 51. Dans la position d'annulation, l'action sur le capteur de validation C1 annule l'édition du texte pour passer du mode d'édition à un mode de consultation initial.

[0056] Après chaque sélection du jeu de caractères, il est possible d'enregistrer la ligne de texte composée en activant le capteur de validation C1.

[0057] Pour l'étape du choix du caractère 61 à l'endroit de l'indication du curseur 66, un défilement des caractères majuscules sélectionnés dans cet exemple est réalisé à l'aide de l'action sur les capteurs C2 et C3. Au début à la première brève activation du capteur C2, le premier caractère majuscule 67 de l'alphabet apparaît sur l'affichage du bas. Par contre, si le capteur C3 est brièvement activé au début à la place du capteur C2, la dernière lettre majuscule de l'alphabet apparaît. L'action sur le capteur C2 fait défiler les caractères alphanumériques chronologiquement dans un ordre croissant, alors que l'action sur le capteur C3 fait défiler les caractères alphanumériques chronologiquement dans un ordre décroissant. En activant le capteur C2 depuis l'étape 58, on obtient tout d'abord le caractère B à l'étape 59 puis le caractère C à l'étape 60. Bien entendu, si le capteur C2 est toujours activé, l'alphabet est parcouru dans un ordre croissant de A à Z. En maintenant le capteur C2 continuellement activé, une vitesse de défilement des caractères majuscules peut être supérieure à la vitesse de défilement des caractères en activant brièvement et de manière successive ledit capteur C2. Il en est de même avec le capteur C3 si ce dernier est activé pour faire défiler les caractères de l'alphabet dans un

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ordre décroissant de Z à A.

[0058] Il est à noter qu'il est possible d'interrompre le défilement des caractères dans un ordre croissant par l'action du capteur C2, et de faire défiler les caractères dans un ordre décroissant par l'action du capteur C3, et vice versa, comme indiqué par le sens des flèches sur la figure 4.

[0059] Pour l'étape du déplacement du curseur 66 dans le texte édité ou modifié, les capteurs C5 et C7 sont utilisés. Au début, le curseur 66 se trouve positionné à l'endroit du premier caractère à éditer ou à modifier. En activant le capteur C5, le curseur se déplace de l'étape 63 à l'étape 65 vers la droite, alors qu'en activant le capteur C7, le curseur se déplace par exemple de l'étape 65 à l'étape 63 vers la gauche jusqu'à la première position.

[0060] Une fois que le texte a été rédigé, le capteur de validation C1 peut être activé pour enregistrer les données éditées et revenir dans le menu sélectionné en mode de consultation.

[0061] Il est à noter qu'un champ de données peut comprendre, pour ce mode préféré, jusqu'à 63 caractères du type alphanumérique par exemple, mais chaque affichage ne peut montrer que 12 caractères. Le message rédigé va donc défiler sur l'affichage permettant de le lire intégralement.

[0062] La figure 5 montre différentes étapes du procédé de commande, selon l'invention, pour la consultation ou l'entrée de données et/ou de paramètres dans le menu sélectionné Réglages 111.

[0063] Une fois que la sélection du menu Réglages 111 est opérée, les affichages à cristaux liquides indiquent tout d'abord l'heure actuelle à l'étape 112 qui provient par exemple d'un circuit garde-temps de la montre en correspondance à l'heure affichée par les aiguilles. Dans ce mode de consultation des différentes données ou paramètres de ce menu, un des capteurs d'un premier groupe de capteurs C4, C5 peut être activé pour consulter diverses données ou paramètres dans un ordre croissant ou dans une direction déterminée. L'activation d'un des capteurs d'un second groupe de capteurs C6, C7 peut être activé pour consulter lesdites données ou lesdits paramètres dans un ordre décroissant ou dans une direction opposée. L'activation des capteurs C2 et C3 n'a aucun effet dans ce mode de consultation du menu Réglages.

[0064] En activant successivement un des capteurs C4 ou C5 depuis l'indication de l'heure actuelle à l'étape 112, les affichages à cristaux liquides indiquent, dans un ordre chronologique, une date actuelle 121, au moins une alarme 123, des données musicales 125, une langue programmée 127, une opération de synchronisation des aiguilles 129, une indication de la mémoire utilisée 131, un code de confidentialité 133, et une étape terminale de retour 135. Bien entendu en activant successivement un des capteurs C6 ou C7 au lieu d'activer un des capteurs C4 ou C5, il est possible de consulter les données de ce menu dans une direction opposée. Les flèches, reliant chaque position de consultation de ce menu, indiquent la direction de consultation en fonction des capteurs activés C4, C5 ou C6, C7. Le passage à ces différentes étapes peut être également réalisé en maintenant activé un des capteurs C4 ou C5 ou un des capteurs C6 ou C7.

[0065] A titre d'exemple d'édition ou de réglage des paramètres, on explique ci-après la façon de corriger l'heure affichée. En activant pendant une durée déterminée le capteur C1 à l'étape 112, on passe dans un mode d'édition ou de réglage de l'heure 113. A l'étape 114, l'affichage du bas indique l'heure 10:30 à corriger avec les premiers chiffres d'indication de l'heure qui clignotent. Si le capteur C2 est activé brièvement depuis l'étape 114, les chiffres de l'heure sont incrémentés d'une unité pour indiquer 11:30 à l'étape 115. Par contre, si le capteur C3 est activé brièvement à l'étape 114, les chiffres de l'heure sont décrémentés d'une unité pour indiquer 9:30 à l'étape 116. Bien entendu, il est également possible de passer de l'étape 116 à l'étape 114 en activant brièvement le capteur C2 pour incrémenter d'une unité les chiffres de l'heure ou de passer de l'étape 115 à l'étape 114 en activant brièvement le capteur C3 pour décrémenter d'une unité les chiffres de l'heure.

[0066] Si le capteur C2 est à plusieurs reprises activé brièvement, les chiffres de l'heure sont incrémentés du nombre d'unités correspondant au nombre d'activations du capteur C2. Ledit capteur C2 peut également être maintenu activé pour faire défiler les chiffres de l'heure dans un ordre croissant à une vitesse déterminée de manière à corriger l'heure entre 0 et 12h ou entre 0 et 24h selon la configuration souhaitée. De même, si le capteur C3 est à plusieurs reprises activé brièvement, les chiffres de l'heure sont décrémentés du nombre d'unités correspondant au nombre d'activations du capteur C3. Le capteur C3 peut comme pour le capteur C2 être maintenu activé pour faire défiler les chiffres de l'heure dans un ordre décroissant à une vitesse déterminée.

[0067] Pour corriger les minutes de l'heure affichée à l'étape 114, un des capteurs C4 ou C5 doit être activé de manière à faire apparaître sur l'affichage du bas à l'étape 117 les chiffres des minutes qui clignotent. L'opération inverse peut également être réalisée en activant un des capteurs C6 ou C7 pour passer de l'étape 117 à l'étape 114. Comme auparavant, en activant brièvement le capteur C2 à l'étape 117, les chiffres des minutes sont incrémentés d'une unité pour indiquer 10:31 à l'étape 118. Par contre en activant brièvement le capteur C3 à l'étape 117, les chiffres des minutes sont décrémentés d'une unité pour indiquer 10:29 à l'étape 119. Bien entendu, il est également possible de passer de l'étape 119 à l'étape 117 en activant brièvement le capteur C2 pour incrémenter d'une unité les chiffres de l'heure ou de passer de l'étape 118 à l'étape 117 en activant brièvement le capteur C3 pour décrémenter d'une unité les chiffres de l'heure.

[0068] Si le capteur C2 est à plusieurs reprises activé

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brièvement notamment depuis l'étape 117, les chiffres de l'heure sont incrémentés du nombre d'unités correspondant au nombre d'activations du capteur C2. Ledit capteur C2 peut également être maintenu activé pour faire défiler les chiffres des minutes dans un ordre croissant à une vitesse déterminée de manière à corriger les minutes entre 0 et 59 minutes. De même, si le capteur C3 est à plusieurs reprises activé brièvement notamment depuis l'étape 117, les chiffres de l'heure sont décrémentés du nombre d'unités correspondant au nombre d'activations du capteur C3. Le capteur C3 peut, comme pour le capteur C2, être maintenu activé pour faire défiler les chiffres des minutes dans un ordre décroissant à une vitesse déterminée.

[0069] Une fois que l'heure de la montre a été corrigée, l'enregistrement de l'heure, ainsi que la synchronisation des aiguilles du mouvement horloger est réalisé à l'étape 120 en activant le capteur de validation C1. Après cette étape 120, il y a un retour à l'étape 112 d'indication de l'heure actuelle.

[0070] La date à l'étape 121 peut également être modifiée. En activant pendant une durée déterminée le capteur de validation C1, on entre dans un mode d'édition de la date à l'étape 122. Toutes les étapes de correction ou modification de la date ne seront pas décrites en détail, mais sont basées sur le même principe décrit précédemment pour la correction de l'heure affichée. Après avoir corrigé la date, le capteur de validation C1 peut être activé pour mémoriser la date corrigée et revenir à l'étape 121.

[0071] Au moins une alarme à l'étape 123 peut être également programmée. En activant pendant une durée déterminée le capteur de validation C1, on entre dans un mode d'édition des fonctions d'alarmes à l'étape 124. Le réglage ou programmation de cette alarme ne sera également pas décrit en détail, car ce réglage est basé sur le même principe d'activation des capteurs C2 à C7 décrit précédemment pour la correction de l'heure affichée. La validation de l'alarme programmée est réalisée en activant le capteur C1.

[0072] A l'étape 125, l'activation pendant une durée déterminée du capteur C1 fait passer à l'étape 126 en mode de réglage de la musique souhaitée par exemple pour au moins une alarme ou signaler des rendez-vous. Dans ce mode de réglage, l'activation du capteur C2 ou C3 permet d'opérer un choix de mélodies. Plusieurs mélodies à choix, par exemple quatre mélodies, sont enregistrées dans l'unité à microprocesseur. Elles sont désignées chacune par un titre apparaissant sur l'affichage du bas lors de la sélection à l'étape 126 ou après la mémorisation suite à l'activation du capteur C1.

[0073] A l'étape 127, l'activation pendant une durée déterminée du capteur C1 permet d'entrer à l'étape 128 dans un mode de réglage de la langue souhaitée pour désigner par exemple chaque objet des fiches dans une langue désirée. Dans ce mode de réglage, l'activation du capteur C2 ou C3 permet d'opérer un choix de langues. Plusieurs langues à choix, par exemple au moins cinq langues, sont mémorisées dans l'unité à microprocesseur. Elles sont indiquées chacune sur l'affichage du bas lors de la sélection à l'étape 128 ou après la mémorisation suite à l'activation du capteur C1.

[0074] A l'étape 129, l'activation pendant une durée déterminée du capteur C1 permet d'entrer à l'étape 130 dans un mode de réglage de la position des aiguilles. Le réglage des aiguilles est réalisé en activant par exemple un des capteurs C2 ou C3 qui ont pour fonction de déplacer les aiguilles jusqu'à une position de référence, telle que 12h indiquée sur l'affichage du bas. L'activation du capteur C2 permet de bouger l'aiguille des minutes dans le sens horaire, alors que l'activation du capteur C3 permet de bouger l'aiguille des minutes dans le sens anti-horaire. Une fois que les aiguilles ont été amenées sur la position de référence par l'action manuelle sur les capteurs C2 et C3, l'activation du capteur C1 va permettre de ramener les aiguilles dans leur position corrigée d'indication de l'heure. L'activation du capteur C4 ou C5, ou du capteur C6 ou C7, permet de corriger les heures. A chaque activation, une heure est corrigée dans le sens horaire avec un des capteurs C4 ou C5 ou dans le sens anti-horaire avec un des capteurs C6 ou C7.

[0075] A l'étape 131, l'activation du capteur C1 pendant une durée déterminée permet de gérer automatiquement la place mémoire à l'étape 132 qui comprend un certain nombre de fiches mémorisées. Une fois que la gestion est terminée, un retour à l'étape 131 est opéré.

[0076] A l'étape 133, l'activation du capteur C1 pendant une durée déterminée permet de passer dans un mode d'édition d'un code confidentiel à l'étape 134. Dans ce mode d'édition, il est possible d'écrire un nom de code comme expliqué en référence à la figure 4. A la fin du code introduit à l'étape 134, l'activation du capteur C1 va mémoriser le code confidentiel et passer à l'étape 133.

[0077] Finalement, l'activation du capteur C1 à l'étape 135 opère un retour à la position initiale 101 de la fonction agenda.

[0078] La figure 6 montre différentes étapes du procédé de commande selon l'invention, pour la consultation, ou l'entrée, la modification ou la suppression de données dans le menu sélectionné Notes 107.

[0079] Une fois que la sélection du menu Notes 107 est opérée, la première note déjà mémorisée apparaît sur les affichages à cristaux liquides à l'étape 140. Sur l'affichage du haut, le titre de la note rédigée est affiché, alors que sur l'affichage du bas, le texte de la note rédigée est affiché. Toutes les notes déjà mémorisées peuvent être consultées dans un ordre chronologique par l'activation d'un des capteurs C4 ou C5. L'activation d'un des capteurs C6 ou C7 permet de consulter ces notes mémorisées dans un ordre inverse. Bien entendu si aucune note n'a été rédigée au préalable, la sélection du menu Notes 107 va amener directement à l'indication de l'étape 141.

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[0080] En activant un des capteurs C4 ou C5 depuis l'étape 140, on passe à l'étape 141. A cette étape, il est possible de commander l'exécution d'une nouvelle note en activant le capteur C1 pendant une durée déterminée. Il doit être rédigé tout d'abord le titre de la note, qui apparaît sur l'affichage du haut, et ensuite après activation du capteur C1, le texte de la note, qui apparaît sur l'affichage du bas après mémorisation de la note.

[0081] En activant un des capteurs C4 ou C5, il est possible de passer de l'étape 141 à l'étape terminale 142. Dans cette étape terminale 142, l'action sur le capteur C1 opère un retour à la position initiale 101 de la fonction agenda. Finalement depuis l'étape 142, l'action sur un des capteurs C4 ou C5 fait passer à l'étape 140 de la première note mémorisée.

[0082] La note mémorisée à l'étape 140 peut être modifiée. En activant le capteur C1 pendant une durée déterminée, on passe à l'étape 143 d'un mode d'édition ou de modification de la note. En activant un des capteurs C4 ou C5 depuis l'étape 143, on passe à l'étape 145. A cette étape 145, l'action sur le capteur C1 opère une suppression de la note mémorisée et un retour à une nouvelle première position de consultation dans le menu Notes. Depuis cette étape 145, un retour à l'étape 143 peut être réalisé en activant un des capteurs C6 ou C7. Une nouvelle action sur un des capteurs C6 ou C7 fait passer de l'étape 143 à l'étape 144 qui est une position d'échappement. A cette étape 144, l'action sur le capteur C1 va opérer un retour à la position initiale de l'étape 140 sans modification de la note. Depuis cette étape 144, un retour à l'étape 143 peut être réalisé en activant un des capteurs C4 ou C5.

[0083] En choisissant de modifier la note précédemment mémorisée, il est nécessaire d'activer le capteur C1 à l'étape 143. Dès cet instant à l'étape 146, le curseur est placé sous le premier caractère du titre de la note. La modification du titre peut être réalisée comme expliqué ci-dessus en référence à la figure 4.

[0084] Une fois que le titre a été modifié, l'action du capteur C1 fait passer à l'étape 147 pour modifier le texte de la note. Le curseur comme précédemment est placé sous le premier caractère du texte de la note. La modification du texte peut être faite comme expliqué ci-dessus en référence à la figure 4.

[0085] Après avoir modifié le texte de la note à l'étape 147, l'action du capteur C1 fait passer à l'étape 148 ou 149 du choix de la confidentialité de la note rédigée. Par l'action du capteur C2 ou C3, on peut choisir si la note doit être confidentielle ou non. Finalement, après cette étape, le capteur C1 peut être activé pour mémoriser à l'étape 150 la note modifiée avec un retour à l'étape 140 initiale.

[0086] La figure 7 montre différentes étapes du procédé de commande selon l'invention, pour la consultation, ou pour l'entrée, la modification ou la suppression de données dans le menu sélectionné Adresses 108.

[0087] Une fois que la sélection du menu Adresses 108 est opérée, les nom et prénom à l'étape 160 de la première adresse mémorisée sont affichés sur les affichages à cristaux liquides. Le répertoire d'adresses est géré et stocké par ordre alphabétique dans l'unité à microprocesseur. Toutes les fiches adresse déjà mémorisées dans le répertoire d'adresses peuvent être consultées individuellement.

[0088] En activant un des capteurs C2, C4 ou C5, on peut consulter le répertoire d'adresses de l'étape 160 à l'étape 163 par ordre alphabétique de A à Z des noms et prénoms déjà mémorisés. En activant un des capteurs C3, C6 ou C7, on parcourt le répertoire d'adresses dans un ordre opposé de Z à A.

[0089] Dans le cas où plusieurs noms de fiches adresse débutent par une même lettre de l'alphabet, l'action du capteur C2, respectivement du capteur C3, fait passer directement de cette lettre de l'alphabet à une lettre suivante, respectivement précédente. Par contre, l'action sur les capteurs C4 à C7 permet de parcourir tous les noms d'une même lettre de l'alphabet dans un ordre croissant avec les capteurs C4 et C5 ou dans un ordre décroissant avec les capteurs C6 et C7.

[0090] Depuis l'étape 163 de la dernière adresse mémorisée, on passe à l'étape 164 en activant un des capteurs C2, C4 ou C5. A cette étape 164, il est possible d'entrer dans un mode d'édition d'adresse à l'étape 166 en activant pendant une durée déterminée le capteur C1 de manière à introduire toutes les données d'une nouvelle adresse à mémoriser. Un retour de l'étape 164 à l'étape 163 peut être réalisé en activant un des capteurs C3, C6 ou C7.

[0091] En activant un des capteurs C2, C4 ou C5 de l'étape 164 ou en activant un des capteurs C3, C6 ou C7 de l'étape 160, on passe à l'étape terminale 165 à partir de laquelle il est possible de revenir à la position initiale 101 de la fonction agenda par l'action du capteur C1.

[0092] Afin de consulter toutes les données mémorisées d'une adresse particulière par exemple pour la première adresse de l'étape 160, on active brièvement le capteur C1 pour passer à l'étape 167. En activant plus longtemps le capteur C1 pendant une durée déterminée, on entre par contre dans un mode d'édition d'adresse où des modifications des données préalablement enregistrées de l'adresse peuvent être faites. Concernant la manière d'introduire toutes les données d'une nouvelle adresse ou d'une adresse à modifier, les explications ont déjà été faites précédemment en référence à la figure 4. Cependant après chaque champ de l'adresse édité ou modifié, il est nécessaire d'activer le capteur C1 pour passer à un champ suivant. Après le dernier champ édité ou modifié, l'activation du capteur C1 opère la mémorisation de toutes les données et un retour à la position initiale par exemple à l'étape 160.

[0093] Depuis l'étape 167, tous les champs de données mémorisées peuvent être consultés en activant un des capteurs C4 ou C5 pour visionner ces données de l'étape 167 à l'étape 180 dans un ordre croissant. Ces champs de données peuvent être consultés également

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dans un ordre décroissant par exemple de l'étape 180 à l'étape 167 en activant un des capteurs C6 ou C7. Les différents champs de chaque fiche d'adresses sont relatifs au nom 167, au prénom 168, à la rue 169, au lieu d'habitation 170, au pays 171, par exemple à trois types de numéros de téléphone 172 à 174, à une adresse de courrier électronique 175, à des remarques 176 et 177, au titre de la personne 178, au secteur de travail 179 et à l'entreprise de travail 180.

[0094] En activant un des capteurs C4 ou C5 à l'étape 180 ou en activant un des capteurs C6 ou C7 à l'étape 167, on passe à une étape terminale 181. En activant le capteur C1 à cette étape terminale 181, un retour est opéré à la position initiale 160.

[0095] La figure 8 montre différentes étapes du procédé de commande selon l'invention, pour la consultation, ou pour l'entrée, la modification ou la suppression de données dans le menu sélectionné Agenda 109. Dans ce menu, plusieurs rendez-vous peuvent être mémorisés selon un calendrier définissant le jour, le mois et l'année. De manière à fournir un rappel aux rendez-vous mémorisés, il peut être prévu de fournir à l'utilisateur de la montre un signal sonore, par exemple à l'aide d'une des mélodies programmées dans le menu Réglages. Le signalement du rendez-vous peut être fait d'une autre manière à l'aide d'un signal lumineux ou à l'aide de vibrations du boîtier de la montre.

[0096] Une fois que la sélection du menu Agenda 109 est opérée, on passe à l'étape 200 indiquant sur l'affichage du haut l'indication du jour présent et sur l'affichage du bas le nombre de rendez-vous déjà mémorisés à cette étape 200. En activant brièvement un des capteurs C4, C5 à l'étape 200, on passe au jour suivant à l'étape 201. En activant à de multiples reprises ou en maintenant activé un des capteurs C4, C5, un défilement croissant des jours est opéré à une vitesse déterminée. Par contre en activant à de multiples reprises ou en maintenant activé un des capteurs C6, C7, un défilement décroissant des jours est opéré à une vitesse déterminée. Pour passer de l'étape 200 à l'étape 202, un des capteurs C6 ou C7 doit être activé brièvement une fois.

[0097] Pour changer les mois dans un sens croissant ou respectivement décroissant, le capteur C2 ou respectivement le capteur C3 doit être activé. Par exemple pour passer de l'étape 200 à l'étape 203 correspondant à un mois suivant, il est nécessaire d'activer brièvement le capteur C2. Pour passer de l'étape 203 à l'étape 200, le capteur C3 doit être activé brièvement.

[0098] En se positionnant sur un jour particulier, il est possible de consulter les rendez-vous préalablement enregistrés. Par exemple en activant brièvement le capteur C1 à l'étape 201, on passe à l'étape 204 indiquant le premier rendez-vous mémorisé. Plusieurs rendez-vous peuvent être consultés à partir de cette étape 204 dans un ordre croissant en activant un des capteurs C4 ou C5 ou dans un ordre décroissant en activant un des capteurs C6 ou C7. Dans cet exemple, un seul rendez-vous a été mémorisé.

[0099] En activant un des capteurs C6 ou C7 à l'étape 204, on passe à l'étape terminale 205 à partir de laquelle il est possible de revenir à l'étape initiale 201 en activant le capteur C1. En activant un des capteurs C4 ou C5 à l'étape 204, on passe à l'étape 206 proposant une nouvelle entrée d'un rendez-vous.

[0100] En activant le capteur C1 pendant une durée déterminée à l'étape 206, on entre dans un mode d'édition d'un nouveau rendez-vous dans lequel l'heure du début du rendez-vous à l'étape 207 dans un premier champ doit être programmé. Une heure prédéfinie à l'étape 208 peut apparaître sur l'affichage du bas. Comme expliqué en référence à la figure 5, la programmation de l'heure peut être accomplie à l'aide des capteurs C2 à C7. En activant le capteur C2 à l'étape 208, on incrémente d'une unité les chiffres des heures pour passer à l'étape 209. L'opération inverse est accomplie en activant le capteur C3. En activant un des capteurs C4 ou C5 à l'étape 208, on passe à l'étape 210 pour la programmation des minutes. Ainsi, en activant le capteur C2 à l'étape 210, on incrémente d'une unité les chiffres des minutes pour passer à l'étape 211. L'opération inverse est accomplie à l'étape 211 en activant le capteur C3.

[0101] Une fois que l'heure du début est choisie, on active le capteur C1 pour passer à la programmation de l'heure de fin du rendez-vous à l'étape 212 dans un second champ de la fiche agenda. Comme précédemment, une heure prédéfinie à l'étape 213 peut apparaître sur l'affichage du bas. Cette heure prédéfinie correspond normalement à l'heure du début mémorisée. En activant le capteur C2 à l'étape 213, on incrémente d'une unité les chiffres des heures pour passer à l'étape 214. L'opération inverse est accomplie en activant le capteur C3. En activant un des capteurs C4 ou C5 à l'étape 213, on passe à l'étape 215 pour la programmation des minutes. Ainsi, en activant le capteur C2 à l'étape 215, on incrémente d'une unité les chiffres des minutes pour passer à l'étape 216. L'opération inverse est accomplie à l'étape 216 en activant le capteur C3.

[0102] Après avoir fixé l'heure de fin du rendez-vous, le capteur C1 peut être activé pour passer à l'étape 217 pour la rédaction d'un texte d'information du rendez-vous dans au moins un troisième champ de la fiche agenda. Les mêmes opérations pour la rédaction d'un texte ont été décrites ci-devant en référence à la figure 4.

[0103] Après avoir rédigé un texte, le capteur C1 est activé afin de choisir la confidentialité du rendez-vous aux étapes 218 et 219. Par l'action du capteur C2 ou C3, on peut choisir si la note doit être confidentielle ou non. Après cette étape en activant le capteur C1, on permet d'enregistrer le rendez-vous à l'étape 220 et de revenir à la position initiale 201.

[0104] A partir de la description qui vient d'être faite de multiples variantes de réalisation du procédé de commande pour l'exécution de fonctions dans une mon-

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tre électronique peuvent être conçues par l'homme du métier sans sortir du cadre de l'invention définie par les revendications.

Revendications

1. Procédé de commande pour l'exécution de fonctions dans une montre agenda électronique (1), qui comprend dans un boîtier (3, 3') fermé par un verre (4), un circuit garde-temps et/ou un mouvement horloger (17) alimenté par une source d'énergie (15), un cadran (8) sur lequel l'heure est affichée de manière digitale et/ou analogique, au moins un affichage à cristaux liquides (5, 6) pour visionner des données d'agenda, un nombre déterminé de capteurs (C1 à C7), dont une plage sensible au toucher de chaque capteur est disposée sur une face intérieure ou extérieure du verre (4), chaque capteur pouvant être activé par un doigt (20) d'un utilisateur posé sur le verre dans une zone déterminée de la plage sensible du capteur à activer, et une unité à microprocesseur (14) programmée pour gérer des opérations de la fonction agenda de manière à consulter différents menus ou données mémorisées ou à entrer, modifier ou supprimer des données et/ou des paramètres au moyen des capteurs (C1 à C7) reliés à l'unité, **caractérisé en ce que** le procédé comprend une première série d'étapes dans un premier mode de consultation de la fonction agenda consistant à :

   - visionner différents menus ou paramètres ou données ou fiches de données d'un menu de la fonction agenda sur l'affichage à cristaux liquides (5, 6) dans un ordre croissant ou décroissant en activant au moins un capteur (C4, C5) d'un groupe de capteurs (C4 à C7) susceptibles d'opérer chacun une même fonction dans ce premier mode, et
   - sélectionner un menu ou une fiche de données, d'un type parmi plusieurs types, du menu à consulter en activant un capteur (C1) de validation, et **en ce que** le procédé comprend une seconde série d'étapes dans un second mode d'entrée, de modification ou de suppression de données et/ou de paramètres consistant à :

   - activer pendant une durée déterminée ou avec une pression déterminée le capteur de validation (C1) afin d'entrer dans le second mode dans une position désirée d'un menu sélectionné,
   - entrer, modifier ou supprimer des données et/ou des paramètres en activant certains capteurs (C2 à C7) commandant chacun l'exécution d'une fonction déterminée spécifique dans ce second mode, et
   - valider les paramètres et/ou les données entrés, modifiés ou supprimés par l'action sur le capteur de validation (C1).

2. Procédé selon la revendication 1, **caractérisé en ce que** pour réaliser les première et seconde séries d'étapes du procédé pour la fonction agenda, il est utilisé un nombre déterminé de capteurs choisi entre trois et dix, et de préférence égal à sept.

3. Procédé selon l'une des revendications 1 et 2, **caractérisé en ce que** lors de la première série d'étapes du procédé, il est utilisé deux groupes de capteurs formés chacun d'une paire de capteurs, pour visionner, dans un ordre croissant, les différents menus ou données ou fiches de données en activant au moins un capteur (C4, C5) du premier groupe, ou pour visionner, dans un ordre décroissant, les différents menus ou données ou fiches de données en activant au moins un capteur (C6, C7) du second groupe.

4. Procédé selon l'une des revendications 1 à 3, **caractérisé en ce qu'**après l'étape de sélection d'un menu ou d'une fiche de données dans la première série d'étapes du procédé, des champs de données mémorisées de fiches du menu sélectionné sont consultés dans un ordre croissant ou décroissant en activant au moins un capteur (C4) d'un premier groupe de capteurs.

5. Procédé selon l'une des revendications 1 à 4, **caractérisé en ce que** pour sélectionner un menu ou valider des données ou des paramètres dans les première et seconde séries d'étapes du procédé, il est utilisé un capteur de validation dont la plage sensible (C1) est disposée au centre du verre (4), alors que les plages sensibles (C2 à C7) des autres capteurs, utilisés pour consulter des menus ou des données ou des fiches de données, ou pour entrer, modifier ou supprimer des données et/ou des paramètres des première et seconde séries d'étapes du procédé, sont réparties en périphérie du verre (4) autour de la plage sensible du capteur de validation (C1) en étant suffisamment espacées les unes des autres pour qu'un seul capteur puisse être activé par un doigt (20) d'un utilisateur sans influencer les capteurs avoisinants, et pour rendre visible les menus ou données affichés sur un ou deux affichages à cristaux liquides (5, 6) lors de l'activation de ces capteurs.

6. Procédé selon la revendication 5, **caractérisé en ce que** dans la seconde série d'étapes du procédé, l'édition d'un champ de données d'une fiche du menu sélectionné, choisi parmi des menus notes, adresses ou agenda, est réalisée par des étapes consistant à :

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- sélectionner un jeu de caractères parmi plusieurs jeux dans un ordre croissant ou décroissant en activant un des capteurs situés en dessus des indications 3h et 9h d'une montre analogique,
- parcourir des caractères alphanumériques, des chiffres, des symboles ou des accents en fonction du jeu de caractères sélectionné, pour compléter un emplacement d'un champ à éditer, dans un ordre croissant ou décroissant en activant un des capteurs situés en périphérie du verre en des positions d'indication 6h et 12h d'une montre analogique,
- déplacer un curseur, définissant l'emplacement d'un caractère à chercher, à modifier ou à supprimer, dans le champ édité dans une direction ou dans l'autre direction en activant un des capteurs situés en dessous des indications 3h et 9h d'une montre analogique, et
- répéter les différentes étapes ci-dessus et valider le champ édité à mémoriser en activant le capteur de validation (C1).

7. Procédé selon la revendication 6, **caractérisé en ce que** dans une étape de recherche des caractères d'un jeu de caractères sélectionné dans un mode d'édition d'un champ de données, la vitesse de défilement des caractères dans un ordre croissant ou décroissant est dépendante de la durée d'activation d'un des capteurs situés en des positions d'indication 6h et 12h d'une montre analogique, en dessous d'une durée déterminée d'activation les caractères défilant à une première vitesse lente et en dessus d'une durée déterminée d'activation les caractères défilant à une seconde vitesse haute.

8. Procédé selon la revendication 1, **caractérisé en ce qu'**avant de débuter la première série d'étapes, la fonction agenda de la montre est enclenchée lorsque des moyens d'enclenchement (9) sont activés, les capteurs et l'affichage à cristaux liquides étant placés au préalable et/ou après une période d'inactivité de la fonction agenda dans un mode de veille.

9. Procédé selon la revendication 8 pour une montre agenda disposant d'aiguilles entraînées par le mouvement horloger pour l'affichage de l'heure de façon analogique, **caractérisé en ce qu'**au moment où la fonction agenda est enclenchée par les moyens d'enclenchement (9), les aiguilles d'indication de l'heure sont déplacées en des positions déterminées de manière à ne pas cacher les données affichées sur un ou deux affichage à cristaux liquides (5, 6) et/ou à ne pas perturber la fonctionnalité des capteurs.

10. Procédé selon la revendication 1 pour une montre agenda disposant de moyens de réception et/ou d'émission (2, 18) de signaux radiofréquences courte distance pour communiquer avec une station d'ordinateur et/ou une autre montre électronique, **caractérisé en ce qu'**une fois que le menu de transmission a été sélectionné dans la première série d'étape par le capteur de validation, tous les champs édités et/ou mémorisés sont transmis par les moyens de réception et/ou d'émission une fois qu'une liaison est établie entre la station d'ordinateur et/ou l'autre montre.

11. Procédé selon la revendication 4, **caractérisé en ce qu'**en sélectionnant un menu parmi des menus notes, adresses, agenda, transmission ou réglages, il est utilisé des second et troisième capteurs (C2, C3) différents des capteurs (C4 à C7) des premier et second groupes pour consulter dans un ordre croissant ou décroissant différents champs de fiches du menu sélectionné.

12. Procédé selon la revendication 1 pour une montre agenda disposant de deux affichages à cristaux liquides, **caractérisé en ce que** dans les première et seconde série d'étapes, au moins un pointeur (12) sur au moins un des affichages à cristaux liquides (5, 6) apparaît pour désigner au moins une icône d'un groupe d'icônes disposées sur le cadran (8) en des positions déterminées autour de chaque affichage à cristaux liquides (5, 6) de manière à indiquer une fonction ou une opération en cours.

13. Procédé de commande pour l'exécution de fonctions d'une montre agenda électronique, qui comprend dans un boîtier (3, 3') fermé par un verre (4), un circuit garde-temps et/ou un mouvement horloger (17) alimenté par une source d'énergie (15), un cadran (8) sur lequel l'heure est affichée de manière digitale et/ou analogique, au moins un affichage à cristaux liquides (5, 6) pour visionner des données d'agenda sur une ou plusieurs lignes, un nombre déterminé de capteurs (C1 à C7), dont une plage sensible au toucher de chaque capteur est disposée sur une face intérieure ou extérieure du verre (4), chaque capteur pouvant être activé par un doigt (20) d'un utilisateur posé sur le verre dans une zone déterminée de la plage sensible du capteur à activer, et une unité à microprocesseur (14) programmée pour gérer des opérations de la fonction agenda de manière à consulter différents menus ou données mémorisées ou à entrer, modifier ou supprimer des données et/ou des paramètres au moyen des capteurs (C1 à C7) reliés à l'unité, **caractérisé en ce que** le procédé comprend une série d'étapes dans un mode d'entrée, de modification ou de suppression de données et/ ou de paramètres consistant à :

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- activer pendant une durée déterminée ou avec une pression déterminée un capteur de validation (C1) afin d'entrer dans le mode d'entrée, de modification ou de suppression de données et/ou de paramètres dans une position désirée d'un menu sélectionné,
- entrer, modifier ou supprimer des données et/ou des paramètres en activant certains capteurs (C2 à C7) commandant chacun l'exécution d'une fonction déterminée spécifique dans ce mode, et
- valider les paramètres et/ou les données entrés, modifiés ou supprimés par l'action sur le capteur de validation (C1).

14. Procédé selon la revendication 13, **caractérisé en ce qu'**il comprend une série d'étapes préliminaires consistant à :

- enclencher la fonction agenda lorsque des moyens d'enclenchement (9) sont activés, les capteurs et un ou deux affichages à cristaux liquides étant placés au préalable et/ou après une période d'inactivité de la fonction agenda dans un mode de veille,
- visionner différents menus ou données ou fiches de données d'agenda dans un mode de consultation sur au moins un affichage à cristaux liquides (5, 6) dans un ordre croissant ou décroissant en activant au moins un capteur (C4, C5) d'un groupe de capteurs (C4 à C7) susceptibles d'opérer chacun une même fonction dans ce mode de consultation, et
- sélectionner un menu ou une fiche de données, d'un type parmi plusieurs types, du menu à consulter en activant le capteur (C1) de validation,
- consulter des champs de données mémorisées de fiches du menu sélectionné dans un ordre croissant ou décroissant en activant au moins un capteur (C4) du groupe de capteurs.

15. Procédé selon l'une des revendications 1 et 13, **caractérisé en ce qu'**il est utilisé des repères (11) placés sur la face intérieure du verre (4) de montre afin d'indiquer l'endroit de chaque plage sensible de capteurs et/ou une fonction de chaque capteur de manière à faciliter l'activation des capteurs pour la consultation des menus ou des données ou des fiches de données, et l'entrée, la modification ou la suppression de données et/ou de paramètres.

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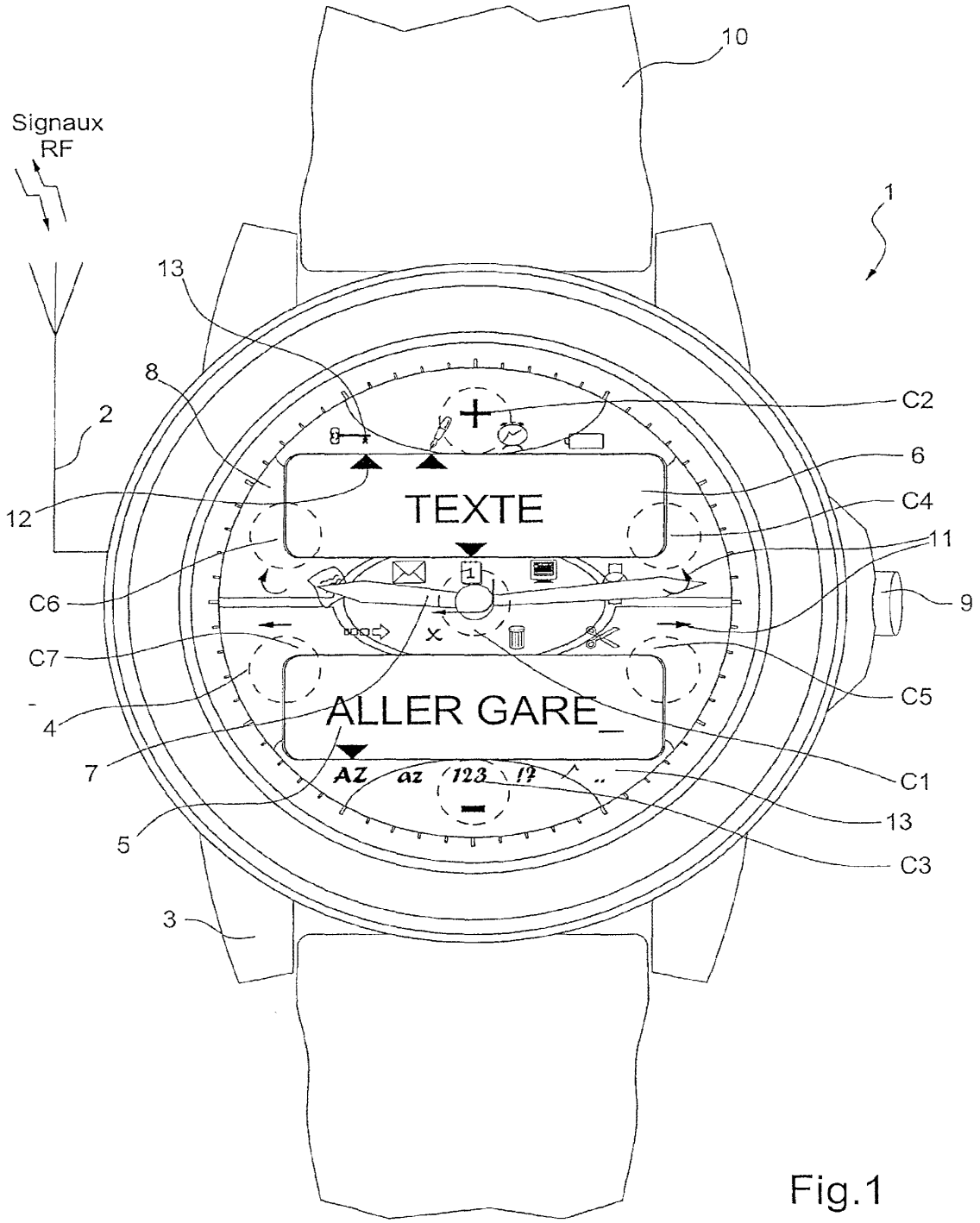


Fig.1

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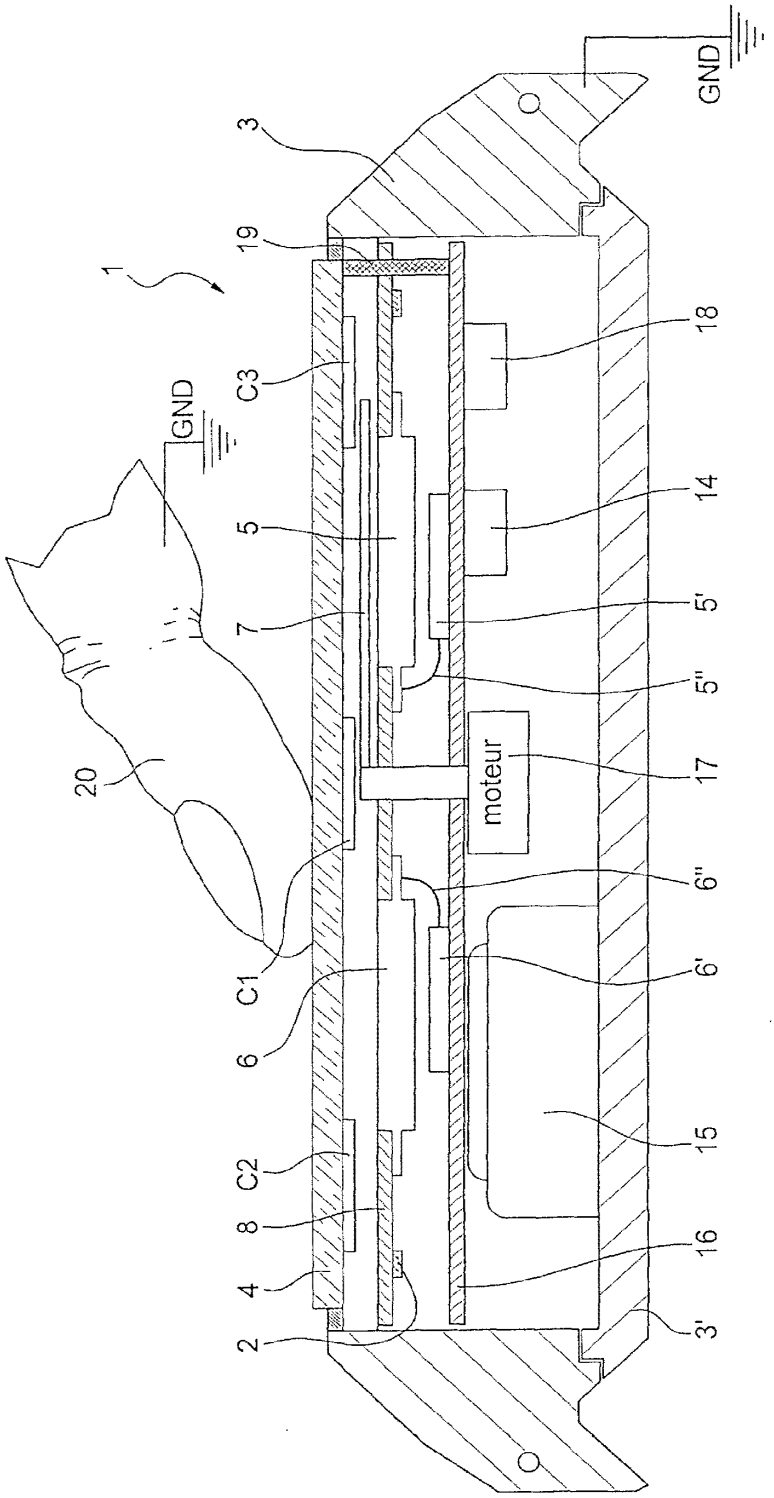
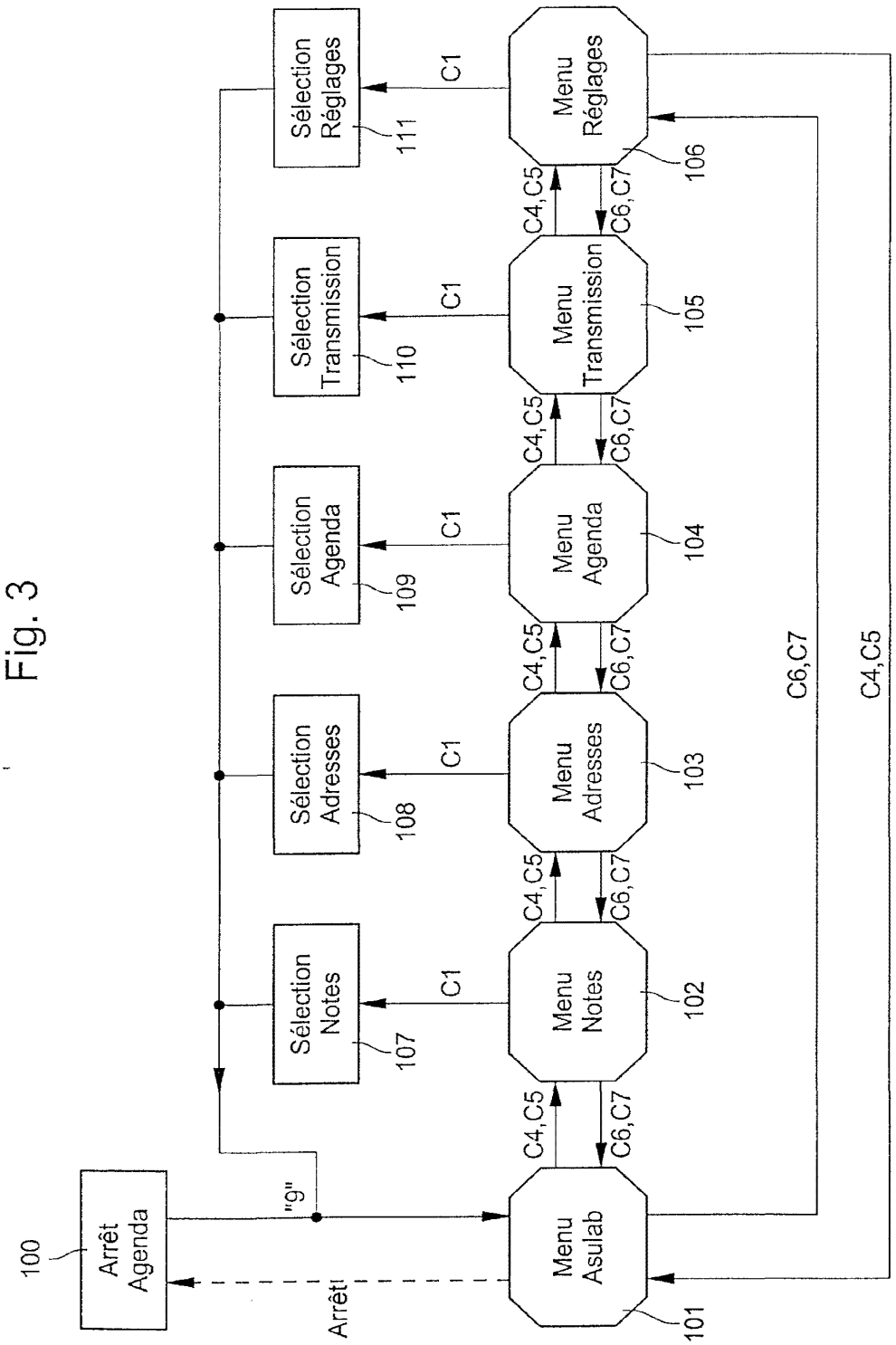


Fig. 2

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Fig. 3



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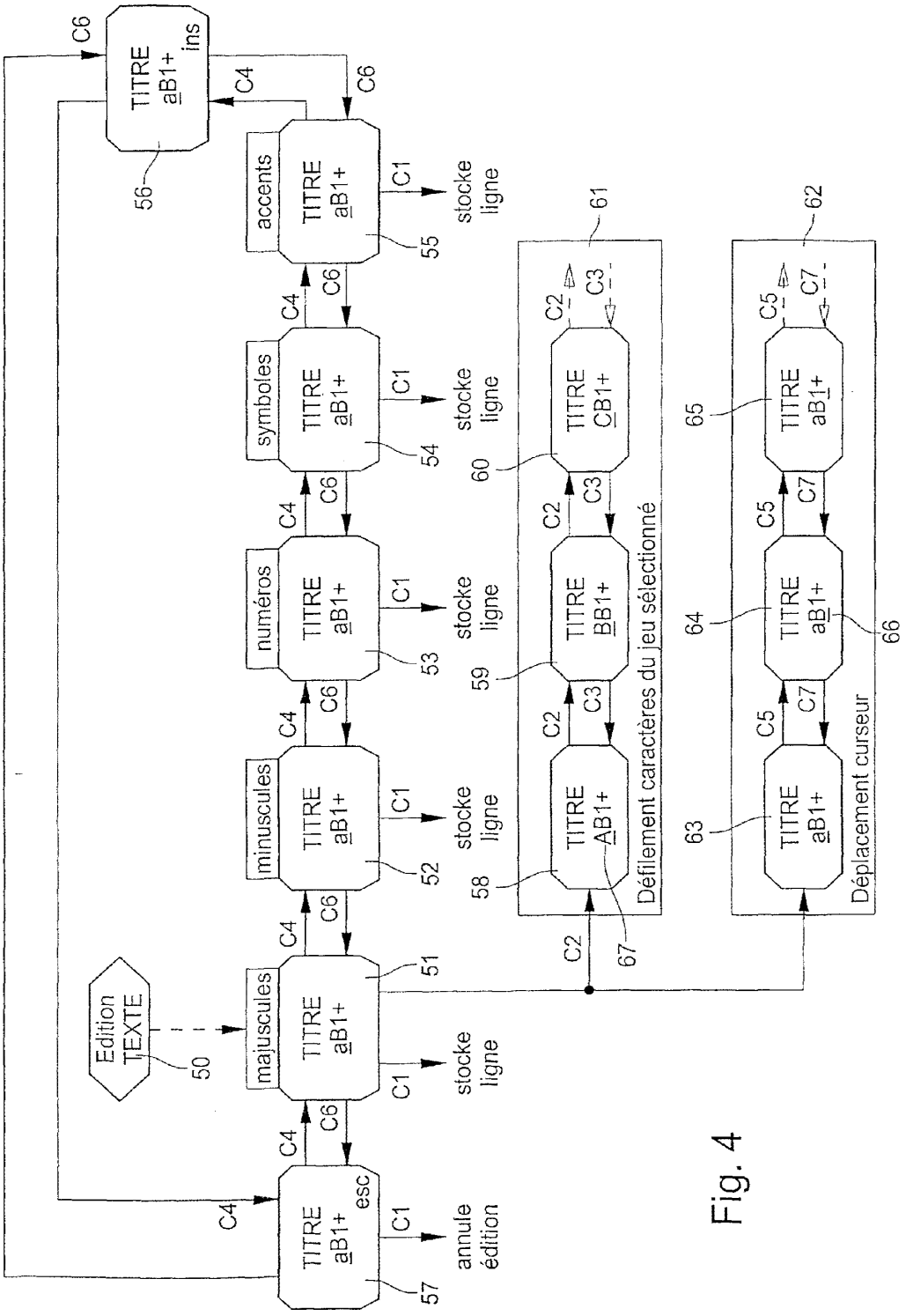


Fig. 4

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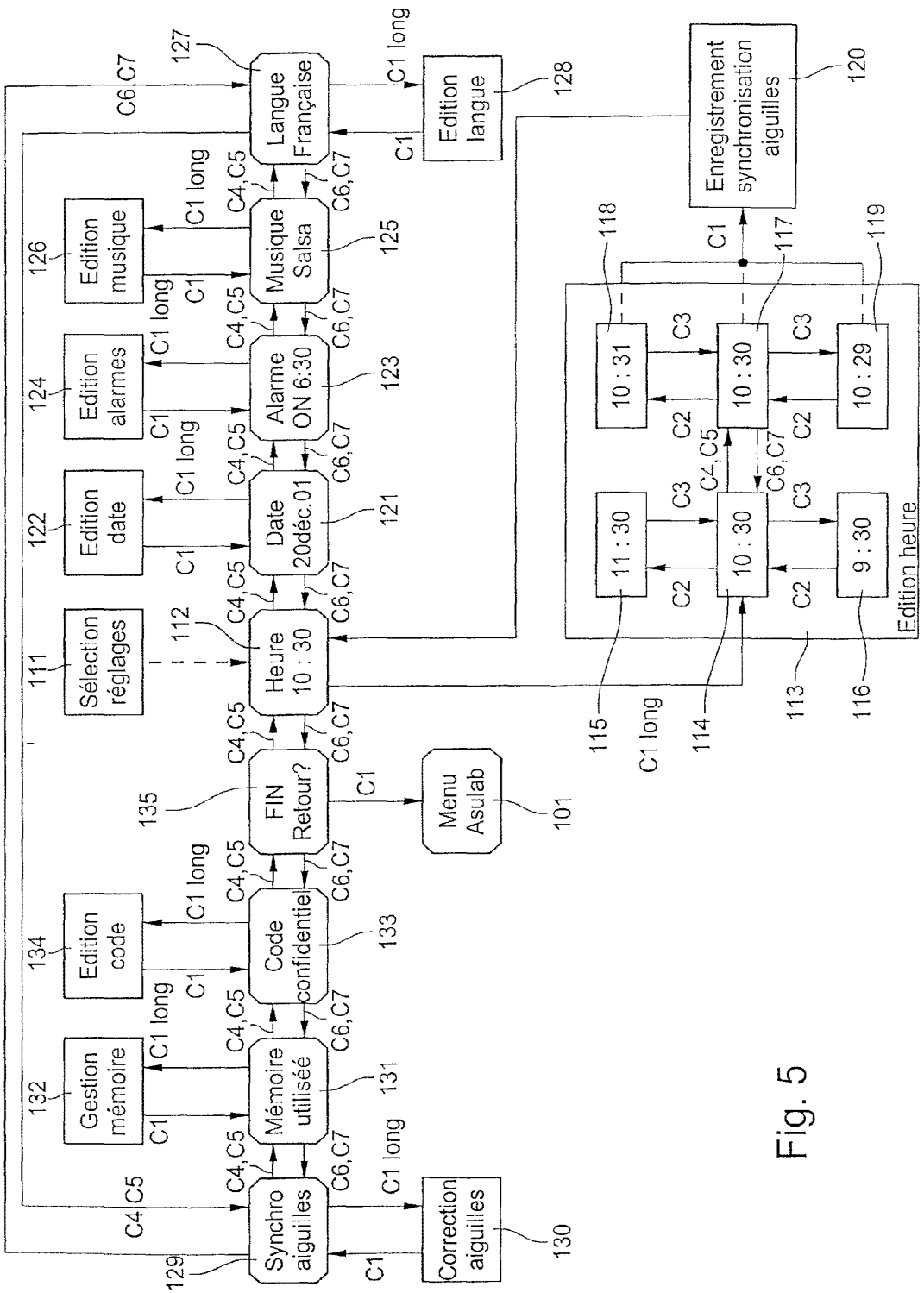
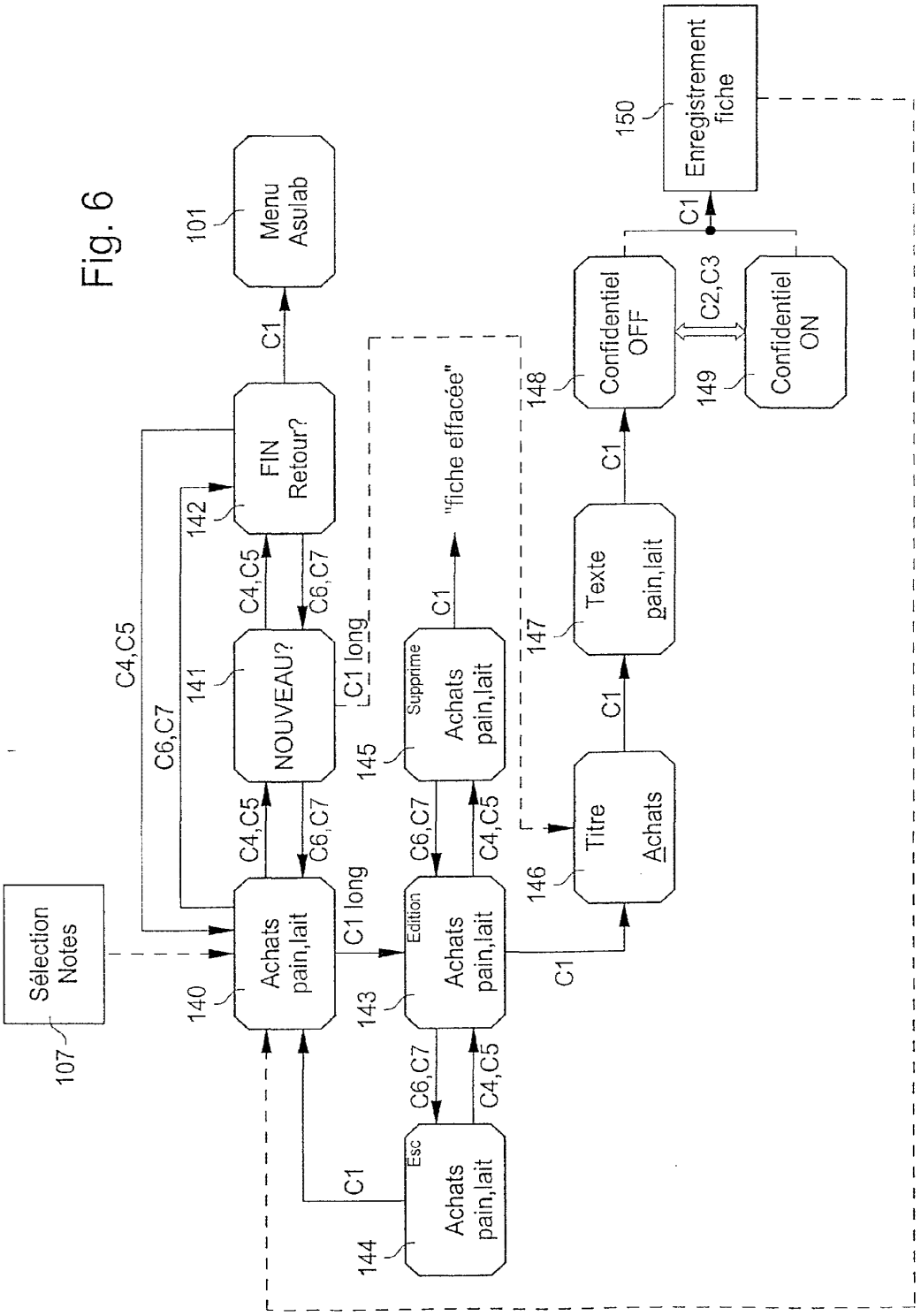


Fig. 5

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Fig. 6



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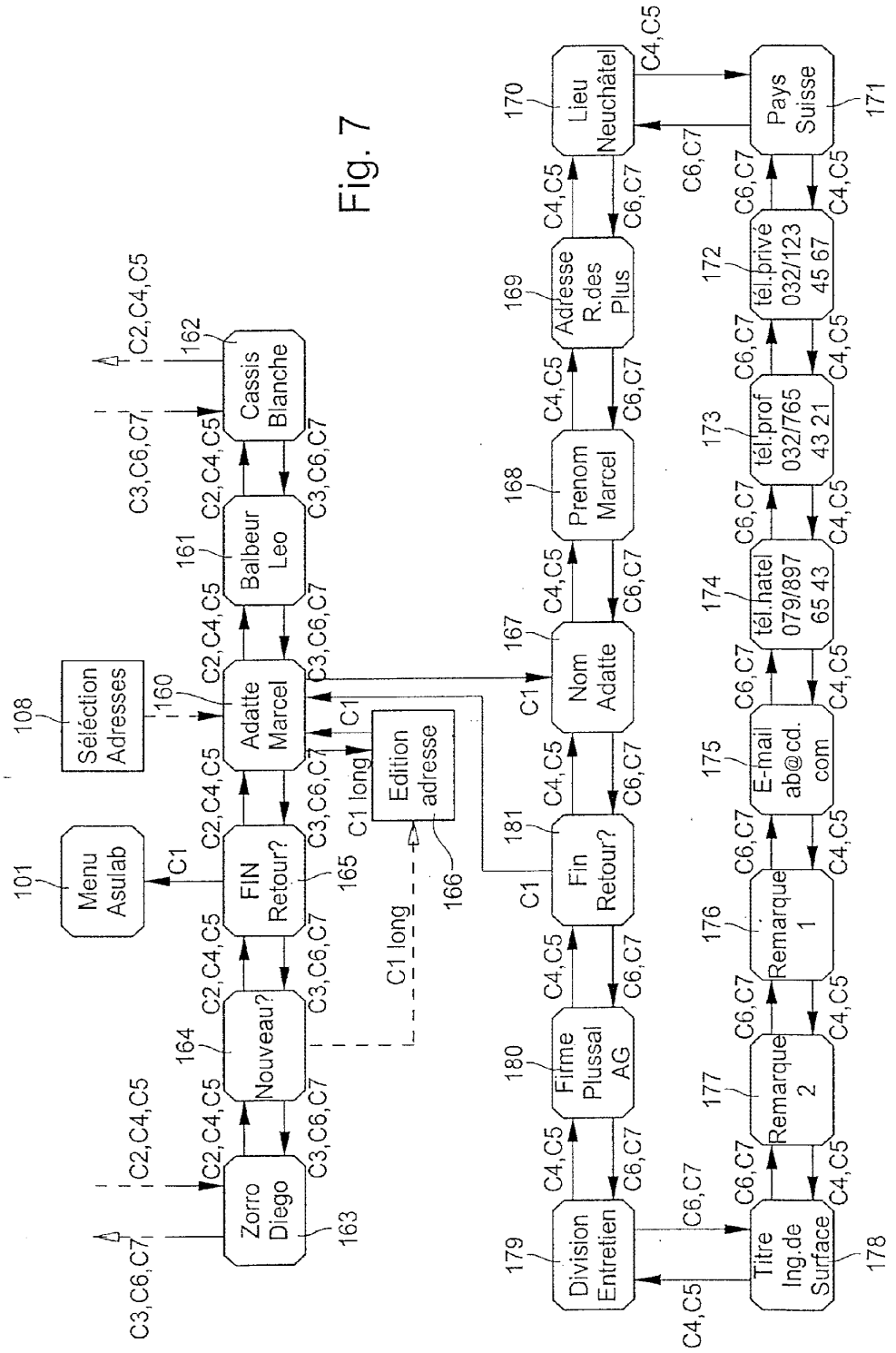
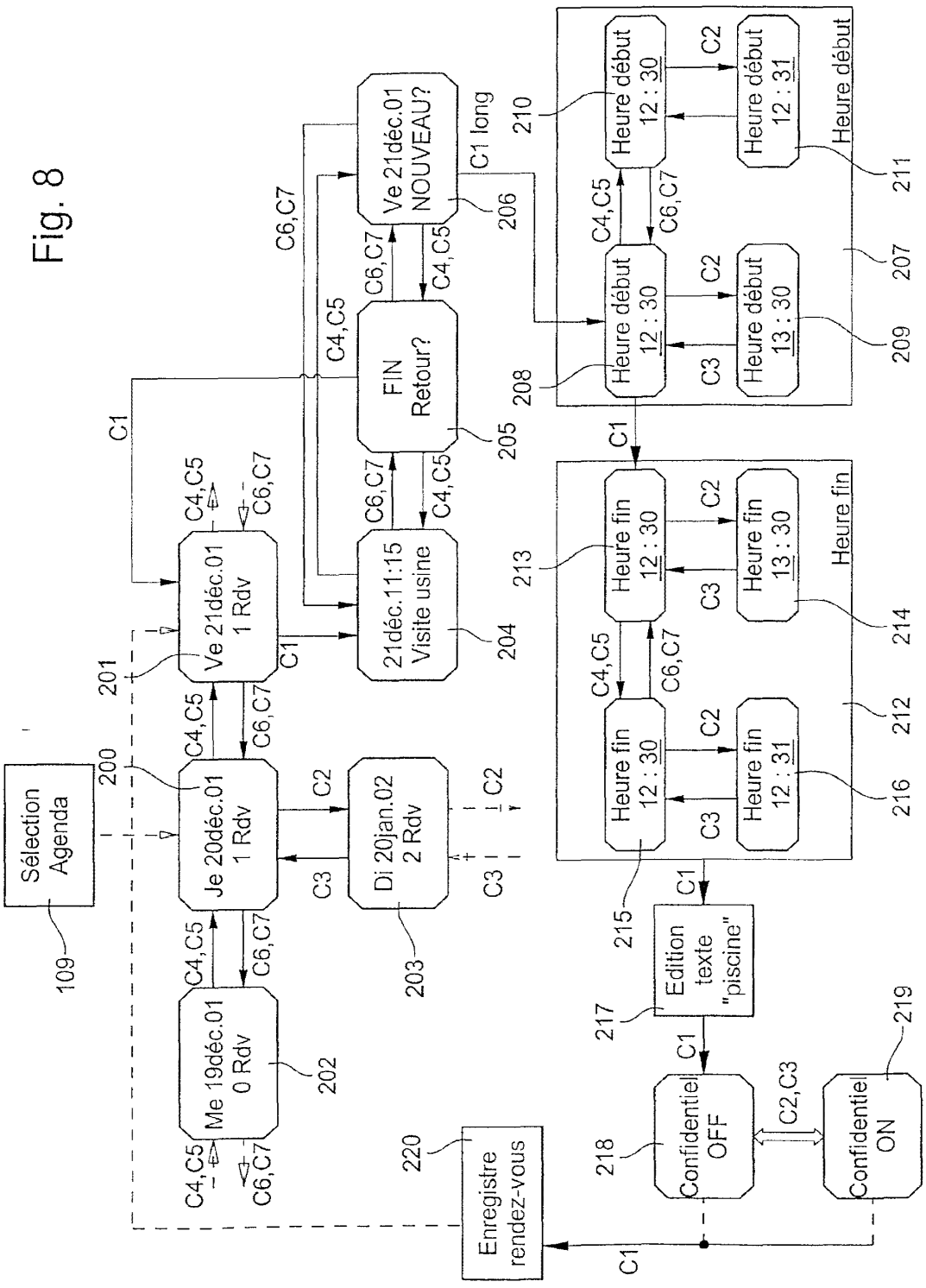


Fig. 7

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Fig. 8



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Office européen des brevets

RAPPORT DE RECHERCHE EUROPEENNE

Numéro de la demande
EP 01 20 5160

DOCUMENTS CONSIDERES COMME PERTINENTS

Catégorie	Citation du document avec indication, en cas de besoin, des parties pertinentes	Revendication concernée	CLASSEMENT DE LA DEMANDE (Int.Cl.7)
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Y	US 5 088 070 A (SHIFF VICTOR) 11 février 1992 (1992-02-11) * colonne 1, ligne 7 - colonne 3, ligne 40; figures 1-7,12 *	1-15	
Y	EP 1 079 325 A (SWATCH AG) 28 février 2001 (2001-02-28) * colonne 1, ligne 3 - colonne 3, ligne 12; figures 1-7 *	1-6, 11-14	
Y	US 4 369 440 A (PIGUET CHRISTIAN ET AL) 18 janvier 1983 (1983-01-18) * colonne 1, ligne 56 - colonne 2, ligne 21 *	7	
Y	US 5 329 501 A (MEISTER PIERRE-ANDRE ET AL) 12 juillet 1994 (1994-07-12) * figures 1-19 *	8	DOMAINES TECHNIQUES RECHERCHES (Int.Cl.7)
Y	US 5 528 559 A (LUCAS ALFRED R) 18 juin 1996 (1996-06-18) * revendication 14 *	9	G04G

Le présent rapport a été établi pour toutes les revendications

Lieu de la recherche	Date d'achèvement de la recherche	Examinateur
LA HAYE	10 juin 2002	Exelmans, U

CATEGORIE DES DOCUMENTS CITES

X : particulièrement pertinent à lui seul
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ANNEXE AU RAPPORT DE RECHERCHE EUROPEENNE RELATIF A LA DEMANDE DE BREVET EUROPEEN NO. EP 01 20 5160

La présente annexe indique les membres de la famille de brevets relatifs aux documents brevets cités dans le rapport de recherche européenne visé ci-dessus.
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10-06-2002

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Pour tout renseignement concernant cette annexe : voir Journal Officiel de l'Office européen des brevets, No.12/82

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(19) Europäisches Patentamt
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Remarks:
Amended claims in accordance with Rule 86 (2) EPC.

(54) System and method for activating an electronic device

(57) The invention provides a system and method for activating an electronic device from a low power state. In the system, an activation circuit for an electronic device is provided. The circuit comprises: a motion sensor circuit (32,38); an input device (34); and a monitoring circuit (36) connected to the input device. The monitoring circuit provides power to the input device when the motion sensor circuit detects a notable movement of the device and selectively generates an activation signal (IRQ) used to activate the electronic device to a higher power state in response to receiving a notable signal received from the input device.

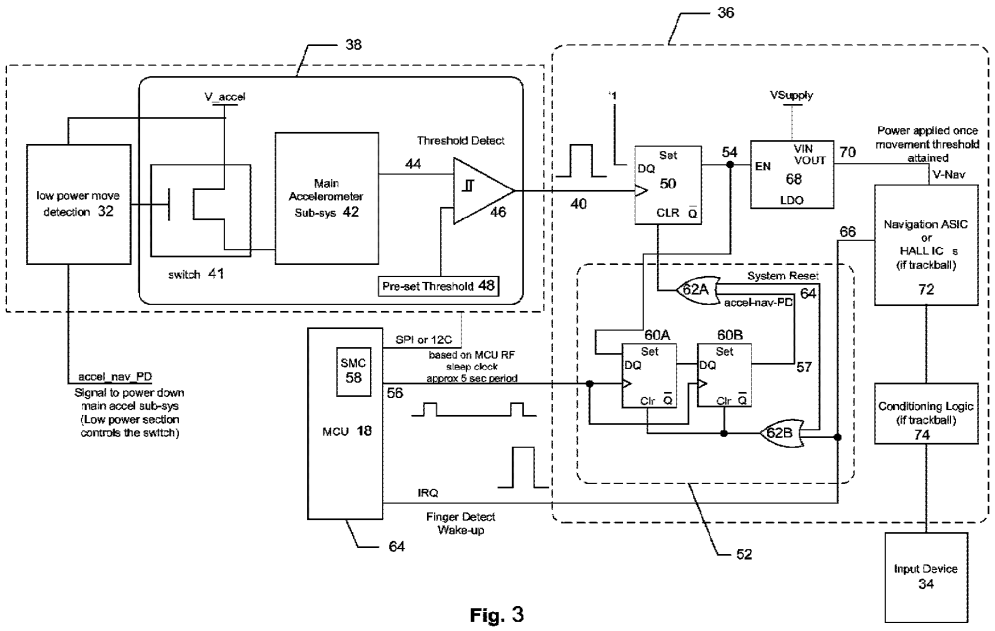


Fig. 3

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Description

[0001] The invention described herein relates to a system and method for selectively activating electronic elements in an electronic device. In particular, the invention described herein relates to activating the device from a low-power state by: detecting a notable movement of the device, then determining whether an input device has been activated, then selectively activating or re-activating components in the device.

[0002] Current wireless handheld mobile communication devices perform a variety of functions to enable mobile users to stay current with information and communications, such as e-mail, corporate data and organizer information while they are away from their desks. A wireless connection to a server allows a mobile communication device to receive updates to previously received information and communications. The handheld devices optimally are lightweight, compact and have long battery life. In order to conserve power consumption of the devices, "sleep" modes are provided which selectively either slow down the clocking rate of the components, selectively de-activate components, or both. However, when in a sleep mode, a re-activation signal can be generated after a certain event (e.g. movement of the device, receipt of a message, etc.) which is used to re-activate the device. Such events can be detected by electronic sensors in the device. However, such sensors need to be continually powered, thereby draining power from the battery.

[0003] Processing a re-activation signal also has issues. Prior art devices have fed the re-activation signal to an interrupt request (IRQ) line of a microprocessor in the device. A power-up routine operating on the microprocessor monitors for the activation of the IRQ line and when it is received, the routine causes the microprocessor to power up. The technique can be inefficient for power management, as once the IRQ line is activated, the microprocessor is fully re-activated, thereby draining a significant amount of power. False positive IRQ signals will cause unnecessary re-activations of the microprocessor.

[0004] There is a need for a system and method which addresses deficiencies in the prior art.

[0005] In a first aspect of an embodiment, an activation circuit for an electronic device is preferably provided. The circuit comprises: a motion sensor circuit; an input device; and a monitoring circuit connected to the input device. The monitoring circuit provides power to the input device when the motion sensor circuit detects a notable movement of the device and selectively generates an activation signal used to activate the electronic device to a higher power state in response to receiving a notable signal received from the input device.

[0006] The activation circuit may further comprise a microprocessor; a wake-up software routine operating on the microprocessor to selectively bring the electronic device to the higher power state upon receipt of the activation signal; and a timing module to initiate a timing window after detection of the notable movement. Therein, the input device may be activated during the timing window and if a sufficient input signal is provided on the input device during the timing window, the activation signal is generated.

[0007] In the circuit, the activation signal may be provided to an interrupt line of the microprocessor which is associated with the wake-up software routine.

[0008] In the circuit, a slow clock signal may be generated by the timing module indicating when the microprocessor is in a lower power state.

[0009] In the circuit, the motion sensor circuit may comprise a first motion sensor which is continually powered and a second motion sensor which is activated upon receiving an appropriate signal from the first sensor. The circuit may further comprise a threshold circuit connected to the second sensor to filter insignificant signals produced by the second sensor from the monitoring circuit.

[0010] In the circuit, the activation signal may also be used to reset the monitoring circuit to allow it to process subsequent signals from the motion sensor.

[0011] In the circuit, the input device may be activated by a power signal generated by the monitoring circuit.

[0012] In the circuit, the first motion sensor may be an accelerometer.

[0013] In the circuit, the input device may detect movement of a finger by a sensor.

[0014] In the circuit, if the time window elapses, the power signal for the input device may be removed.

[0015] The circuit may further comprise an additional input device connected to the monitoring circuit, providing additional signals to the monitoring circuit for evaluation for generation of the activation signal.

[0016] In a second aspect, a method for activating an electronic device is provided. The method comprises: detecting a motion of the device; activating an input device upon detecting the motion if the motion surpasses a predefined threshold; waiting for a notable signal to be received from the input device for a predetermined length of time; and if the notable signal is received within the predetermined time, generating an activation signal for activating the electronic device to a higher power state.

[0017] In the method, the step of detecting the motion may comprise utilizing signals from a low MEM-g accelerometer to activate a second accelerometer. Further, the threshold may be set by a threshold circuit having an output from the second accelerometer as an input to the threshold circuit.

[0018] In the method, the step of waiting for the notable signal may utilize a slow clock signal to track the predetermined length of time.

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[0019] The method may further comprise deactivating the input device if the predetermined time elapses without receiving the notable signal from the input device.

[0020] In the method, upon generation of the activation signal, it may be provided to a microprocessor associated with the device; and the microprocessor may react to receipt of the activation signal by transiting to a higher power state.

[0021] In a third aspect, an electronic device is provided. The device comprises: a microprocessor; a motion sensor circuit; an input device; and a monitoring circuit connected to the input device and an output associated with the second motion sensor. The monitoring circuit provides power to the input device when the motion sensor circuit detects a notable movement of the device and selectively generates an activation signal used to activate the electronic device to a higher power state utilizing a notable signal received from the input device.

[0022] The device may further comprise a wake-up software routine operating on the microprocessor to selectively bring the electronic device to the higher power state upon receipt of the activation signal; and a timing module to initiate a timing window after detecting the notable movement. The input device may be activated during the timing window and if a sufficient input signal is provided on the input device during the timing window, the activation signal may be generated.

[0023] In the device, the motion sensor circuit may comprise a first motion sensor; a second motion sensor activated by a signal from the first motion sensor; and a threshold circuit connected to the second motion sensor to filter insignificant signals produced by the second motion sensor from the monitoring circuit.

[0024] In the device, the activation signal may also be used to reset the monitoring circuit to allow it to process subsequent signals from the second motion sensor.

[0025] In other aspects various combinations of sets and subsets of the above aspects are provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

[0027]

Fig. 1 is a schematic representation of an electronic device having a device activation system in accordance with an embodiment;

[0028]

Fig. 2 is a block diagram of certain internal components and the device activation system in the device in Fig. 1;

[0029]

Fig. 3 is a block diagram of the device activation system and its associated elements of the embodiment of Fig. 1;

[0030]

Fig. 4 is a block diagram of an alternative circuit in device activation system of Fig. 3; and

[0031]

Fig. 5 is a state diagram of a device activation routine executed by the embodiment of Fig. 1.

DESCRIPTION OF PREFERRED EMBODIMENT

[0032] The description which follows and the embodiments described therein are provided by way of illustration of an example or examples of particular embodiments of the principles of the present invention. These examples are provided for the purposes of explanation and not limitation of those principles and of the invention. In the description which follows, like parts are marked throughout the specification and the drawings with the same respective reference numerals.

[0033] Referring to Fig. 1, an electronic device for receiving electronic communications in accordance with an embodiment of the invention is indicated generally at 10. In the present embodiment, electronic device 10 is based on a computing platform having functionality of an enhanced personal digital assistant with cellphone and e-mail features. It is, however, to be understood that electronic device 10 can be based on construction design and functionality of other electronic devices, such as smart telephones, desktop computers pagers or laptops having telephony equipment. In a present embodiment, electronic device 10 includes a housing 12, an LCD 14, speaker 16, an LED indicator 18, a trackwheel 20, an ESC ("escape") key 22, keypad 24, a telephone headset comprised of an ear bud 26 and a microphone

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28. Trackwheel 20 and ESC key 22 can be inwardly depressed along the path of arrow "A" as a means to provide additional input to device 10.

[0034] It will be understood that housing 12 can be made from any suitable material as will occur to those of skill in the art and may be suitably formed to house and hold all components of device 10.

[0035] Device 10 is operable to conduct wireless telephone calls, using any known wireless phone system such as a Global System for Mobile Communications ("GSM") system, Code Division Multiple Access ("CDMA") system, Cellular Digital Packet Data ("CDPD") system and Time Division Multiple Access ("TDMA") system. Other wireless phone systems can include Bluetooth and the many forms of 802.11 wireless broadband, like 802.11a, 802.11b, 802.11g, etc. that support voice. Other embodiments include Voice over IP (VoIP) type streaming data communications that can simulate circuit switched phone calls. Ear bud 26 can be used to listen to phone calls and other sound messages and microphone 28 can be used to speak into and input sound messages to device 10.

[0036] Referring to Fig. 2, functional components of device 10 are provided. The functional components are generally electronic, structural or electro-mechanical devices. In particular, microprocessor 18 is provided to control and receive almost all data, transmissions, inputs and outputs related to device 10. Microprocessor 18 is shown schematically as coupled to keypad 24, power activation module 30, motion sensor 32, input device 34 and other internal devices. Microprocessor 18 controls the operation of the power activation module (PAM) 30, as well as the overall operation of the device 10, in response to activation of device 10. Exemplary microprocessors for microprocessor 18 include Data 950 (trade-mark) series microprocessors and the 6200 series microprocessors, all available from Intel Corporation. Microprocessor 18 is connected to other elements in device 10 through a series of electrical connections to its various input and output pins. Microprocessor 18 has an IRQ input line which allows it to receive signals from various devices, including device activation system 30. Appropriate interrupt firmware is provided which receives and reacts to the signals detected on the IRQ line.

[0037] In addition to the microprocessor 18, other internal devices of the device 10 are shown schematically in Fig. 2. These include: communication sub-system 100; short-range communication sub-system 102; keypad 24; display 14; auxiliary I/O devices 106; serial port 108; speaker 16; microphone port 112 for microphone 28; flash memory 116 (which provides persistent storage of data); random access memory (RAM) 118; clock 120 and other device sub-systems (not shown). The device 10 is preferably a two-way radio frequency (RF) communication device having voice and data communication capabilities. In addition, device 10 preferably has the capability to communicate with other computer systems via the Internet.

[0038] Operating system software executed by the microprocessor 18 is preferably stored in a computer readable medium, such as flash memory 116, but may be stored in other types of memory devices, such as read only memory (ROM) or similar storage element. In addition, system software, specific device applications, or parts thereof, may be temporarily loaded into a volatile store, such as RAM 118. Communication signals received by the mobile device may also be stored to RAM 118.

[0039] Microprocessor 18, in addition to its operating system functions, enables execution of software applications on device 10. A set of software applications 130 that control basic device operations, such as a voice communication module 130A and a data communication module 130B, may be installed on the device 10 during manufacture or downloaded thereafter. Power management module (PMM) 130C may also be installed on device 10 during manufacture. PMM 130C monitors usage of device 10 and selectively controls power to the components. PMM 130C may also control, in part, PAM 30. As well, additional software modules, illustrated as software module 130N, which may be for instance a personal information manager (PIM) application, may be installed during manufacture or downloaded thereafter into device 10. PIM application is preferably capable of organizing and managing data items, such as e-mail messages, calendar events, voice mail messages, appointments, and task items. Data associated with each application can be stored in flash memory 116.

[0040] Communication functions, including data and voice communications, are performed through the communication sub-system 100 and the short-range communication sub-system 102. Collectively, sub-system 102 and sub-system 100 provide the signal-level interface for all communication technologies processed by device 10. Various applications 130 provide the operational controls to further process and log the communications. Communication sub-system 100 includes receiver 150, transmitter 152 and one or more antennas, illustrated as receive antenna 154 and transmit antenna 156. In addition, communication sub-system 100 also includes processing module, such as digital signal processor (DSP) 158 and local oscillators (LOs) 160. The specific design and implementation of communication sub-system 100 is dependent upon the communication network in which device 10 is intended to operate. For example, communication sub-system 100 of the device 10 may be designed to operate with the Mobitex (trade-mark), DataTAC (trade-mark) or General Packet Radio Service (GPRS) mobile data communication networks and also designed to operate with any of a variety of voice communication networks, such as Advanced Mobile Phone Service (AMPS), Time Division Multiple Access (TDMA), Code Division Multiple Access CDMA, Personal Communication Service (PCS), Global System for Mobile Communication (GSM), etc. Other types of data and voice (telephonic) networks, both separate and integrated, may also be utilized with device 10. In any event, communication sub-system 100 provides device 10 with the capability

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of communicating with other devices using various communication technologies, including instant messaging (IM) systems, text messaging (TM) systems and short message service (SMS) systems.

[0041] In addition to processing communication signals, DSP 158 provides control of receiver 150 and transmitter 152. For example, gains applied to communication signals in receiver 150 and transmitter 152 may be adaptively controlled through automatic gain control algorithms implemented in DSP 158.

[0042] In a data communication mode, a received signal, such as a text message or web page download, is processed by the communication sub-system 100 and is provided as an input to microprocessor 18. The received signal is then further processed by microprocessor 18 which can then generate an output to display 14 or to an auxiliary I/O device 106. A device user may also compose data items, such as e-mail messages, using keypad 24, thumbwheel 20 and/or some other auxiliary I/O device 106, such as a touchpad, a rocker switch, a separate thumbwheel or some other input device. The composed data items may then be transmitted over communication network 140 via communication sub-system 100. Sub-system 100 may also detect when it is out of communication range for its remote systems.

[0043] In a voice communication mode, overall operation of device 10 is substantially similar to the data communication mode, except that received signals are output to speaker 16, and signals for transmission are generated by microphone 28. Alternative voice or audio I/O sub-systems, such as a voice message recording sub-system, may also be implemented on device 10. In addition, display 14 may also be utilized in voice communication mode, for example, to display the identity of a calling party, the duration of a voice call, or other voice call related information.

[0044] Short-range communication sub-system 102 enables communication between device 10 and other proximate systems or devices, which need not necessarily be similar devices. For example, the short-range communication sub-system may include an infrared device and associated circuits and components, or a Bluetooth (trade-mark) communication module to provide for communication with similarly-enabled systems and devices.

[0045] Powering the entire electronics of the mobile handheld communication device is power source 170. Preferably, the power source 170 includes one or more batteries. More preferably, the power source 170 is a single battery pack, especially a rechargeable battery pack. A power switch (not shown) provides an "on/off" switch for device 10. Upon activation of the power switch an application 130 is initiated to turn on device 10. Upon deactivation of the power switch, an application 130 is initiated to turn off device 10. Power to device 10 may also be controlled by other devices and by software applications 130.

[0046] It will be appreciated that device 10 can cycle through a normal operating mode to a low-power mode and back to a normal operating mode. In the normal operating mode for device 10, PMM 130C monitors the current state of usage of device 10. When device 10 is detected as being inactive (e.g. no activation of from keypad 24 or no messages received) after a predetermined amount of time (e.g. 5 minutes), then the PMM 130C selectively shuts down an element or places an element of device 10 into a lower power consumption mode. For example, microprocessor 18 may be placed in a "slow clock" mode, wherein the clocking signal for the microprocessor is slowed, thereby causing device 10 to operate slower and conserve battery power. Alternatively, display 14 may be turned off. One or more elements can be selectively powered down. When device 10 is in a low-power mode, device 10 can subsequently be re-activated into the normal power or higher-power mode.

[0047] For a low-power mode, the embodiment utilizes the following elements to manage the re-activation of device 10: power activation module 30, motion sensor 32, input device 34, microprocessor 18 and software operating on microprocessor 18. In particular, the elements collectively monitor the state of activation of device 10, monitor signals received from motion sensor 32 and input device 34, then selectively activate components of device 10. Further detail on these elements is provided below.

[0048] Turning now to Fig. 3, power activation module 30 comprises two main sections: (1) trigger circuit 38 for use with motion sensor 32; and (2) monitoring circuit 36 for use with input device 34. Briefly, a two-stage approach is used to re-activate device 10. First, trigger circuit 38 is used with motion sensor 32 to detect an initial movement or intent to use device 10. Collectively, trigger circuit 38 and motion sensor 32 may be considered to be a motion sensor circuit. Once the trigger circuit 38 generates its activation signal, monitoring circuit 36 is activated with input device 34 to detect any further indication that the device is meant to be reactivated. Once monitoring circuit 36 determines that device 10 is meant to be re-activated, it sends a re-activation signal to microprocessor 18.

[0049] Motion sensor 32 is preferably a motion detection device which utilizes less power in a quiescent state than components in trigger circuit 38 and components in monitoring circuit 36. For example, a low-g MEMs (micro-electro-mechanical system) accelerometer may be used for motion sensor 32. Further, the accelerometer may be of almost any type, including a capacitive, piezoelectric, piezoresistive, or a gas-based accelerometer. An exemplary low-g MEM accelerometer is a LIS3L02AQ tri-axis analog accelerometer, available from STMicroelectronics of Geneva, Switzerland. Accelerometers sense and convert an acceleration detected from a motion (e.g. tilt, inertial, or vibration) or gravity into an electrical signal (producing a corresponding change in output) and are available in one, two or three axis configurations. Accelerometers may produce digital or analog output signals.

[0050] In Fig. 3, for trigger circuit 38, when accelerometer (also noted by reference number 32) is moved, e.g. by a movement of device 10, the output signal generated by accelerometer 32 is provided to switch 41. If the signal is sufficient

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to activate switch 41, a power signal from switch 41 is provided to main sub-system 42 to activate it. In one embodiment, sub-system 42 provides a second motion sensor which is activated by the trigger signal from switch 41. As such, when a further movement is detected, the output of the second motion sensor in sub-system circuit 42 is provided to threshold comparator 46. Comparator 46 compares the signal 44 compared by comparator against a threshold value 48. If the size of signal 44 exceeds the threshold value 48, comparator 46 generates activation signal 40. Activation signal 40 represents a "true" activation signal received from sensor 32.

[0051] Circuit 38 may be implemented as a single digital device having a series of modules, which can be separately activated and de-activated. A separate "power down" input lines can be associated with main sub-system 42, which would then allow any signals from sensor 32 to be provided directly to the "power down" pin, bypassing switch 41. Similarly, comparator 46 and threshold value 48 may be a second module. A "power-down" pin associated with the threshold module may be tied to the output of main sub-system 42. As such, the output of sensor 32 may be used to provide an input signal to a "power-down" pin in the device. Also, when the main sub-system 42 generates an output signal, it can activate the second module which will then conduct a comparison and generate its output signal. An exemplary integrated device is a LIS3L02DQ tri-axis accelerometer having an I2C or SPI interface, also available from STMicroelectronics. In another embodiment, any of switch 41, sub-system circuit 42, threshold register 48 and comparator 46 may not be provided in the single device.

[0052] It will be appreciated that in most instances, depending on motion sensitivities set for sensor 32 and sub-system 42, when device 10 is initially moved from rest, the signal generated by sensor 32 activates sub-system 42 and the signal generated by it is sufficient to trigger the threshold detection circuit 46, to produce signal 40. However, it is possible that the movement of accelerometer 32 is large enough to trigger switch 41, but if the movement may still not be considered to be valid for the remainder of the circuit. For the example, the movement may be too small to be a true activation signal, the movement may have happened too quickly, or the movement may be deemed to be spurious.

[0053] Since a digital device typically consumes more power than an analog equivalent, it is advantageous to provide a lower current e.g. piezoelectric sensor, to first detect a movement through sensor 32 and then enable power to the digital accelerometer device to validate the movement. In such an implementation, a digital accelerometer can remain in a power-down mode until required to transition to an active state. Preferably, power to sensor 32 is continually provided. When sensor 32 is implemented as a low-power accelerometer, the draw on battery for device 10 is reduced.

[0054] To improve sensitivities of an accelerometer when it is used as motion sensor 32, its outputs can be calibrated to compensate for individual axis offset and sensitivity variations. Calibrations can also could be performed at the system level, providing end-to-end calibration. Calibrations can also be performed by collecting a large set of measurements with the device in different orientations.

[0055] Referring to Fig. 4, an alternative circuit 38A is shown for sensor 32 which is aligned as a single axis analog sensor. Sensor 32 can be oriented such that its output detects movement along a desired axis (e.g. 'Z' axis detecting when device moved vertically). Additional axes may be monitored by replicating circuit 38A for each additional axis. Briefly, the output of sensor 32 is provided to buffer amp 400. The output of buffer amp 400 is provided in tandem to comparators 402 and 404. The other inputs of comparators 402 and 404 are taken from different taps on resistor ladder 406, comprising resistors 406A, 406B and 406C. Comparators 402 and 404 each produce upper and lower limit comparison signals for the output of sensor 32. If the value of the signal from sensor 32 is either below the upper limit set by the parameters of comparator 402 (comparing the signal from sensor 32 against its tap from the resistor ladder 406) or above the lower limit set by the parameters of comparator 404 (comparing the signal from sensor 32 against its tap from the resistor ladder 406) then OR gate 408 generates a trigger signal 40. It will be appreciated that the limits can be used to define a range of signals detected by sensor 32 representing when be device 10 is either stationary (e.g. at rest) or being moved.

[0056] It will be appreciated that other circuits using different combinations of sensors and triggering components and threshold detectors may be used to provide functionalities of sensor 32 and circuit 38.

[0057] For example, if device 10 is lying on a flat, horizontal surface, a trigger condition for the Z-axis of sensor 32 can be set to trigger after detecting a force greater than 1 g. When device 10 is picked up, two changes in velocity are detected along the Z-axis of sensor 32: first, a positive acceleration is detected (e.g. a force greater than 1 g) when device 10 is first picked up and is being raised from the surface; and second, a negative acceleration is detected as device 10 is brought to a given height above the surface and movement of device 10 slows down to hold it at that height. If sensor 32 is a digital device, it preferably produces a positive range of values, for example between 0 and 255, representing all detected up and down movements. In that example, the rest reading for sensor 32 for device 10 may be a value around 127. As such, up and down movements of device 10 would cause readings to move above and below the value of 127. If a movement in either direction is sufficient to trigger one of comparators 402 or 404, the reading on sensor 32 would have to be outside the tolerance window of the rest reading. Thus, OR gate 408 would generate a HIGH when the output signal from sensor 32 is outside the tolerance window. It will be appreciated that the limits of 1 g can be used with a tolerance buffer to compensate for noise in the signals. A comparable analog circuit may be provided if the sensor is producing a voltage signal. In other embodiments, positive and negative values produced by sensor 32

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may be analyzed.

[0058] Further, if sensor 32 and trigger circuit 38 use only one accelerometer, then the output of OR gate 408 can be used as trigger signal 40. If sensor 32 and trigger circuit 38 use two accelerometers, then the output of OR gate 408 can be used to represent triggers switch 41 or a trigger signal to a Power Down pin of the second accelerometer. In such a circuit, the output of comparators 402 and 404 can be set to be LOW when in the first accelerometer detects movements in only about the 1 g range. Low-pass filtering may also be added to reduce noise and invalid signals being generated by the comparators.

[0059] In other embodiments, a single comparator can be used to perform comparisons.

[0060] In an embodiment, a specific gesture detected by sensor 32 and / or sub-system 42 may be required to activate device 10, such as a quick "snap" movement in a certain direction of device 10 or the movement of device 10 in a clockwise circular pattern. That gesture can be broken down into a series of sequential notable components. As the gesture is being executed by a user with device 10 in hand, sensor 32 and / or sub-system 42 detects each component of the gesture, and each component is analyzed to determine whether the gesture has been properly formed, thereby providing a signal to activate device 10.

[0061] In other embodiments, motion sensor 32 may be substituted with a different device, such as a spring-loaded switch, a keypad, an infrared sensor, a capacitive touch sensor, a proximity sensor, a location sensor, a presence detector, a light sensor or any other device which can generate a signal responsive to a condition predetermined to indicate that device 10 is about to be re-activated. It is preferable that the device have low quiescent power draw characteristics. Further, system notifications , time/date, or alarms may be used to trigger power to be enabled to the input sub-system indicating device reactivation. It will be further appreciated that other motion sensor circuits known in the art may be used, as appropriate.

[0062] The second section of circuit 30 provides a further check for activation inputs from additional devices. The second section includes monitoring circuit 36 which interfaces with device 34. Briefly, monitoring circuit 36 checks for signals from input device 34 and then, if deemed appropriate signals are received, additional activation signal(s) are generated. The additional activation signals can be provided to microprocessor 18 as a wake-up signal to cause microprocessor 18 to initiate a re-activation routine. Ultimately, a sufficient signal from device 34 is still needed before the wake-up signal for microprocessor 18 are generated.

[0063] Input device 34 is any device which allows the user of device 10 to provide some form of input to device 10. It can be a keypad, a touchscreen, a touchpad, a touchstrip, a trackball, a fingerprint reader, a mouse, a trackwheel, a joystick, a switch, a motion sensor, a light sensor, a microphone, an IR sensor, an accelerometer or any other input device. Preferably, input device 34 can detect movement of a finger of the user across its sensor. The description of device 10 has already noted keypad 24, trackwheel 20, ESC key 22, auxiliary I/O devices 106, microphone 28 as separate devices. However, it will be appreciated that any one of those devices are also input devices and can be used as input device 34.

[0064] For monitoring circuit 36, a system reset signal is provided after device power-up to clear the Q outputs of latches 54 and 60. After microprocessor 18 initializes, it will enter its sleep state after a period of inactivity. Its sleep state will be provisioned by a slow clock signal. A free-running TIMED_REF_CLK signal 56 is provided from microprocessor 18 based on the slow clock. The shape of signal 56 can be defined to meet different requirements. One pulse can be a short pulse generated every 5 seconds. Preferably, microprocessor 18 generates signal 56 only when it is asleep. In other embodiments, TIMED_REF_CLK signal 56 may be generated by a separate timer circuit (not shown) independently from microprocessor 18.

[0065] First, activation signal 40 is provided to latch 50. Reset circuit 52 provides a pre-condition for allowing trigger signal 54 to be generated. One condition is that microprocessor 18 be active, but in a low-power state. In the embodiment, when microprocessor 18 is in a low-power state, a slow clock signal is provisioned by the microprocessor to be able to respond to remote, radio frequency requests, user requests, alarms, etc. Typically this slow clock is provided by an external oscillator which feeds slow clock module 58. The slow clock signal has a slower clocking rate than the normal clocking signal used by microprocessor 18. The TIMED_REF_CLK signal 56 is derived from a timer which is clocked by slow clock module 58 in microprocessor 18. TIMED_REF_CLK signal 56 may have a duty cycle which has a shorter "ON" cycle compared to its "OFF" cycle. Monitoring circuit may be implemented to monitor for the edge or level of signal 56.

[0066] To process the conditions for generating trigger signal 54, time window generation and reset circuit 52 comprises a series of staged latches 60A and 60B and OR gates 62A and 62B. TIMED_REF_CLK signal 56 is fed as an input to time window generation and reset circuit 52. The output of time window generation and reset circuit 52 is provided to the CLR line of latch 50. TIMED_REF_CLK signal 56 is used as the clocking signal for latches 60A and 60B. The data line of latch 60A comes from the output of latch 50. The output of latch 60A is fed to the data line of latch 60B. The output of latch 60B is pulse 57 defined by two upward edges of TIMED_REF_CLK signal 56 and is fed to OR gate 62A.

[0067] A system reset signal 64 from microprocessor 18 is provided as a second input to OR gate 62A. The output of OR gate 62A is provided to latch 50 CLR. The output of OR gate 62B is provided to the CLR lines of gates 60A and 60B. The inputs of OR gate 62B are provided by the system reset signal 64 and the wakeup signal 66 provided by

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monitoring circuit 38. As such, the setting and resetting of trigger signal 54 is mainly controlled by: (1) the state of activation signal 40; (2) the state of TIMED_REF_CLK signal 56 (represented by pulse 57); (3) the state of reset signal 64; and (4) the state of the wake-up signal 66. For the case where the wake-up signal 66 is OFF (i.e. it not been activated), a state table of the signals is provided in Table A:

Table A

Inputs			Output
Reset Signal 64	Pulse 57	Activation Signal 40	Trigger Signal 54
OFF	OFF	OFF	OFF
OFF	OFF	ON	OFF
OFF	ON	OFF	OFF
OFF	ON	ON	ON
ON	OFF	OFF	OFF
ON	OFF	ON	OFF
ON	ON	OFF	OFF

As such, it will be seen that the only instance where trigger signal 54 is generated as an ON signal if the reset signal 64 is OFF (i.e. not active), the duty cycle of the slow clock is ON (i.e. active), and the activation signal is ON and the signal of pulse 57 is in its open window. The system reset signal 54 may be provided by microprocessor 18 or any other device. Generally, it is generated in situations where a large failure has occurred, required the reset of device 10.

[0068] In other embodiments, the above noted state diagram may be implemented in other circuits, PLDs, PLAs, software, firmware or other systems known in the art. Further, other types of trigger circuits employing more or less input signals, as required, may be provided in other embodiments. Also, in other embodiments different condition signals may be used from one or more different devices in evaluating whether to generate trigger signal 54.

[0069] In monitoring circuit 36, trigger signal 54 is provided to enable voltage regulator 68 to control the current of the output signal. If trigger signal 54 is ON, then output signal 70 of voltage regulator 68 will be HIGH, i.e. the output voltage of the regulator. The output signal 70 is used to activate any necessary power circuits for input device 34. It will be seen that use of the first and second sections provides a staged power-up routine for device 34. In another embodiment, Navigation ASIC/module 72 is provisioned with a Power Down pin, which must be asserted before module 72 is powered. In certain configurations, use of a Power Down pin for module 72 would allow voltage regulator 68 to be eliminated.

[0070] With device 34 activated, circuit 36 can monitor and evaluate any signals received from of device 34. These functions are provided by navigation ASIC 72, which is also activated by output signal 70. Navigation circuit 72 receives signals generated by input device 34 and has logical circuits (not shown) which evaluates the signals. In a comparable fashion for signals from motion sensor 32, navigation circuit 72 may evaluate the signals and may require them to be of a certain direction, force, duration, speed or any combination of those characteristics to be considered a signal which is meant to turn on device 10. Again, a specific gesture signal may be required, such as the movement of input device 34 in a circular fashion. Navigation circuit 72 may also process any signals from input device 34 when device 10 is operating in a full-power mode.

[0071] Similar to an embodiment having modules in a single device for motion detector 32 and circuit 38, circuit 36 may be implemented as a monolithic digital device having one, two or more modules. Each module may have a separate power down pin, providing individual control over power over individual modules. As such, an output from ASIC 72 may be used to control a power down pin for conditioning logic circuit 74. Similarly reset circuit 52 may have its output tied to power down pins of latch 50.

[0072] Pulse 57 defines a timed window controlled by TIMED_REF_CLK signal 56, 60A and 60B. The window may be used to selectively activate navigation circuit 72, allowing it to monitor for an input signal from device 34. Power is provided to circuit 72 when the window is open. If no sufficient signal from input device 34 is received in the window, power to navigation circuit 72 and / or device 34 may be reduced or turned off. The window may be any duration, such as 5, 10, 20, or 30 seconds. If after activation from signal 54, navigation circuit 72 does not respond via an IRQ within the window period derived by TIMED_REF_CLK, then signal 60B will be clocked by the second occurrence of TIMED_REF_CLK which will place a HIGH on the CLR of latch 50 and disable power to navigation circuits. If a higher power accelerometer is used (separate from the low power move detect 32) or if the accelerometer contains a higher power section that may be powered down independently (example: digital section), then the accelerometer may be placed in a power down mode as well.

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[0073] When navigation circuit 72 determines that an acceptable signal has been received from input device 34, circuit 72 generates wake-up signal 66. As noted earlier, the wake-up signal is provided to OR gate 62B of reset circuit 52. It is also provided to the IRQ line of microprocessor 18. An interrupt routine is provided for microprocessor 18 which is activated upon the receipt of the wakeup signal 66 on the IRQ line. The microprocessor , once awakened by the IRQ signal, will disable the TIMED_REF_CLK signal 56 to prevent powering down of navigation circuit 72 via CLR of 50. When the system returns back to a sleep state because of user inactivity, the TIMED_REF_CLK is re-enabled. Alternatively, microprocessor 18 may provide an output signal (once awakened) that feeds OR gate 62B input instead of signal 66. Microprocessor 18 would set this signal HIGH until ready to re-enter sleep state to inhibit the disabling of the navigation ASIC/module.

[0074] The logic and technologies for navigation circuit 72 may be implemented as an ASIC, a PLD, discrete elements, a PLA or any other technologies known in the art. It will be appreciated that various different implementations can be made for navigation circuit 72, depending on the re-activation requirements made for device 10. For example, navigation circuit 72 may monitor for signals from one or more input devices 34. For specific types of input devices 34, such as a trackball, navigation circuit 72 may be implemented as a Hall effect circuit. Further, a specific signal sequence may be required from one or more input devices 34 in order for navigation circuit 72 to generate wake-up signal 66. Alternatively, the re-activation requirements may be more modest. For example, signal 66 may be generated after any signal is detected from device 34. Conditioning module 74 also can be provided between input device 34 and navigation circuit 72 to debounce or filter any deemed spurious signals generated by input device 34.

[0075] When wake-up signal 66 is provided to an IRQ line of microprocessor 18, microprocessor 18 activates the associated interrupt routine. The interrupt routine contains instructions to re-activate microprocessor 18 and initiate other processes and routines to move device 10 from its current power-up state to another, higher-power up state. The routine is encoded as software or firmware and may be stored in an appropriate memory location in memory 116. The next power state may be a full-power state or it may be an enhanced power state. Further progression up or down from the next power state may be dependent on further detection of use of device 10 by circuit 30 or an additional circuit.

[0076] Referring to Fig. 5, state diagram 500 shows a progression of states passed during monitoring and execution of a power-up sequence routine for device 10. Initial state 502 is entered when device 10 enters a lower-power state. The system immediately transfers to Wait for Signal from Sensor state 504, which monitors for any initial trigger signal from sensor 32. If the trigger is received, then the second sensor in sub-system 42 is activated and the system waits for a trigger from the second sensor. If a trigger is received, the system moves to state 506, where the trigger is evaluated to whether it has passed all imposed thresholds, if any. If all thresholds are passed, the system moves to state 508. If all thresholds are not passed, then the system returns to state 504.

[0077] In state 508, device 10 waits for a TIMED_REF_CLK clock signal from microprocessor 18. Other activation signals could be used. Once the activation signal is received, the system moves to state 510, the main monitoring state. Here, the state will wait for one of three triggers: (1) receipt of a signal from input device 34; (2) receipt of any time out signal from the monitoring circuit; or (3) receipt of any reset signal, such as a reset signal from a CPU 18. If a signal is from input device 34, the system transits to state 512, otherwise it transits back to state 504. In state 512, a wake-up signal is generated and sent to the system, such as microprocessor 18, so that a transition to higher power level may occur. The system then automatically transits to state 514 where signals are reset. Then the system transits to power down state 502. It will be appreciate that various implementations using techniques known in the art can be used to implement all or parts of the system flow shown in Fig. 5. For example, a combination of hardware, software and firmware elements can implement one or more monitoring and signal generation features described herein. It will further be appreciated that different embodiments may utilize selected certain features of the algorithm shown in Fig. 5. Alternatively, different branches may be provided or additional wait times and threshold steps may be added.

[0078] It will be appreciated that with careful selection of motion sensor 32 and input device 34, less power may be drawn by device 10 when it is in low-power mode and is simply waiting for device 10 to be activated, based mostly on signals from low-power sensor 32 instead of higher-power input device 34.

[0079] It will further be appreciated that the several layers of filtering of signals generated by PAM 30 ensure that the ultimate wake-up signal 66 is not spurious. This lessens the possibility of awakening microprocessor 18 incorrectly and wasting power for its re-activation.

[0080] The present invention is defined by the claims appended hereto, with the foregoing description being merely illustrative of a preferred embodiment of the invention. Those of ordinary skill may envisage certain modifications to the foregoing embodiments which, although not explicitly discussed herein, do not depart from the scope of the invention, as defined by the appended claims.

Claims

1. An activation circuit for an electronic device, comprising:

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a motion sensor circuit;
an input device; and
a monitoring circuit connected to said input device and an output associated with said motion sensor circuit, said monitoring circuit being arranged to provide power to said input device when said motion sensor circuit detects a notable movement of at least one motion device in said motion sensor circuit and to selectively generate an activation signal used to activate said electronic device to a higher power state utilizing a notable signal received from said input device.

2. The activation circuit as claimed in claim 1, further comprising:

a microprocessor;
a wake-up software routine operating on said microprocessor to selectively bring said electronic device to said higher power state upon receipt of said activation signal; and
a timing module to initiate a timing window after detection of said notable movement,

wherein a monitoring circuit for said input device is arranged to be activated during said timing window and if a sufficient input signal from said input device is detected by said monitoring circuit during said timing window, the monitoring circuit is arranged to generate said activation signal.

3. The activation circuit as claimed in claim 2, wherein the monitoring circuit is arranged to provide said activation signal to an interrupt line of said microprocessor which is associated with said wake-up software routine.

4. The activation circuit as claimed in claim 2 or claim 3, wherein said timing module is arranged to generate a slow clock signal indicating when said microprocessor is in a lower power state.

5. The activation circuit as claimed in any one of claims 1 to 4, wherein said motion sensor circuit comprises

a first motion sensor;
a second motion sensor which is activated upon receiving an appropriate signal from said first motion sensor; and
a threshold circuit connected to said second motion sensor to filter insignificant signals produced by said second motion sensor from said monitoring circuit.

6. The activation circuit as claimed in any one of claims 1 to 5, wherein the monitoring circuit is arranged to be reset by said activation signal to allow it to process subsequent signals from said motion sensor.

7. The activation circuit as claimed in any one of claims 1 to 5, wherein said input device is arranged to be activated by a power signal generated by said monitoring circuit.

8. The activation circuit as claimed in claim 5 or any one of claim 6 or claim 7 when dependent on claim 5, wherein said first motion sensor is an accelerometer.

9. The activation circuit as claimed in any one of claims 1 to 8, wherein said input device is arranged to detect movement of a finger by a sensor.

10. The activation circuit as claimed in claim 2 or any one of claims 3 to 9 when dependent on claim 2, wherein if said time window elapses, said power for said input device is removed.

11. The activation circuit as claimed in claim 10, further comprising an additional input device connected to said monitoring circuit, for providing additional signals to said monitoring circuit for evaluation for generation of said activation signal.

12. A method for activating an electronic device, comprising:

detecting a motion of the device;
activating an input device upon detection of said motion if said motion surpasses a predefined threshold;
waiting for a notable signal to be received from said input device for a predetermined length of time; and
if said notable signal is received within said predetermined time, generating an activation signal for activating said electronic device to a higher power state.

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13. The method for activating an electronic device as claimed in claim12, wherein:

said step of detecting said motion comprises utilizing signals from a low MEM-g accelerometer to activate a second accelerometer; and
said threshold is set by a threshold circuit having an output from said second accelerometer as an input to said threshold circuit.

14. The method for activating an electronic device as claimed in claim 12 or claim 13, wherein:

said step of waiting for said notable signal to be received from said input device utilizes a slow clock signal to track said predetermined length of time.

15. The method for activating an electronic device as claimed in any one of claims 12 to 14, further comprising:

deactivating said input device if said predetermined time elapses without receiving said notable signal from said input device.

16. The method for activating an electronic device as claimed in any one of claims 12 to 15, wherein

upon generation of said activation signal, it is provided to a microprocessor associated with said device; and said microprocessor reacts to receipt of said activation signal by transiting to a higher power state.

17. An electronic device, comprising:

a microprocessor;
a motion sensor circuit;
an input device; and
a monitoring circuit connected to said input device and an output associated with said motion sensor circuit, for providing power to said input device when said motion sensor circuit detects a notable movement of said device and for selectively generating an activation signal used to activate said electronic device to a higher power state utilizing a notable signal received from said input device.

18. The electronic device as claimed in claim 17, further comprising:

a wake-up software routine operating on said microprocessor to selectively bring said electronic device to said higher power state upon receipt of said activation signal; and
a timing module to initiate a timing window after detection of said notable movement,

wherein said input device is arranged to be activated during said timing window and if a sufficient input signal is provided on said input device during said timing window, the monitoring circuit is arranged to generate said activation signal.

19. The electronic device as claimed in claim 17 or claim 18, wherein said motion sensor circuit comprises

a first motion sensor;
a second motion sensor, activated by a signal from said first motion sensor; and
a threshold circuit connected to said second motion sensor to filter insignificant signals produced by said second motion sensor from said monitoring circuit.

20. The electronic device as claimed in any one of claims 17 to 19, wherein the monitoring circuit is arranged to be reset by said activation signal to allow it to process subsequent signals from said second motion sensor.

21. A computer program product for activating an electronic device, the computer program product comprising a computer readable medium embodying program code means executable by a processor of an electronic device for implementing the method of any one of claims 12 to 16.

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Amended claims in accordance with Rule 86(2) EPC.

1. An activation circuit for an electronic device, comprising:

a first sensor;
a second sensor which is activated upon receiving an appropriate signal from said first sensor;
an input device;
a monitoring circuit connected to said input device and an output associated with said second sensor, said monitoring circuit being arranged to provide power to said input device when said second sensor circuit detects a notable movement and to selectively generate an activation signal used to activate said electronic device to a higher power state after receiving a notable signal received from said input device; and
a threshold circuit connected to said second motion sensor to filter insignificant signals produced by said second motion sensor from said monitoring circuit.

2. The activation circuit as claimed in claim 1, further comprising:

a microprocessor;
a wake-up software routine operating on said microprocessor to selectively bring said electronic device to said higher power state upon receipt of said activation signal; and
a timing module to initiate a timing window after detection of said notable movement,

wherein a monitoring circuit for said input device is arranged to be activated during said timing window and if a sufficient input signal from said input device is detected by said monitoring circuit during said timing window, the monitoring circuit is arranged to generate said activation signal.

3. The activation circuit as claimed in claim 2, wherein the monitoring circuit is arranged to provide said activation signal to an interrupt line of said microprocessor which is associated with said wake-up software routine.

4. The activation circuit as claimed in claim 2 or claim 3, wherein said timing module is arranged to generate a slow clock signal indicating when said microprocessor is in a lower power state.

5. The activation circuit as claimed in any one of claims 1 to 4, wherein the monitoring circuit is arranged to be reset by said activation signal to allow it to process subsequent signals from said second sensor.

6. The activation circuit as claimed in any one of claims 1 to 5, wherein said input device is arranged to be activated by a power signal generated by said monitoring circuit.

7. The activation circuit as claimed any one of claims 1 to 6, wherein said motion sensor is a low g MEM accelerometer.

8. The activation circuit as claimed in any one of claims 1 to 7, wherein said input device is arranged to detect movement of a finger.

9. The activation circuit as claimed in claim 2 or any one of claims 3 to 8 when dependent on claim 2, wherein if said time window elapses, said power for said input device is removed.

10. The activation circuit as claimed in claim 9, further comprising an additional input device connected to said monitoring circuit, for providing additional signals to said monitoring circuit for evaluation for generation of said activation signal.

11. A method for activating an electronic device, comprising:

monitoring for an initial motion of said device utilizing signals from a low MEM-g accelerometer;
upon detection of said initial motion, activating a second accelerometer using a signal from said low MEM-g accelerometer to detect a further motion;
activating an input device upon detection of said further motion if said motion surpasses a predefined threshold;
waiting for a notable signal to be received from said input device for a predetermined length of time; and
if said notable signal is received within said predetermined time, generating an activation signal for activating said electronic device to a higher power state.

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12. The method for activating an electronic device as claimed in claim 11, wherein:

said step of waiting for said notable signal to be received from said input device utilizes a slow clock signal to track said predetermined length of time.

13. The method for activating an electronic device as claimed in any one of claims 11 or 12, further comprising:

deactivating said input device if said predetermined time elapses without receiving said notable signal from said input device.

14. The method for activating an electronic device as claimed in any one of claims 11 to 13, wherein

upon generation of said activation signal, it is provided to a microprocessor associated with said device; and said microprocessor reacts to receipt of said activation signal by transiting to a higher power state.

15. An electronic device, comprising:

a microprocessor;
a first sensor;
a second sensor which is activated upon receiving an appropriate signal from said first sensor;
an input device;
a monitoring circuit connected to said input device and an output associated with said second sensor, said monitoring circuit being arranged to provide power to said input device when said second sensor circuit detects a notable movement and to selectively generate an activation signal used to activate said electronic device to a higher power state after receiving a notable signal received from said input device; and
a threshold circuit connected to said second sensor to filter insignificant signals produced by said second sensor from said monitoring circuit.

16. The electronic device as claimed in claim 15, further comprising:

a wake-up software routine operating on said microprocessor to selectively bring said electronic device to said higher power state upon receipt of said activation signal; and
a timing module to initiate a timing window after detection of said notable movement,

wherein said input device is arranged to be activated during said timing window and if a sufficient input signal is provided on said input device during said timing window, the monitoring circuit is arranged to generate said activation signal.

17. An electronic device, comprising a microprocessor and the activation circuit defined in Claims 1-10.

18. A computer program product for activating an electronic device, the computer program product comprising a computer readable medium embodying program code means executable by a processor of an electronic device for implementing the method of any one of claims 11 to 14.

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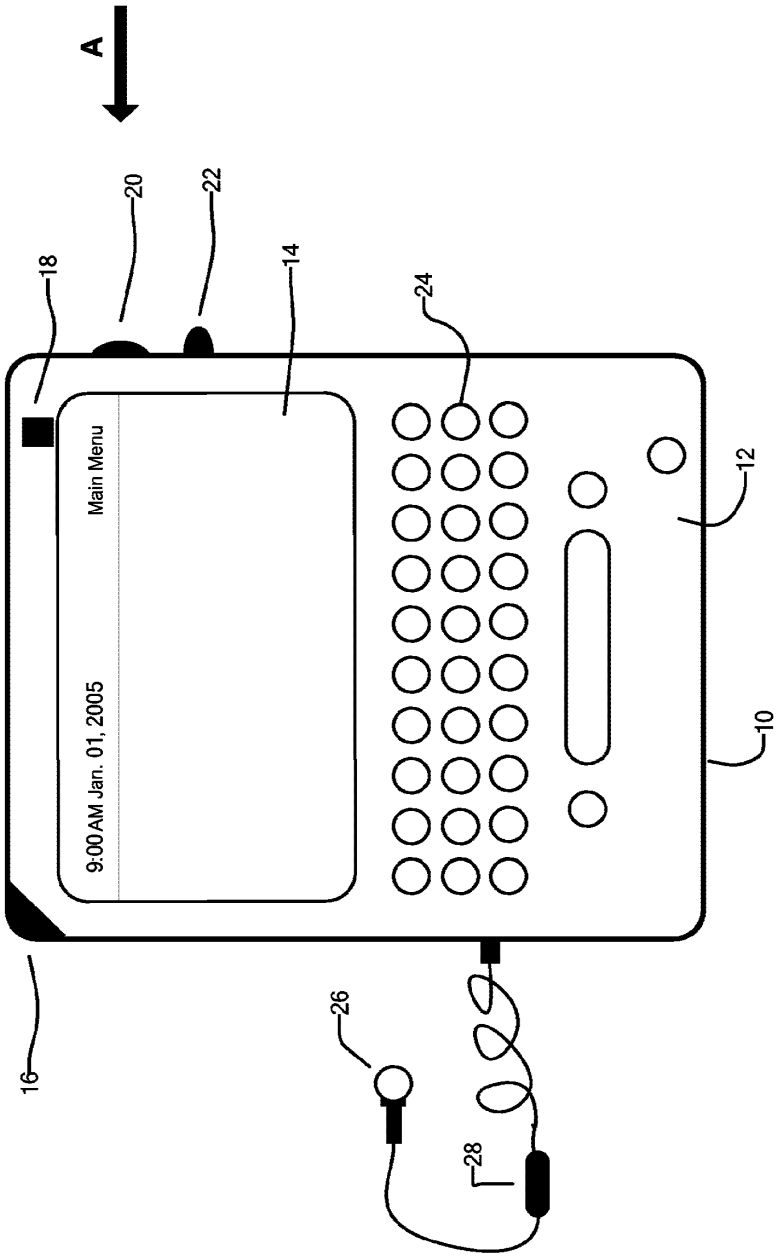


Fig. 1

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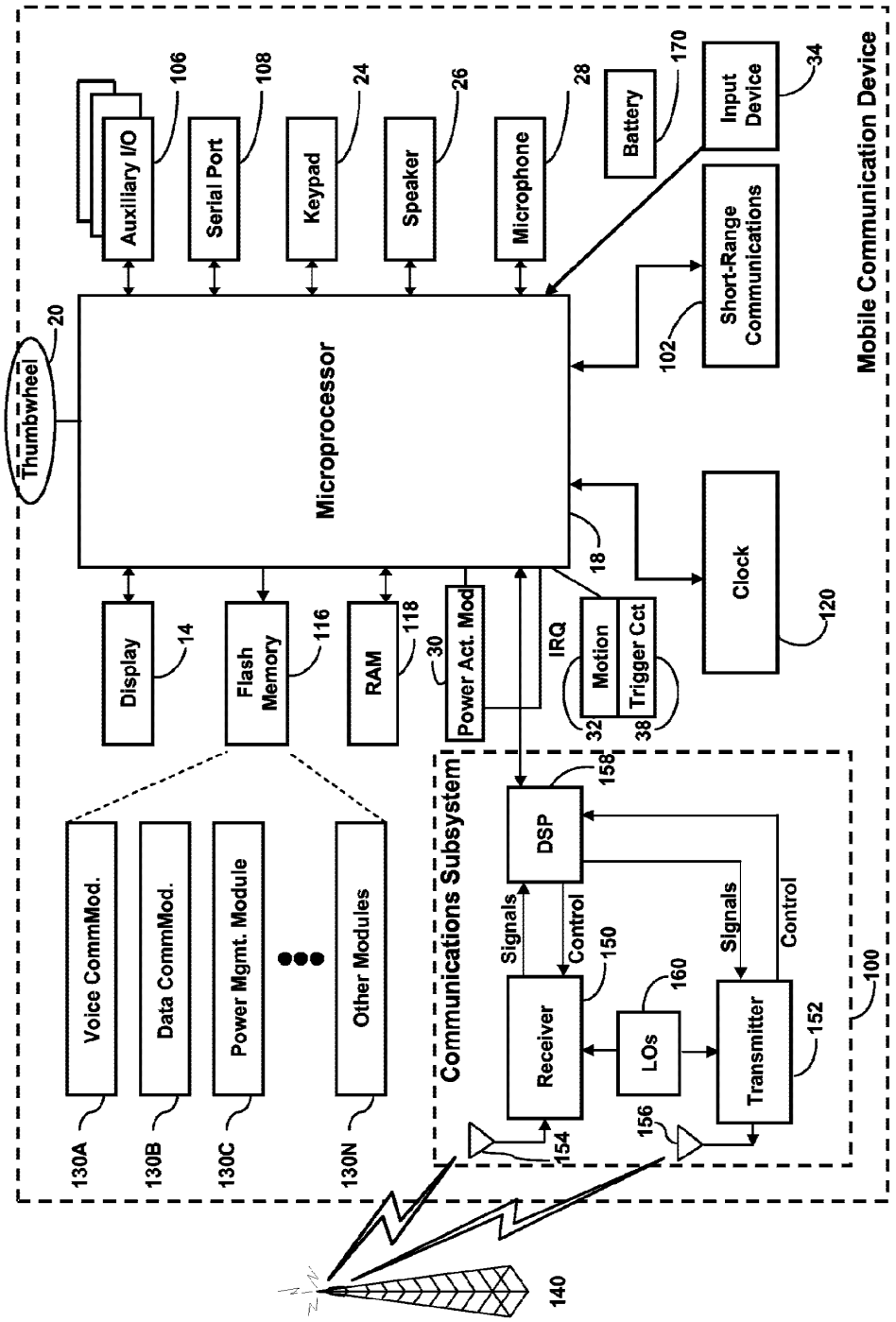


Fig. 2

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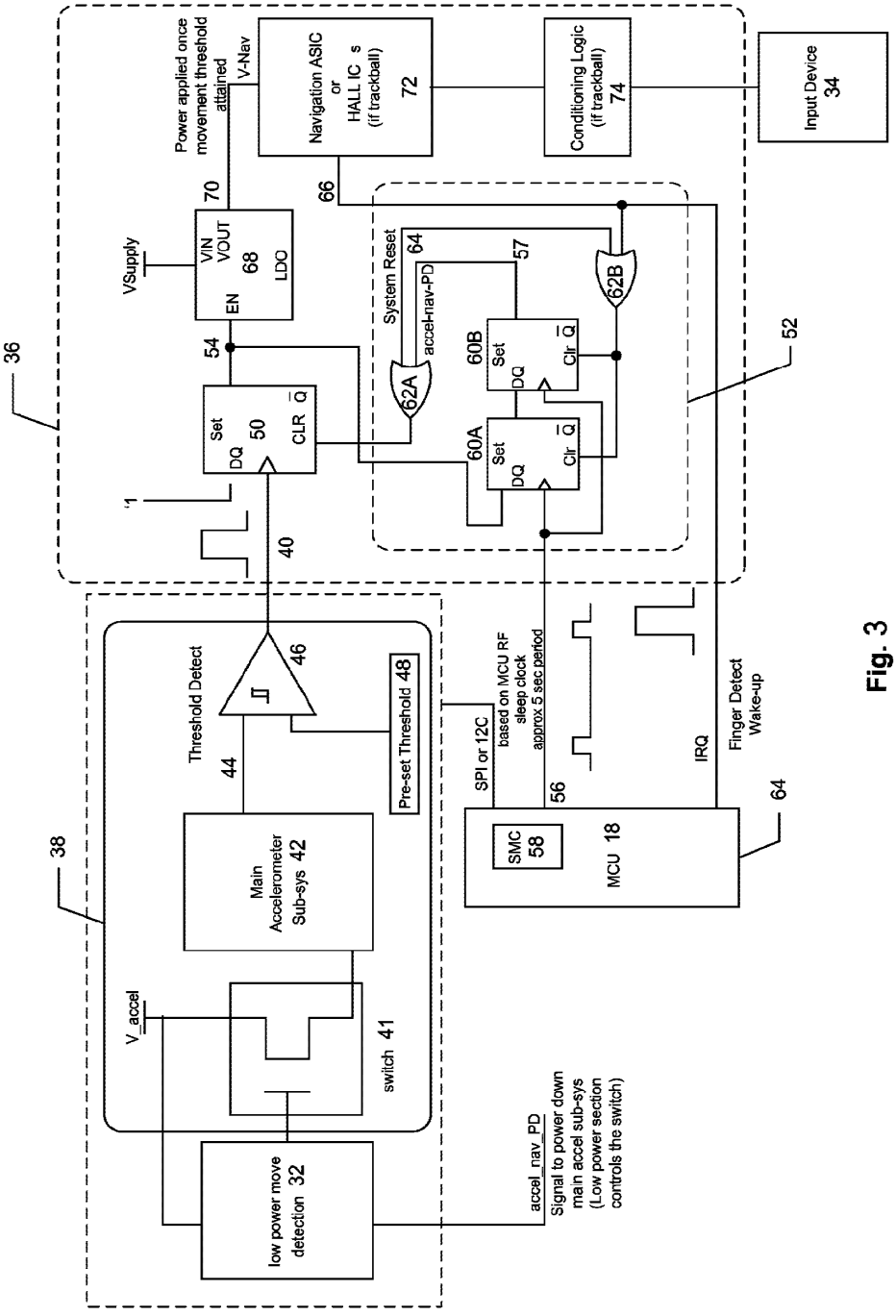


Fig. 3

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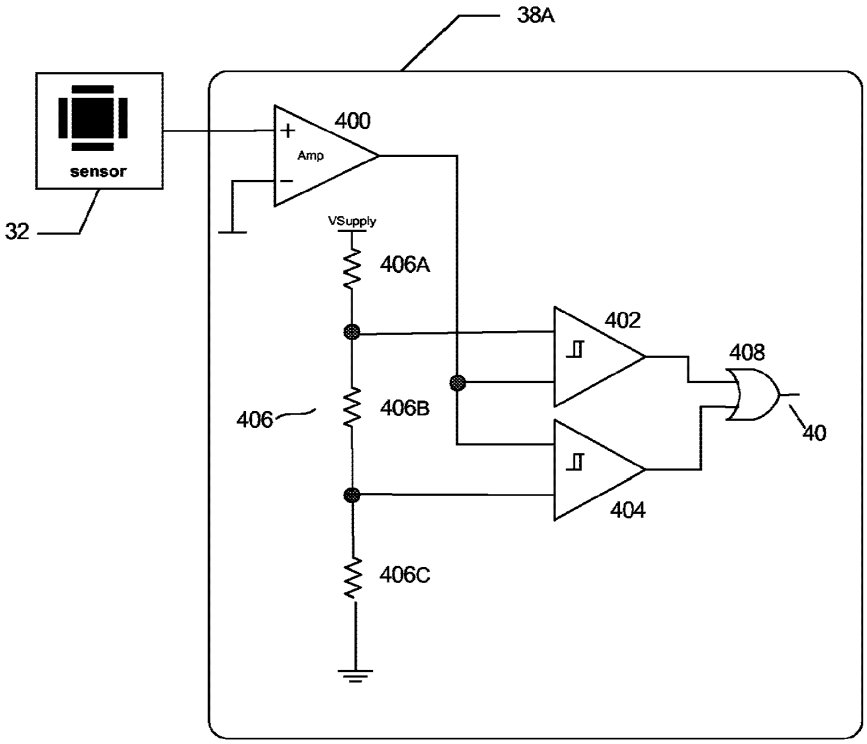


Fig. 4

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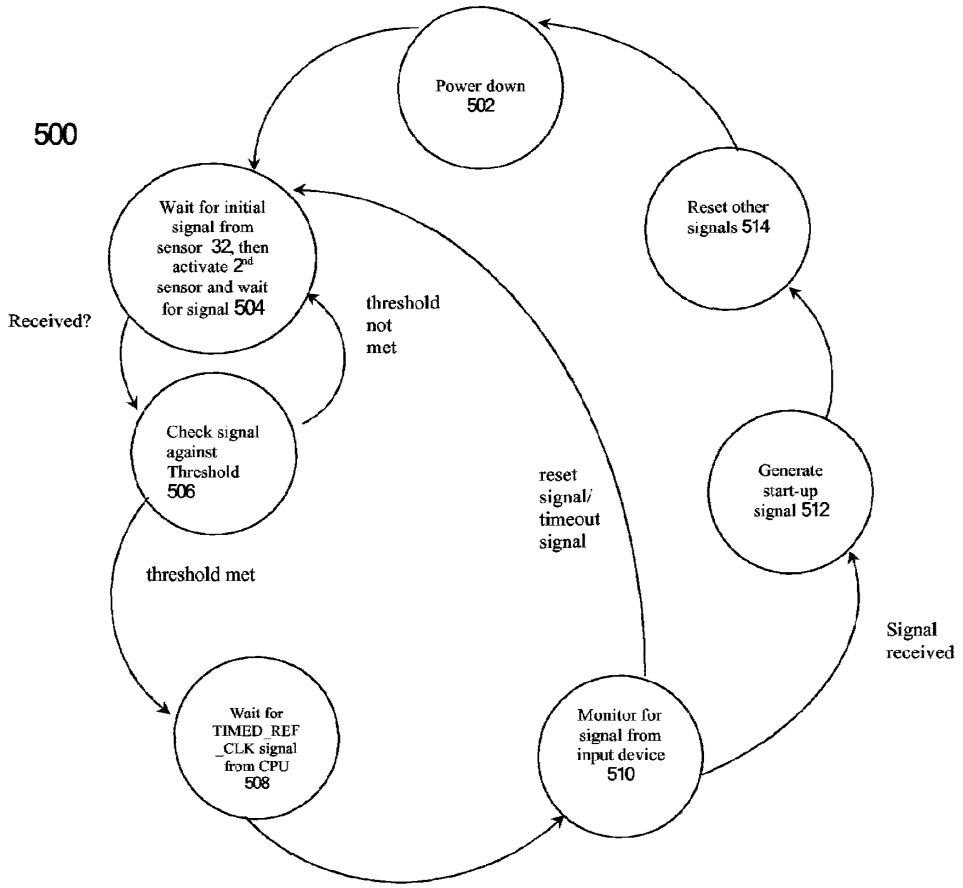


Fig. 5

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 11 0611

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 996 080 A (SILVA ET AL) 30 November 1999 (1999-11-30)	1,7,9,17	INV. G06F1/32
A	* column 3, line 56 - column 7, line 4 * * column 7, line 26 - line 64 * * column 8, line 18 - line 49 * * column 9, line 16 - column 12, line 40; figures 1-3,5-11 *	2,5,8, 12,18,19	
A	US 5 656 804 A (BARKAN ET AL) 12 August 1997 (1997-08-12) * column 4, line 6 - column 5, line 5 * * column 7, line 64 - column 8, line 42 * * column 8, line 63 - column 11, line 55; figures 2A-2C,3A-5C *	1,2,7,9, 12,17	
A	US 6 734 845 B1 (NIELSEN JAKOB ET AL) 11 May 2004 (2004-05-11) * column 2, line 16 - column 3, line 4 * * column 4, line 27 - column 7, line 13; figures 1-7 *	1,2,5, 17-19,21	
			TECHNICAL FIELDS SEARCHED (IPC) G06F H04M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 June 2006	Semple, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 11 0611

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) A method of waking up and a portable electronic device configured to perform the same

(57) The present disclosure provides a method of waking a portable electronic device and a portable electronic device configured to perform the same. In accordance with one embodiment, there is provided a method of conserving power on a portable electronic device, the portable electronic device having a device housing which comprises a touch-sensitive display, an accelerometer, and a force sensing transducer, the method comprising: causing the portable electronic device to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display is deactivated in the sleep mode and the force sensing transducer measures forces applied to the touch-sensitive display at a reduced rate relative to a rate of a full power mode when in the sleep mode; detecting an inertial event using the accelerometer; causing the force sensing transducer to measure forces applied to the touch-sensitive display at the rate of the full power mode in response to detection of an inertial event; detecting forces applied to the touch-sensitive display using the force sensing transducer at the rate of the full power mode; causing the touch-sensitive display to be reactivated in response to detection of a force which is greater than a predetermined wake force threshold; detecting touch events on the touch-sensitive display; and causing the portable electronic device to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of the force which is greater than a predetermined wake force threshold.

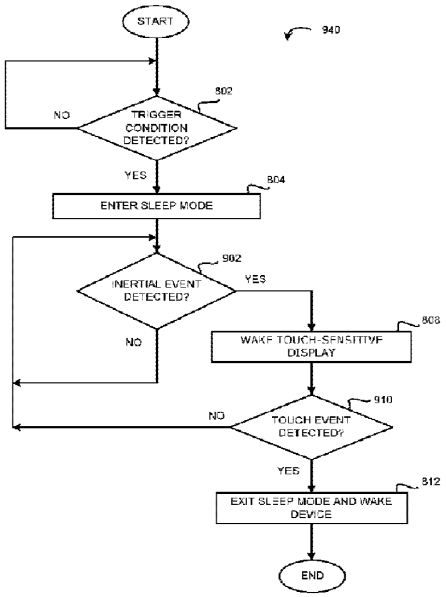


FIG. 11

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to portable electronic devices, including but not limited to portable electronic devices having touch screen displays and their control.

BACKGROUND

[0002] Electronic devices, including portable electronic devices, have gained widespread use and may provide a variety of functions including, for example, telephonic, electronic messaging and other personal information manager (PIM) application functions. Portable electronic devices include, for example, several types of mobile stations such as simple cellular telephones, smart telephones, wireless personal digital assistants (PDAs), and laptop computers with wireless 802.11 or Bluetooth™ capabilities.

[0003] Portable electronic devices such as PDAs or smart telephones are generally intended for handheld use and ease of portability. Smaller devices are generally desirable for portability. A touch-sensitive display, also known as a touchscreen display, is particularly useful on handheld devices, which are small and have limited space for user input and output. The information displayed on the touch-sensitive displays may be modified depending on the functions and operations being performed. The power consumed by touch-sensitive displays is a relatively large portion of the total power draw for the device. Accordingly, improvements which reduce the power consumption of touch-sensitive displays of portable electronic devices are desirable.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Figure 1 is a simplified block diagram of components including internal components of a portable electronic device according to one aspect;

[0005] Figure 2 is a front view of an example of a portable electronic device in a portrait orientation;

[0006] Figure 3A is a sectional side view of portions of the portable electronic device of Figure 2;

[0007] Figure 3B is a side view of a portion of the portable electronic device shown in Figure 3A;

[0008] Figure 4 is a front view of an example of a portable electronic device in a portrait orientation, showing hidden detail in ghost outline;

[0009] Figure 5 is a block diagram of a circuit for controlling the actuators of the portable electronic device in accordance with one example embodiment of the present disclosure;

[0010] Figure 6 is a block diagram of a circuit for controlling the force sensors of the portable electronic device in accordance with one example embodiment of the present disclosure;

[0011] Figure 7 is schematic diagram of a circuit for controlling the force sensors of the portable electronic device in accordance with one example embodiment of the present disclosure;

[0012] Figure 8 is a flowchart illustrating a method of waking up a portable electronic device in accordance with one example embodiment of the present disclosure;

[0013] Figure 9 is a flowchart illustrating a method of waking up a portable electronic device in accordance with another example embodiment of the present disclosure;

[0014] Figure 10 is a flowchart illustrating a method of waking up a portable electronic device in accordance with a further example embodiment of the present disclosure; and

[0015] Figure 11 is a flowchart illustrating a method of waking up a portable electronic device in accordance with another example embodiment of the present disclosure.

DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS

[0016] The present disclosure provides a wakeup detection circuit, and in particular, a low power wakeup detection circuit, and a portable electronic device having such wakeup detection circuits. Portable electronic devices may have several power modes: a "full power" mode (also referred to as an "on mode" or "normal" mode) in which normal full functionality of the device is provided; a sleep mode (also referred to as a "low power" mode or "standby" mode) in which reduced functionality of the device is provided; and an "off mode" in which the device is powered-off and performs no functions or a minimized set of functions. To exit the sleep mode or off mode, portable electronic devices having a touch-sensitive display typically periodically scan the touch-sensitive display to detect a touch event. When a touch event is detected, the device switches from the sleep mode or off mode to the full power mode. Periodic scanning of the touch-sensitive display consumes scarce power. The present disclosure provides a wakeup detection circuit which does not require periodic scanning of the touch-sensitive display. The present disclosure also provides a method of waking a portable electronic device and a portable electronic device configured to perform the same.

[0017] In accordance with one embodiment, there is provided a method of conserving power on a portable electronic device, the portable electronic device having a device housing which comprises a touch-sensitive display, an accelerometer, and a force sensing transducer, the method comprising: causing the portable electronic device to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display is deactivated in the sleep mode and the force sensing transducer measures forces applied to the touch-sensitive display at a reduced rate relative to a rate of a full power mode when in the sleep mode; detecting an inertial event using the accelerometer; causing the force sensing transducer to measure forces applied to the touch-sensitive display

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at the rate of the full power mode in response to detection of an inertial event; detecting forces applied to the touch-sensitive display using the force sensing transducer at the rate of the full power mode; causing the touch-sensitive display to be reactivated in response to detection of a force which is greater than a predetermined wake force threshold; detecting touch events on the touch-sensitive display; and causing the portable electronic device to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of the force which is greater than a predetermined wake force threshold.

[0018] In accordance with another embodiment, there is provided a method of conserving power on a portable electronic device, the portable electronic device having a device housing which comprises a touch-sensitive display and a force sensing transducer, the method comprising: causing the portable electronic device to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display is deactivated in the sleep mode; detecting forces applied to the touch-sensitive display using the force sensing transducer; causing the touch-sensitive display to be reactivated in response to detection of a force which is greater than a predetermined wake force threshold; detecting touch events on the touch-sensitive display; and causing the portable electronic device to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of the force which is greater than a predetermined wake force threshold.

[0019] In accordance with a further embodiment, there is provided a method of conserving power on a portable electronic device, the portable electronic device having a device housing which comprises a touch-sensitive display, an accelerometer, and a force sensing transducer, the method comprising: causing the portable electronic device to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display is deactivated in the sleep mode and the force sensing transducer measures forces applied to the touch-sensitive display at a reduced rate relative to a rate of a full power mode when in the sleep mode; detecting an inertial event using the accelerometer; causing the force sensing transducer to measure forces applied to the touch-sensitive display at the rate of the full power mode in response to detection of an inertial event; detecting forces applied to the touch-sensitive display using the force sensing transducer at the rate of the full power mode; and causing the touch-sensitive display to be reactivated and causing the portable electronic device to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of the force which is greater than a predetermined wake force threshold.

[0020] In accordance with a further embodiment, there is provided a method of conserving power on a portable electronic device, the portable electronic device having a device housing which comprises a touch-sensitive display and an accelerometer, the method comprising: causing the portable electronic device to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display is deactivated in the sleep mode; detecting an inertial event using the accelerometer; causing the touch-sensitive display to be reactivated in response to detection of an inertial event; detecting touch events on the touch-sensitive display; and causing the portable electronic device to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of inertial event.

[0021] In some embodiments, the portable electronic device comprises a plurality of piezoelectric elements resiliently biased and located beneath the back side of the touch-sensitive display opposite to the touch-sensitive overlay of the touch-sensitive display, the movement of the touch-sensitive display being caused by modulating the charge of the piezoelectric elements thereby providing haptic feedback which simulates the collapse of a dome-type switch. In some embodiments, the plurality of piezoelectric elements comprise four piezoelectric disks, each piezoelectric disk being located near a respective corner of the touch-sensitive display.

[0022] In some embodiments in which the portable electronic device comprises a force sensing transducer, the force sensing transducer is located beneath a back side of the touch-sensitive display opposite to a touch-sensitive overlay of the touch-sensitive display, the force sensing transducer measuring forces applied to the touch-sensitive overlay of the touch-sensitive display. In some embodiments, the portable electronic device comprises a plurality of force sensing transducers, wherein a sum of force data measured by the force sensing transducers is used to determine whether an applied force is greater than the predetermined wake force threshold. In some embodiments, the force sensing transducers are force sensing resistors. In some embodiments, the force sensing transducers comprise four force sensing resistors, each force sensing resistor being located near a respective corner of the touch-sensitive display.

[0023] In accordance with further embodiments, there is provided a portable electronic device having a device housing in which a controller is received and which comprises a touch-sensitive display, and one or both of an accelerometer or force sensing transducer, the controller being configured to perform any one of the methods described herein.

[0024] In accordance with one example embodiment, there is provided a portable electronic device, comprising: a housing; a processor received within the housing; a touch-sensitive display connected to the processor and exposed by the housing, the touch-sensitive display having a touch-sensitive overlay detecting touch events; an accelerometer received within the housing connected to the controller and measuring inertial events; at least one force sensing transducer located below the touch-sensitive display on an opposite side to the touch-sensitive overlay, the at least one force sensing transducer being connected to the controller and measuring forces applied

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to the touch-sensitive display; wherein the controller is configured for: causing the portable electronic device to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display is deactivated in the sleep mode and the force sensing transducer measures forces applied to the touch-sensitive display at a reduced rate relative to a rate of a full power mode when in the sleep mode; detecting an inertial event using the accelerometer; causing the force sensing transducer to measure forces applied to the touch-sensitive display at the rate of the full power mode in response to detection of an inertial event; detecting forces applied to the touch-sensitive display using the force sensing transducer at the rate of the full power mode; causing the touch-sensitive display to be reactivated in response to detection of a force which is greater than a predetermined wake force threshold; detecting touch events on the touch-sensitive display; and causing the portable electronic device to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of the force which is greater than a predetermined wake force threshold.

[0025] In accordance with a further embodiment, there is provided a control circuit, comprising: a control circuit, comprising: a controller having a full power duty cycle and a slower sleep mode duty cycle, the full power duty cycle and sleep mode duty cycle each having an active portion in which data is read and an inactive portion in which data is not read; a plurality of force sensing transducers for measuring force data which are connected to the controller; a multi-port switch which sums the force data output of the plurality of force sensing transducers, the multi-port switch having a switch for each of the force sensing transducers, a respective switch for each of the force sensing transducers being closed during an active portion of the sleep duty cycle and the respective switch for each of the force sensing transducers being open during the inactive portion of the sleep duty cycle; and a comparator for comparing the summed force data from the multi-port switch to a wakeup force threshold; wherein the controller is configured to wake from a sleep mode and return to a full power mode when the summed force data is greater than the wakeup force threshold.

[0026] In accordance with a further embodiment, there is provided a portable electronic device, comprising: a housing; a controller received within the housing; a touch-sensitive display having a touch-sensitive overlay, the touch-sensitive display being mechanically constrained by the housing; at least one force sensing transducer located below the touch-sensitive display on an opposite side to the touch-sensitive overlay, the at least one force sensing transducer being connected to the controller and measuring forces applied to the touch-sensitive display; wherein the controller is configured for: initiating a sleep mode from a full power mode in response to a trigger; when in the sleep mode, reading force data measured by the at least one force sensing transducer at a reduced duty cycle relative to the full power mode, comparing the force data to a wakeup force threshold, and returning to the full power mode from the sleep mode when the force data is greater than the wakeup force threshold.

[0027] In accordance with a further embodiment, there is provided a control circuit, comprising: a controller having a full power duty cycle and a slower sleep mode duty cycle, the full power duty cycle and sleep mode duty cycle each having an active portion in which data is read and an inactive portion in which data is not read; at least one force sensing transducer for measuring force data which is connected to the controller; a switch connected to the at least one force sensing transducer which is closed during an active portion of the sleep duty cycle and open during the inactive portion of the sleep duty cycle; and a comparator for comparing the force data from the switch to a wakeup force threshold; wherein the controller is configured to wake from a sleep mode and return to a full power mode when the force data is greater than the wakeup force threshold.

[0028] For simplicity and clarity of illustration, reference numerals may be repeated among the figures to indicate corresponding or analogous elements. Numerous details are set forth to provide an understanding of the embodiments described herein. The embodiments may be practiced without these details. In other instances, well-known methods, procedures, and components have not been described in detail to avoid obscuring the embodiments described. The description is not to be considered as limited to the scope of the embodiments described herein.

[0029] The disclosure generally relates to an electronic device, which is a portable electronic device in the embodiments described herein. Examples of portable electronic devices include mobile, or handheld, wireless communication devices such as pagers, cellular phones, cellular smart-phones, wireless organizers, personal digital assistants, wirelessly enabled notebook computers, and so forth. The portable electronic device may also be a portable electronic device without wireless communication capabilities, such as a handheld electronic game device, digital photograph album, digital camera, or other device.

[0030] A block diagram of an example of a portable electronic device 100 is shown in Figure 1. The portable electronic device 100 includes multiple components, such as a processor 102 that controls the overall operation of the portable electronic device 100. Communication functions, including data and voice communications, are performed through a communication subsystem 104. Data received by the portable electronic device 100 is decompressed and decrypted by a decoder 106. The communication subsystem 104 receives messages from and sends messages to a wireless network 150. The wireless network 150 may be any type of wireless network, including, but not limited to, data wireless networks, voice wireless networks, and networks that support both voice and data communications. A power source 142, such as one or more rechargeable batteries or a port to

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an external power supply, powers the portable electronic device 100.

[0031] The processor 102 interacts with other components, such as Random Access Memory (RAM) 108, memory 110, a display screen 112 (such as a liquid crystal display (LCD)) with a touch-sensitive overlay 114 operably connected to an electronic controller 116 that together comprise a touch-sensitive display 118, one or more actuators 120, one or more force sensors 122, one or more auxiliary input/output (I/O) subsystems 124, a data port 126, a speaker 128, a microphone 130, short-range communications subsystem 132, and other device subsystems 134. It will be appreciated that the electronic controller 116 of the touch-sensitive display 118 need not be physically integrated with the touch-sensitive overlay 114 and display screen 112. User-interaction with a graphical user interface is performed through the touch-sensitive overlay 114. The processor 102 interacts with the touch-sensitive overlay 114 via the electronic controller 116. Information, such as text, characters, symbols, images, icons, and other items that may be displayed or rendered on a portable electronic device, is displayed on the touch-sensitive display 118 via the processor 102. The processor 102 may interact with an accelerometer 136 that may be utilized to detect direction of gravitational forces or gravity-induced reaction forces. Instead of an accelerometer 136, another type of inertial sensor could be used in other embodiments.

[0032] The portable electronic device 100 also includes one or more clocks including a system clock (not shown) and sleep clock (not shown). In other embodiments, a single clock can operate as both system clock and sleep clock. The sleep clock is a lower power, lower frequency clock. By way of example, the system clock may comprise a voltage controlled oscillator operating at a frequency of approximately 700 to 800 megahertz (though the speed of the system clock may vary depending on the mode of the portable electronic device 100), whereas the sleep clock may comprise a low power oscillator operating at a frequency in the range of 30 kilohertz to 60 kilohertz. In one example embodiment, the sleep clock operates at 32 kilohertz to reduce the power consumption.

[0033] The auxiliary I/O subsystems 124 could include other input devices such as one or more control keys, a keyboard or keypad, navigational tool (input device), or both. The navigational tool could be a clickable/depressible trackball or scroll wheel, or touchpad. The other input devices could be included in addition to, or instead of, the touch-sensitive display 118, depending on the embodiment.

[0034] To identify a subscriber for network access, the portable electronic device 100 uses a Subscriber Identity Module or a Removable User Identity Module (SIM/RUIM) card 138 for communication with a network, such as the wireless network 150. Alternatively, user identification information may be programmed into memory 110.

[0035] The portable electronic device 100 includes an operating system 146 and software programs or components 148 that are executed by the processor 102 and are typically stored in a persistent, updatable store such as the memory 110. Additional applications or programs may be loaded onto the portable electronic device 100 through the wireless network 150, the auxiliary I/O subsystem 124, the data port 126, the short-range communications subsystem 132, or any other suitable subsystem 134.

[0036] A received signal such as a text message, an e-mail message, or web page download is processed by the communication subsystem 104 and input to the processor 102. The processor 102 processes the received signal for output to the display screen 112 and/or to the auxiliary I/O subsystem 124. A subscriber may generate data items, for example e-mail messages, which may be transmitted over the wireless network 150 through the communication subsystem 104. For voice communications, the overall operation of the portable electronic device 100 is similar. The speaker 128 outputs audible information converted from electrical signals, and the microphone 130 converts audible information into electrical signals for processing.

[0037] Figure 2 shows a front view of an example of a portable electronic device 100 in portrait orientation. The portable electronic device 100 includes a housing 200 that houses internal components including internal components shown in Figure 1 and frames the touch-sensitive display 118 such that the touch-sensitive display 118 is exposed for user-interaction therewith when the portable electronic device 100 is in use. It will be appreciated that the touch-sensitive display 118 may include any suitable number of user-selectable features rendered thereon, for example, in the form of virtual buttons for user-selection of, for example, applications, options, or keys of a keyboard for user entry of data during operation of the portable electronic device 100.

[0038] The touch-sensitive display 118 may be any suitable touch-sensitive display, such as a capacitive, resistive, infrared, surface acoustic wave (SAW) touch-sensitive display, strain gauge, optical imaging, dispersive signal technology, acoustic pulse recognition, and so forth, as known in the art. A capacitive touch-sensitive display includes a capacitive touch-sensitive overlay 114. The overlay 114 may be an assembly of multiple layers in a stack including, for example, a substrate, a ground shield layer, a barrier layer, one or more capacitive touch sensor layers separated by a substrate or other barrier, and a cover. The capacitive touch sensor layers may be any suitable material, such as patterned indium tin oxide (ITO).

[0039] One or more touches, also known as touch contacts or touch events, may be detected by the touch-sensitive display 118. The processor 102 may determine attributes of the touch, including a location of a touch. Touch location data may include an area of contact or a single point of contact, such as a point at or near a centre of the area of contact. The location of a detected touch

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may include x and y components, e.g., horizontal and vertical components, respectively, with respect to one's view of the touch-sensitive display 118. For example, the x location component may be determined by a signal generated from one touch sensor, and the y location component may be determined by a signal generated from another touch sensor. A signal is provided to the controller 116 in response to detection of a touch. A touch may be detected from any suitable object, such as a finger, thumb, appendage, or other items, for example, a stylus, pen, or other pointer, depending on the nature of the touch-sensitive display 118. Multiple simultaneous touches may be detected.

[0040] The actuators 120 comprise one or more piezoelectric devices that provide tactile feedback for the touch-sensitive display 118. The actuators 120 may be depressed by applying sufficient force to the touch-sensitive display 118 to overcome the actuation force of the actuators 120. The actuators 120 may be actuated by pressing anywhere on the touch-sensitive display 118. The actuator 120 may provide input to the processor 102 when actuated. Contraction of the piezoelectric actuators applies a spring-like force, for example, opposing a force externally applied to the touch-sensitive display 118. Each piezoelectric actuator includes a piezoelectric device, such as a piezoelectric (PZT) ceramic disk adhered to a metal substrate. The metal substrate bends when the PZT disk contracts due to build up of charge at the PZT disk or in response to a force, such as an external force applied to the touch-sensitive display 118. The charge may be adjusted by varying the applied voltage or current, thereby controlling the force applied by the piezoelectric disks. The charge on the piezoelectric actuator may be removed by a controlled discharge current that causes the PZT disk to expand, releasing the force thereby decreasing the force applied by the piezoelectric disks. The charge may advantageously be removed over a relatively short period of time to provide tactile feedback to the user. Absent an external force and absent a charge on the piezoelectric disk, the piezoelectric disk may be slightly bent due to a mechanical preload.

[0041] The housing 200 can be any suitable housing for the internal components shown in Figure 1. Figure 3A shows a sectional side view of portions of the portable electronic device 100 and Figure 3B shows a side view of a portion of the actuators 120. The housing 200 in the present example includes a back 302, a frame 304, which frames the touch-sensitive display 118 and sidewalls 306 that extend between and generally perpendicular to the back 302 and the frame 304. A base 308 is spaced from and is generally parallel to the back 302. The base 308 can be any suitable base and can include, for example, a printed circuit board or flexible circuit board supported by a stiff support between the base 308 and the back 302. The back 302 may include a plate (not shown) that is releasably attached for insertion and removal of, for example, the power source 142 and the SIM/RUIM card 138 referred to above. It will be appreciated that the back 302, the sidewalls 306 and the frame 304 may be injection molded, for example. In the example of the portable electronic device 100 shown in Figure 2, the frame 304 is generally rectangular with rounded corners, although other shapes are possible.

[0042] The display screen 112 and the touch-sensitive overlay 114 are supported on a support tray 310 of suitable material such as magnesium for providing mechanical support to the display screen 112 and touch-sensitive overlay 114. A compliant spacer such as a gasket compliant 312 is located around the perimeter of the frame 304, between an upper portion of the support tray 310 and the frame 304 to provide a gasket for protecting the components housed in the housing 200 of the portable electronic device 100. A suitable material for the compliant gasket 312 includes, for example, a cellular urethane foam for providing shock absorption, vibration damping and a suitable fatigue life. In some embodiments, a number of compliant spacers may be used to provide the function of the gasket compliant 312.

[0043] The actuators 120 includes four piezoelectric disk actuators 314, as shown in Figure 4, with each piezoelectric disk actuator 314 located near a respective corner of the touch-sensitive display 118. Referring again to Figures 3A and 3B, each piezoelectric disk actuator 314 is supported on a respective support ring 316 that extends from the base 308 toward the touch-sensitive display 118 for supporting the respective piezoelectric disk actuator 314 while permitting flexing of the piezoelectric disk actuator 314. Each piezoelectric disk actuator 314 includes a piezoelectric disk 318 such as a PZT ceramic disk adhered to a metal substrate 320 of larger diameter than the piezoelectric disk 318 for bending when the piezoelectric disk 318 contracts as a result of build up of charge at the piezoelectric disk 318. Each piezoelectric disk actuator 314 is supported on the respective support ring 316 on one side of the base 308, near respective corners of the metal substrate 320, base 308 and housing 200. The support 316 ring is sized such that the edge of the metal substrate 320 contacts the support ring 316 for supporting the piezoelectric disk actuator 314 and permitting flexing of the piezoelectric disk actuator 314.

[0044] A shock-absorbing element 322, which in the present example is in the form of a cylindrical shock-absorber of suitable material such as a hard rubber is located between the piezoelectric disk actuator 314 and the support tray 310. A respective force sensor 122 is located between each shock-absorbing element 322 and the respective piezoelectric disk actuator 314. A suitable force sensor 122 includes, for example, a puck-shaped force sensing resistor for measuring applied force (or pressure). It will be appreciated that a force can be determined using a force sensing resistor as an increase in pressure on the force sensing resistor results in a decrease in resistance (or increase in conductance). In the portable electronic device 100, each piezoelectric disk actuator 314 is located between the base 308 and the

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support tray 310 and force is applied on each piezoelectric disk actuator 314 by the touch-sensitive display 118, in the direction of the base 308, causing bending of the piezoelectric disk actuator 314. Thus, absent an external force applied by the user, for example by pressing on the touch-sensitive display 118, and absent a charge on the piezoelectric disk actuator 314, the piezoelectric disk actuator 314 undergoes slight bending. An external applied force in the form of a user pressing on the touch-sensitive display 118 during a touch event, and prior to actuation of the piezoelectric disk actuator 314, causes increased bending of the piezoelectric disk actuator 314 and the piezoelectric disk actuator 314 applies a spring force against the touch-sensitive display 118. When the piezoelectric disk 318 is charged, the piezoelectric disk 318 shrinks and causes the metal substrate 320 and piezoelectric disk 318 to apply a further force, opposing the external applied force, on the touch-sensitive display 118 as the piezoelectric actuator 314 straightens.

[0045] Each of the piezoelectric disk actuators 314, shock absorbing elements 322 and force sensors 122 are supported on a respective one of the support rings 316 on one side of the base 308. The support rings 316 can be part of the base 308 or can be supported on the base 308. The base 308 can be a printed circuit board while the opposing side of the base 308 provides mechanical support and electrical connection for other components (not shown) of the portable electronic device 100. Each piezoelectric disk actuator 314 is located between the base 308 and the support tray 310 such that an external applied force on the touch-sensitive display 118 resulting from a user pressing the touch-sensitive display 118 can be measured by the force sensors 122 and such that the charging of the piezoelectric disk actuator 314 causes a force on the touch-sensitive display 118, away from the base 308.

[0046] In the present embodiment each piezoelectric disk actuator 314 is in contact with the support tray 310. Thus, depression of the touch-sensitive display 118 by user application of a force thereto is determined by a change in resistance at the force sensors 122 and causes further bending of the piezoelectric disk actuators 314 as shown in Figure 3A. Further, the charge on the piezoelectric disk actuator 314 can be modulated to control the force applied by the piezoelectric disk actuator 314 on the support tray 310 and the resulting movement of the touch-sensitive display 118. The charge can be modulated by modulating the applied voltage or current. For example, a current can be applied to increase the charge on the piezoelectric disk actuator 314 to cause the piezoelectric disk 318 to contract and to thereby cause the metal substrate 320 and the piezoelectric disk 318 to straighten as referred to above. This charge therefore results in the force on the touch-sensitive display 118 for opposing the external applied force and movement of the touch-sensitive display 118 away from the base 308. The charge on the piezoelectric disk actuator 314 can also be removed via a controlled discharge current causing the piezoelectric disk 318 to expand again, releasing the force caused by the electric charge and thereby decreasing the force on the touch-sensitive display 118, permitting the touch-sensitive display 118 to return to a rest position.

[0047] Figure 5 shows a circuit for controlling the actuators 120 of the portable electronic device 100 according to one embodiment. As shown, each of the piezoelectric disks 318 is connected to a controller 500 such as a microprocessor including a piezoelectric driver 502 and an amplifier and analog-to-digital converter (ADC) 504 that is connected to each of the force sensors 122 and to each of the piezoelectric disks 318. In some embodiments, the ADC 504 could be a 9-channel ADC. The controller 500 is also in communication with the main processor 102 of the portable electronic device 100. The controller 500 can provide signals to the main processor 102 of the portable electronic device 100. It will be appreciated that the piezoelectric driver 502 may be embodied in drive circuitry between the controller 500 and the piezoelectric disks 318.

[0048] The mechanical work performed by the piezoelectric disk actuator 314 can be controlled to provide generally consistent force and movement of the touch-sensitive display 118 in response to detection of an applied force on the touch-sensitive display 118 in the form of a touch, for example. Fluctuations in mechanical work performed as a result of, for example, temperature, can be reduced by modulating the current to control the charge.

[0049] The controller 500 controls the piezoelectric driver 502 for controlling the current to the piezoelectric disks 318, thereby controlling the charge. The charge is increased to increase the force on the touch-sensitive display 118 away from the base 308 and decreased to decrease the force on the touch-sensitive display 118, facilitating movement of the touch-sensitive display 118 toward the base 308. In the present example, each of the piezoelectric disk actuators 314 are connected to the controller 500 through the piezoelectric driver 502 and are all controlled equally and concurrently. Alternatively, the piezoelectric disk actuators 314 can be controlled separately.

[0050] The portable electronic device 100 is controlled generally by monitoring the touch-sensitive display 118 for a touch event thereon, and modulating a force on the touch-sensitive display 118 for causing a first movement of the touch-sensitive display 118 relative to the base 308 of the portable electronic device 100 in response to detection of a touch event. The force is applied by at least one of the piezoelectric disk actuators 314, in a single direction on the touch-sensitive input surface of the touch-sensitive display 118. In response to determination of a touch event, the charge at each of the piezoelectric disks 318 is modulated to modulate the force applied by the piezoelectric disk actuators 314 on the touch-sensitive display 118 and to thereby cause movement of the touch-sensitive display 118 for simulating the collapse of

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a dome-type switch. When the end of the touch event is detected, the charge at each of the piezoelectric disks 318 is modulated to modulate the force applied by the piezoelectric disk actuators 314 to the touch-sensitive display 118 to cause movement of the touch-sensitive display 118 for simulating release of a dome-type switch.

[0051] The touch-sensitive display 118 is moveable within the housing 200 as the touch-sensitive display 118 can be moved away from the base 308, thereby compressing the compliant gasket 312, for example. Further, the touch-sensitive display 118 can be moved toward the base 308, thereby applying a force to the piezoelectric disk actuators 314. By this arrangement, the touch-sensitive display 118 is mechanically constrained by the housing 200 and resiliently biased by the compliant gasket compliant 312. In at least some embodiments, the touch-sensitive display 118 is resiliently biased and moveable between at least a first position and a second position in response to externally applied forces wherein the touch-sensitive display 118 applies a greater force to the force sensors 122 in the second position than in the first position. The movement of the touch-sensitive display 118 in response to externally applied forces is detected by the force sensors 122.

[0052] The analog-to-digital converter 504 is connected to the piezoelectric disks 318. In addition to controlling the charge at the piezoelectric disks 318, an output, such as a voltage output, from a charge created at each piezoelectric disk 318 may be measured based on signals received at the analog to digital converter 504. Thus, when a pressure is applied to any one of the piezoelectric disks 318 causing mechanical deformation, a charge is created. A voltage signal, which is proportional to the charge, is measured to determine the extent of the mechanical deformation. Thus, the piezoelectric disks 318 also act as sensors for determining mechanical deformation.

[0053] Figure 6 shows a block diagram of a circuit 600 for controlling the force sensors 122 of the portable electronic device 100 according to one embodiment of the present disclosure. Figure 7 is schematic diagram of an example circuit according to one embodiment of the present disclosure. The circuit 600 provides a wakeup detection circuit in some modes including, but not limited to (i) a full power mode in which normal, full functionality of the device 100 is provided; (ii) a sleep mode in which reduced functionality of the device 100 is provided; and (iii) an off mode in which the device 100 is powered-off and performs no functions or a minimized set of functions. As described above, the force sensors 122 measure the amount of applied force to the touch-sensitive display 118 (e.g., by the device user's fingers) and the touch-sensitive display 118 measures the location of touch events. The portable electronic device 100 described above provides a virtual click or "v-click" touchscreen which uses touch data and force data to generate click or unclick inputs and provide tactile feedback in response to click or unclick inputs using the piezoelectric disks 318 to actuate the touch-sensitive display 118. The touch-sensitive display 118 is actuated (or moved) up and down in response to the expansion and contraction of the piezoelectric disks 318 as described above. For convenience, the touch-sensitive display 118 is sometimes referred to as a touch sensor herein.

[0054] The circuit 600 consists of both analog and digital sections and provides a means of configuring a programmable response of the force sensors 122 to a user's press against the touch-sensitive display 118. In the shown example embodiment, the force sensors 122 comprise a number of force sensing resistors (FSRs) 602 for measuring applied force (or pressure). The resistance of the FSRs 602 change when a force or pressure is applied to them. The change in resistance causes a detectable voltage change. The FSRs 602 are numbered 1 to n where n is the total number of resistors. As described above in connection with FIG. 3A to 5, in some embodiments four FSRs 602 are used and located with a piezoelectric disk actuator 314 near a respective corner of the touch-sensitive display 118. The FSRs 602 may be disk-shaped or puck-shaped and may be located on top of the piezoelectric disks 318 and below the touch-sensitive display 118.

[0055] The FSRs 602 are each controlled by a digitally controlled switch. In the shown embodiment, the FSRs 602 are connected to an n-port switch 604 (also known as a multi-port switch) which comprises n single-pole, single-throw (SPST) switches. In embodiments in which four FSRs 602 are used, the n-port switch 604 comprises four SPST switches, one for each FSR 602. The n-port switch 604 controls which, if any, of the FSRs 602 report force data to host processor 102 (directly or indirectly). The n-port switch 604 and SPST switches are controlled by the controller 500 of Figure 5.

[0056] The n-port switch 604 generates an output signal which is sent to a signal conditioning circuit or module 606 of the circuit 600. The signal conditioning module 606 can be used to offset (or bias) the FSRs 602 at various levels under the control of the controller 500. The signal conditioning module 606 can also be used to vary the sensitivity of the FSR response by varying the gain provided by the signal conditioning module 606. The controller 500 controls the variable offset and gain of the signal conditioning module 606. In at least some embodiments, the signal conditioning module 606 comprises digital potentiometers which are controlled by the controller 500 and utilized for adjusting and calibrating the response of the FSRs 602 and an operational amplifier (Op-Amp), while in other embodiments, analog potentiometers could be used. In other embodiments, the signal conditioning module 606 could be omitted depending on the configuration of the FSRs 602 or other force sensor 122 used in the circuit 600.

[0057] Typically, the FSRs 602 are pre-loaded with an amount of force as a result of the mechanical forces applied by the housing 200 and touch-sensitive display 118. The amount of pre-loading may vary between embodi-

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ments. The bias and gain of the FSRs 602 can be calibrated to account for the pre-loading and FSR sensitivity differences using the signal conditioning module 606, for example, using potentiometers. In the shown embodiment, the circuit 600 can be used to calibrate each FSR 602 individually by closing the respective switch in the n-port switch 604.

[0058] In other embodiments, rather than summing all of the FSRs 602 via the n-port switch 604 groups of FSRs 602 may be summed and evaluated independently. For example, when four FSRs 602 are used near the respective corners of the touch-sensitive display 108, the top pair of FSRs 602 and bottom pair of FSRs 602 could be summed and evaluated independently (e.g., groups of two FSRs 602 could be evaluated). These groupings could shift depending on whether the portable electronic device is in a portrait or landscape orientation. Alternatively, the left side and right sight FSRs 602 could be summed and evaluated independently. In yet other embodiments, individual FSRs 602 could be read/scanned and evaluated independently. A force event could be triggered (e.g. for a wakeup event) if all, any group or pair, or any one of the FSRs 602 measured a force which exceeds the predetermined wake force/pressure threshold. In other embodiments, other force sensing transducers comprising a force sensor such as a strain gauge or pressure sensor could be used to detect a force event (e.g. an applied force against the touch-sensitive display which exceeds the predetermined wake force/pressure threshold) instead of FSRs 602. Alternatively, the piezoelectric disk actuators 314 could be used to detect a force event.

[0059] The controller 500, in the shown embodiment of Figure 6, includes a General Purpose Input/Output (GPIO). A GPIO is an interface which can act as input to read digital signals from other parts of the circuit 600 such as the signal conditioning module 606, or output digital signals to other parts of the circuit. The GPIO may be provided by a GPIO port having a number of individual GPIOs configurable as either input or outputs, and may be configurable to produce interrupts to the host processor 102. The controller 500 also includes an ADC 504 (Figure 5) with a corresponding interface as described above. Alternatively, the controller 500 or signal conditioning block 606 could incorporate an analog comparator with a programmable reference for achieving the same. In some example embodiments, the controller 500 could be the electronic controller 116 of the touch-sensitive display 118 or the processor 102.

[0060] The portable electronic device 100 has several power modes: (i) a full power mode in which normal, full functionality of the device 100 is provided; (ii) a sleep mode in which reduced functionality of the device 100 is provided; and (iii) an off mode in which the device 100 is powered-off and performs no functions or a minimized set of functions. The sleep mode may be triggered by any one of a number of possible trigger conditions. The portable electronic device 100 monitors for one or more predetermined trigger conditions for entering the sleep mode. The one or more trigger conditions may be include any one or more of a selection of a sleep/standby option or device lock option via corresponding input, user inactivity for a predetermined duration, lack of wireless network coverage for a predetermined duration, a holstering or closing of the portable electronic device 100, or other suitable trigger condition. In response to detection of a trigger condition, the processor 102 initiates the sleep mode and notifies the controller 500 to initiate a sleep mode for the circuit 600. The controller 500 then proceeds to read (scan) the FSRs 602 for a wakeup event until either a wakeup force/pressure threshold is met, or the processor 102 signals the controller 500 to cease reading/scanning the FSRs 602. When the wakeup force threshold is exceeded, the controller 500 can signal an interrupt back to the processor 102 waking it from the sleep mode (or standby state).

[0061] In some embodiments, when in the sleep mode, power consumption is conserved by powering off the high frequency system clock and switching the controller 500 from the system clock to the sleep clock. This reduces the power consumption of the circuit 600. In the sleep mode, the sleep clock is used by the controller 500 and the host processor 102 is idle.

[0062] The controller 500 uses a sleep clock to schedule "on" and "off" time of the circuit 600 accordance with a predetermined duty cycle. The duty cycle is programmable and controls the balance between power consumption and response latency. In some embodiments, the n-port switch 604 is closed and the FSRs 602 are powered "on" for approximately 1 millisecond every 100 milliseconds. During this time, the controller 500 reads the FSRs 602 to detect force events, that is, to determine if a force greater than a predetermined amount of applied force (i.e., a force threshold) is read by one or more of the FSRs 602. After being powered-on for approximately 1 millisecond during the "on" time, the FSRs 602 are powered-off for 99 milliseconds by re-opening the n-port switch 604 for "off" time or inactive portion of the duty cycle. The FSRs 602 are powered-off for the remainder of the duty cycle.

[0063] The duration of the duty cycle may be selected to configure the duration of a force applied to the touch-sensitive display 118 (e.g., screen press) required to trigger a force event. For example, in some embodiments the duration of time which the FSRs 602 are read is configured to detect a "push and hold" or "press and hold" action caused by the device user pressing a finger against the touch-sensitive display 118 and holding it against the touch-sensitive display 118 for a predetermined duration such as, for example, approximately 100 milliseconds. The predetermined duration for a press and hold may be programmable/ configurable, for example, to tune the wakeup function to the device user's habits or preferences and to filter out small ambient vibrations from normal movements, such as the device user walking with the device 100. For example, an inertial event

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caused by a tap event would occur and be over within a few milliseconds, e.g. approximately 20-25 milliseconds or less. The predetermined duration for a press and hold action is set to be longer than that of a typical tap event such as, for example, approximately 100 milliseconds. However, the predetermined duration could be more or less than 100 milliseconds and would typically be less than one second, and possibly less than 500 milliseconds. This means that any inertial event would have ended when the predetermined duration for detecting a press and hold event is reached. The touch-sensitive display 118 should also detect a tap event of the predetermined duration at the same time. Due to latency issues the forces measured by the force sensors 122 and the touches measures by the touch-sensitive display 118 may not be reported at the same time, however, these events can be synchronized or matched with each other.

[0064] In the shown example embodiment, the controller 500 configures the n-port switch 604 to sum the measurement of all of the FSRs 602 by closing each of the 4 SPST switches of the n-port switch 604 which are normally open, thereby connecting the FSRs 602 in parallel. The resultant output signal of the n-port switch 604 is then fed as input into the signal conditioning module 606. The variable offset and gain provided by the signal conditioning module 606 allows for a programmable response from the FSRs 602, thereby controlling the predetermined amount of applied force (i.e., force threshold) which is needed to trigger a force event.

[0065] As a result of summing of the readings of the FSRs 602 and a properly set force threshold, it is possible to trigger a force event when a device user presses on the touch-sensitive display 118 at any location. This occurs because a screen press under these conditions causes a force greater than or equal to the predetermined amount of applied force (i.e., the force threshold) to be detected on at least one of the FSRs 602. The force event will typically be detected by the FSR 602 closest to the location of the applied force on the touch-sensitive display 118 and possibly one or more of the other FSRs 602.

[0066] Force events are defined by applied forces greater than the force threshold. Force events can be detected using either analog or digital threshold comparator depending on the embodiment. In some embodiments, the analog signal output by the signal conditioning module 606 can be digitized by an ADC and then evaluated with a digital threshold comparator which can be implemented either in hardware or in software. For example, in some embodiments, force events could be detected by the controller's internal ADC 504 detecting that the analog signal has exceeded the force threshold. In other embodiments, force events could be detected by an analog comparator circuit (not shown) which triggers an interrupt to the controller 500 when the analog signal output by the signal conditioning module 606 exceeds the force threshold. The analog comparator can detect and signal a high/low output to the processor 102. When a force event is detected, the controller 500 sends a signal to the host processor 102 of the device 100 that an interrupt event was detected, and brings the portable electronic device 100 out of the sleep mode and into the full power mode. Wakeup events are defined by applied forces greater than a predetermined wakeup force threshold.

[0067] The described method of wakeup uses a relatively small amount of power while still allowing wakeup events to be detected. This functionality also reproduces the wakeup of a portable electronic device 100 caused by the collapse of a dome-type switch disposed between the touch-sensitive display 118 and housing 200 when the device user presses any where on the touch-sensitive display 118.

[0068] Figure 8 shows a flowchart illustrating a method 800 of providing a sleep mode on the portable electronic device 100 and waking up the device 100 from the sleep mode in accordance with one example embodiment. The steps of Figure 8 may be carried out by routines or subroutines of software executed by, for example, the processor 102. The coding of software for carrying out such steps is well within the scope of a person of ordinary skill in the art given the present disclosure. For example, the sleep mode may be implemented by a sleep process which operates in the background as part of the operating system 146.

[0069] In the first step 802, the processor 102 monitors for one or more predetermined trigger conditions for entering the sleep mode. The one or more trigger conditions may be include any one or more of a selection of a sleep/standby option via corresponding input or possibly a device lock option via corresponding input, user inactivity for a predetermined duration, lack of wireless network coverage for a predetermined duration, a holstering or closing of the portable electronic device 100, or other suitable trigger condition.

[0070] When one of the trigger conditions for entering the sleep mode is detected, the processor 102 initiates the sleep mode (step 804). The sleep mode may comprise the processor 102 switching from the system clock to the sleep clock and deactivating (e.g., powering off) the touch-sensitive display 118. When deactivated, the touch-sensitive display 118 does not measure touch data or detect touch events and its backlight is deactivated/disabled. In the sleep mode, the force sensors 122 continue to detect and measure forces applied to the touch-sensitive display 118. In at least some embodiments, the processor 102 instructs the controller 500 to initiate a sleep mode for the force sensor circuit 600 when one of the trigger conditions for entering the sleep mode is detected. In the sleep mode, the force sensors 122 operate at a reduced duty cycle relative to the full power mode and/or sample at a lower sampling rate relative to the full power mode to consume less power.

[0071] A locked mode may also be initiated in response to detecting one of the trigger conditions for entering a sleep mode when the sleep mode is itself triggered by a locking process, depending on the configuration of the

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locking process. In the locked mode, restrictions limiting interaction with the portable electronic device 100 are enforced. The restrictions typically affect at least some of its input interfaces/devices (e.g., overlay 114, auxiliary I/O 124, accelerometer 136) and at least some of its output interfaces/devices (e.g., display screen 112, speaker 128).

[0072] To reduce the power and resources consumed by the force sensor circuit 600, touch-sensitive display 118 and the host processor 102, the force sensors 122 and touch-sensitive display 118 can be put in a low reporting mode in which data is provided to the processor 102 only when a change in state of the respective sensor occurs. The low reporting mode can be contrasted with a full reporting mode in which the force sensors 122 and touch-sensitive display 118 provide data at regular scanning cycles irrespective of the state of the respective sensor. For the touch sensor 118, a change in the location of a touch event greater than a predetermined threshold or a change number of touches will trigger a change of state. For the force sensors 122, a change in state occurs when a force greater than a predetermined force threshold is detected by the force sensor controller 500 on all, any group or pair, or any one of the force sensors 122. A force greater than the predetermined force threshold is assumed to be a user finger applied to the touch-sensitive display 118. The predetermined force threshold for trigger a change in state is different from, and less than, the predetermined wake force threshold mentioned above.

[0073] In some embodiments, the sleep mode comprises changing the sampling of the force sensors 122 from the full reporting mode to the low reporting mode to consume less power. However, in other embodiments, the low reporting mode may be used by the force sensor 122 and possibly the touch-sensitive display 118 in both the full power mode and the sleep mode.

[0074] Next, in step 806 the force sensor controller 500 reads the force data output by the force sensors 122 and detects any wakeup force. The wakeup force is a force greater than the predetermined wake force threshold. This can be performed using analog or digital means as described above. When a wakeup force is detected, the force sensors 122 (e.g., and the circuit 600) wakeup from the sleep mode and return to the normal duty cycle and/or normal sampling rate of the full power mode, and touch-sensitive display 118 is reactivated (powered-up) so that touch data can be read/sampled for a predetermined duration (step 808). In other embodiments, the force sensors 122 could be maintained at the lower sampling rate of the sleep mode to consume less power when the touch-sensitive display 118 is reactivated. The force data and touch data are then read and it is determined whether a screen press or "click" has occurred or is in progress.

[0075] The backlight of the touch-sensitive display 118 may or may not be reactivated during the scanning/reading of the touch-sensitive display 118 which occurs in response to detection of a wakeup force, depending on the embodiment. For example, in some embodiments the backlight of the touch-sensitive display 118 is not activated until the wakeup event is confirmed by touch data read by the touch-sensitive display 118 to conserve power.

[0076] When the force data read by the forces sensors 122 and the touch data read by the touch-sensitive display 118 indicates a screen press r "click" has occurred or is in progress (step 810), the processor 102 wakes up from the sleep mode and returns to full power mode (step 812). If the processor 102 was switched from the system clock to the sleep clock during the sleep mode, the processor 102 switches back to the system clock. Other changes made when entering the sleep mode are also reversed. In at least some embodiments, the charge at each of the piezoelectric disks 318 is then be modulated to modulate the force applied by the piezoelectric disk actuators 314 on the touch-sensitive display 118 and to thereby cause movement of the touch-sensitive display 118 for simulating the collapse of a dome-type switch. This provides tactile or haptic feedback to the device user so that they know a screen press or "click" was registered by the device 100.

[0077] If a screen press or "click" is not detected, the touch-sensitive display 118 is deactivated again until being reactivated by the detection of another wakeup force, and the force sensors 122 are returned to the lower duty cycle and/or lower sampling rate of the sleep mode.

[0078] As will be appreciated by persons skilled in the art, sampling forces and touches applied to the touch-sensitive display 118 consumes scarce device power. During normal operation, this sampling occurs at a high rate to keep up with user interaction with the touch-sensitive display 118. However, when the portable electronic device 100 is idle a high sampling rate needlessly consumes power resulting in a shorter life for the power source 142. The present disclosure provides a method and portable electronic device 100 which aims to minimize, or at least reduce, the power consumed when the portable electronic device 100 while still clicking in response to forces.

[0079] To reduce the power and processing resources consumed, the present disclosure provides a sleep mode which deactivates the touch-sensitive display 118 when the device 100 is idle and uses the force sensors 122 to sample force data at a lower sampling rate to detect a potential wakeup when a force greater than the predetermined wakeup force threshold is detected. The sleep mode described in the present disclosure aims to minimize, or at least reduce, the power consumed when the portable electronic device 100 is idle while also registering screen presses or "clicks" in response to applied forces and optionally providing tactile/haptic feedback by modulating the charge at each of the piezoelectric disks 318 to modulate the force applied by the piezoelectric disk actuators 314.

[0080] Moreover, the predetermined wakeup force threshold may be set so as to filter out small applied forc-

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es such as ambient forces resulting from normal movements of the portable electronic device 100 (such as those applied to the device 100 while in a user's pocket while walking), while still detecting a finger pressing against touch-sensitive display 118. This avoids unnecessary wakeup event checks by limiting the applied forces which will be detected as potential wakeup events.

[0081] Figure 9 shows a flowchart illustrating a method 900 of providing a sleep mode on the portable electronic device 100 and waking up the device 100 from the sleep mode in accordance with another example embodiment. The steps of Figure 9 may be carried out by routines or subroutines of software executed by, for example, the processor 102. The coding of software for carrying out such steps is well within the scope of a person of ordinary skill in the art given the present disclosure. For example, the sleep mode may be implemented by a sleep process which operates in the background as part of the operating system 146.

[0082] In steps 802 and 804, the processor 102 monitors for one or more trigger conditions for enter a sleep mode, and enters a sleep mode in response to detection of one of the trigger conditions as described above. In the sleep mode of the embodiment shown in Figure 9, the forces sensors 122 are not read by the controller 500. As a result, the force sensors 122 or the entire circuit 600 may be powered-off to consume less power. In some embodiments, the circuit 600 has a non-power cycled current draw of approximately 80 pA which can be reduced by powering down the forces sensors 122. In other embodiments, the force sensors 122 could be operated at a reduced/slower duty cycle relative to the full power mode and/or sample at a lower sampling rate relative to the full power mode to consume less power as in the method 800 of Figure 8.

[0083] Next, in step 902 the accelerometer 136 is used to detect an inertial event. The inertial event could be a tap on the touch-sensitive display 118, a movement of the device 100 causing a change in acceleration which exceeds a predetermined threshold, or possible a predetermined movement or gesture performed by moving the device 100 in a predetermined manner (this motion being detected by the accelerometer 136).

[0084] A gesture is a predetermined motion performed by moving the device 100 in a predetermined manner such as a predetermined direction or series of directions. Gestures are identified by comparing the accelerations measured by the accelerometer 136 to reference data for the predetermined motions to determine whether the detected motion is characteristic of one of the predetermined motions. This is typically performed by the host processor 102 using acceleration data provided by the accelerometer 136, but could be performed via a built-in electronic controller of the accelerometer 136. The predetermined inputs could be a forward movement, backward movement, up movement, down movement, left movement, right movement, tilt left movement, tilt right movement, swing left movement, swing right movement or any other predetermined movement such as a movement which approximate a letter, number of symbol, or a series of such movements. In some embodiments, a horizontal tilt or swing movement (i.e., a left or right horizontal tilt or swing movement) and vertical tilt or swing movement (i.e., an up or down tilt or swing movement). Alternatively, a left tilt or swing movement, right tilt or swing movement, up tilt or swing movement and down tilt or swing movement could each be distinct predetermined inputs.

[0085] In some example embodiments, the inertial event could be a tap on the touch-sensitive display 118 and the accelerometer 136 is a digital accelerometer having a built-in tap detection function which may be used to detect a tap on the touch-sensitive display 118. Many commercially available digital accelerometers have a built-in tap detection function. Any digital accelerometer having a built-in tap detection function could be used. The tap detect threshold used by the built-in tap detection function may be programmable/ configurable and set so as to filter out small ambient vibrations from normal movements, such as the device user walking with the device 100.

[0086] Alternatively, rather than a digital accelerometer an analog accelerometer with an analog comparator circuit (not shown) with a programmable/ configurable reference could be used. The programmable reference acts as a predetermined acceleration threshold for an inertial event. The analog comparator circuit sends an interrupt to the controller 500 when the analog output signal of the analog accelerometer exceeds the programmable reference.

[0087] The accelerometer 136 may also be power-cycled to lower the sampling rate and conserve power when the device 100 is idle, for example, when the acceleration reading has not changed by more than a predetermined amount for a predetermined duration. Power-cycling of the accelerometer 136 may occur automatically as part of entering the sleep mode. When the acceleration exceeds this amount, the accelerometer 136 returns to the higher sampling rate to reduce latency in detection acceleration. In some example embodiments, the accelerometer 136 could have autonomous power cycling that can reduce current consumption to approximately 25 pA or less.

[0088] When an inertial event is detected, an interrupt is sent from the accelerometer 136 or a comparator circuit for the accelerometer 136 to the controller 500 to wake the force sensors 122 (step 904). As noted above, waking the force sensors 122 may comprise powering on the force sensors 122, increasing from a lower sampling rate of the sleep mode to a higher sampling rate (e.g., normal sampling rate of the full power mode), depending on the configuration of the sleep mode. Alternatively, the interrupt could be sent to the host processor 102, or to both the controller 500 and processor 102.

[0089] Next, in step 806 the force data output by the force sensors 122 is read by the force sensor controller

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500 of the circuit 600 which detects any wakeup force. This can be done via analog or digital means as described above. In some embodiments in which sleeping and waking the force sensors 122 comprises powering down and powering up the force sensors, the process of powering up the force sensors 122 and taking a measurement may take approximately 1 millisecond or less depending on the design of the signal conditioning module 606. This amount of time is sufficiently short that a wakeup force caused by an inertial event should, in at least most circumstances, still be present when the force sensors 122 wake. If no wakeup force is present when the force sensors 122 wake, the inertial event is considered to be erroneous and caused by something other than a screen press or "click".

[0090] When a wakeup force is detected, the touch-sensitive display 118 is reactivated/powered-up and the processor 102 wakes up from the sleep mode and returns to full power mode (step 812). If the processor 102 was switched from the system clock to the sleep clock during the sleep mode, the processor 102 switches back to the system clock. Other changes made to when entering the sleep mode are also reversed. In at least some embodiments, the charge at each of the piezoelectric disks 318 is modulated to modulate the force applied by the piezoelectric disk actuators 314 on the touch-sensitive display 118 and to thereby cause movement of the touch-sensitive display 118 for simulating the collapse of a dome-type switch. This provides tactile or haptic feedback to the device user so that they know a screen press or "click" was registered by the device 100.

[0091] If a wakeup force is not detected, the force sensors 122 are deactivated/powered-off again and returned to the sleep mode until being reactivated by the detection of another inertial event.

[0092] The method 900 provides a wakeup solution which uses inertial events to trigger a device wakeup and a force event to verify this trigger. The inertial event could be a movement of the device 100 or a tap on the touch-sensitive display 118. For example, in some embodiments the device could be configured to use a "press and hold" event as a wakeup event. In a press and hold event, the user presses or taps on the touch-sensitive display 118 with a finger to create an inertial event and presses on the touch-sensitive display 118 for a predetermined duration to create a force event. The touch-sensitive display 118 should also detect a tap event of the predetermined duration at the same time. Due to latency issues the forces measured by the force sensors 122 and the touches measures by the touch-sensitive display 118 may not be reported at the same time, however, these events can be synchronized or matched with each other. The inertial event will have ended when the predetermined duration for detecting a press and hold event is reached. The press and hold event will trigger a wakeup as described above.

[0093] In an alternate embodiment, the force sensors 122 are not affected by the sleep mode. In the sleep mode, the touch-sensitive display 118 and host processor 102 are put to sleep as described above and the accelerometer 136 is used to monitor for inertial events which, when detected, trigger an increase in the duty cycle and/or sampling rate of the force sensors 122 in order to reduce the latency in detecting wakeup events in the form of force events.

[0094] Figure 10 shows a flowchart illustrating a method 920 of providing a sleep mode on the portable electronic device 100 and waking up the device 100 from the sleep mode in accordance with a further example embodiment. The steps of Figure 10 may be carried out by routines or subroutines of software executed by, for example, the processor 102. The coding of software for carrying out such steps is well within the scope of a person of ordinary skill in the art given the present disclosure. For example, the sleep mode may be implemented by a sleep process which operates in the background as part of the operating system 146.

[0095] The method 920 comprises the steps 802, 804, 902, 904 and 806 described above in connection with the method 900 of Figure 9. However, the force sensors 122 measure force at a reduced rate in the sleep mode as in the method 800 of Figure 8. When a wakeup force is detected, the force sensors 122 (e.g., and the circuit 600) wakeup from the sleep mode and return from a reduced duty cycle of the sleep mode to the normal duty cycle and/or normal sampling rate of the full power mode, and touch-sensitive display 118 is reactivated (powered-up) so that touch data can be read/sampled for a predetermined duration (step 808).

[0096] When the force data read by the forces sensors 122 and the touch data read by the touch-sensitive display 118 indicates a screen press or "click" has occurred or is in progress (810), the processor 102 wakes up from the sleep mode and returns to full power mode (step 812). If the processor 102 was switched from the system clock to the sleep clock during the sleep mode, the processor 102 switches back to the system clock. Other changes made when entering the sleep mode are also reversed. In at least some embodiments, the charge at each of the piezoelectric disks 318 is then be modulated to modulate the force applied by the piezoelectric disk actuators 314 on the touch-sensitive display 118 and to thereby cause movement of the touch-sensitive display 118 for simulating the collapse of a dome-type switch. This provides tactile or haptic feedback to the device user so that they know a screen press or "click" was registered by the device 100.

[0097] If a screen press or "click" is not detected, the touch-sensitive display 118 is deactivated again until being reactivated by the detection of another wakeup force, and the force sensors 122 are returned to the lower duty cycle and/or lower sampling rate of the sleep mode.

[0098] The method 920 is similar to the method 800 of Figure 8 but adds inertial event detection using the accelerometer 136 from the method 900 of Figure 9 to verify potential wakeup events which an aim to reduce the false

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"wakeups" which may result, for example, from a finger moving across the touch-sensitive display 118.

[0099] In an alternate embodiment, the force sensors 122 are not affected by the sleep mode. In the sleep mode, the touch-sensitive display 118 is deactivated and host processor 102 is idled as described above and the accelerometer 136 is used to monitor for inertial events which, when detected, trigger an increase in the duty cycle and/or sampling rate of the force sensors 122 in order to reduce the latency in detecting wakeup events in the form of force events. In another alternate embodiment, detection of the inertial event could wake both the force sensors 122 and touch-sensitive display 118 at the same time.

[0100] In some embodiments, the detection of an inertial event could cause the duty cycle and/or the sampling rate of the touch-sensitive display 118 to be increased to reduce the latency in wakeup event detection caused by the relatively long scan cycle of the touch-sensitive display 118.

[0101] Figure 11 shows a flowchart illustrating a method 940 of providing a sleep mode on the portable electronic device 100 and waking up the device 100 from the sleep mode in accordance with a further example embodiment. The steps of Figure 11 may be carried out by routines or subroutines of software executed by, for example, the processor 102. The coding of software for carrying out such steps is well within the scope of a person of ordinary skill in the art given the present disclosure. For example, the sleep mode may be implemented by a sleep process which operates in the background as part of the operating system 146.

[0102] The method 940 comprises the steps 802, 804 and 902 as described above. However, the detection of an inertial event is used to reactivate (power-up) the touch-sensitive display 118 so that touch data can be read/sampled for a predetermined duration (step 808) rather than waking up force sensors 122. The force sensors 122 are not used in the process 940 and could be omitted from a device 100 which implements this method. When the touch data read by the touch-sensitive display 118 indicates a touch event has occurred or is in progress (step 910), the processor 102 wakes up from the sleep mode and returns to full power mode (step 812). If the processor 102 was switched from the system clock to the sleep clock during the sleep mode, the processor 102 switches back to the system clock. Other changes made when entering the sleep mode are also reversed. The charge of the piezoelectric disks 318 is not modulated and no tactile or haptic feedback is provided to the device user. In such embodiments, the force sensors 122 and actuators 120 (e.g. piezoelectric disk actuators 314) could be omitted.

[0103] If a touch event is not detected (step 810), the touch-sensitive display 118 is deactivated again until being reactivated by the detection of another inertial event.

[0104] The method 940 is similar to the method 900 of Figure 9 but does not use the force sensors 122 to detect wakeup events. Instead, the inertial event detection function provided by the accelerometer 136 is used to wake the touch-sensitive display 118, and the touch data measured by the touch-sensitive display 118 is used verify potential wakeup events which an aim to reduce the false "wakeups" which may result from using only the inertial event detection function as a wakeup event. That is, a touch event must be detected within a predetermined duration of when the touch-sensitive display 118 wakes up. The charge of the piezoelectric disks 318 is not modulated and no tactile or haptic feedback is provided to the device user.

[0105] The present disclosure teaches a method and portable electronic device which combines measurements from two or more independent sensors to confirm the detection of a wakeup event for a portable electronic device 100, thereby reducing false-positives. In some embodiments, such as the method 800, force data provided by force sensors 122 is combined with touch data provided by a touch-sensitive display 118 to verify potential wakeup events with an aim to reduce the false "wakeups".

[0106] In some embodiments, such as the method 900 and 920, inertial event detection provided by the accelerometer 136 is combined with force data provided by the force sensors 122 to verify potential wakeup events which an aim to reduce the false "wakeups" which may result from a finger moving across the touch-sensitive display 118. The time correlation of the interrupt signal from the threshold crossing event of accelerometer 136 and the interrupt signal from the threshold crossing event of force sensors 122 may be used to reliably detect a device wakeup event at relatively low power and complexity.

[0107] In some embodiments, such as the method 900 and 920, the power draw of the sleep mode may be reduced by powering off both the touch-sensitive display 18 and force sensors 122 while powering only the accelerometer 136. In some embodiments, further power savings may be realized by power cycling the accelerometer 136.

[0108] The various embodiments presented above are merely examples and are in no way meant to limit the scope of this disclosure. Variations of the innovations described herein will be apparent to persons of ordinary skill in the art, such variations being within the intended scope of the present application. In particular, features from one or more of the above-described embodiments may be selected to create alternative embodiments comprised of a sub-combination of features which may not be explicitly described above. In addition, features from one or more of the above-described embodiments may be selected and combined to create alternative embodiments comprised of a combination of features which may not be explicitly described above. Features suitable for such combinations and sub-combinations would be readily apparent to persons skilled in the art upon review of the present application as a whole. The subject matter

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described herein and in the recited claims intends to cover and embrace all suitable changes in technology.

Claims

1. A method of conserving power on a portable electronic device, the portable electronic device having a device housing which comprises a touch-sensitive display, an accelerometer, and a force sensing transducer, the method comprising:

   causing the portable electronic device to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display is deactivated in the sleep mode and the force sensing transducer measures forces applied to the touch-sensitive display at a reduced rate relative to a rate of a full power mode when in the sleep mode;
   detecting an inertial event using the accelerometer;
   causing the force sensing transducer to measure forces applied to the touch-sensitive display at the rate of the full power mode in response to detection of an inertial event;
   detecting forces applied to the touch-sensitive display using the force sensing transducer at the rate of the full power mode;
   causing the touch-sensitive display to be reactivated in response to detection of a force which is greater than a predetermined wake force threshold;
   detecting touch events on the touch-sensitive display; and
   causing the portable electronic device to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of the force which is greater than a predetermined wake force threshold.

2. The method of claim 1, wherein causing of the portable electronic device to wake from the sleep mode only occurs when the touch event exceeds a second predetermined duration and the predetermined wake force threshold is exceeded for the second predetermined duration.

3. The method of claim 2, wherein the second predetermined duration exceeds a duration of inertial events comprising taps.

4. A method of conserving power on a portable electronic device, the portable electronic device having a device housing which comprises a touch-sensitive display and a force sensing transducer, the method comprising:

   causing the portable electronic device to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display is deactivated in the sleep mode;
   detecting forces applied to the touch-sensitive display using the force sensing transducer;
   causing the touch-sensitive display to be reactivated in response to detection of a force which is greater than a predetermined wake force threshold;
   detecting touch events on the touch-sensitive display; and
   causing the portable electronic device to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of the force which is greater than a predetermined wake force threshold.

5. The method of claim 4, wherein the force sensing transducer measures forces applied to the touch-sensitive display at a reduced rate relative to a rate of a full power mode when in the sleep mode.

6. The method of claim 5, further comprising:

   causing the force sensing transducer to measure forces applied to the touch-sensitive display at the rate of the full power mode in response to detection of a force which is greater than the predetermined wake force threshold.

7. The method of claim 6, wherein the force sensing transducer is powered-off in the sleep mode, wherein the force sensing transducer is powered-on to measure forces applied to the touch-sensitive display at the rate of the full power mode in response to detection of a force which is greater than the predetermined wake force threshold.

8. The method of any one of claims 4 to 7, wherein causing of the portable electronic device to wake from the sleep mode only occurs when the touch event exceeds a second predetermined duration and the predetermined wake force threshold is exceeded for the second predetermined duration.

9. A method of conserving power on a portable electronic device, the portable electronic device having a device housing which comprises a touch-sensitive display, an accelerometer, and a force sensing transducer, the method comprising:

   causing the portable electronic device to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display is deactivated in the sleep mode and the force sensing transducer measures forces applied to the touch-sensitive display at a reduced rate relative

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to a rate of a full power mode when in the sleep mode;
detecting an inertial event using the accelerometer;
causing the force sensing transducer to measure forces applied to the touch-sensitive display at the rate of the full power mode in response to detection of an inertial event;
detecting forces applied to the touch-sensitive display using the force sensing transducer at the rate of the full power mode; and
causing the touch-sensitive display to be reactivated and causing the portable electronic device to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of the force which is greater than a predetermined wake force threshold.

10. The method of claim 9, wherein causing the touch-sensitive display to be reactivated and causing of the portable electronic device to wake from the sleep mode only occurs when the predetermined wake force threshold is exceeded for a second predetermined duration.

11. The method of any one of claims 1 to 10, further comprising:

causing movement of the touch-sensitive display relative to the device housing which simulates the collapse of a dome-type switch.

12. The method of claim 11, wherein the portable electronic device comprises at least one piezoelectric element resiliently biased and located beneath a back side of the touch-sensitive display opposite to a touch-sensitive overlay of the touch-sensitive display, the movement of the touch-sensitive display being caused by modulating a charge of the piezoelectric element thereby providing haptic feedback which simulates the collapse of a dome-type switch.

13. The method of claim 12, comprising a plurality of piezoelectric elements resiliently biased and located beneath the back side of the touch-sensitive display opposite to the touch-sensitive overlay of the touch-sensitive display, the movement of the touch-sensitive display being caused by modulating the charge of the piezoelectric elements thereby providing haptic feedback which simulates the collapse of a dome-type switch.

14. A method of conserving power on a portable electronic device, the portable electronic device having a device housing which comprises a touch-sensitive display and an accelerometer, the method comprising:

causing the portable electronic device to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display is deactivated in the sleep mode;
detecting an inertial event using the accelerometer;
causing the touch-sensitive display to be reactivated in response to detection of an inertial event;
detecting touch events on the touch-sensitive display; and
causing the portable electronic device to wake from the sleep mode in response to detection of a touch event within a predetermined duration of the detection of inertial event.

15. A portable electronic device, comprising: a housing; a processor received within the housing; a touch-sensitive display connected to the processor and exposed by the housing, the touch-sensitive display having a touch-sensitive overlay detecting touch events; and one or both of an accelerometer or force sensing transducer; wherein the controller is configured for performing the method of any one of claims 1 to 14.

Amended claims in accordance with Rule 137(2) EPC.

1. A method of conserving power on a portable electronic device, the portable electronic device (100) having a device housing (200) which comprises a touch-sensitive display (118), an accelerometer (136), and a force sensing transducer (122), the method comprising:

causing the portable electronic device (100) to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display (118) is deactivated in the sleep mode and the force sensing transducer (122) measures forces applied to the touch-sensitive display (118) at a reduced rate relative to a rate of a full power mode when in the sleep mode;
detecting an inertial event using the accelerometer (136);
causing the force sensing transducer (122) to measure forces applied to the touch-sensitive display (118) at the rate of the full power mode in response to detection of an inertial event;
detecting forces applied to the touch-sensitive display (118) using the force sensing transducer (122) at the rate of the full power mode;
causing the touch-sensitive display (118) to be reactivated in response to detection of a force which is greater than a predetermined wake force threshold;

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detecting touch events on the touch-sensitive display (118); and
causing the portable electronic device (100) to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of the force which is greater than a predetermined wake force threshold.

2. The method of claim 1, wherein causing of the portable electronic device (100) to wake from the sleep mode only occurs when the touch event exceeds a second predetermined duration and the predetermined wake force threshold is exceeded for the second predetermined duration.

3. The method of claim 2, wherein the second predetermined duration exceeds a duration of inertial events comprising taps.

4. A method of conserving power on a portable electronic device (100), the portable electronic device (100) having a device housing (200) which comprises a touch-sensitive display (118) and a force sensing transducer (122), the method comprising:

causing the portable electronic device (100) to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display (118) is deactivated in the sleep mode;
detecting forces applied to the touch-sensitive display (118) using the force sensing transducer (122);
causing the touch-sensitive display (118) to be reactivated in response to detection of a force which is greater than a predetermined wake force threshold;
detecting touch events on the touch-sensitive display (118); and
causing the portable electronic device (100) to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of the force which is greater than a predetermined wake force threshold.

5. The method of claim 4, wherein the force sensing transducer (122) measures forces applied to the touch-sensitive display (118) at a reduced rate relative to a rate of a full power mode when in the sleep made.

6. The method of claim 5, further comprising:

causing the force sensing transducer (122) to measure forces applied to the touch-sensitive display (118) at the rate of the full power mode in response to detection of a force which is greater than the predetermined wake force threshold.

7. The method of claim 6, wherein the force sensing transducer (122) is powered-off in the sleep mode, wherein the force sensing transducer (122) is powered-on to measure forces applied to the touch-sensitive display (118) at the rate of the full power mode in response to detection of a force which is greater than the predetermined wake force threshold.

8. The method of any one of claims 4 to 7, wherein causing of the portable electronic device (100) to wake from the sleep mode only occurs when the touch event exceeds a second predetermined duration and the predetermined wake force threshold is exceeded for the second predetermined duration.

9. A method of conserving power on a portable electronic device (100), the portable electronic device (100) having a device housing (200) which comprises a touch-sensitive display (118), an accelerometer (136), and a force sensing transducer (122), the method comprising:

causing the portable electronic device (100) to enter a sleep mode in response to a trigger condition, wherein the touch-sensitive display (118) is deactivated in the sleep mode and the force sensing transducer (122) measures forces applied to the touch-sensitive display (118) at a reduced rate relative to a rate of a full power mode when in the sleep mode;
detecting an inertial event using the accelerometer (136);
causing the force sensing transducer (122) to measure forces applied to the touch-sensitive display (118) at the rate of the full power mode in response to detection of an inertial event;
detecting forces applied to the touch-sensitive display (118) using the force sensing transducer (122) at the rate of the full power mode; and
causing the touch-sensitive display (118) to be reactivated and causing the portable electronic device (100) to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of the force which is greater than a predetermined wake force threshold.

10. The method of claim 9, wherein causing the touch-sensitive display (118) to be reactivated and causing of the portable electronic device (100) to wake from the sleep mode only occurs when the predetermined wake force threshold is exceeded for a second predetermined duration.

11. The method of any one of claims 1 to 10, further comprising:

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causing movement of the touch-sensitive display (118) relative to the device housing (200) which simulates the collapse of a dome-type switch.

12. The method of claim 11, wherein the portable electronic device (100) comprises at least one piezoelectric element resiliently biased and located beneath a back side of the touch-sensitive display (118) opposite to a touch-sensitive overlay (114) of the touch-sensitive display (118), the movement of the touch-sensitive display (118) being caused by modulating a charge of the piezoelectric element thereby providing haptic feedback which simulates the collapse of a dome-type switch.

13. The method of claim 12, comprising a plurality of piezoelectric elements resiliently biased and located beneath the back side of the touch-sensitive display (118) opposite to the touch-sensitive overlay (114) of the touch-sensitive display (118), the movement of the touch-sensitive display (118) being caused by modulating the charge of the piezoelectric elements thereby providing haptic feedback which simulates the collapse of a dome-type switch.

14. A portable electronic device (100), comprising: a housing (200); a processor (102) received within the housing (200); a touch-sensitive display (118) connected to the processor (102) and exposed by the housing (200), the touch-sensitive display (118) having a touch-sensitive overlay (114) detecting touch events; and one or both of an accelerometer (136) or force sensing transducer (122); wherein the controller is configured for performing the method of any one of claims 1 to 13.

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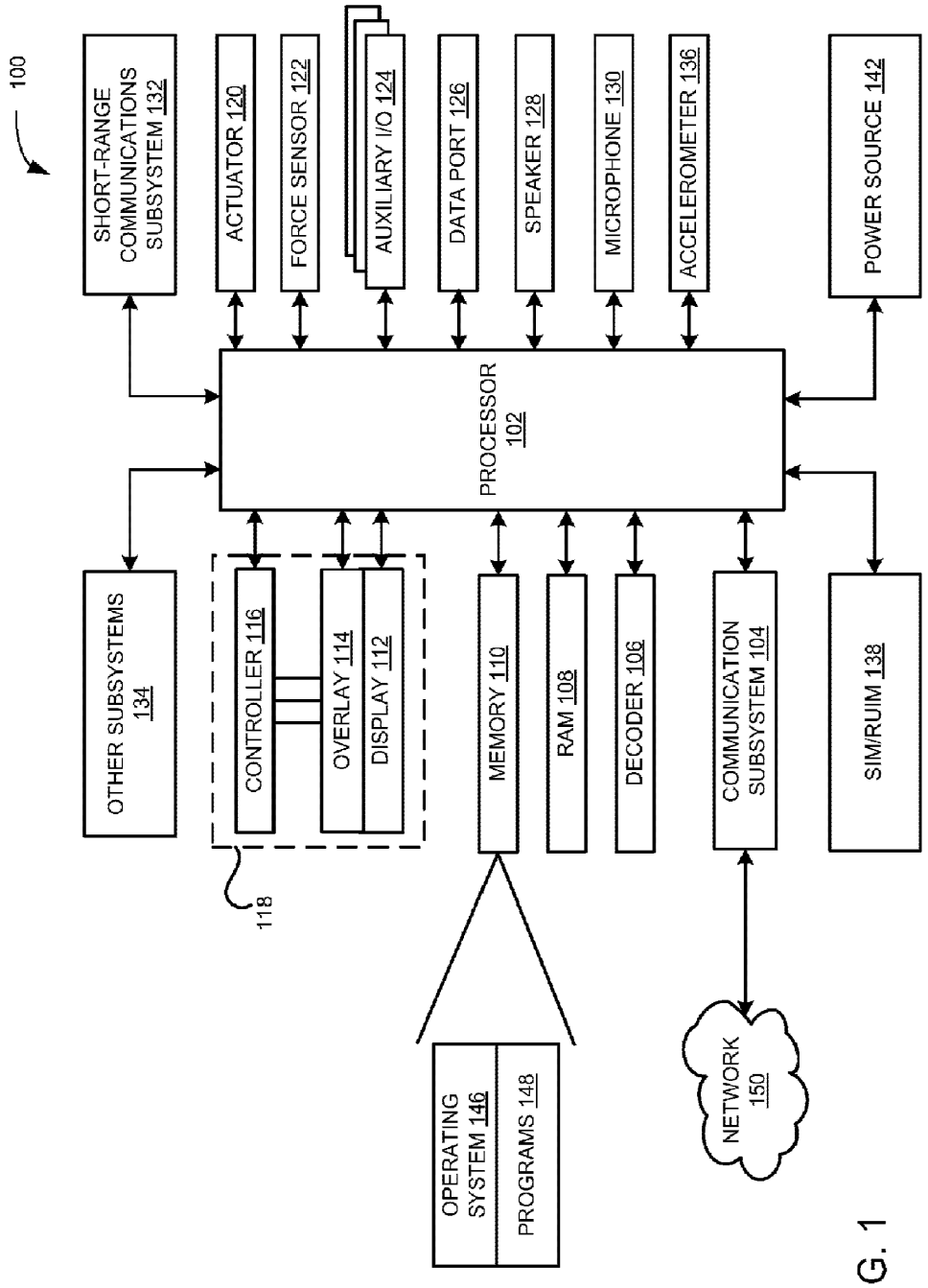


FIG. 1

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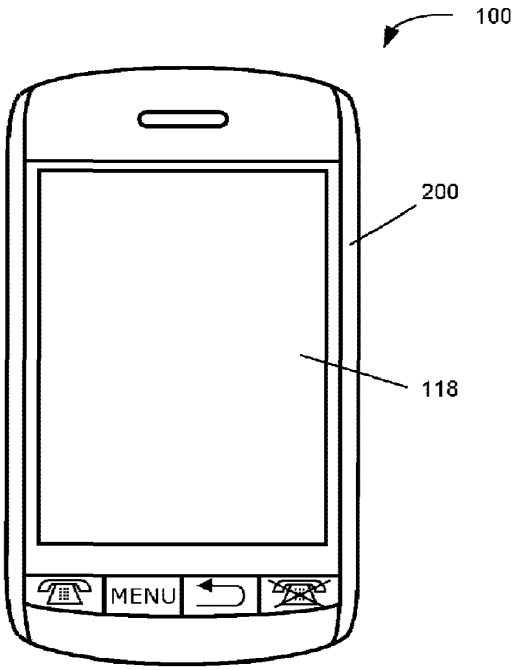


FIG. 2

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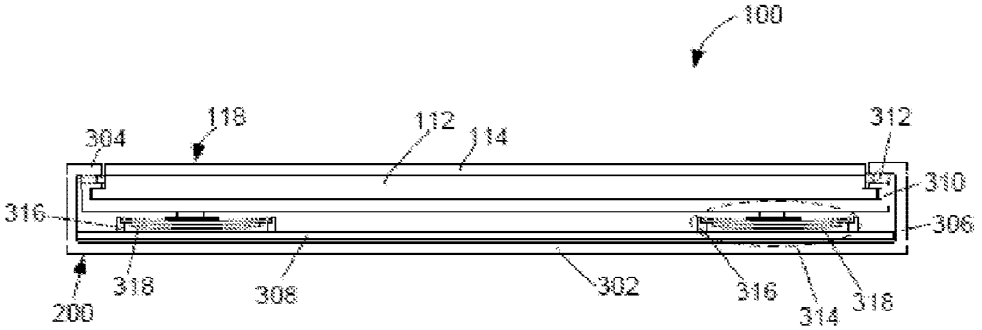


FIG. 3A



FIG. 3B

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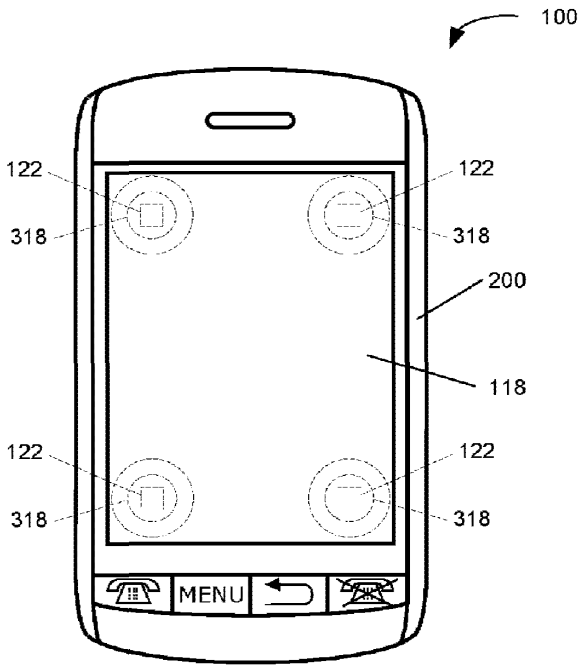


FIG. 4

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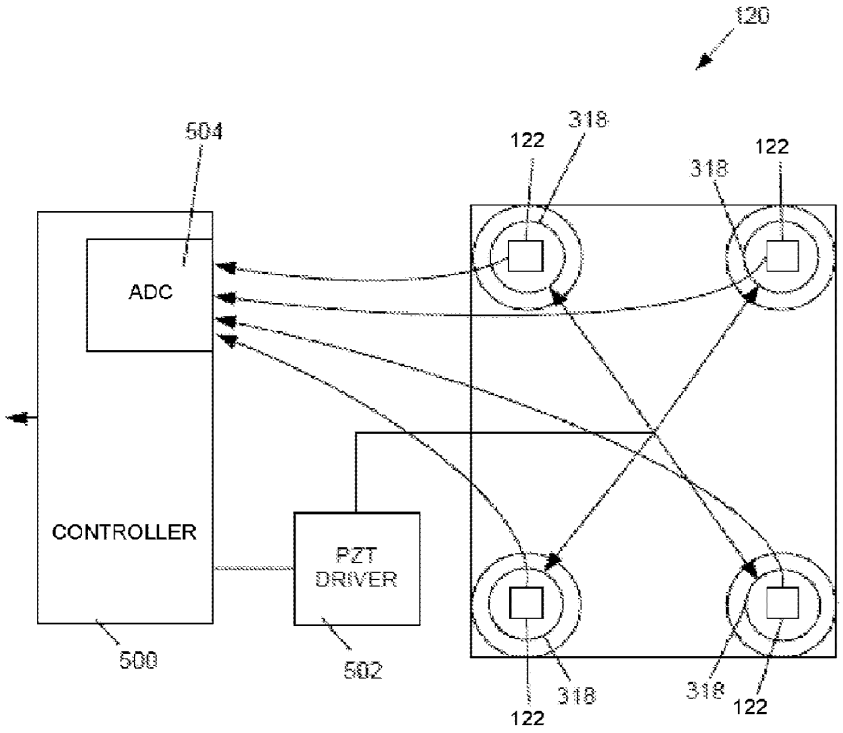


FIG. 5

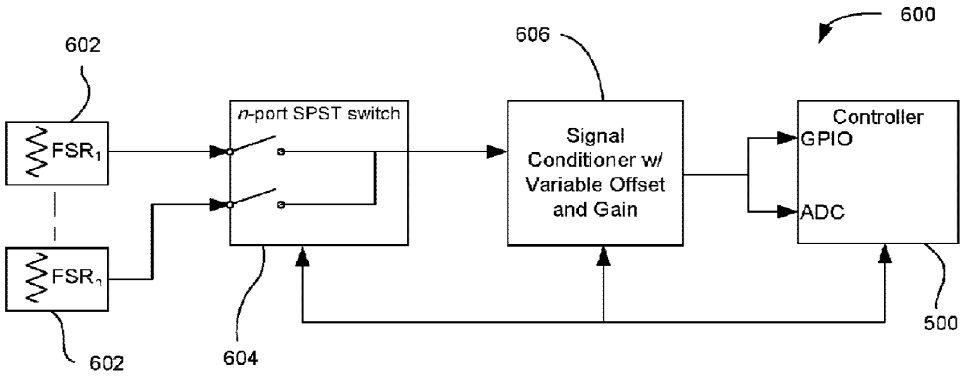


FIG. 6

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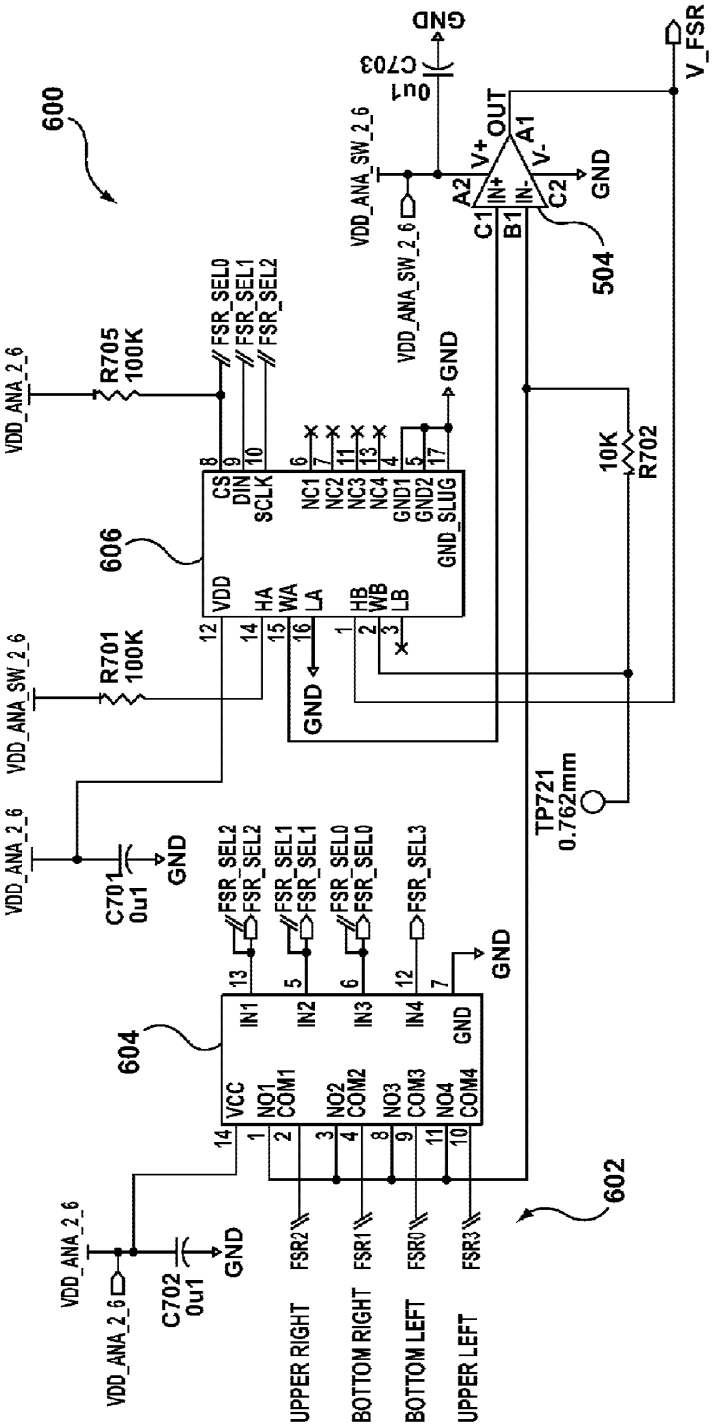


FIG. 7

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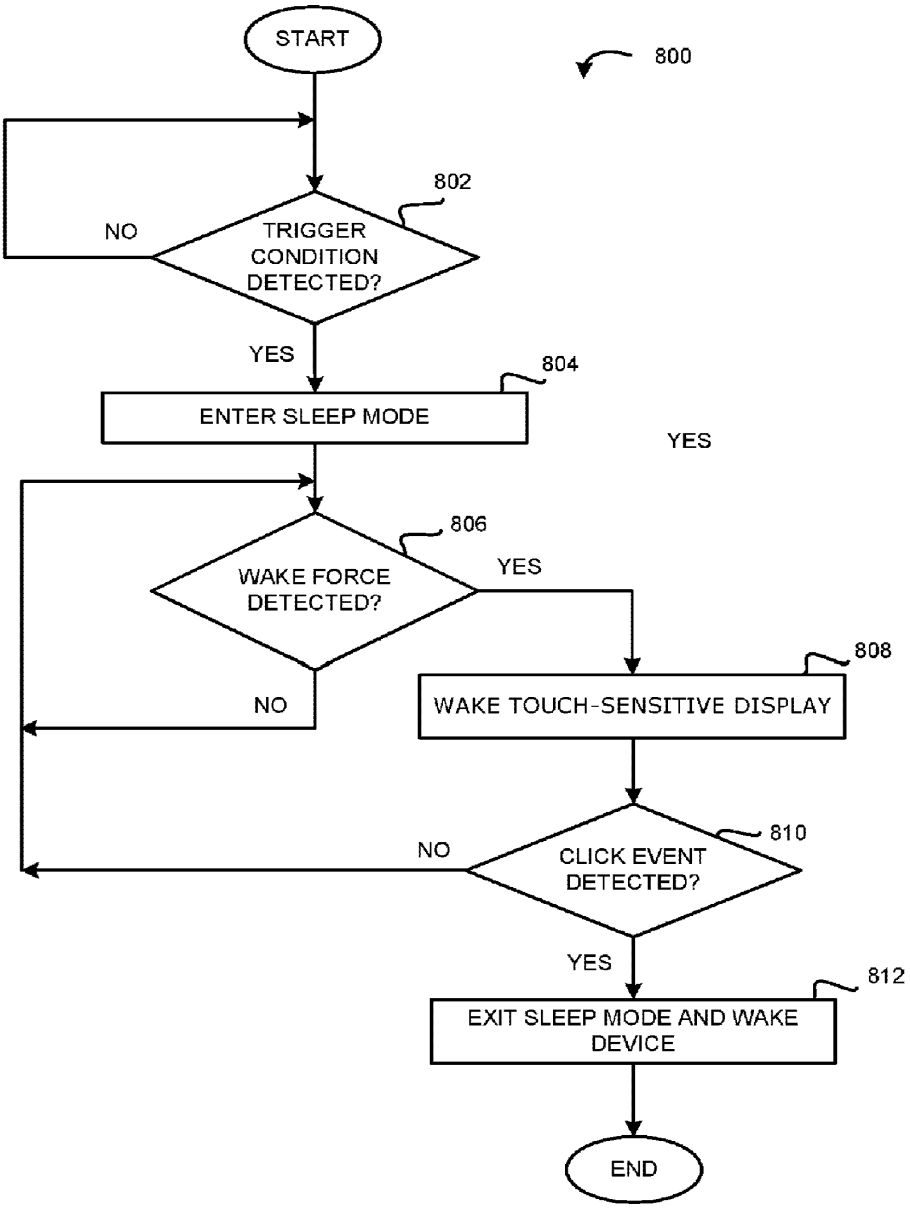


FIG. 8

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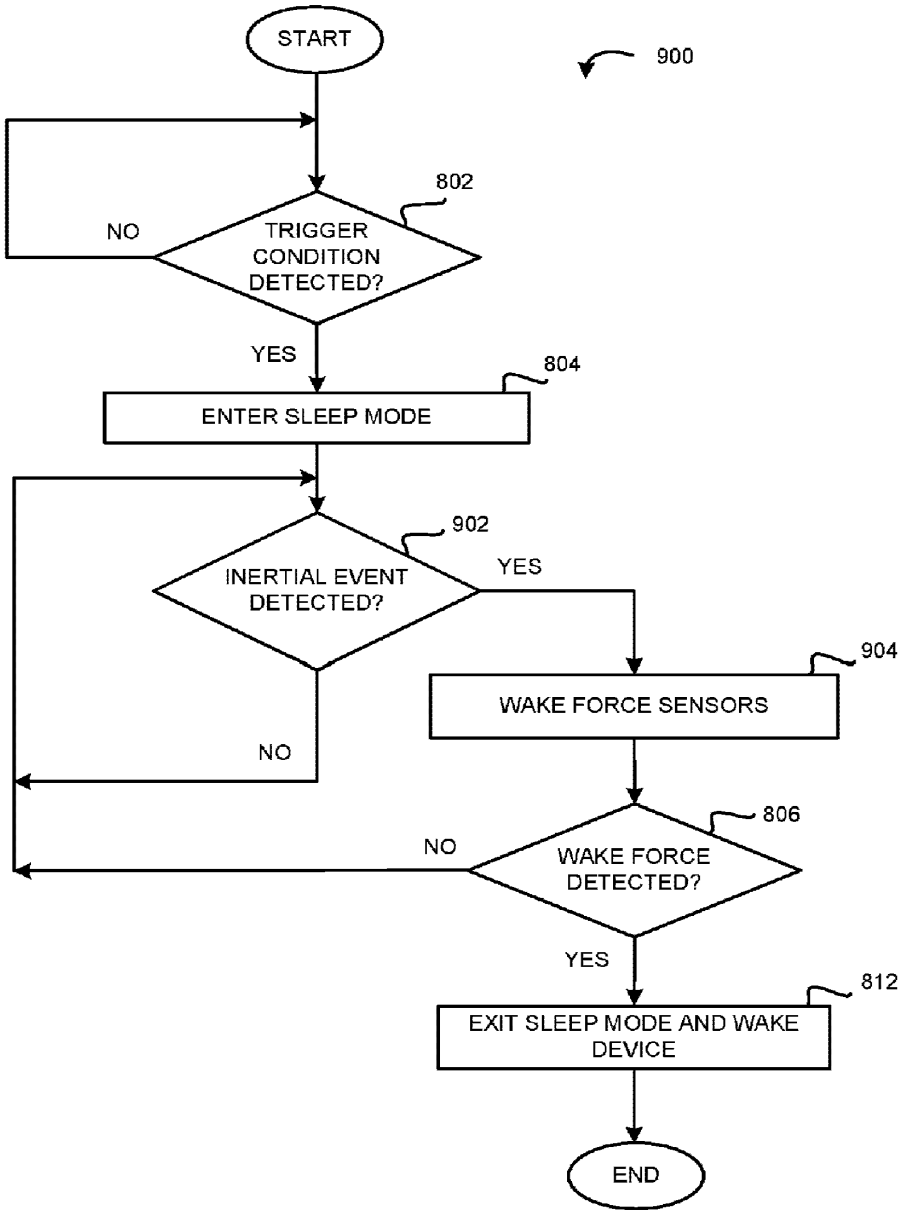


FIG. 9

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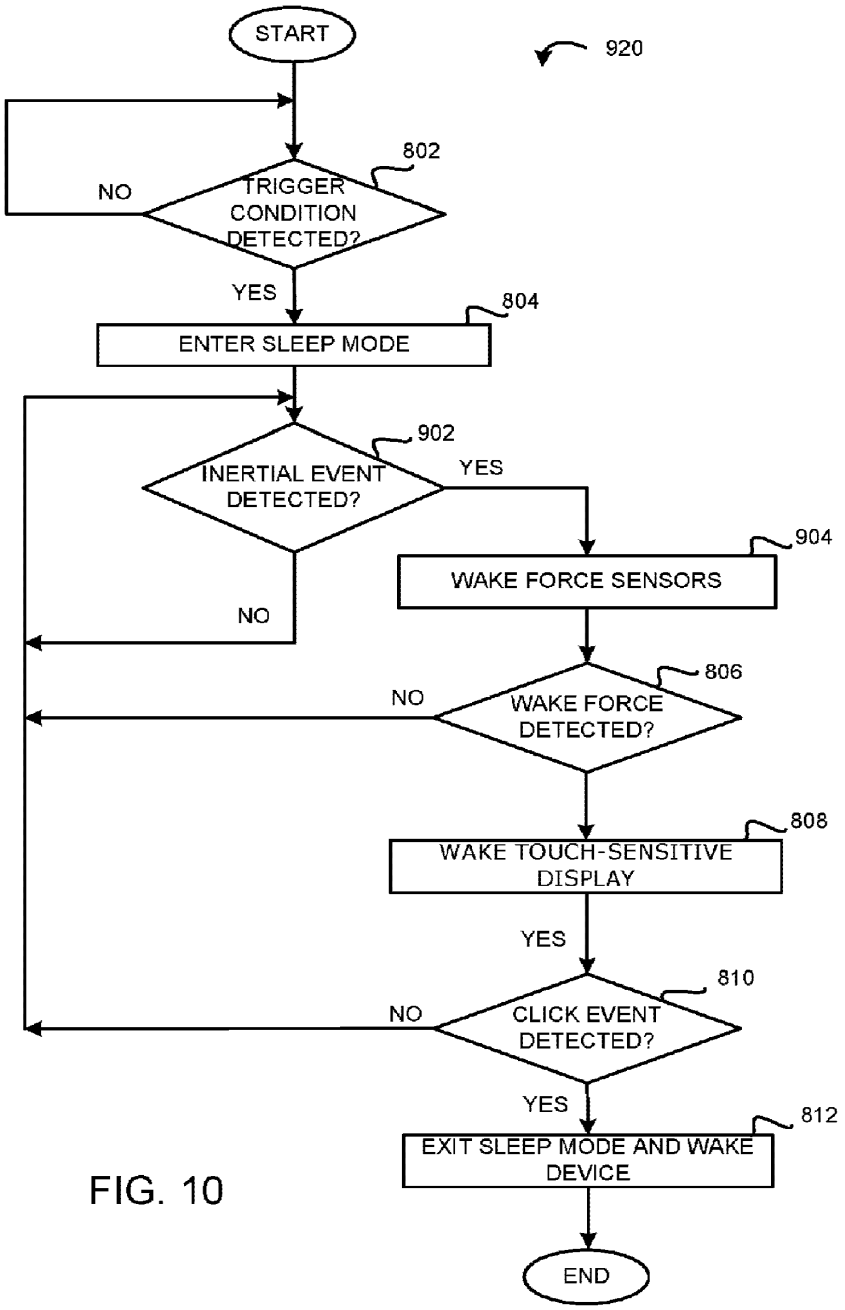


FIG. 10

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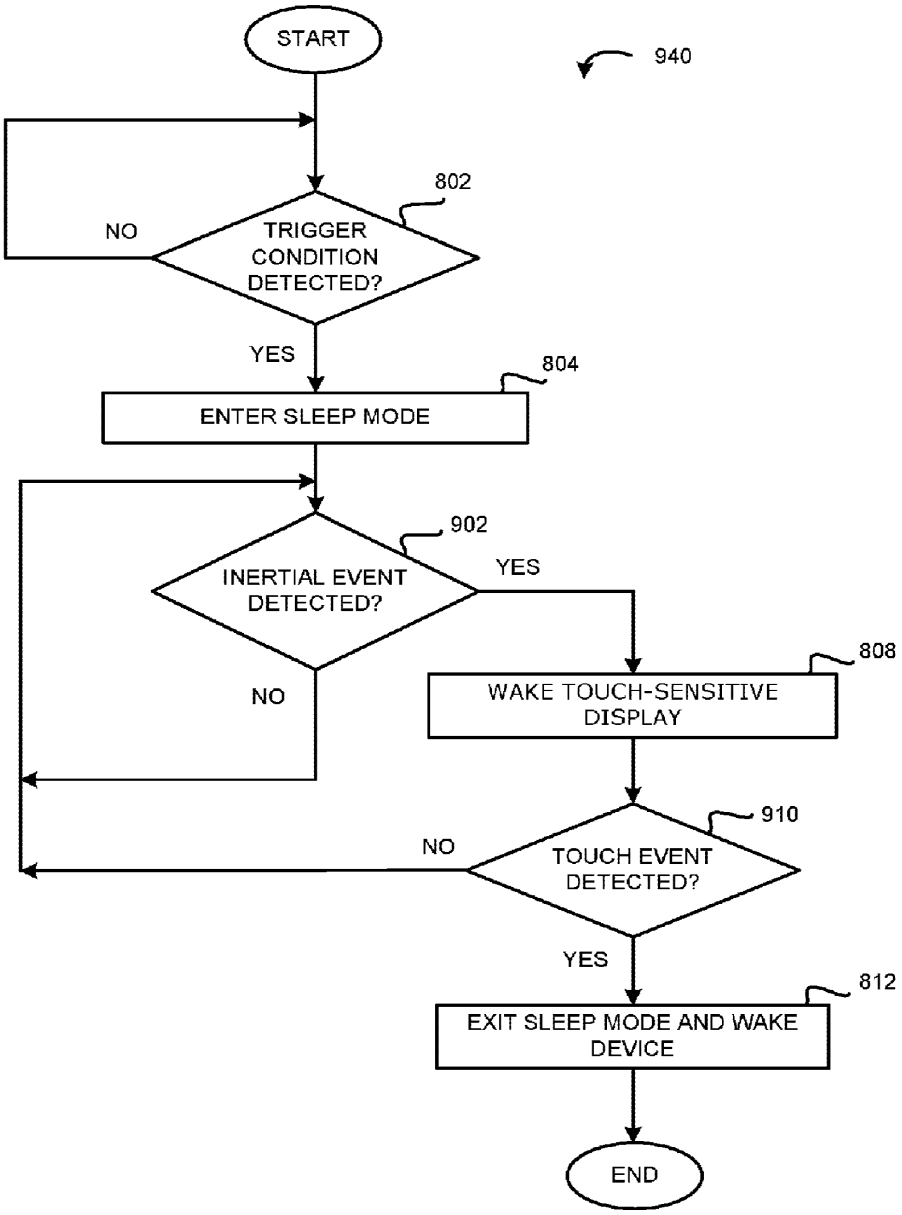


FIG. 11

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Europäisches Patentamt
European Patent Office
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PARTIAL EUROPEAN SEARCH REPORT

which under Rule 63 of the European Patent Convention shall be considered, for the purposes of subsequent proceedings, as the European search report

Application Number EP 09 17 2145

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 1 785 808 A1 (RES IN MOTION LTD [CA]) 16 May 2007 (2007-05-16) * the whole document *	1-3,15	INV. G06F1/32
Y	US 2006/284857 A1 (OH JANG G [KR]) 21 December 2006 (2006-12-21) * paragraph [0022] - paragraph [0026] *	1-3,15	
A	US 2009/239581 A1 (LEE SHU MUK [US]) 24 September 2009 (2009-09-24) * the whole document *	1	
A	US 2006/138983 A1 (LEE JOO-HYUNG [KR] ET AL) 29 June 2006 (2006-06-29) * paragraph [0070] - paragraph [0077]; paragraph [0126] - paragraph [0137]; figures 7-9 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

G06F

INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC to such an extent that a meaningful search into the state of the art cannot be carried out, or can only be carried out partially, for these claims.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:

see sheet C

Place of search	Date of completion of the search	Examiner
Munich	11 June 2010	Alonso Nogueiro, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

2

EPO FORM 1503 03.82 (P04E07)

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INCOMPLETE SEARCH
SHEET C

Application Number
EP 09 17 2145

Claim(s) completely searchable:
1-3, 15

Claim(s) not searched:
4-14

Reason for the limitation of the search:

Claims 1, 4, 9 and 14 are independent claims in the same category.
Independent claims 1, 4, 9 and 14 do not fall under any of the exceptions exposed in Rule 43(2) EPC, as the method claims are not interrelated products, nor different uses of a product or apparatus, nor alternative solutions to a particular problem.
As a consequence, according to Rule 62(a)(1) EPC, only the first independent claim in each category has been search (claims 1 and 15). All other claims (claims 4-14) are not searched.

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 17 2145

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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11-06-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1785808 A1	16-05-2007	CA 2563139 A1	10-05-2007
US 2006284857 A1	21-12-2006	CN 1881148 A	20-12-2006
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		KR 20060072435 A	28-06-2006

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE
First Named Inventor/Applicant Name:	Alex BEZINGE
Filer:	Peter S. Weissman/April Henderson
Attorney Docket Number:	BEZINGE.00101

Filed as Small Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Basic National Stage Fee	2631	1	140	140
Natl Stage Search Fee - Report provided	2642	1	240	240
Natl Stage Exam Fee - all other cases	2633	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**740**

Electronic Acknowledgement Receipt

EFS ID:	18800967
Application Number:	14352727
International Application Number:	PCT/EP2012/070273
Confirmation Number:	4023
Title of Invention:	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE
First Named Inventor/Applicant Name:	Alex BEZINGE
Customer Number:	27557
Filer:	Peter S. Weissman/April Henderson
Filer Authorized By:	Peter S. Weissman
Attorney Docket Number:	BEZINGE.00101
Receipt Date:	18-APR-2014
Filing Date:	
Time Stamp:	11:22:20
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$740
RAM confirmation Number	8954
Deposit Account	232185
Authorized User	WEISSMAN, PETER S
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	Transmittal.pdf	80016 e248f96af9af44da4ed4e7201c940c68a528de0f	no	3
Warnings:					
Information:					
2		IDS.pdf	91281 675b5f35bf31cee436013004d613f859bc412221	yes	4

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	2
	Information Disclosure Statement (IDS) Form (SB08)	3	4

Warnings:					
Information:					
3	Application Data Sheet	ADS.pdf	222699 593ae91fe3008214c890693ffe46844d3f0996d7	no	7
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
4		PA.pdf	185619 eaff97214e486f515c41799fec68c8cf985d3d67	yes	14

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Specification	2	2
	Abstract	3	3
	Claims	4	7
	Drawings-only black and white line drawings	8	8

	Applicant Arguments/Remarks Made in an Amendment		9	9	
	Drawings-only black and white line drawings		10	14	
Warnings:					
Information:					
5	Specification	CleanSpec.pdf	215012 8f09bda508b21f91bfd45431ed6723a1636c8ca2	no	22
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Information:					
6	Specification	MarkedUpSpec.pdf	248201 99ece3afa29e7baa8cde7739845e4490fcf88543	no	22
Warnings:					
Information:					
7		WO2013057048_NatlPhase.pdf	1138560 20ce6e762a1ea08088ec1917c757ab5385d13439	yes	33
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Abstract		1	1	
	Specification		2	19	
	Claims		20	23	
	Drawings-only black and white line drawings		24	28	
	Other Reference-Patent/App/Search documents		29	33	
Warnings:					
Information:					
8	Non Patent Literature	NPL1.pdf	1425097 c12886f8548d69fa9b52c5898574202fb48c7b3a	no	16
Warnings:					
Information:					
9	Non Patent Literature	NPL2.pdf	5310032 4b36a6393dea8b1f3495b33b16981bdf3d33e9c5	no	70
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Information:					

10		Abstract.pdf	103990 3ea16a6e98c83d2e6074f600613d8286ac633b11	yes	3
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Foreign Reference		1	1	
	Foreign Reference		2	3	
Warnings:					
Information:					
11	Other Reference-Patent/App/Search documents	SearchReport.pdf	441633 22613adceb2a54023469187fcf1d761b0e085985	no	7
Warnings:					
Information:					
12	Foreign Reference	WO09120292.pdf	611497 dc3bf9fb101b67d44783df76648827e6a8e3c024	no	14
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Information:					
13	Foreign Reference	WO11000893.pdf	1654469 0cccf1ce16b096acf23ff64eb8188cf7750750ed	no	45
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14	Foreign Reference	EP1324159.pdf	1496105 84540e82d59ca99ecb0ea1076735da3c1d6df805	no	24
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Information:					
15	Foreign Reference	EP1785808.pdf	1129228 fbbbc6d70b69495b00aa0f8aa6f875f719c07000	no	20
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16	Foreign Reference	EP2315101.pdf	1650882 349190c1fdb277e5693c317ac0b5168da969b507	no	31
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17	Fee Worksheet (SB06)	fee-info.pdf	32922 2285cd44f2c5218506cef6940daba38523cd8022	no	2

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Total Files Size (in bytes):	16037243

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EP12/70273

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Bern, 18. Okt. 2012

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Petitioner Samsung Ex-1004, 0257

Intellectual property

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Titre:
A method and circuit for switching a microelectronic device from a first power mode to a second power mode.

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Unveränderliches Exemplar
Exemplaire invariable
Esemplare immutabile

Smartc-3-ch

A method and circuit for switching a microelectronic device from a first power mode to a second power mode

Field of the invention

[0001] The present invention is related to a method for switching a microelectronic device from a first power mode to a second power mode, and to a device which can be switched from a first power mode to a second power mode. The present invention is also related to devices with a touch panel and a plurality of power modes.

Description of related art

[0001] EP1324159 concerns a wristwatch having a touch panel. When not used, a display is switched to a sleeping mode. To avoid an accidental activation of the sensors, a press button is provided to activate the sensors and the liquid crystal display.

[0002] US2009199130 concerns a method and apparatus for receiving an input by a user on an interactive touchscreen display. The input comprises a contact gesture detected with accelerometers.

[0003] US2002118605 discloses a tactile wristwatch in which touch-sensitive keyboard keys are switched on when a user presses a touch-sensitive keyboard.

[0004] US2009102669 discloses an alarm clock that can be stopped by the hand of a user approaching a proximity sensor.

[0005] WO09120292 concerns mobile handheld devices such as, for example, cell phones or personal digital assistants (PDAs) containing an accelerometer that sends a signal that causes the device to turn on.

[0006] WO11000893 describes a wristwatch with a touch display. The wristwatch comprises an accelerometer which is used for simulating effects

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of shocks or acceleration on the movement. In order to reduce the power consumption, the display is automatically switched into a sleeping mode when not used. The user can wake up the display by means of a slight pressure of the glass or with a single tap or a double tap on the touch panel. This document does not describe how taps or double taps are detected and distinguished from other gestures or manipulations of the watch.

[0007] Therefore, different methods are known in order to switch on a device in sleep mode. However, it is difficult to distinguish between intentional commands to switch a device and other gestures or accelerations during normal use of the device. For example, undesired switch of operating mode could occur when the touch display touches a piece of cloth or during other manipulations of the watch.

Brief summary of the invention

[0008] It is therefore an aim of the invention to provide a better method for switching a device, such as a microelectronic device, into a different power mode.

[0009] It is another aim of the invention to provide a method for faster switching of a device into a different power mode, without causing unwanted power mode switches..

[0010] It is another aim to provide a method for switching a device into a different power mode which avoids undesired change of mode.

[0011] According to the invention, these aims are achieved by means of a method for switching a device from a first power mode to a second power mode, comprising:

using an inertial sensor for detecting a gesture on a display of said device;

using a touch panel within said display for detecting said gesture;

combining gesture detection by the inertial sensor and gesture

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detection with the touch panel for triggering a switch from said first power mode to said second power mode.

[0012] The gesture entered by the user to switch the power mode could be a tap, a double tap, a long tap or any other significant and recognizable gesture rarely occurring outside of normal use of the device, and which do not need important processing capabilities to be recognized.

[0013] The simultaneous and combinatory usage of an inertial sensor, such as an accelerometer, and of a touch sensor or touch panel for detecting a gesture provides a more reliable discrimination between various gestures and other manipulations. Moreover, this solution reduces the power consumption in the first power mode since only the inertial sensor needs to be switched on in this mode.

[0014] The first power mode could be a sleep mode, or standby mode, in which the power consumption is reduced but no indications are displayed on the display. The second power mode could be an operating mode where indications are displayed on the display.

Brief Description of the Drawings

[0015] The invention will be better understood with the aid of the description of an embodiment given by way of example and illustrated by the figures, in which:

Figure 1a illustrates a perspective view of a buttonless wristwatch with a touch display according to the invention.

Figure 1b illustrates a transversal cut through the wristwatch of Figure 1a.

Figure 2 schematically illustrates a possible arrangement of some components within an embodiment of wristwatch.

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Figure 3 is a chronogram which illustrates the force f applied to the glass of a touch panel during a tap gesture.

Figure 4 is a chronogram which illustrates the acceleration measured by an accelerometer in a direction perpendicular to the glass of a touch panel during a tap gesture.

Figure 5 is a chronogram which illustrates a signal measured by a touch sensor during a tap gesture.

Figure 6 is a signal which illustrates an example of power-on signal generated by a circuit according to the invention.

Detailed Description of possible embodiments of the Invention

[0016] Figure 1a and 1b illustrate an example of a wristwatch 1 according to the invention. The illustrated watch comprises notably a wristband 2 and a watch case 5 closed with a glass 3a and a touch sensor 3b covering a digital matrix display 4.

[0017] In a preferred embodiment, the watch has no crown and no push-buttons and is operated only through the touch panels and additional sensors, such as inertial sensors, inside the watch case. The water-tightness and solidity of the case is thus improved.

[0018] A luminosity sensor enabling the intensity of the screen to be automatically adapted to the surrounding luminosity can also be used as an option. The watch can switch nearly instantly from a stand-by mode, where the display is switched off or at least less luminous, to a "time reading" and/or navigation mode, for example as soon as the glass is touched or following a tap or double tap on the glass.

[0019] The watch case 5 can also include a connector (not shown) to connect the watch to an external computer, for example a micro or nano USB connector on the bottom or in one of the watch's sides. Wireless

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connection means, for example a ZigBee or Bluetooth module, can also be provided for connecting the watch to a personal computer and/or for supplying power to the watch and load the battery.

[0020] The watch is advantageously powered electrically by means of a rechargeable accumulator 20 (Figure 1b) through the micro or nano USB connector, through a specific or proprietary connector or, in a variant embodiment, through a radiofrequency interface.

[0021] The glass 3a with the touch sensor 3b underneath closes the upper surface of the watch case and covers the digital matrix display 4; there is an air gap between the touch sensor 3b and the display. The glass is preferably made of sapphire or of another scratchproof material and is coated with an anti-glare treatment. In a preferred embodiment, the glass is cylindrically, or possibly spherically curved, while the display 4 is preferably flat.

[0022] The display 4 is preferably a high-resolution digital matrix display, and fills up nearly the entire surface under the glass 3a and thus serves both as multipurpose multifunction display and as time indicator. In a preferred embodiment, the display is a color liquid crystal display (LCD) or color thin film transistor display (TFT) with at least 150x150 pixels or more than 200 dpi (dot per inch). Other types of display, including displays based on the AMOLED technology for example, can also be used. Furthermore, the watch could also have several displays, for example several digital displays, or a digital matrix display combined with hands or other mechanical indicators.

[0023] The display 4 is preferably placed on a printed circuit board 31 on which other components, such as a microcontroller, an inertial sensor etc are also mounted. A connector 30 connects the touch sensor 3b with the printed circuit board 3b; in one preferred embodiment, this connector is detachable, so that the glass 3a can be replaced independently of the printed circuit board. In the illustrated embodiment, the printed circuit board 31 rests directly against the watch case 5, so that accelerations on the

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glass 3a are transmitted to the inertial sensor on the board 31 with minimal damping.

[0024] The touch sensor or touch panel 3b is laminated or deposited underneath the glass 3a. In the following, since those two components are integrated, we will use interchangeably the expression glass or touch panel or touch sensor for designating the same component, depending on the context. A touch panel integrated between the display 4 and the glass cover 3a could also be used in a sandwich configuration with a flat glass cover 3a.

[0025] The touch panel 3b has an array of transparent electrodes and is placed underneath the glass 3b in order to detect the presence of a finger or of a stylus. The detection technology preferably uses methods known in the state of the art, for example a capacitive detection, for detecting finger contact and various gestures on one or several of the electrodes. In one embodiment, transparent electrodes can be individually powered in order to put the touch panel in a low power mode with only some electrodes, for example electrodes in the middle, which are powered on and can detect finger contact on the corresponding part of the display; the remaining electrodes are not powered on in this low power mode.

[0026] The display 4 can display various indications, for example the current time, date, chrono, reverse counter, calendar, etc...or phases of the moon as shown in Figure 1. In order to extend the watch's functionalities, the user can switch from one display mode to another and for example replace the card displayed in Figure 1 with other cards . In a preferred embodiment, the user can move from one card to the other with a slide (fast) or scroll (slow) gesture for moving through and viewing a collection of available displays or cards. Scrolling or sliding in the horizontal or vertical direction is achieved by moving the finger on the glass in the corresponding direction.

[0027] Figure 2 schematically illustrates a possible arrangement and schematic of some components within an embodiment of wristwatch

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according to the invention. Only components which are necessary for the understanding of the invention have been represented, although other components and other arrangements could be provided in other embodiments of the invention.

[0028] The illustrated arrangement comprises a power supply 20, such as a rechargeable battery, for supplying power to all other components. A microcontroller 21 controls the display of indications on the matrix panel 4, depending on signals provided by the sensors 22, 23 and on commands entered by the user through the touch panel 4.

[0029] The component 22 is a real-time clock for generating a clock signal based on a quartz (not shown).

[0030] The sensor 23 is an inertial sensor, preferably an accelerometer, preferably a 3-axis mems-based accelerometer for measuring acceleration values a (fig. 4) in a direction perpendicular to center of the glass of the wristwatch and in two orthogonal directions in a plane tangential to this glass at his center. This inertial sensor can comprise signal processing capabilities embedded within the same component or chip, for determining the frequency of the measured acceleration signal, the direction of this signal in 2 or 3 directions, the duration of an event in the acceleration signal, etc.

[0031] The component 24 is a touch panel controller for interpreting touch signals provided by the touch panel 3b when the user touches the glass 3a with his finger and consequently generate signals in the touch panel 3b located underneath, and for converting those signals into command signals for the microcontroller 21.

[0032] Other components, such as an input-output circuit, for example a USB decoder or a Bluetooth or ZigBee receiver, can also be integrated.

[0033] The microcontroller 21 is specifically configured to interpret the signals from the touch controller 24 and from the inertial sensor 23, to

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select indications from several available indications depending on these signals, and to display those indications on the digital matrix display 4; this arrangement is preferably achieved by storing in the microcontroller's memory a computer program (firmware) allowing this specific sequence of operation to be fully controlled.

[0034] At least some of the components 21 to 24 and 3b and 4 can be powered in at least two different modes. In one preferred embodiment, a power saving mode and a time display mode are provided; the whole wristwatch can thus be powered either in time display mode for displaying time or other indications on the display 4, or in power saving mode for preserving the battery 20 by switching the display 4 the touch sensor 3b and other components in a low consumption mode. In one preferred embodiment, the display 4 an d the touch sensor 3b are switched off in low power saving mode.

[0035] In some embodiments, more than two power modes can be provided; for example, the real time clock 22 is preferably always powered on in power saving mode, so that the real time is not lost when the display 4 and the touch panel 3b are switched off; it is possible however to switch the real time clock off in a deep sleep mode in order to prevent the battery from being totally discharged. Other components, such as the microcontroller 21, the touch panel 3b etc could have more than two different power modes, for example a hot power saving mode allowing for a very fast re-start, and a cold power saving mode in which restart is possibly slower or necessitates restarting an operating system.

[0036] The device 1 can be switched from a first power mode, such as a power saving mode, to a second power mode, such as a time display mode, with a user gesture on the glass 3a / touch panel 3b . The device 1 can automatically return to the first power mode, for example after a predetermined duration, or when no acceleration and no activity are detected.

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[0037] In one embodiment, a gesture command to switch the device into a second power mode is detected with the inertial sensor 23 for detecting a tap, a double tap or another command which can be input by the user onto the glass 3a / touch panel 3b in order to trigger a change of power mode. The inertial sensor 23 could be an accelerometer with embedded power processing capabilities and which is always powered on in the first low power mode.

[0038] In order to avoid undesired switches to the second power mode, which would switch the display on and reduce the operating time of the battery, it is necessary to discriminate between changes in the acceleration signals which are caused by a switch on gesture, such as a tap or a double tap, and any other acceleration caused when the wristwatch is displaced or manipulated in normal use. In one preferred embodiment, the accelerometer 23 generates a power on signal 230 for powering the touch panel 3b and the touch controller 24 when the user enters a tap gesture on the glass 3a/ touch panel 3b, which can be discriminated from other signals with the following properties:

–frequency: tap signals are typically high frequency signals and can be distinguished from other signals produced by slide, rub etc. The acceleration produced by a valid single tap is a pulse function with a first step of fast increase of the acceleration almost immediately followed by a step of fast deceleration, the duration of the whole pulse being typically in the range of 10 to 20 ms. Therefore, the bandwidth of this pulse-like function is necessarily higher than a predefined threshold, and a low pass filtering of acceleration signals can be used to cancel signals produced by gestures other than taps.

–duration of the pulse: as indicated, a valid single tap generates a pulse with a duration within a given range, usually between 5 and 100 ms, typically between 10 and 20 ms.

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-amplitude of the pulse: a valid single tap is detected only if the amplitude of the acceleration is higher than a first predefined threshold $a_{\_tap\_thresh}$. End of the tap is detected when the amplitude decreases below a second threshold $a_{\_notap\_thresh}$.

-direction of the acceleration: a tap on the glass generates a maximal acceleration in a main direction perpendicular to the center of the glass, oriented toward the bottom of the watch, and a much lower acceleration in all other directions. A 3D accelerometer can be used for discriminating valid taps based on the direction of the acceleration. For example, if the acceleration in a direction other than the main direction is higher than the acceleration in the main direction, the gesture will not be recognized as a switch on tap.

-slope of the acceleration : this feature can also be used to differentiate between a valid switch on tap and a non valid one. Taps typically generate a fast increase of the acceleration, whereas most other gestures such as swipes etc produce a slower acceleration increase. Therefore, the system could distinguish that a tap is not valid if the slope of the acceleration is not in an expected range.

[0039] Those discriminating criteria can also be combined in different ways. For example, the processing means within the accelerometer could use the direction of the acceleration only during a limited time window, for example a less than 100 ms time interval starting at the beginning of the pulse.

[0040] Other discriminating criteria could be used if other gestures, such as double taps or long taps, are used as command to change the power mode.

[0041] In the embodiment of the invention illustrated on Figure 2, the power on signal 230 generated by the inertial sensor 23 is used to wake up

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the touch panel 3b and/or the touch controller 24, or to switch those components from a low power mode to another power mode. Therefore, the touch panel 3b is switched off, or at least in low power mode, when the device 1 is in the first power mode, and is powered on, or at least partially powered on, after detection of a likely tap and generation of a wake up signal 230 by the accelerometer 23. In one embodiment, the wake up signal 230 generated by the inertial sensor 23 triggers a switch on command of the touch panel 3b and/or of the touch controller 24 from a low power mode in which nothing is displayed and no finger touch can be detected, to an intermediate power mode where only a subset of electrodes of the touch panel is activated, for example electrodes in the middle of the touch panel, in order detect finger contact such as taps or double taps in this limited area only and to avoid detection if a tap is made in a different area. In another embodiment, the wake up signal 230 triggers a switch on command of the touch controller 24 into a mode where all touch electrodes are activated, to detect a tap or double tap in any area of the touch panel 3b. It is also possible to activate the touch panel 3b and the touch controller 24 during only a limited duration, preferably less than 100 ms, after generation of the wake up signal 230.

[0042] The touch controller 24 generates a second wake up signal 240 to wake up the microcontroller 21, and possibly other components of the device 1, when this touch controller confirms the tap detection. The second wake up signal 240 can be input to an interrupt line or switch on line of the microcontroller 21. In one embodiment, the wake signal 230 of the inertial sensor 23 is generated very fast at the beginning of the tap, the touch controller 24 is immediately woken up, and used to confirm the finger detection on the touch sensor 3b during the remaining time of the tap. In another embodiment, a double tap is required, and the inertial sensor is used to detect the first tap while the touch sensor 3b, possibly in cooperation with the inertial sensor 23, is used for detecting the second confirmation tap. In yet another embodiment, a long tap is required, i.e. a tap where the finger rests against the glass during a minimal period. In all embodiments, a second wake up signal 240 is only generated if confirmation of a tap or double tap from the touch panel 3b occurs within

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a predetermined duration after the first wake signal, for example within a duration less than 300 ms, preferably less than 100 ms.

[0043] Discrimination of a tap by the touch controller 24 preferably depends on the location, size and duration of a touch signal generated by adjacent electrodes. A tap is usually made with the tip of a finger, i.e. on a small surface, during a short period, preferably on predetermined locations of the display.

[0044] The microcontroller 21 is only woken up by the second wake up signal of the touch controller 24. In another embodiment not illustrated hereby, the microcontroller is already woken up by the first wake up signal, and used for discriminating between tap and no tap based on signals from the touch controller 24; the second wake up signal is only used to confirm the first wake up signal and prevent the microcontroller 21 for reentering into the first power mode.

[0045] In one embodiment, a rough discrimination between a wake up gesture and no wake up gesture is made by the inertial sensor 23 and/or the touch sensor 3b, in order to wake up the microprocessor 21. The microprocessor then analyses the sequence of acceleration value delivered by the acceleration sensor, as well the signals delivered by the touch controller 24, to confirm or infirm the decision to wake up the device 1 and in particular the display and touch panel 3b. If the microprocessor confirms the tag detection, it remains in operating mode and wake up the display. On the other hand, if tap detection is not confirmed by the more advanced algorithms used by the microcontroller, the microcontrollers puts the touch panel 3b, touch controller 24 and itself back into the first power mode.

[0046] Figures 3 to 6 illustrate chronograms of various signals produced during a tap of the user on the glass of the wristwatch. Figure 3 illustrates the force f applied by the finger on the glass during a tap between t0 and t1. The force increases very suddenly from t1, remains approximately constant at a high level, and then decreases very quickly when the user

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releases the finger until he left the glass at t1. The duration between t0 and t1 is typically comprised between 10 and 20 ms.

[0047] Figure 4 illustrates the acceleration as measured by the accelerometer 23 in a direction perpendicular to the center of the touch panel 3b during the tap. The acceleration increases from time t_0 up to a maximum, and then decreases or even becomes negative until t_1. The acceleration might oscillate at low amplitude after the finger release. A tap is detected only if the amplitude of the measured acceleration reaches a first predefined threshold $a_{\_tap\_thresh}$ at time t_3. End of the tap is detected at time t_4 when the amplitude decreases below a second threshold $a_{\_notap\_thresh}$. A valid tap is discriminated based on the amplitude of the acceleration, duration between t_3 and t_4, frequency of the amplitude signal, and / or slope of the acceleration signal.

[0048] Figure 5 illustrates a signal s produced by the touch controller 24 during a tap. This signal might be a combination between signals from different electrodes of the touch panel, or a signal processed from different signals of the electrodes. In one embodiment, the signal s is related to the probability of a tap, based on criteria like the size of the contact area, the frequency and timing of the contact signal, etc. The touch panel 3b and touch controller 24 are preferably in low power mode until time t_3 when the accelerometer 23 detects a tap and generates a first wake up signal 23. At time t_5, the signal s reaches a threshold $s_{\_tap\_thresh}$ where the touch controller 24 detects a tap. End of the tap is detected at time t_6 when the signal s decreases below the threshold $s_{\_notap\_thresh}$

[0049] Figure 6 illustrates a second wake up signal 240 generated by the touch controller 24 or by a suitable circuit for switching the microcontroller 21 from a first low power mode to a second high power mode. The wake up signal is inactive until time t_5 when a tap is detected by the inertial sensor and confirmed by the touch sensor. The microcontroller 21, and preferably the display of the touch panel 3b, is preferably activated at the rising flank of the signal 240 at time t_5. This signal becomes inactive at time

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t_4 or t_6, at the end of the tap, although this does not result in changing the power mode of the device 1.

Other methods of combining indications of the inertial sensor 23 and of the touch sensor 3b could be considered by the skilled person, including methods using additional wake up circuitry for discriminating between a tap gesture and no tap based on indication of the two sensors. The described example has the advantage that the number of components which need to be in an active power mode for discriminating a tap is very limited; in fact only the inertial sensor with integrated signal processing is required. In particular, no advanced signal processing capabilities are required in order to discriminate between a tap and other gestures or displacements of the watch with the accelerometer; the limited signal processing possibilities available in current mems-based accelerometers are sufficient.

[0050] Discrimination between a gesture and no gesture could be made within the processing means of the inertial sensor, by the touch controller 24, by the microcontroller 21, by a dedicated circuit (not shown), or by any combination thereof. Hardware and/or software modules could be used for this discrimination.

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Claims

1. A method for switching a device (1) from a first power mode to a second power mode, comprising:

using an inertial sensor (23) for detecting a gesture on a cover glass (3a) of said device;

using a touch panel (3b) underneath said cover glass (3a) for detecting said gesture;

combining gesture detection by the inertial sensor (23) and gesture detection with the touch panel (3b) for triggering a switch from said first power mode to said second power mode.

2. The method of claim 1, wherein said inertial sensor (23) comprises an accelerometer with embedded signal processing capabilities that discriminates between gesture and no gesture based on the frequency of an acceleration signal.

3. The method of one of the claims 1 or 2, wherein said inertial sensor (23) comprises a three dimensional accelerometer with embedded signal processing capabilities that discriminates between gesture and no gesture based on the direction of an acceleration signal.

4. The method of one of the claims 1 to 3, wherein said inertial sensor (23) comprises an accelerometer with embedded signal processing capabilities that discriminates between gesture and no gesture based on the duration of an acceleration signal.

5. The method of one of the claims 1 to 4, wherein said inertial sensor (23) comprises an accelerometer with embedded signal processing capabilities that discriminates between gesture and no gesture based on the amplitude of an acceleration signal.

6. The method of one of the claims 1 to 3, wherein said inertial sensor (23) comprises an accelerometer with embedded signal processing

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capabilities that discriminates between gesture and no gesture based on the slope of an acceleration signal.

7. The method of one of the claims 1 to 6, wherein said touch panel (3b) comprises a plurality of touch areas, wherein a first subset of said touch area is powered for detecting said gesture and a larger subset is powered in said second power mode.

8. The method of one of the claims 1 to 7, wherein discrimination between gesture and no gesture is based on the duration ($t_5 - t_3$) between a detection signal from said accelerometer (23) and a detection signal with said touch panel (3b).

9. The method of one of the claims 1 to 8, wherein said inertial sensor (23) is powered on when said device (1) is in said first powered when,

wherein said touch panel (3b) is in low power mode when said device (1) is in said first power mode,

wherein said touch panel (3b) is woken up upon detection of a gesture by said inertial sensor (23).

10. The method of one of the claims 1 to 9, wherein said device comprises a microcontroller (21) which is only woken up upon detection of a gesture by said inertial sensor (23) and with said touch panel (3b).

11. The method of one of the claims 1 to 10, wherein said device (1) comprises a microcontroller (21) which is woken up upon detection of a gesture by said inertial sensor (23), said microcontroller (21) being used for discriminating between gesture and no gesture based on signals from said inertial sensor (23) and/or from said touch panel (3b).

12. The method of one of the claims 1 to 11, said gesture being a tap or a double tap.

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13. A device (1) which can be operated in a plurality of power modes including a first power mode and a second power mode, comprising:

a display (4);

an inertial sensor (23) for detecting a gesture on cover glass (3a) of said device;

a touch panel (3b) underneath said cover glass (3a) for detecting said gesture;

a microcontroller (21) arranged to be switched to said second power mode upon gesture detection by said inertial sensor and gesture detection by said touch panel.

14. The device of claim 13, said inertial sensor (23) being an accelerometer with embedded signal processing capabilities for discriminating between gesture and no gesture based on the frequency and/or duration and/or direction and/or amplitude and/or slope of an acceleration signal.

15. The device of one of the claims 13 or 14, wherein said inertial sensor (23) is a three dimensional accelerometer with embedded signal processing capabilities for discriminating between gesture and no gesture based on the direction of an acceleration signal.

16. The device of one of the claims 13 to 15, wherein said touch panel (3b) comprises a plurality of touch areas, wherein a first subset of said touch area is powered for detecting said gesture and a larger subset is powered in said second power mode.

17. The device of one of the claims 13 to 16, said device being an electronic wristwatch without any power on button.

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Abstract

An electronic wristwatch operable in two power modes and comprising:

an inertial sensor for detecting a gesture on a cover glass of said device;

a touch panel underneath said cover glass for detecting said gesture;

gesture detection by the inertial sensor is combined with gesture detection by the touch panel for triggering a switch from a first power mode to a second power mode.

(Fig. 2)

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Unveränderliches Exemplar
Exemplaire invariable
Esemplare immutabile

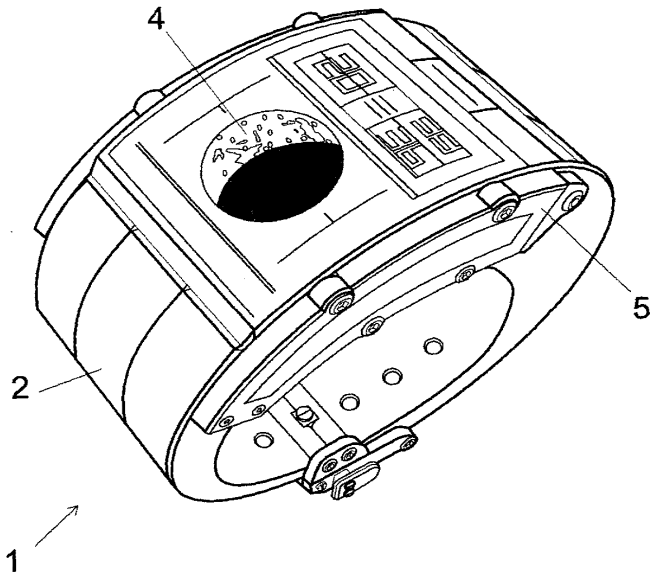


Fig. 1a

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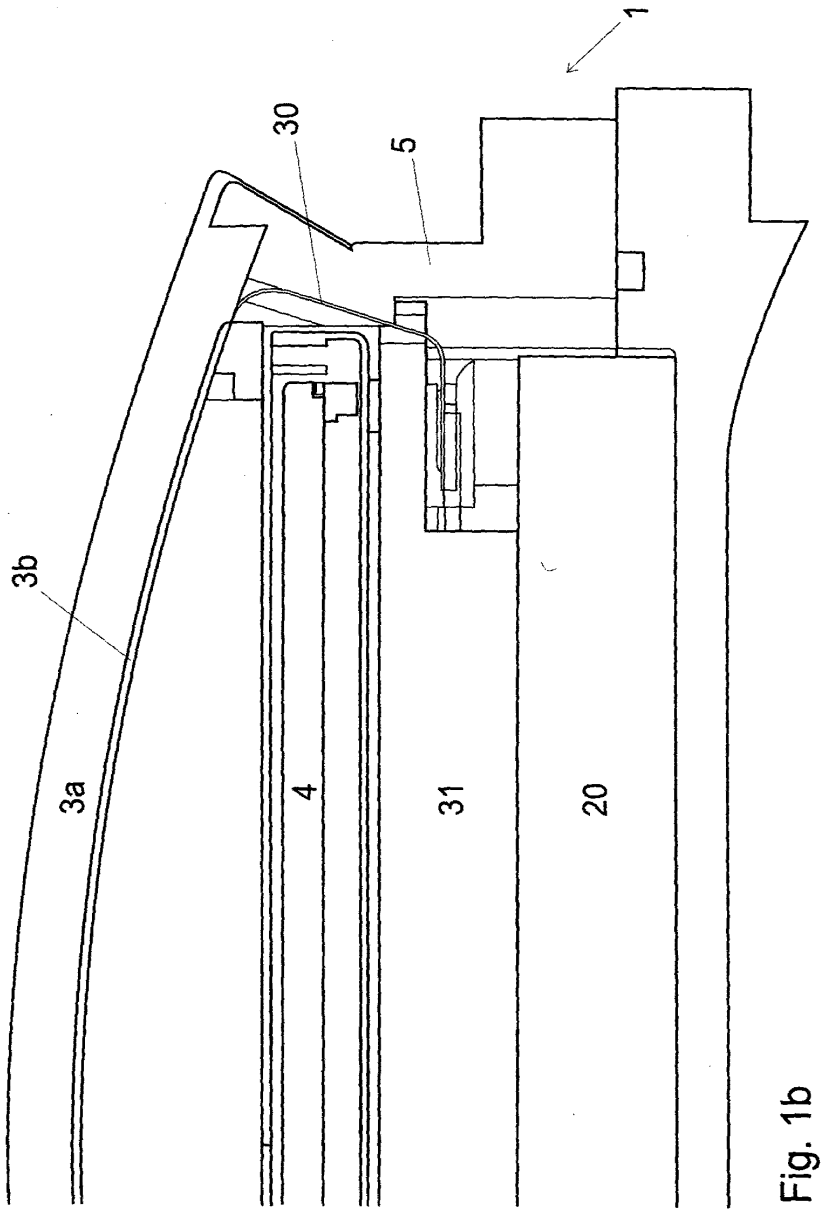


Fig. 1b

Unveränderliches Exemplar
Exemplaire invariable
Esemplare immutabile

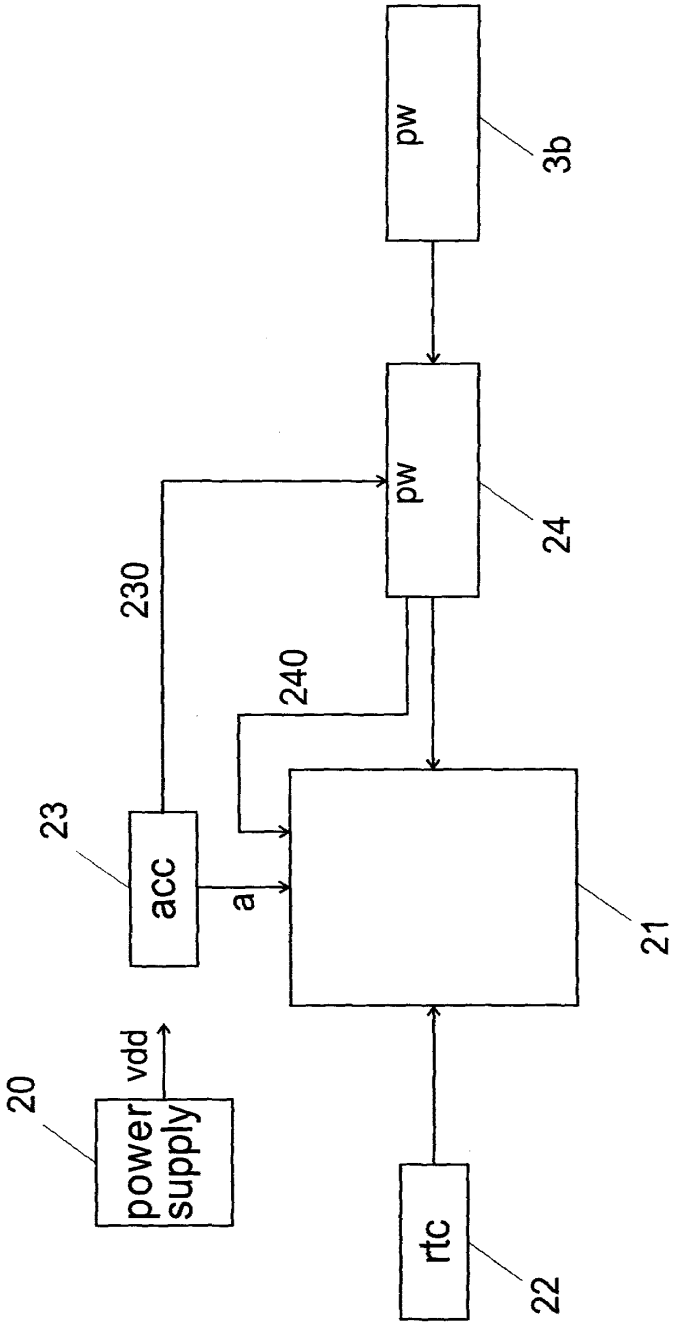


Fig. 2

Unveränderliches Exemplar
Exemplaire invariable
Esemplare immutabile

Fig. 3

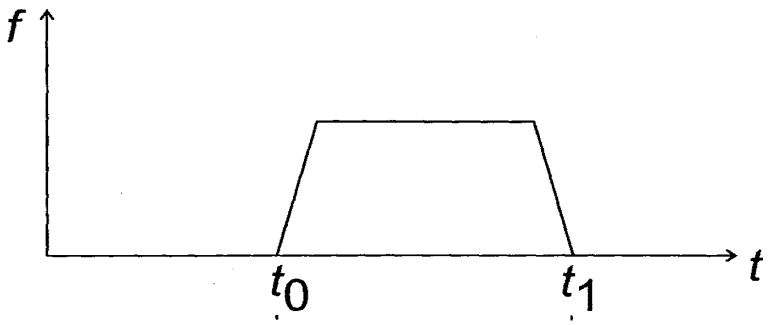


Fig. 4

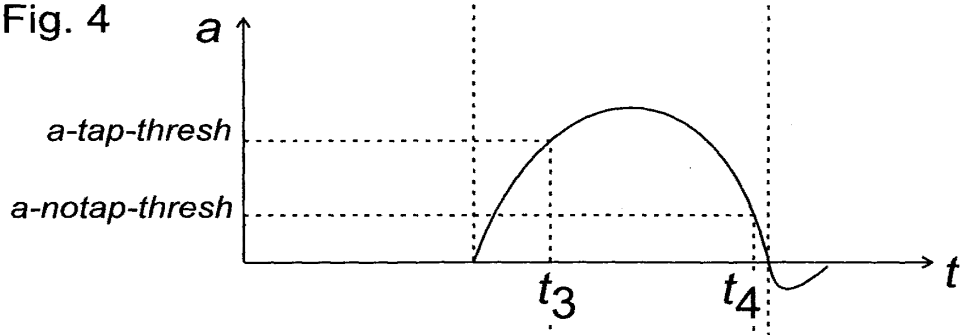


Fig. 5

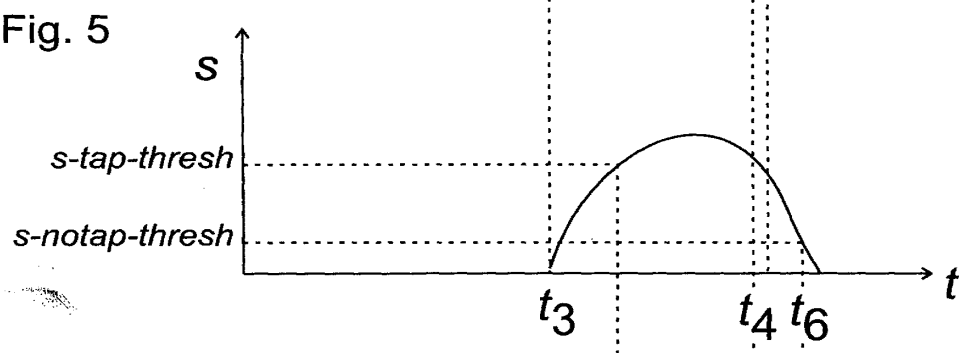
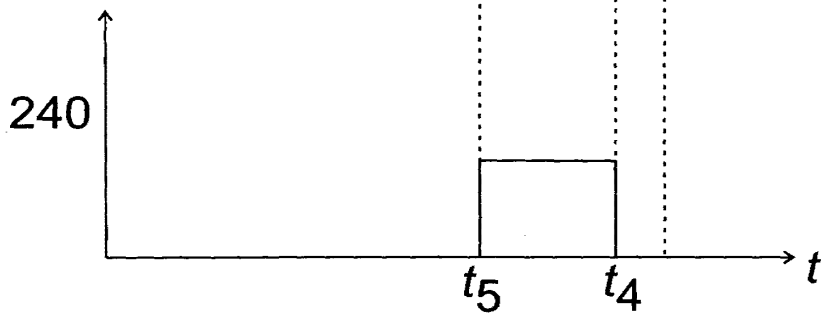


Fig. 6



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I	**Title of Invention**	A method and circuit for switching a wristwatch from a first power mode to a second power mode
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V	**DESIGNATIONS**	
V-1	**The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.**	
VI-1	**Priority claim of earlier national application**	
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VI-2	**Incorporation by reference :** where an element of the international application referred to in Article 11(1)(iii)(d) or (e) or a part of the description, claims or drawings referred to in Rule 20.5(a) is not otherwise contained in this international application but is completely contained in an earlier application whose priority is claimed on the date on which one or more elements referred to in Article 11(1)(iii) were first received by the receiving Office, that element or part is, subject to confirmation under Rule 20.6, incorporated by reference in this international application for the purposes of Rule 20.6.		
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VII-2	**Request to use results of earlier search; reference to that search**		
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VIII	**Declarations**	Number of declarations	
VIII-1	Declaration as to the identity of the inventor	–	
VIII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	–	
VIII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	–	
VIII-4	Declaration of inventorship (only for the purposes of the designation of the United States of America)	–	
VIII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	–	
IX	**Check list**	Number of sheets	Electronic file(s) attached
IX-1	Request (including declaration sheets)	4	✓
IX-2	Description	18	✓
IX-3	Claims	4	✓
IX-4	Abstract	1	✓
IX-5	Drawings	5	✓
IX-7	TOTAL	32	

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IX-8	Fee calculation sheet	–	✓
IX-18	PCT-SAFE physical media	–	–
IX-20	**Figure of the drawings which should accompany the abstract**	2	
IX-21	**Language of filing of the international application**	English	
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X-1-1	Name	P&TS SA	
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(54) **Title**: A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

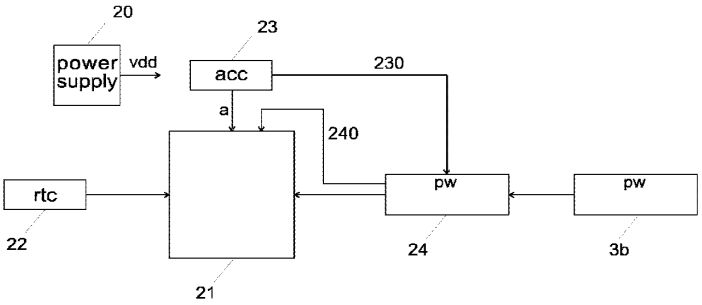


Fig. 2

(57) **Abstract**: An electronic wristwatch operable in two power modes and comprising: an inertial sensor for detecting a gesture on a cover glassof said wristwatch; a touch panel underneath said cover glass for detecting said gesture; gesture detection by the inertial sensor is combined with gesture detection by the touch panel for triggering a switch from a first power mode to a second power mode.

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Claims

1. A method for switching a wristwatch (1) from a first power mode to a second power mode, comprising:

using an accelerometer (23) with embedded signal processing capabilities for generating an acceleration signal used for detecting a gesture on a cover glass (3a) of said wristwatch;

using a touch panel (3b) underneath said cover glass (3a) for detecting said gesture;

combining gesture detection by the accelerometer (23) and gesture detection with the touch panel (3b) for triggering a switch from said first power mode to said second power mode,

said method comprising a step of discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and/or the slope of said acceleration signal.

2. The method of claim 1, wherein the discrimination between gesture and no gesture is also based on the duration of said acceleration signal.

3. The method of one of the claims 1 to 2, wherein the discrimination between gesture and no gesture is also based on the amplitude of said acceleration signal.

4. The method of one of the claims 1 to 3, said step of discriminating between gesture and no gesture comprises determining said frequency and determining that there is no gesture if said frequency is not in a predetermined frequency range compatible with a tap.

5. The method of one of the claims 1 to 3, said step of discriminating between gesture and no gesture comprises determining said slope and determining that there is no gesture if said slope is not in a predetermined slope range compatible with a tap.

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6. The method of claim 5, said step of determining said slope comprising determining the time it takes for said acceleration to increase from a first value to a second value.

7. The method of one of the claims 1 to 6, wherein said touch panel (3b) comprises a plurality of touch areas, said method comprising a step of applying a power supply sufficient for detecting a gesture to only a first subset of said touch areas.

8. The method of one of the claims 1 to 7, wherein discrimination between gesture and no gesture is based on the duration ($t_5 - t_3$) between a detection signal from said accelerometer (23) and a detection signal with said touch panel (3b).

9. The method of one of the claims 1 to 8, wherein said accelerometer (23) is powered on when said wristwatch (1) is in said first power mode,

said method comprising a step of at partially waking up said touch panel (3b) upon detection of a gesture by said accelerometer (23).

10. The method of claim 9, comprising a step of waking up only a subset of the complete area of said touch panel (3b) upon detection of a gesture by said accelerometer (23).

11. The method of one of the claims 1 to 10, comprising a step of waking up a microcontroller (21) in said wristwatch upon detection of a gesture by said accelerometer (23) and with said touch panel (3b).

12. The method of one of the claims 1 to 10, comprising a step of waking up a microcontroller (21) in said wristwatch upon detection of a gesture by said accelerometer (23), said microcontroller (21) being then used for discriminating between gesture and no gesture based at least on signals from said touch panel (3b).

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13. The method of one of the claims 1 to 12, said gesture being a tap or a double tap.

14. The method of one of the claims 1 to 13, further comprising a step of detecting a wristturn with said accelerometer (23), and switching said wristwatch (1) from said first power mode to said second power mode when a wristturn has been detected.

15. The method of claim 14, said step of detecting a wristturn comprising:

detecting that the wristwatch in a first orientation in a first range;

detecting that the wristwatch is then in a second range, different from said first range,

detecting that the displacements of the wristwatch remains under a predetermined threshold during a predetermined duration.

16. A wristwatch (1) which can be operated in a plurality of power modes including a first power mode and a second power mode, comprising:

a display (4);

a touch panel (3b) underneath a cover glass (3a) of said wristwatch for detecting a gesture on said cover glass (3a);

an accelerometer (23) with embedded signal processing capabilities, said accelerometer being arranged for generating an acceleration signal and for discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal as measured by said accelerometer (23) being a three dimensional accelerometer, and/or the slope of said acceleration signal,

a microcontroller (21) commanded so as to be switched to said second power mode upon gesture detection by accelerometer (23)and gesture detection by said touch panel.

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17. The wristwatch of claim 16, wherein said touch panel (3b) comprises a plurality of touch areas and powering means arranged for powering only a first subset of said touch area upon detection of a gesture by said accelerometer (23), and for powering a larger subset in said second power mode.

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A method and circuit for switching a wristwatch from a first power mode to a second power mode

Field of the invention

[0001] The present invention is related to a method for switching a wristwatch from a first power mode to a second power mode, and to a wristwatch which can be switched from a first power mode to a second power mode. The present invention is also related to wristwatches with a touch panel and a plurality of power modes.

Description of related art

[0001] EP1324159 concerns a wristwatch having a touch panel. When not used, a display is switched to a sleeping mode. To avoid an accidental activation of the sensors, a press button is provided to activate the sensors and the liquid crystal display.

[0002] US2009199130 concerns a method and apparatus for receiving an input by a user on an interactive touchscreen display. The input comprises a contact gesture detected with accelerometers.

[0003] US2002118605 discloses a tactile wristwatch in which touch-sensitive keyboard keys are switched on when a user presses a touch-sensitive keyboard.

[0004] US2009102669 discloses an alarm clock that can be stopped by the hand of a user approaching a proximity sensor.

[0005] WO09120292 concerns mobile handheld devices such as, for example, cell phones or personal digital assistants (PDAs) containing an accelerometer that sends a signal that causes the device to turn on.

[0006] WO11000893 describes a wristwatch with a touch display. The wristwatch comprises an accelerometer which is used for simulating effects

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of shocks or acceleration on the movement. In order to reduce the power consumption, the display is automatically switched into a sleeping mode when not used. The user can wake up the display by means of a slight pressure of the glass or with a single tap or a double tap on the touch panel. This document does not describe how taps or double taps are detected and distinguished from other gestures or manipulations of the watch.

[0007] US2010/235667 describes a device with an accelerometer for detecting gestures used to wake up the device.

[0008] EP2315101 describes a method combining use of an inertial sensor and of a touch panel for detecting taps on the touch panel of a device such as a smartphone. The detection of taps by the touch panel is mainly based on the amplitude of the acceleration signal; if this amplitude is higher than a threshold, then the touch panel will be woken up to confirm this detection. Although this process might work well in smartphones, it has been found that a more precise detection method would be needed for wristwatches. Indeed, wristwatches are often subject to high acceleration values, sometimes in the magnitude of 50G or higher, in normal use or during sport. The inertial system described in this document is not able to distinguish reliably between those high acceleration values in normal use and acceleration due to a tap or other gesture. This results in numerous undesirable activation of the touch panel and therefore in a decrease of the power reserve. Moreover, the user is requested to exert a strong pressure on the display in order to produce an acceleration above the detection threshold.

[0009] A similar solution is described in EP1785808.

[0010] Therefore, different methods are known in order to switch on a device in sleep mode. However, it is difficult to distinguish between intentional commands to switch a device and other gestures or accelerations which may be produced during normal use of the device. For example, undesired switch of operating mode could occur when the touch

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display touches a piece of cloth or in case of strong acceleration value, for example during sport.

Brief summary of the invention

[0011] It is therefore an aim of the invention to provide a better method for switching a device, such as a microelectronic device, into a different power mode.

[0012] It is another aim of the invention to provide a method for faster switching of a device into a different power mode, without causing unwanted power mode switches.

[0013] It is another aim to provide a method for switching a device into a different power mode which avoids undesired change of mode.

[0014] According to the invention, these aims are achieved by means of a method for switching a device from a first power mode to a second power mode, comprising:

using an accelerometer (as example of inertial sensor) with embedded signal processing capabilities for generating an acceleration signal used for detecting a gesture on a cover glass of said wristwatch;

using a touch panel underneath said cover glass for detecting said gesture;

combining gesture detection by the inertial sensor and gesture detection with the touch panel for triggering a switch from said first power mode to said second power mode,

said method comprising a step of discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and/or the slope of said acceleration signal.

[0015] The gesture entered by the user to switch the power mode could be a tap, a double tap, a long tap or any other significant and recognizable

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gesture rarely occurring outside of normal use of the device, and which do not need important processing capabilities to be recognized.

[0016] The simultaneous and combinatory usage of an inertial sensor, such as an accelerometer, and of a touch sensor or touch panel for detecting a gesture provides a more reliable discrimination between various gestures and other manipulations. Moreover, this solution reduces the power consumption in the first power mode since only the inertial sensor needs to be switched on in this mode.

[0017] The discrimination based on the frequency, and/or the slope of the acceleration signal is much more robust than a discrimination based on the amplitude of the acceleration signal only. It has been found that taps produce an acceleration signal in a specific relatively narrow frequency range. It has also been found that the slope of this acceleration signal, during increase and subsequent decrease, is in a specific range. Therefore, the frequency and/or the slope of the acceleration signal can both be used, alone or in combination, as a signature of an acceleration produced by taps, or by other gestures one wants to detect, allowing thus to distinguish between an acceleration caused by a tap from most other causes of acceleration.

[0018] It has been found that the acceleration caused by a tap comprises a significant component along a direction substantially perpendicular to the surface of the glass on which the tap is made, whereas most other causes produce accelerations along other directions. Therefore, a measure of the direction of the acceleration relatively to the surface of the glass could be used for distinguishing taps.

[0019] This discrimination based on the direction is even more reliable if the user is requested to make a tap on a predefined limited portion of the glass. In this case, detection of the direction of the tap is easier, especially if the glass is curved.

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[0020] The first power mode could be a sleep mode, or standby mode, in which the power consumption is reduced but no indications are displayed on the display. The second power mode could be an operating mode where indications are displayed on the display.

Brief Description of the Drawings

[0021] The invention will be better understood with the aid of the description of an embodiment given by way of example and illustrated by the figures, in which:

Figure 1a illustrates a perspective view of a buttonless wristwatch with a touch display according to the invention.

Figure 1b illustrates a transversal cut through the wristwatch of Figure 1a.

Figure 2 schematically illustrates a possible arrangement of some components within an embodiment of wristwatch.

Figure 3 is a chronogram which illustrates the force f applied to the glass of a touch panel during a tap gesture.

Figure 4 is a chronogram which illustrates the acceleration measured by an accelerometer in a direction perpendicular to the glass of a touch panel during a tap gesture.

Figure 5 is a chronogram which illustrates a signal measured by a touch sensor during a tap gesture.

Figure 6 is a signal which illustrates an example of power-on signal generated by a circuit according to the invention.

Figures 7a to 7c illustrate three successive positions of the wristwatch that are detected during a wristturn detection method.

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Detailed Description of possible embodiments of the Invention

[0022] Figures 1a and 1b illustrate an example of a wristwatch 1 according to the invention. The illustrated watch comprises notably a wristband 2 and a watch case 5 closed with a glass 3a and a touch sensor 3b covering a digital matrix display 4.

[0023] In a preferred embodiment, the watch has no crown and no push-buttons and is operated only through the touch panels and additional sensors, such as inertial sensors, inside the watch case. The water-tightness and solidity of the case is thus improved.

[0024] A luminosity sensor enabling the intensity of the screen to be automatically adapted to the surrounding luminosity can also be used as an option. The watch can switch nearly instantly from a stand-by mode, where the display is switched off or at least less luminous, to a "time reading" and/or navigation mode, for example as soon as the glass is touched or following a tap or double tap on the glass.

[0025] The watch case 5 can also include a connector (not shown) to connect the watch to an external computer, for example a micro or nano USB connector on the bottom or in one of the watch's sides. Wireless connection means, for example a ZigBee or Bluetooth module, can also be provided for connecting the watch to a personal computer and/or for supplying power to the watch and load the battery.

[0026] The watch is advantageously powered electrically by means of a rechargeable accumulator 20 (Figure 1b) through the micro or nano USB connector, through a specific or proprietary connector or, in a variant embodiment, through a radiofrequency interface.

[0027] The glass 3a with the touch sensor 3b underneath closes the upper surface of the watch case and covers the digital matrix display 4; there is an air gap between the touch sensor 3b and the display. The glass is preferably made of sapphire or of another scratchproof material and is

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coated with an anti-glare treatment. In a preferred embodiment, the glass is cylindrically, or possibly spherically curved, while the display 4 is preferably flat.

[0028] The display 4 is preferably a high-resolution digital matrix display, and fills up nearly the entire surface under the glass 3a and thus serves both as multipurpose multifunction display and as time indicator. In a preferred embodiment, the display is a color liquid crystal display (LCD) or color thin film transistor display (TFT) with at least 150x150 pixels or more than 200 dpi (dot per inch). Other types of display, including displays based on the AMOLED technology for example, can also be used. Furthermore, the watch could also have several displays, for example several digital displays, or a digital matrix display combined with hands or other mechanical indicators.

[0029] The display 4 is preferably placed on a printed circuit board 31 on which other components, such as a microcontroller, an inertial sensor etc are also mounted. A connector 30 connects the touch sensor 3b with the printed circuit board 31; in one preferred embodiment, this connector is detachable, so that the glass 3a can be replaced independently of the printed circuit board. In the illustrated embodiment, the printed circuit board 31 rests directly against the watch case 5, so that accelerations on the glass 3a are transmitted to the inertial sensor on the board 31 with minimal damping.

[0030] The touch sensor or touch panel 3b is laminated or deposited underneath the glass 3a. In the following, since those two components are integrated, we will use interchangeably the expression glass or touch panel or touch sensor for designating the same component, depending on the context. A touch panel integrated between the display 4 and the glass cover 3a could also be used in a sandwich configuration with a flat glass cover 3a.

[0031] The touch panel 3b has an array of transparent electrodes and is placed underneath the glass 3a in order to detect the presence of a finger

or of a stylus. The detection technology preferably uses methods known in the state of the art, for example a capacitive detection, for detecting finger contact and various gestures on one or several of the electrodes. In one embodiment, transparent electrodes can be individually powered in order to put the touch panel in a low power mode with only some electrodes, for example electrodes in the middle, which are powered on and can detect finger contact on the corresponding part of the display; the remaining electrodes are not powered on in this low power mode.

[0032] The display 4 can display various indications, for example the current time, date, chrono, reverse counter, calendar, etc...or phases of the moon as shown in Figure 1. In order to extend the watch's functionalities, the user can switch from one display mode to another and for example replace the card displayed in Figure 1 with other cards. In a preferred embodiment, the user can move from one card to the other with a slide (fast) or scroll (slow) gesture for moving through and viewing a collection of available displays or cards. Scrolling or sliding in the horizontal or vertical direction is achieved by moving the finger on the glass in the corresponding direction.

[0033] Figure 2 schematically illustrates a possible arrangement and schematic of some components within an embodiment of wristwatch according to the invention. Only components which are necessary for the understanding of the invention have been represented, although other components and other arrangements could be provided in other embodiments of the invention.

[0034] The illustrated arrangement comprises a power supply 20, such as a rechargeable battery, for supplying power to all other components. A microcontroller 21 controls the display of indications on the matrix panel 4, depending on signals provided by the sensors 22, 23 and on commands entered by the user through the touch panel 4.

[0035] The component 22 is a real-time clock for generating a clock signal based on a quartz (not shown).

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[0036] The sensor 23 is an inertial sensor, preferably an accelerometer, preferably a 3-axis mems-based accelerometer for measuring acceleration values a (Figure 4) in a direction perpendicular to center of the glass of the wristwatch and in two orthogonal directions in a plane tangential to this glass at his center. This inertial sensor can comprise signal processing capabilities embedded within the same component or chip, for determining the frequency of the measured acceleration signal, the direction of this signal in 2 or 3 directions, the duration of an event in the acceleration signal, etc.

[0037] The component 24 is a touch panel controller (touch controller) for interpreting touch signals provided by the touch panel 3b when the user touches the glass 3a with his finger and consequently generate signals in the touch panel 3b located underneath, and for converting those signals into command signals for the microcontroller 21.

[0038] Other components, such as an input-output circuit, for example a USB decoder or a Bluetooth or ZigBee receiver, can also be integrated.

[0039] The microcontroller 21 is specifically configured to interpret the signals from the touch controller 24 and from the inertial sensor 23, to select indications from several available indications depending on these signals, and to display those indications on the digital matrix display 4; this arrangement is preferably achieved by storing in the microcontroller's memory a computer program (firmware) allowing this specific sequence of operation to be fully controlled.

[0040] At least some of the components 21 to 24 and 3b and 4 can be powered in at least two different modes. In one preferred embodiment, a power saving mode and a time display mode are provided; the whole wristwatch can thus be powered either in time display mode for displaying time or other indications on the display 4, or in power saving mode for preserving the battery 20 by switching the display 4, the touch sensor 3b and other components in a low consumption mode. In one preferred

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embodiment, the display 4 and the touch sensor 3b are switched off in low power saving mode.

[0041] In some embodiments, more than two power modes can be provided; for example, the real time clock 22 is preferably always powered on in power saving mode, so that the real time is not lost when the display 4 and the touch panel 3b are switched off; it is possible however to switch the real time clock off in a deep sleep mode in order to prevent the battery from being totally discharged. Other components, such as the microcontroller 21, the touch panel 3b etc could have more than two different power modes, for example a hot power saving mode allowing for a very fast re-start, and a cold power saving mode in which restart is possibly slower or necessitates restarting an operating system.

[0042] The device 1 can be switched from a first power mode, such as a power saving mode, to a second power mode, such as a time display mode, with a user gesture on the glass 3a / touch panel 3b. The device 1 can automatically return to the first power mode, for example after a predetermined duration, or when no acceleration and/or no activity are detected.

[0043] In one embodiment, a gesture command to switch the device into a second power mode is detected with the inertial sensor 23 for detecting a tap, a double tap or another command which can be input by the user onto the glass 3a / touch panel 3b in order to trigger a change of power mode. The inertial sensor 23 could be an accelerometer with embedded power processing capabilities and which is always powered on in the first low power mode. The embedded power processing capabilities comprise a processor or other processing means for executing programmable software code for analysing the accelerations values delivered by the accelerometer, and for generating signals or values when certain conditions are met.

[0044] In order to avoid undesired switches to the second power mode, which would switch the display on and reduce the operating time of the

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battery, it is necessary to discriminate between changes in the acceleration signals which are caused by a switch on gesture, such as a tap or a double tap, and any other acceleration caused when the wristwatch is displaced or manipulated in normal use. In one preferred embodiment, the accelerometer 23 generates a power on signal 230 for powering the touch panel 3b and the touch controller 24 when the user enters a tap gesture on the glass 3a/ touch panel 3b, which can be discriminated from other signals with the following properties:

–frequency: tap signals are typically high frequency signals and can be distinguished from other signals produced by slide, rub etc and from most acceleration that occur during normal use of the wristwatch. The acceleration produced by a valid single tap is a pulse function with a first step of fast increase of the acceleration almost immediately followed by a step of fast deceleration, the duration of the whole pulse being typically in the range of 10 to 20 ms. Therefore, the bandwidth of this pulse-like function is necessarily higher than a predefined threshold, and a low pass filtering of acceleration signals can be used to cancel signals produced by gestures other than taps or by movements of the wrist. Preferably, the embedded processing capabilities of the accelerometer exclude the possibility of the tap if the frequency of the acceleration signal, in a given direction such as the direction perpendicular to the center of the glass, is not in a predefined range.

–duration of the pulse: as indicated, a valid single tap generates a pulse with a duration within a given range, usually between 5 and 100 ms, typically between 10 and 20 ms.

-amplitude of the pulse: a valid single tap is detected only if the amplitude of the acceleration is higher than a first predefined threshold $a_{\_tap\_thresh}$. End of the tap is detected when the amplitude decreases below a second threshold $a_{\_notap\_thresh}$.

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-direction of the acceleration: a tap on the glass generates a maximal acceleration in a main direction perpendicular to the center of the glass, oriented toward the bottom of the watch, and a much lower acceleration in all other directions. A 3D accelerometer can be used for discriminating valid taps based on the direction of the acceleration. For example, if the acceleration in a direction other than the main direction is higher than the acceleration in the main direction, the gesture will not be recognized as a switch on tap.

-slope of the acceleration: this feature can also be used to differentiate between a valid switch on tap and a non valid one. Taps typically generate a fast increase of the acceleration, whereas most other gestures such as swipes etc and most movements of the wrist produce a slower acceleration increase. Therefore, the system could distinguish that a tap is not valid if the slope of the acceleration is not in an expected range. It is also possible to measure the slope of acceleration in one preferential direction, for example in a direction perpendicular to the center of the glass, or separately in a plurality of predefined directions. The slope may be defined by the difference between two predefined acceleration values divided by the time it takes for the acceleration signal to goes from the first of those predefined values to the second one:
slope= (a_tap_threshold – a_notap_threshold)/($t_3 - t_2$) (see Figure 4).

[0045] Those discriminating criteria can also be combined in different ways. For example, the processing means within the accelerometer could use the direction of the acceleration only during a limited time window, for example a less than 100 ms time interval starting at the beginning of the pulse.

[0046] It is also possible to consider at least one of those criteria separately during the raising portion of the acceleration signal and during

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the decreasing portion of this signal. For example, it is possibly to verify whether the duration, the frequency, and/or the slope of the acceleration signal during the raising portion, and then during the decreasing portion, are each in predefined ranges compatibles with the gesture one wants to discriminate.

[0047] Other discriminating criteria could be used if other gestures, such as double taps or long taps, are used as command to change the power mode.

[0048] In the embodiment of the invention illustrated on Figure 2, the power on signal 230 generated by the inertial sensor 23 is used to wake up the touch panel 3b and/or the touch controller 24, or to switch those components from a low power mode to another power mode. Therefore, the touch panel 3b is switched off, or at least in low power mode, when the device 1 is in the first power mode, and is powered on, or at least partially powered on, after detection of a likely tap and generation of a wake up signal 230 by the accelerometer 23. In one embodiment, the wake up signal 230 generated by the inertial sensor 23 triggers a switch on command of the touch panel 3b and/or of the touch controller 24 from a low power mode in which nothing is displayed and no finger touch can be detected, to an intermediate power mode where only a subset of electrodes of the touch panel is activated, for example electrodes in the middle of the touch panel, in order detect finger contact such as taps or double taps in this limited area only and to avoid detection if a tap is made in a different area. In another embodiment, the wake up signal 230 triggers a switch on command of the touch controller 24 into a mode where all touch electrodes are activated, to detect a tap or double tap in any area of the touch panel 3b. It is also possible to activate the touch panel 3b and the touch controller 24 during only a limited duration, preferably less than 100 ms, after generation of the wake up signal 230.

[0049] The touch controller 24 generates a second wake up signal 240 to wake up the microcontroller 21, and possibly other components of the device 1, when this touch controller confirms the tap detection. The second

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wake up signal 240 can be input to an interrupt line or switch on line of the microcontroller 21. In one embodiment, the wake signal 230 of the inertial sensor 23 is generated very fast at the beginning of the tap, the touch controller 24 is immediately woken up, and used to confirm the finger detection on the touch sensor 3b during the remaining time of the tap. In another embodiment, a double tap is required, and the inertial sensor is used to detect the first tap while the touch sensor 3b, possibly in cooperation with the inertial sensor 23, is used for detecting the second confirmation tap. In yet another embodiment, a long tap is required, i.e. a tap where the finger rests against the glass during a minimal period. In all embodiments, a second wake up signal 240 is only generated if confirmation of a tap or double tap from the touch panel 3b occurs within a predetermined duration after the first wake signal, for example within a duration less than 300 ms, preferably less than 100 ms.

[0050] Discrimination of a tap by the touch controller 24 preferably depends on the location, size and duration of a touch signal generated by adjacent electrodes. A tap is usually made with the tip of a finger, i.e. on a small surface, during a short period, preferably on predetermined locations of the display.

[0051] The microcontroller 21 is only woken up by the second wake up signal of the touch controller 24. In another embodiment not illustrated hereby, the microcontroller is already woken up by the first wake up signal, and used for discriminating between tap and no tap based on signals from the touch controller 24; the second wake up signal is only used to confirm the first wake up signal and prevent the microcontroller 21 for reentering into the first power mode.

[0052] In one embodiment, a rough discrimination between a wake up gesture and no wake up gesture is made by the inertial sensor 23 and/or the touch sensor 3b, in order to wake up the microprocessor 21. The microprocessor then analyses the sequence of acceleration value delivered by the acceleration sensor, as well the signals delivered by the touch controller 24, to confirm or infirm the decision to wake up the device 1 and

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in particular the display and touch panel 3b. If the microprocessor confirms the tag detection, it remains in operating mode and wake up the display. On the other hand, if tap detection is not confirmed by the more advanced algorithms used by the microcontroller, the microcontrollers puts the touch panel 3b, touch controller 24 and itself back into the first power mode.

[0053] Figures 3 to 6 illustrate chronograms of various signals produced during a tap of the user on the glass of the wristwatch. Figure 3 illustrates the force f applied by the finger on the glass during a tap between t_0 and t_1. The force increases very suddenly from t_0, remains approximately constant at a high level, and then decreases very quickly when the user releases the finger until he left the glass at t_1. The duration between t_0 and t_1 is typically comprised between 10 and 20 ms.

[0054] Figure 4 illustrates the acceleration as measured by the accelerometer 23 in a direction perpendicular to the center of the touch panel 3b during the tap. The acceleration increases from time t_0 up to a maximum at t_{max}, and then decreases or even becomes negative until t_1. The acceleration might oscillate at low amplitude after the finger release. A tap is detected only if the amplitude of the measured acceleration reaches a first predefined threshold $a_{\_tap\_thresh}$ at time t_3. End of the tap is detected at time t_4 when the amplitude decreases below a second threshold $a_{\_notap\_thresh}$. A valid tap is discriminated based on the amplitude of the acceleration, duration between t_3 and t_4, frequency of the amplitude signal, and / or slope of the acceleration signal.

[0055] Figure 5 illustrates a signal s produced by the touch controller 24 during a tap. This signal might be a combination between signals from different electrodes of the touch panel, or a signal processed from different signals of the electrodes. In one embodiment, the signal s is related to the probability of a tap, based on criteria like the size of the contact area, the frequency and timing of the contact signal, etc. The touch panel 3b and touch controller 24 are preferably in low power mode until time t_3 when the accelerometer 23 detects a tap and generates a first wake up signal 230. At time t_5, the signal s reaches a threshold $s_{\_tap\_thresh}$ where the touch

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controller 24 detects a tap. End of the tap is detected at time t_6 when the signal s decreases below the threshold $s_{\_notap\_thresh}$

[0056] Figure 6 illustrates a second wake up signal 240 generated by the touch controller 24 or by a suitable circuit for switching the microcontroller 21 from a first low power mode to a second high power mode. The wake up signal is inactive until time t_5 when a tap is detected by the inertial sensor and confirmed by the touch sensor. The microcontroller 21, and preferably the display of the touch panel 3b, is preferably activated at the rising flank of the signal 240 at time t_5. This signal becomes inactive at time t_4 or t_6, at the end of the tap, although this does not result in changing the power mode of the device 1.

[0057] Figures 7a to 7c schematically illustrate three steps of another method for switching the wristwatch 1 from a first power mode to a second power mode. This method can be used in the same wristwatch than the above described method, so that a user can decide to wake his wristwatch either with the above described method (for example with a tap on the glass 3a) or with this other method of Figures 7a to 7c.

[0058] In this second method, a wristturn detection is performed for detecting rotation of the wrist and deciding if this rotation corresponds to predefined pattern, in which case the wristwatch should be switched to a second power mode for example in order to activate the display.

[0059] Initially, the microcontroller 21 is in a low power mode, for example completely off. The touch controller 24 to which the accelerometer 23 is connected, and which has the responsibility to wake up the microcontroller 21, is in a sleep mode (low power mode), but will wake up when an interrupt in the accelerometer 23 occurs. The accelerometer 23 is set so as to generate an interrupt when its position changes and reaches a given range that is maintained during a predetermined duration, as will be described.

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[0060] The accelerometer 23 knows its position relatively to the vertical and horizontal direction. This can be determined for example by determining the direction along which the acceleration is substantially equal to 1G when the accelerometer is substantially immobile during a predefined duration.

[0061] During a first step of the wristturn detection method, illustrated on Figure 7a, the wristwatch reaches a starting position in a first defined angle range $\alpha 1$ (e.g. 25° to 155° relatively to the horizontal). This position must be held for a defined time (e.g. 50ms) otherwise the start position is not registered. This position is identified using the accelerometer 23 internal orientation detection mechanism, for which the angle range can be set. The fact that a valid start position has been reached is then registered, for example in the accelerometer 23 or alternatively in the touch controller 24 which may be quickly woken to register that a valid start position is reached, before it goes back to wait for the next interrupt.

[0062] During a next step of the wristturn detection method, illustrated on Figure 7b, the wristwatch has been rotated and reaches a final position in a second defined angle range $\alpha 1$ (e.g. -25° to -75° relatively to the horizontal). This position is a typical position for reading the time on the watch, with the display oriented toward the face of the user. This position must be held for a defined time (e.g. 50ms) other the position is not registered. This position is identified using the accelerometer 23 internal orientation detection mechanism, for which the angle range can be set. When a final position in this range is reached, the system checks if a valid start position was registered during the previous step of Figure 7a. If necessary, the touch controller 24 may be woken for this verification and/or for subsequent steps of the method.

[0063] The duration between the starting position and the final position may be measured. If this duration is not in a predefined range, the method is interrupted. Otherwise, the touch controller 24 changes to a No-movement & Angle Check mode. Alternatively, this No-movement & Angle

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Check detection may be performed by the embedded processing capabilities within the accelerometer 23.

[0064] On Figure 7c, the system (for example the touch controller 24, or the accelerometer 23) verifies whether this final orientation of the wristwatch is maintained during a given duration. For this, the value of the acceleration along the three axes is periodically verified. If all 3 axis show no movement above a certain threshold for a defined time (respective defined number of samples), and if the orientation calculated from X/Y/Z is in a defined range (e.g. -25° to -60°), then the system determines that the user is probably consulting his watch. In this case, the touch controller 24 activates the microcontroller 21 and the display 3b, so the user can read the time.

[0065] Other methods of combining indications of the inertial sensor 23 and of the touch sensor 3b could be considered by the skilled person, including methods using additional wake up circuitry for discriminating between a tap gesture and no tap based on indication of the two sensors. The described example has the advantage that the number of components which need to be in an active power mode for discriminating a tap is very limited; in fact only the inertial sensor with integrated signal processing is required. In particular, no advanced signal processing capabilities are required in order to discriminate between a tap and other gestures or displacements of the watch with the accelerometer; the limited signal processing possibilities available in current mems-based accelerometers are sufficient.

[0066] Discrimination between a gesture and no gesture could be made within the processing means of the inertial sensor, by the touch controller 24, by the microcontroller 21, by a dedicated circuit (not shown), or by any combination thereof. Hardware and/or software modules could be used for this discrimination.

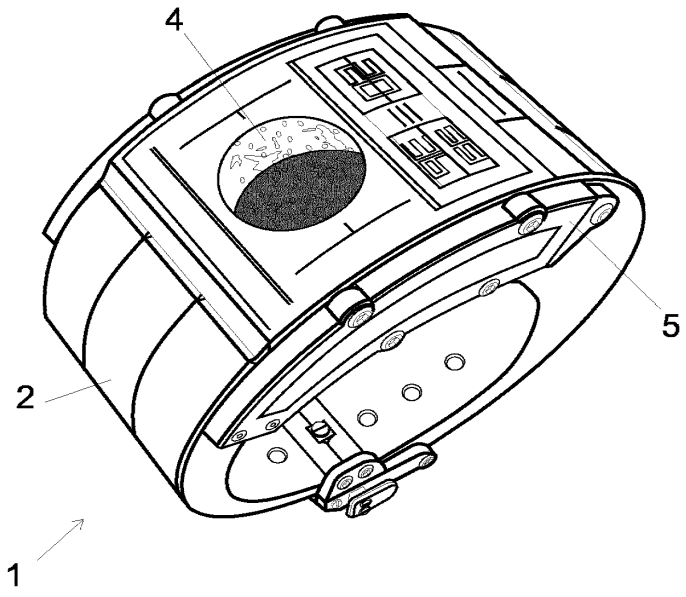


Fig. 1a

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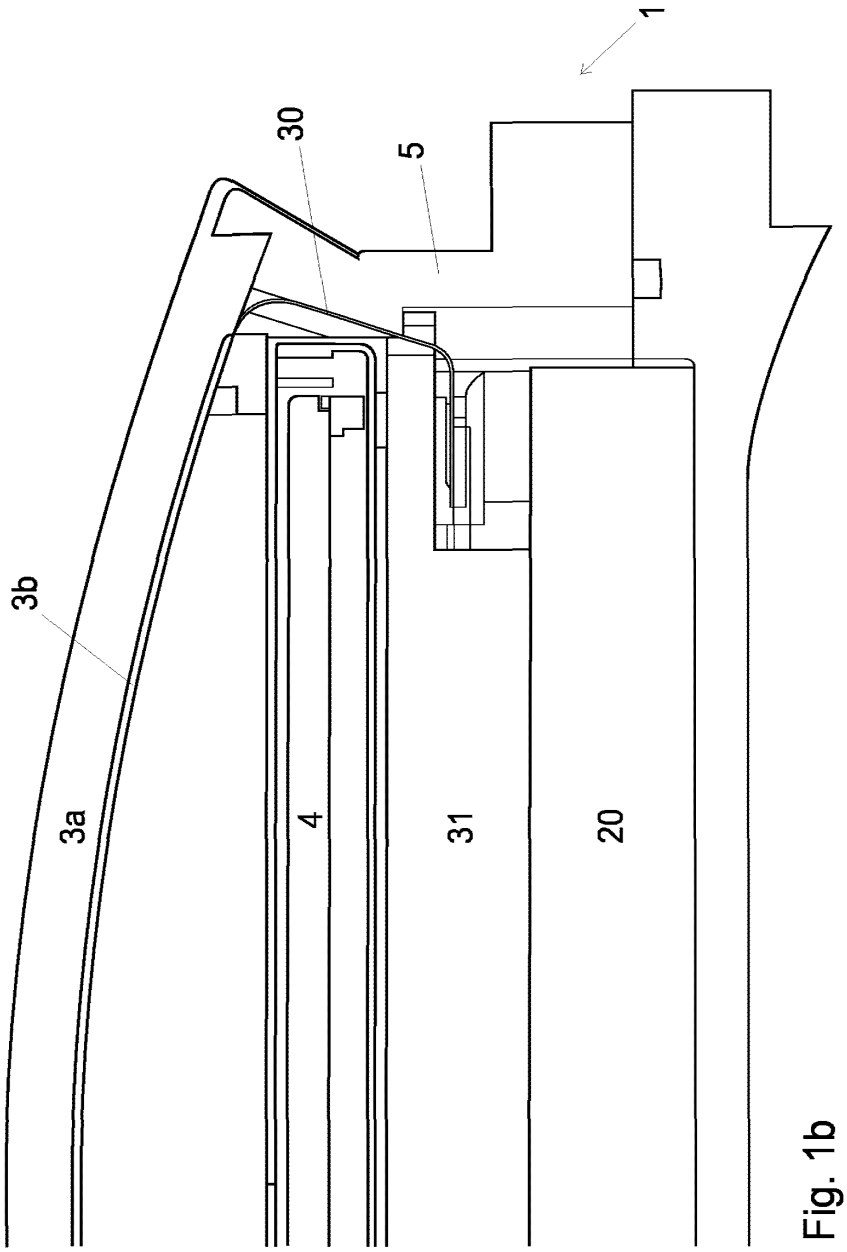


Fig. 1b

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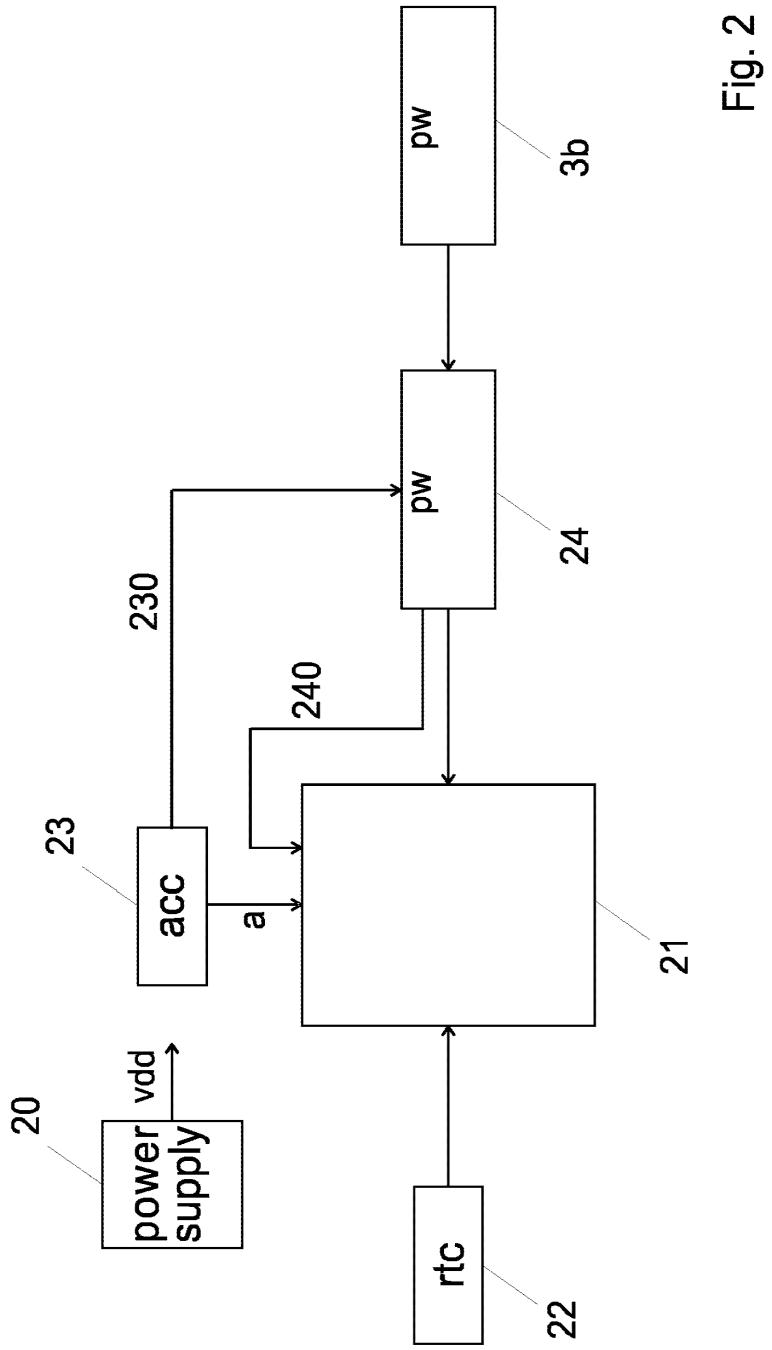


Fig. 2

Fig. 3

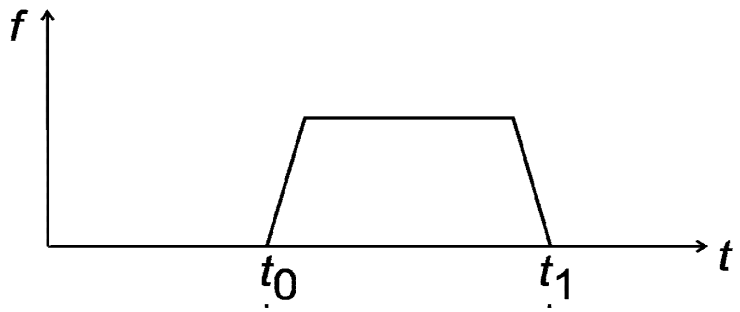


Fig. 4

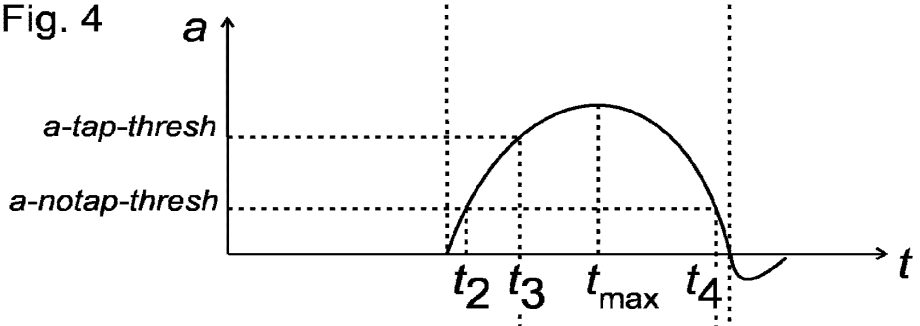


Fig. 5

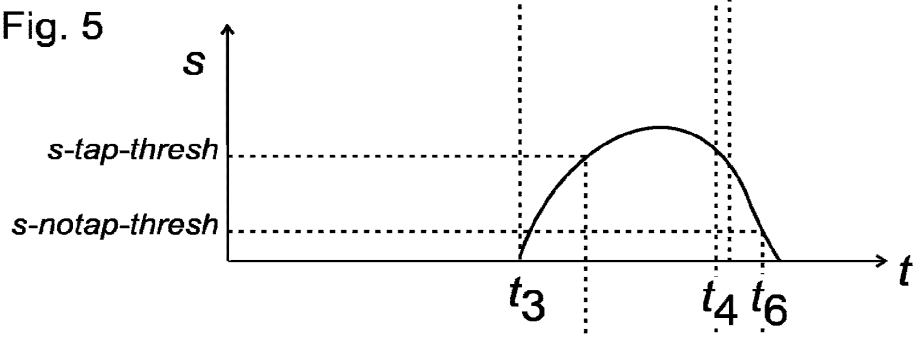
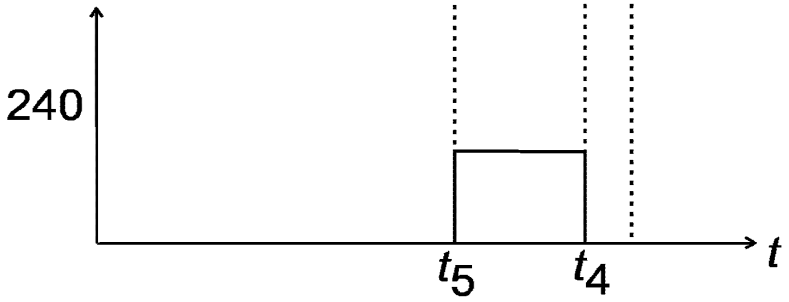


Fig. 6



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Fig. 7a

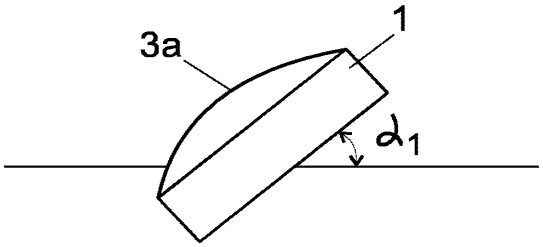


Fig. 7b

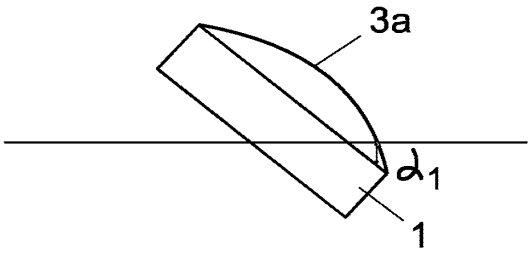
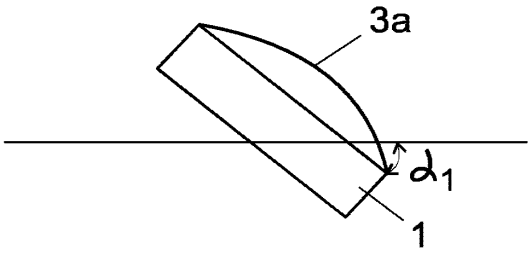


Fig. 7c



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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/352,727	Filing Date 04/18/2014	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 04/18/2014	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 17	Minus	** 20	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $210 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
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Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
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LIE
/SANDRA TUCKER SMITH/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
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U.S. APPLICATION NUMBER NO.	FIRST NAMED INVENTOR	ATTY. DOCKET NO.
14/352,727	Alex Bezinge	BEZINGE.00101

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INTERNATIONAL APPLICATION NO.	
PCT/EP2012/070273	
I.A. FILING DATE	PRIORITY DATE
10/12/2012	10/18/2011

CONFIRMATION NO. 4023
371 FORMALITIES LETTER

OC000000068785220

Date Mailed: 06/05/2014

Notification of Insufficiency Under 37 CFR 1.492 and/or 1.495 (DO/EO/US)

The following items have been submitted by the applicant or the International Bureau to the United States Patent and Trademark Office as a Designated / Elected Office (37 CFR 1.495).

- Indication of Small Entity Status
- Priority Document
- Copy of the International Application filed on 04/18/2014
- Copy of the International Search Report filed on 04/18/2014
- Preliminary Amendments filed on 04/18/2014
- Information Disclosure Statements filed on 04/18/2014
- U.S. Basic National Fees filed on 04/18/2014
- Substitute Specification filed on 04/18/2014
- Priority Documents filed on 04/18/2014
- Authorization to Permit Access filed on 04/18/2014
- Application Data Sheet (37 CFR 1.76) filed on 04/18/2014

The following items **MUST** be furnished within the period set forth below:

- To avoid abandonment, a surcharge (for late submission of search fee, examination fee or inventor's oath or declaration) as set forth in 37 CFR 1.492(h) of $70 for a small entity in compliance with 37 CFR 1.27 , must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fees required for this application is $**70** for a Small Entity:
- $**70** Surcharge.

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.495(c).

- Properly executed inventor's oath or declaration for the following inventor(s) has not been submitted: **Alex Bezinge**, **Adrian Mohni**, **Daniel Pfeifer**, and **Musa Dogan**

ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

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The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

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VONDA M WALLACE

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/352,727	04/18/2014		740	BEZINGE.00101	17	3

CONFIRMATION NO. 4023

27557
BLANK ROME LLP
WATERGATE
600 NEW HAMPSHIRE AVENUE, N.W.
WASHINGTON, DC 20037

FILING RECEIPT

OC000000068785219

Date Mailed: 06/05/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Alex Bezinge, Saviese, SWITZERLAND;
Adrian Mohni, St-Gallen, SWITZERLAND;
Daniel Pfeifer, Anton Am Arlberg, AUSTRALIA;
Musa Dogan, Heerbrugg, SWITZERLAND;

Applicant(s)

Slyde Watch SA, Luins, SWITZERLAND

Power of Attorney: The patent practitioners associated with Customer Number 27557

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/EP2012/070273 10/12/2012

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
SWITZERLAND 01689/11 10/18/2011

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 06/02/2014
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/352,727**
Projected Publication Date: 09/11/2014
Non-Publication Request: No
Early Publication Request: No

Petitioner Samsung Ex-1004, 0319

** **SMALL ENTITY** **

Title

METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

Petitioner Samsung Ex-1004, 0320

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Petitioner Samsung Ex-1004, 0321

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/352,727

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	140		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	240		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	17 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	740		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

Application Number	Filing Date
14352727	

Applicant(s) Alex BEZINGE

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT			*		*		*	
	Indep	Depend	Indep	Depend	Indep	Depend		Indep	Depend	Indep	Depend	Indep	Depend
1	1		1				51						
2		1		1			52						
3		(1)		1			53						
4		(1)		1			54						
5		(1)		1			55						
6		(1)	---	---			56						
7		(1)		1			57						
8		(1)		1			58						
9		(1)		1			59						
10		(1)		1			60						
11		(1)		1			61						
12		(1)	---	---			62						
13		(1)		1			63						
14		(1)		1			64						
15		(1)		1			65						
16	1		1				66						
17		1		1			67						
18			1				68						
19				1			69						
20							70						
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43							93						
44							94						
45							95						
46							96						
47							97						
48							98						
49							99						
50							100						
Total Indep	2		3		0								
Total Depend	15	↵	14	↵	0	↵							
Total Claims	17		17		0								

Petitioner Samsung Ex-1004, 0323

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: August 4, 2014 Signature: (Peter S. Weissman)

Docket No.: 143297.00101
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Alex BEZINGE et al.

Application No.: 14/352,727 Confirmation No.: 4023

Filed: April 18, 2014 Art Unit: 2621

For: A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE Examiner: Not Yet Assigned

RESPONSE TO NOTIFICATION OF INSUFFICIENCY

MS Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

In response to the Notification of Insufficiency mailed June 5, 2014, Applicant respectfully submits a Declaration and Substitute Statements in Lieu of an Oath or Declaration (4).

Please charge our credit card in the amount of $70.00 covering the fee set forth in 37 C.F.R. § 1.492(h). Authorization to charge our credit card is being submitted separately herewith through private PAIR. The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 23-2185, under Order No. 143297.00101.

Dated: August 4, 2014

Respectfully submitted,

By
Peter S. Weissman
Registration No.: 40,220
BLANK ROME LLP
Correspondence Customer Number: 27557
Attorney for Applicant

143297.00101/36383442v.1

Petitioner Samsung Ex-1004, 0324

Doc Code: Oath
Document Description: Oath or declaration filed

PTO/AIA/08 (08-12)
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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☐ Declaration Submitted With Initial Filing **OR** ☒ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (f)) required)

Attorney Docket Number	BEZINGE.00101
First Named Inventor	Adrian MOHNI
COMPLETE IF KNOWN	
Application Number	14/352,727-Conf. #4023
Filing Date	April 18, 2014
Art Unit	N/A
Examiner Name	Not Yet Assigned

A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

(Title of the Invention)

As a below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application

OR

☒ United States Application Number or PCT International application number PCT/EP2012/070273

filed on 10/12/2012.

The above-identified application was made or authorized to be made by me.

I believe I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Authorization To Permit Access To Application by Participating Office

☒ If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed, 2) any foreign application to which the above-identified patent application claims priority under 35 USC 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

Petitioner Samsung Ex-1004, 0325

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DECLARATION — Utility or Design Patent Application

Direct all correspondence to: [x] The address associated with Customer Number: 27557 OR [ ] Correspondence address below

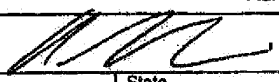
Name		
Address		
City	State	Zip
Country	Telephone	Email

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Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available. Petitioner/applicant is advised that documents which form the record of a patent application (such as the PTO/SB/01) are placed into the Privacy Act system of records DEPARTMENT OF COMMERCE, COMMERCE-PAT-7, System name: *Patent Application Files*. Documents not retained in an application file (such as the PTO-2038) are placed into the Privacy Act system of COMMERCE/PAT-TM-10, System name: *Deposit Accounts and Electronic Funds Transfer Profiles*.

LEGAL NAME OF SOLE OR FIRST INVENTOR:

(*E.g.*, Given Name (first and middle [if any]) and Family Name or Surname)
Adrian MOHNI

Inventor's Signature	Date (Optional)
	26.5.19

Residence: City	State	Country
St-Gallen		Switzerland

Mailing Address:
Boppartshofweg 12

City	State	Zip	Country
St-Gallen		CH-9014	Switzerland

[x] Additional inventors are being named on the 1 supplemental sheet(s) PTO/AIA/10 attached hereto.

Petitioner Samsung Ex-1004, 0326

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SUPPLEMENTAL SHEET FOR DECLARATION	ADDITIONAL INVENTOR(S) Supplemental Sheet (for PTO/AIA/08,09) Page 1 of 1

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Daniel PFEIFER

Inventor's Signature	Date (Optional)
	15.05.14

Residence: City	State	Country
Anton Am Arlberg		Austria

Mailing Address: Pfarriweg 33

City	State	Zip	Country
Anton Am Arlberg		A-6580	Austria

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Musa DOGAN

Inventor's Signature	Date (Optional)
	25.05.14

Residence: City	State	Country
Heerbrugg		Switzerland

Mailing Address: Karl-Volker-Strasse 10

City	State	Zip	Country
Heerbrugg		CH-9435	Switzerland

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Alex BEZINGE

Inventor's Signature	Date (Optional)
See Substitute Statement In Lieu of an Oath or Declaration	

Residence: City	State	Country
Saviese		Switzerland

Mailing Address: Prafirmin 213

City	State	Zip	Country
Saviese		CH-1965	Switzerland

Petitioner Samsung Ex-1004, 0327

PTO/AIA/10 (06-12)
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SUPPLEMENTAL SHEET FOR DECLARATION	ADDITIONAL INVENTOR(S) Supplemental Sheet (for PTO/AIA/08,09) Page 1 of 1

Legal Name of Additional Joint Inventor, if any:
(E.g., Given Name (first and middle (if any)) and Family Name or Surname)
Daniel PFEIFER

Inventor's Signature	Date (Optional)

Residence: City	State	Country
Anton Am Arlberg		Austria

Mailing Address: Pfarriweg 33

City	State	Zip	Country
Anton Am Arlberg		A-6580	Austria

Legal Name of Additional Joint Inventor, if any:
(E.g., Given Name (first and middle (if any)) and Family Name or Surname)
Musa DOGAN

Inventor's Signature	Date (Optional)

Residence: City	State	Country
Heerbrugg		Switzerland

Mailing Address: Karl-Volker-Strasse 10

City	State	Zip	Country
Heerbrugg		CH-9435	Switzerland

Legal Name of Additional Joint Inventor, if any:
(E.g., Given Name (first and middle (if any)) and Family Name or Surname)
Alex BEZINGE

Inventor's Signature	Date (Optional)
See Substitute Statement in Lieu of an Oath or Declaration	

Residence: City	State	Country
Saviese		Switzerland

Mailing Address: Prafirmin 213

City	State	Zip	Country
Saviese		CH-1965	Switzerland

Petitioner Samsung Ex-1004, 0328

Doc Code: Oath
Document Description: Oath or declaration filed

PTO/AIA/02 (07-13)
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SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)

Title of Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

This statement is directed to:

☐ The attached application,

OR

☒ United States application or PCT international application number PCT/EP2012/070273 filed on 10/12/2012.

LEGAL NAME of inventor to whom this substitute statement applies:

(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)

Alex BEZINGE

Residence (except for a deceased or legally incapacitated inventor):

City	State	Country

Mailing Address (except for a deceased or legally incapacitated inventor):

City	State	Zip	Country

I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.

The above-identified application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Relationship to the inventor to whom this substitute statement applies:

☒ Legal Representative (for deceased or legally incapacitated inventor only),

☐ Assignee,

☐ Person to whom the inventor is under an obligation to assign,

☐ Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or

☐ Joint Inventor.

143297.00101/36384582v.1

Petitioner Samsung Ex-1004, 0329

PTO/AIA/02 (07-13)
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SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- [x] Inventor is deceased,
- [ ] Inventor is under legal incapacity,
- [ ] Inventor cannot be found or reached after diligent effort, or
- [ ] Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- [x] An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

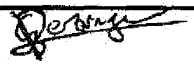
- [ ] An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name: Gaetan Bezinge	Date (Optional):

Signature: 

APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

If the applicant is a juristic entity, list the applicant name and the title of the signer:

Applicant Name: Slyde Watch SA

Title of Person Executing This Substitute Statement: Heir of inventor, Alex Bezinge

The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City: Saviese	State:	Country: Switzerland

Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

Chemin de la Roua 52, 1965 Ormone

City: Saviese	State:	Zip:	Country: Switzerland

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.

Petitioner Samsung Ex-1004, 0330

Doc Code: Oath
Document Description: Oath or declaration filed

PTO/AIA/02 (07-13)
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SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)

Title of Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

This statement is directed to:

[ ] The attached application,

OR

[X] United States application or PCT international application number PCT/EP2012/070273 filed on 10/12/2012.

LEGAL NAME of inventor to whom this substitute statement applies:

(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)

Alex BEZINGE

Residence (except for a deceased or legally incapacitated inventor):

City	State	Country

Mailing Address (except for a deceased or legally incapacitated inventor):

City	State	Zip	Country

I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.

The above-identified application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Relationship to the inventor to whom this substitute statement applies:

[X] Legal Representative (for deceased or legally incapacitated inventor only),

[ ] Assignee,

[ ] Person to whom the inventor is under an obligation to assign,

[ ] Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or

[ ] Joint Inventor.

143297.00101/38384584v.1

Petitioner Samsung Ex-1004, 0331

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SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- [x] Inventor is deceased,
- [ ] Inventor is under legal incapacity,
- [ ] Inventor cannot be found or reached after diligent effort, or
- [ ] Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- [x] An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

- [ ] An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name: Layane Bezinge	Date (Optional):

Signature: 

APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

If the applicant is a juristic entity, list the applicant name and the title of the signer:

Applicant Name: Slyde Watch SA

Title of Person Executing This Substitute Statement: Heir of inventor, Alex Bezinge

The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City: Saviese	State:	Country: Switzerland

Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

Chemin de la Roua 52, 1965 Ormone

City: Saviese	State:	Zip:	Country: Switzerland

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.

Petitioner Samsung Ex-1004, 0332

Doc Code: Oath
Document Description: Oath or declaration filed

PTO/AIA/02 (07-13)
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SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)

Title of Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

This statement is directed to:

☐ The attached application,

OR

☒ United States application or PCT international application number PCT/EP2012/070273 filed on 10/12/2012.

LEGAL NAME of inventor to whom this substitute statement applies:

(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)

Alex BEZINGE

Residence (except for a deceased or legally incapacitated inventor):

City	State	Country

Mailing Address (except for a deceased or legally incapacitated inventor):

City	State	Zip	Country

I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.

The above-identified application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Relationship to the inventor to whom this substitute statement applies:

☒ Legal Representative (for deceased or legally incapacitated inventor only),

☐ Assignee,

☐ Person to whom the inventor is under an obligation to assign,

☐ Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or

☐ Joint Inventor.

143297.00101/36384585v.1

Petitioner Samsung Ex-1004, 0333

PTO/AIA/02 (07-13)
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SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- [x] Inventor is deceased.
- [ ] Inventor is under legal incapacity.
- [ ] Inventor cannot be found or reached after diligent effort, or
- [ ] Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- [x] An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

- [ ] An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name:	Date (Optional):
Leonard Bastien Bezinge	

Signature: /Bezinge/

APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

If the applicant is a juristic entity, list the applicant name and the title of the signer:

Applicant Name: Slyde Watch SA

Title of Person Executing This Substitute Statement: Heir of Inventor, Alex Bezinge

The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City	State	Country
Savièse		Switzerland

Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

Chemin de la Roua 52, 1965 Ormone

City	State	Zip	Country
Savièse			Switzerland

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.

Petitioner Samsung Ex-1004, 0334

Doc Code: Oath
Document Description: Oath or declaration filed

PTO/AIA/02 (07-13)
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SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)

Title of Invention	A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

This statement is directed to:

☐ The attached application,

OR

☒ United States application or PCT international application number PCT/EP2012/070273 filed on 10/12/2012.

LEGAL NAME of inventor to whom this substitute statement applies:

(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)

Alex BEZINGE

Residence (except for a deceased or legally incapacitated inventor):

City	State	Country

Mailing Address (except for a deceased or legally incapacitated inventor):

City	State	Zip	Country

I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.

The above-identified application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Relationship to the inventor to whom this substitute statement applies:

☒ Legal Representative (for deceased or legally incapacitated inventor only),

☐ Assignee,

☐ Person to whom the inventor is under an obligation to assign,

☐ Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or

☐ Joint Inventor.

143297.00101/36384583v.1

Petitioner Samsung Ex-1004, 0335

PTO/AIA/02 (07-13)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- [X] Inventor is deceased,
- [ ] Inventor is under legal incapacity,
- [ ] Inventor cannot be found or reached after diligent effort, or
- [ ] Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- [X] An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

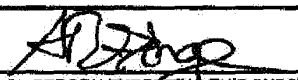
- [ ] An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

WARNING:

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PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name:	Date (Optional):
Alois Nathan Bezinge	

Signature: 

APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

If the applicant is a juristic entity, list the applicant name and the title of the signer:

Applicant Name: Slyde Watch SA

Title of Person Executing This Substitute Statement: Heir of inventor, Alex Bezinge

The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City	State	Country
Saviese		Switzerland

Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

Chemin de la Roua 52, 1965 Ormone

City	State	Zip	Country
Saviese			Switzerland

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.

Petitioner Samsung Ex-1004, 0336

Electronic Patent Application Fee Transmittal

Application Number:	14352727
Filing Date:	18-Apr-2014
Title of Invention:	METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE
First Named Inventor/Applicant Name:	Alex Bezinge
Filer:	Peter S. Weissman/LaRon Kelly
Attorney Docket Number:	143297-00101

Filed as Small Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Oath/Decl > 30 Mos From 371 commencement	2617	1	70	70
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
		Total in USD ($)		**70**

Electronic Acknowledgement Receipt

EFS ID:	19768839
Application Number:	14352727
International Application Number:	
Confirmation Number:	4023
Title of Invention:	METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE
First Named Inventor/Applicant Name:	Alex Bezinge
Customer Number:	27557
Filer:	Peter S. Weissman/LaRon Kelly
Filer Authorized By:	Peter S. Weissman
Attorney Docket Number:	143297-00101
Receipt Date:	04-AUG-2014
Filing Date:	18-APR-2014
Time Stamp:	17:03:07
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$70
RAM confirmation Number	3756
Deposit Account	232185
Authorized User	WEISSMAN, PETER S
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)	
Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)	
Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	143297_Trasmittal.pdf	392729 fcf5673dbe5ee8351c86451da64ef0660705536e	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	143297_Fee_Transmittal.pdf	579654 ea229296c68780cec4f879636b7e3f5cf4745be7	no	1
Warnings:					
Information:					
3	Applicant Response to Pre-Exam Formalities Notice	143297_ResponseToNotificationOfInsufficiency.pdf	343835 c394d5bde1ffdf2e32f76460aac6e664cda405dc	no	1
Warnings:					
Information:					
4	Oath or Declaration filed	143297_Executed_Declaration.pdf	4969071 af1c5575f5c80a51233159624eb39243975fb7f0	no	12
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	30545 5c81a860094900a4758990addebaec2148792efa	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	6315834		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/21 (07-09)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission

Application Number	14/352,727-Conf. #4023
Filing Date	April 18, 2014
First Named Inventor	Alex BEZINGE
Art Unit	2621
Examiner Name	Not Yet Assigned
Attorney Docket Number	143297.00101

ENCLOSURES (*Check all that apply*)

- [x] Fee Transmittal Form
  - [x] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [x] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) (please identify below):

  Declaration; Substitute Statements in Lieu of an Oath or Declaration (4)

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	BLANK ROME LLP		
Signature			
Printed name	Peter S. Weissman		
Date	August 04, 2014	Reg. No.	40,220

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: August 4, 2014

Signature: _____ (Peter S. Weissman)

Petitioner Samsung Ex-1004, 0342

PTO/SB/17 (03-13)
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FEE TRANSMITTAL

Complete if known	
Application Number	14/352,727-Conf. #4023
Filing Date	April 18, 2014
First Named Inventor	Alex BEZINGE
Examiner Name	Not Yet Assigned
Art Unit	2621
Practitioner Docket No.	143297.00101

[X] Applicant asserts small entity status. See 37 CFR 1.27
[ ] Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously

TOTAL AMOUNT OF PAYMENT ($) 70.00

METHOD OF PAYMENT (check all that apply)

[ ] Check [X] Credit Card [ ] Money Order [ ] None [ ] Other (please identify): _____

[X] Deposit Account Deposit Account Number: 23-2185 Deposit Account Name: Blank Rome LLP

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

[ ] Charge fee(s) indicated below
[ ] Charge fee(s) indicated below, **except for the filing fee**
[X] Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17
[X] Credit any overpayment of fee(s)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)

	FILING FEES			SEARCH FEES			EXAMINATION FEES			
Application Type	U ($)	S ($)	M ($)	U ($)	S ($)	M ($)	U ($)	S ($)	M ($)	Fees Paid ($)
Utility	280	140*	70	600	300	150	720	360	180	
Design	180	90	45	120	60	30	460	230	115	
Plant	180	90	45	380	190	95	580	290	145	
Reissue	280	140	70	600	300	150	2,160	1,080	540	
Provisional	260	130	65	0	0	0	0	0	0	

* The $140 small entity status filing fee for a utility application is further reduced to $70 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	Undiscounted Fee ($)	Small Entity Fee ($)	Micro Entity Fee ($)
Each claim over 20 (including Reissues)	80	40	20
Each independent claim over 3 (including Reissues)	420	210	105
Multiple dependent claims	780	390	195

Total Claims	Extra Claims	Fee ($)	Fee Paid ($)
_____ - or HP =	_____ x	_____ =	_____

HP = highest number of total claims paid for, if greater than 20.

Multiple Dependent Claims	
Fee ($)	Fee Paid ($)
_____	_____

Indep. Claims	Extra Claims	Fee ($)	Fee Paid ($)
_____ - or HP =	_____ x	_____ =	_____

HP = highest number of independent claims paid for, if greater than 3.

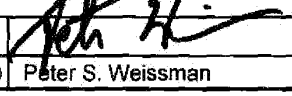
3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $400 ($200 for small entity) ($100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

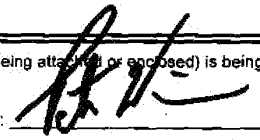
Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee ($)	Fee Paid ($)
_____ - 100 =	_____ /50 =	_____ (round up to a whole number) x	_____ =	_____

4. OTHER FEE(S)

	Fees Paid ($)
Non-English specification, $130 fee (no small or micro entity discount)	
Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small or micro entity)	
Other (e.g., late filing surcharge): 2617 Search fee, examination fee or oath or ...	70.00

SUBMITTED BY					
Signature		Registration No. (Attorney/Agent)	40,220	Telephone	(202) 772-5800
Name (Print/Type)	Peter S. Weissman			Date	August 4, 2014

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: August 4, 2014 Signature:  (Peter S. Weissman)

143297.00101/36383440v.1

Petitioner Samsung Ex-1004, 0343

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/352,727	04/18/2014	Alex BEZINGE	143297-00101

CONFIRMATION NO. 4023

27557
BLANK ROME LLP
WATERGATE
600 NEW HAMPSHIRE AVENUE, N.W.
WASHINGTON, DC 20037

PUBLICATION NOTICE



Title:METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

Publication No.US-2014-0253487-A1
Publication Date:09/11/2014

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Petitioner Samsung Ex-1004, 0344

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/352,727	04/18/2014	2621	810	BEZINGE-00101	17	3

CONFIRMATION NO. 4023

UPDATED FILING RECEIPT

27557
BLANK ROME LLP
WATERGATE
600 NEW HAMPSHIRE AVENUE, N.W.
WASHINGTON, DC 20037

OC000000072391269

Date Mailed: 12/18/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

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Applicant(s)

Slyde Watch SA, Luins, SWITZERLAND

Power of Attorney: The patent practitioners associated with Customer Number 27557

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/EP2012/070273 10/12/2012

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
SWITZERLAND 01689/11 10/18/2011

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 06/02/2014
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/352,727**
Projected Publication Date: Not Applicable
Non-Publication Request: No
Early Publication Request: No

Petitioner Samsung Ex-1004, 0345

**** SMALL ENTITY ****

Title

METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

Preliminary Class

345

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

Petitioner Samsung Ex-1004, 0346

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/352,727

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	140		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	240		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	17 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	740		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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U.S. APPLICATION NUMBER NO.	FIRST NAMED INVENTOR	ATTY. DOCKET NO.
14/352,727	Alex Bezinge	BEZINGE-00101

27557
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INTERNATIONAL APPLICATION NO.	
PCT/EP2012/070273	
I.A. FILING DATE	PRIORITY DATE
10/12/2012	10/18/2011

CONFIRMATION NO. 4023
371 ACCEPTANCE LETTER

OC0000000072391270

Date Mailed: 12/18/2014

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office, in its capacity as a Designated / Elected Office (37 CFR 1.495), has ACCEPTED the above identified international application for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above. A Filing Receipt will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE "FILING DATE or 371(c) DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1) and (c)(2) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN BELOW.** The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363)

04/18/2014
DATE OF RECEIPT OF 35 U.S.C.
371(c)(1) and (c)(2) REQUIREMENTS

The following items have been received:

- Indication of Small Entity Status
- Copy of the International Application filed on 04/18/2014
- Copy of the International Search Report filed on 04/18/2014
- Preliminary Amendments filed on 04/18/2014
- Information Disclosure Statements filed on 04/18/2014
- Inventor's Oath or Declaration filed on 08/04/2014
- U.S. Basic National Fees filed on 04/18/2014
- Substitute Specification filed on 04/18/2014
- Priority Documents filed on 04/18/2014
- Authorization to Permit Access filed on 04/18/2014
- Application Data Sheet (37 CFR 1.76) filed on 04/18/2014

Petitioner Samsung Ex-1004, 0349

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

VONDA M WALLACE

Telephone: (571) 272-3734

FORM PCT/DO/EO/903 (371 Acceptance Notice)

Petitioner Samsung Ex-1004, 0350

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/352,727	04/18/2014	Alex Bezinge	BEZINGE-00101	4023

27557 7590 08/14/2015

BLANK ROME LLP
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600 NEW HAMPSHIRE AVENUE, N.W.
WASHINGTON, DC 20037

EXAMINER	
ZHOU, HONG	

ART UNIT	PAPER NUMBER
2623	

NOTIFICATION DATE	DELIVERY MODE
08/14/2015	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Belay@blankrome.com
WashingtonDocketing@blankrome.com

Petitioner Samsung Ex-1004, 0351

Office Action Summary	Application No. 14/352,727	Applicant(s) BEZINGE ET AL.	
	Examiner HONG ZHOU	Art Unit 2623	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *4/18/2014*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-5,7-11 and 13-19* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-5, 7-11 and 13-19* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *4/18/2014* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☒ All b)☐ Some** c)☐ None of the:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *4/18/2014*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

Petitioner Samsung Ex-1004, 0352

DETAILED ACTION

1. The present application is being examined under the pre-AIA first to invent provisions.

Priority

2. Receipt is acknowledged of certified copies of papers required by 37 CFR 1.55.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on 4/18/2014 is being considered by the examiner.

Preliminary Amendment

4. Applicant's Preliminary amendment filed on April 18, 2014 has been entered. Claims 1, 3-5, 7-11, 13-17 have been amended. Claims 6 and 12 have been cancelled. Claims 18-19 have been added. Claims 1-5, 7-11 and 13-19 are pending in this application.

Claim Objections

5. Claims 1-4, 9, 15 and 19 are objected to because of the following informalities:

Regarding claim 1, the limitations "the frequency", "the direction", and "the slope" should be changed to read ---a frequency---, ---a direction---, and ---a slope---.

Regarding claim 2, the limitation "the duration" should be changed to read ---a duration---.

Regarding claim 3, the limitation "the amplitude" should be changed to read ---an amplitude—

Petitioner Samsung Ex-1004, 0353

Regarding claim 4, the limitation "the duration" should be changed to read --- a duration---.

Regarding claim 15, the limitation "the method of claim 141" and "the orientation", should be changed to read ---the method of claim 14--- and ---an orientation---.

Regarding claim 9, the limitation "a step of at partially waking up" should be changed to read ---a step of partially waking up---.

Regarding claim 19, the limitation "the method of claim 14" should be changed to read ---the method of claim 18---.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-3, 5, 8, 11, 13-14 and 16 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over HYSEK et al. (WO 2011000893, the examiner is using US 2012/0092383 which is equivalent of WO 2011000893) in view of Holbein et al. (US 2011/0080349), and further in view of Fattah (US 2009/0085865).

Regarding claim 1, HYSEK discloses a method for switching a wristwatch from a first power mode to a second power mode (see Fig. 1; [0051]), comprising:

using an accelerometer for generating an acceleration signal (see [0107]);

waking up a display upon detection of a gesture on a cover glass of said wristwatch ([0051], e.g., switching from a stand-by mode to a time reading mode in response to a tap or double tap on a cover glass 3 or touch screen of said wristwatch), and

detecting a gesture based at least on signals from a touch panel underneath said cover glass (see [0056], [0071], [0073], detecting a tap, double tap or a scrolling gesture using a touch panel).

HYSEK does not disclose the method combining gesture detection by the accelerometer and the gesture detection with the touch panel for switching the wristwatch from the first power mode to the second power mode, the method comprising:

using the accelerometer with embedded signal processing capabilities for generating the acceleration signal for detecting the gesture on the cover glass of said wristwatch;

discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal, and/or the slope of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer,

waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer,

using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from the touch panel.

Holbein discloses a method combining gesture detection by an accelerometer and gesture detection with the touch panel for switching a portable electronic device from a first power mode to a second power mode (Figs 1 and 11), the method comprising:

using an accelerometer with embedded signal processing capabilities for generating an acceleration signal for detecting a gesture on a touch sensitive display of the device ([0083]-[0086], e.g., the accelerometer 136 with a built-in controller can be used to generate an acceleration signal for detecting a gesture);

discriminating between gesture and no gesture based on the acceleration signal as measured by said accelerometer (e.g., discriminating a tap gesture by comparing the acceleration signal with a tap detect threshold);

waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer (Figs. 1 and 11; [0102], e.g., waking up a controller 116 of a touch-sensitive display 118 when a tap gesture is detected by the accelerometer 136),

using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from the touch panel (see [0096], [0102], [0104]-[0105], e.g., when the touch sensitive display indicates a screen press or click has occurred, a processor 102 wakes up from a sleep mode to a full power mode).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Holbein in the invention of HYSEK for combining gesture detection by an accelerometer and gesture detection with a touch panel in order to verify potential wakeup events and to reduce false wakeups (see [0104]-[0105] of Holbein).

HYSEK in view of Holbein does not disclose discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal, and/or the slope of said acceleration signal as measured by a three dimensional accelerometer.

Fattah discloses a method for detecting a gesture on an electronic device (Fig. 1; [0018]), the method comprising: using an accelerometer for generating an acceleration signal used for detecting the gesture on the electronic device; and discriminating between gesture and no gesture based on a direction of the acceleration signal as measured by a three dimensional accelerometer (see Fig. 3; [0022], [0025], e.g., detecting a tap gesture based on a direction of the acceleration signal).

It would have been obvious to one of ordinary in the art at the time of the invention to use the teachings of Fattah in the invention of HYSEKin view of Holbein to provide an accelerometer that can measure acceleration in all three directions so that a direction of an acceleration signal can be used to detect a tap gesture on a housing of a device.

Regarding claim 2, HYSEKin view of Holbein and Fattah further discloses the method of claim 1. Fattah further discloses wherein the discrimination between gesture and no gesture is also based on the duration of said acceleration signal (see [0063] of Holbein, e.g., a predetermined duration for a press and hold action is set to be longer than that of a typical tap event such as, for example, approximately 100 milliseconds).

Regarding claim 3, HYSEKin view of Holbein and Fattah discloses the method of claim 2. Fattah further discloses wherein the discrimination between gesture and no gesture is also based on the amplitude of said acceleration signal (see [0031] of Fattah).

Regarding claim 5, HYSEKin view of Holbein and Fattah further discloses the method of claim 1, said step of discriminating between gesture and no gesture comprises determining said direction and determining that there is a tap gesture if said direction is substantially perpendicular to said cover glass (see Figs. 2-3; [0025] of Fattah, e.g., tap gesture in the Z direction or directly on the face of the device can be identified).

HYSEKin view of Holbein and Fattah does not specifically disclose determining that there is no gesture if said direction is not substantially perpendicular to said cover glass.

However, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the invention of HYSEKin view of Holbein and Fattah for detecting a Z direction tap so that a user can perform a wake up gesture by tapping the wristwatch directly on the cover glass.

Regarding claim 8, HYSEKin view of Holbein and Fattah further discloses the method of claim 1, wherein discrimination between gesture and no gesture depends on the duration between a detection signal from said accelerometer and a detection signal with said touch panel (see [0020], [0063], [0104] of Holbein, e.g., causing the portable electronic device to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of inertial event).

Regarding claim 11, HYSEKin view of Holbein and Fattah further discloses the method of claim 1, comprising a step of waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer and with said touch panel (see [0102] of Holbein, e.g., the

processor 102 wakes up from a sleep mode and returns to a full power mode when the tap gesture is detected by the accelerometer and the touch panel).

Regarding claim 13, HYSEK in view of Holbein and Fattah further discloses the method of claim 1, said gesture being a tap or a double tap (see [0051] of HYSEK and [0083] and [0085] of Holbein).

Regarding claim 14, Holbein further discloses detecting a tilt left movement or tilt right movement with the accelerometer and switching a device from a sleep mode to a full power mode when the tile left movement or tilt right movement has been detected (see [0083]-[0084], the accelerometer 136 is used to detect an inertial event by detecting a predetermined movement performed by moving the device 100 and the predetermined movement used to cause the device to wake up from a sleep mode and return to a full power mode includes a horizontal and vertical tilt movements, a left tilt movement, a right tilt movement, a up tilt movement and a down tilt movement).

It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the invention of HYSEK in view of Holbein and Fattah for detecting left tilt movement or right tilt movement of a wristwatch so that a user can switch a wristwatch from a first power to a second power mode by turning a wrist.

Regarding claim 16, HYSEK discloses a wristwatch which can be operated in a plurality of power modes including a first power mode and a second power mode (see Fig. 1; [0051]), comprising:

a display ([0054], display 4);

a touch panel underneath a cover glass of said wristwatch for detecting a gesture on said cover glass ([0056], [0071], [0073], touch panel underneath a cover glass 3 is configured to detect a gesture on the cover glass 3); and an accelerometer bring arranged for generating an acceleration signal ([0107]).

HYSEK does not disclose using the accelerometer with embedded signal processing capabilities for generating the acceleration signal and for discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and/or the slope of said acceleration signal, and switching a microcontroller to said second power mode upon gesture detection by said accelerometer and for discriminating between gesture and no gesture at least on signals from said touch panel.

Holbein discloses a method for switching a portable electronic device from a first power mode to a second power mode (Figs 1 and 11), the method comprising:

using an accelerometer with embedded signal processing capabilities for generating an acceleration signal for detecting a gesture on a touch sensitive display of the device ([0083]-[0086], e.g., the accelerometer 136 with a built-in controller can be used to generate an acceleration signal for detecting a gesture);

discriminating between gesture and no gesture based on the acceleration signal as measured by said accelerometer (e.g., discriminating a tap gesture by comparing the acceleration signal with a tap detect threshold);

switching a microcontroller to the second power mode upon detection of a gesture by said accelerometer (Figs. 1 and 11; [0102], e.g., waking up a controller 116 of a touch-sensitive display 118 when a tap gesture is detected by the accelerometer 136),

using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from the touch panel (see [0096], [0102], [0104]-[0105], e.g., when the touch sensitive display indicates a screen press or click has occurred, a processor 102 wakes up from a sleep mode to a full power mode).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Holbein in the invention of HYSEK for combining gesture detection by an accelerometer and gesture detection with a touch panel in order to verify potential wakeup events and to reduce false wakeups (see [0104]-[0105] of Holbein).

HYSEK in view of Holbein does not disclose discriminating between gesture and no gesture based on the frequency of said acceleration signal, and/or the direction of said acceleration signal, and/or the slope of said acceleration signal as measured by a three dimensional accelerometer.

Fattah discloses a method for detecting a gesture on an electronic device (Fig. 1; [0018]), the method comprising: using an accelerometer for generating an acceleration signal used for detecting the gesture on the electronic device; and discriminating between gesture and no gesture based on a direction of the acceleration signal as measured by a three dimensional accelerometer

(see Fig. 3; [0022], [0025], e.g., detecting a tap gesture based on a direction of the acceleration signal).

It would have been obvious to one of ordinary in the art at the time of the invention to use the teachings of Fattah in the invention of HYSEKin view of Holbein to provide an accelerometer that can measure acceleration in all three directions so that a direction of an acceleration signal can be used to detect a tap gesture on a housing of a device.

8. Claim 4 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over HYSEK et al. (WO 2011000893, the examiner is using US 2012/0092383 which is equivalent of WO 2011000893) in view of Holbein et al. (US 2011/0080349) and Fattah (US 2009/0085865), and further in view of Verplaetse et al. (US 2002/0167699).

Regarding claim 4, HYSEKin view of Holbein and Fattah does not disclose the method of claim 1, said step of discriminating between gesture and no gesture comprises determining said frequency and determining that there is no gesture if said frequency is not in a predetermined frequency range compatible with a tap.

Verplaetse discloses a motion-input device comprising a processor for discriminating between gesture and no gesture based on a frequency of an acceleration signal measured by an accelerometer and determining that there is no gesture if the frequency is not in a predetermined frequency range compatible with a tap. (Figs. 4, 8c, 9c; [0016]-[0017], [0056]-[0058], e.g., distinguishing between a tap command on device 54 and a position command of device 54 by comparing an acceleration signal with a predetermined frequency range).

It would have been obvious to one of ordinary in the art at the time of the invention to use the teachings of Verplaetse in the invention of HYSEKin view of Holbein and Fattah in order to distinguish between tap commands and position commands when a predetermined threshold frequency is greater than or equal to 5 Hz.

9. Claims 7, 9-10 and 17 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over HYSEK et al. (WO 2011000893, the examiner is using US 2012/0092383 which is equivalent of WO 2011000893) in view of Holbein et al. (US 2011/0080349) and Fattah (US 20090085865), and further in view of Nurmi et al. (US 2010/0265209).

Regarding claim 7, HYSEKin view of Holbein and Fattah further discloses the method of claim 1, wherein said touch panel comprises a plurality of touch areas (see Fig. 1A and [0056] of HYSEK, e.g., the touch panel 3 comprises a plurality of touch electrodes for detecting movements of the finger in vertical or horizontal direction), said method comprising a step of applying a power supply sufficient for detecting a gesture to said touch areas ([0102], e.g., when the touch-sensitive display is reactivated, the touch-sensitive display is powered up).

HYSEKin view of Holbein and Fattah does not disclose activating and powering only a first subset of the touch-sensitive display for detecting the gesture.

Nurmi discloses a method for reducing a power consumption of a touch screen comprising activating only a subset of a touch screen for detecting a gesture in a power saving mode [0010]-[0011], e.g., in a sleep mode or power mode, only a small area within the whole touch screen is activated and powered up for detecting a touch gesture).

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It would have been obvious to one of ordinary in the art at the time of the invention to use the teachings of Nurmi in the invention of HYSEKin view of Holbein for activating and powering only a subset of a touch panel for detecting a gesture because activating only a subset of a touch panel can use less power than activating the whole touch panel.

Regarding claim 9, HYSEKin view of Holbein and Fattah further discloses the method of claim 1, wherein said accelerometer is powered on when said wristwatch is in said first power mode (see [0093] of Holbein), said method comprising a step of at waking up said touch panel upon detection of a gesture by said accelerometer (see [0102] of Holbein, waking up the touch sensitive display upon detection of a gesture by the accelerometer).

HYSEKin view of Holbein and Fattah does not disclose partially waking up the touch panel.

Nurmi discloses a method for reducing a power consumption of a touch screen comprising activating only a subset of a touch screen for detecting a gesture in a power saving mode [0010]-[0011], e.g., in a sleep mode or power mode, only a small area within the whole touch screen is activated for detecting a touch gesture).

It would have been obvious to one of ordinary in the art at the time of the invention to use the teachings of Nurmi in the invention of HYSEKin view of Holbein for activating only a subset of a touch panel for detecting a gesture because activating only a subset of a touch panel can use less power than activating the whole touch panel.

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Regarding claim 10, HYSEKin view of Holbein, Fattah and Nurmi discloses the method of claim 7, comprising a step of waking up only a subset of the completed area of said touch panel upon detection of a gesture by said accelerometer (see [0102] of Holbein and [0010] of Nurmi).

Regarding claim 17, HYSEKin view of Holbein and Fattah discloses the wristwatch of claim 16, wherein said touch panel comprises a plurality of touch areas and powering means arranged for powering a larger subset of the touch panel upon detection of a gesture by said accelerometer and in said second power mode (see [0102] of Holbein).

HYSEKin view of Holbein and Fattah does not disclose powering only a first subset of said touch area.

Nurmi discloses a method for reducing a power consumption of a touch screen comprising activating only a subset of a touch screen for detecting a gesture in a power saving mode [0010]-[0011], e.g., in a sleep mode or power mode, only a small area within the whole touch screen is activated for detecting a touch gesture).

It would have been obvious to one of ordinary in the art at the time of the invention to use the teachings of Nurmi in the invention of HYSEKin view of Holbein for activating and powering only a subset of a touch panel for detecting a gesture because activating only a subset of a touch panel can use less power than activating the whole touch panel.

10. Claims 15 and 19 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over HYSEK et al. (WO 2011000893, the examiner is using US 2012/0092383 which is

equivalent of WO 2011000893) in view of Holbein et al. (US 2011/0080349) and Fattah (US 2009/0085865), and further in view of Gritton et al. (US 2007/0176896).

Regarding claims 15 and 19, HYSEKin view of Holbein and Fattah further discloses the method of claim 14, said step of detecting a wristturn comprising: detecting that the orientation of the wristwatch is in a first range; detecting that the orientation of the wristwatch is then in a second range, different from said first range ([0084] of Holbein, e.g., detecting a horizontal tilt movement and a vertical tilt movement of the device).

HYSEKin view of Holbein and Fattah does not disclose said step of detecting the wristturn comprising detecting that the wristwatch remains substantially immobile during a predetermined duration.

Gritton discloses a 3D pointing device which is configured to perform a calibration process to correct accelerometer output errors, wherein the calibration of the accelerometer output uses inputs from a stationary detection function which can operate to detect that the 3D pointing device remains substantially immobile during a predetermined duration (see [0028]-[0030], e.g., a preset time period such as ½ seconds).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Gritton in the invention of HYSEKin view of Holbein and Fattah for detecting that a wristwatch remains stationary for a predetermined duration so that the wristwatch can perform a calibration process to correct accelerometer output errors.

11. Claim 18 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Fattah (US 20090085865) in view of Holbein et al. (US 2011/0080349).

Regarding claim 18, Fattah discloses a method for switching a wristwatch from a first power mode to a second power mode (see Figs 1 and 10; [0048]-[0049], switching a wristwatch 20 from a low power mode to a second power mode), comprising: using an accelerometer for detecting a tap gesture (Fig. 1, [0028], accelerometer 24 is used to detect a tap gesture), and switching said wristwatch from said first power mode to said second power mode when a tap gesture has been detected (see [0048]-[0049]).

Fattah does not disclose switching the wristwatch from the first power mode to the second power mode when a wristturn has been detected.

Holbein discloses a method for switching an electronic device from a first power mode to a second power mode, comprising: using an accelerometer for detecting a left or right tilt movement of the electronic device and switching the electronic device from a first power mode to a second power mode when a tilt left or tilt right movement of the electronic device has been detected (Fig. 9; [0083]-[0084], e.g., switching from a sleep mode to a full power mode by detecting a tilt left or tilt right movement of the electronic device).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Holbein in the invention of Fattah for detecting a tilt left movement or tilt right movement of a wristwatch so that a user can switch a wristwatch from a first power to a second power mode by turning a wrist.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sharkey (US 8,230,246) discloses a mobile device that switches from a first power mode to a second power mode based on a gesture detected by a touch sensor and an accelerometer.

Milne et al. (US 2011/0109540) discloses an CE device configured to discriminate between gesture and no gesture based on a direction of an acceleration signal as measured by a three dimensional accelerometer.

Chang (US 2012/0062470) a method for managing power usage of an electronic device comprising powering on a module upon detection of a touch at the device by an accelerometer.

Lazaridis et al (US 2012/0154303) discloses a display device configured to switch from a low power mode to a full power mode by scanning only a designated area of a touch sensitive display to detect a designated wake-up gesture.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HONG ZHOU whose telephone number is (571)270-5372. The examiner can normally be reached on Monday through Friday 8:30 A.M. - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amare Mengistu can be reached on (571)272-7674. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/HONG ZHOU/
Primary Examiner, Art Unit 2623

Notice of References Cited	Application/Control No. 14/352,727	Applicant(s)/Patent Under Reexamination BEZINGE ET AL.	
	Examiner HONG ZHOU	Art Unit 2623	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2002/0167699 A1	11-2002	Verplaetse et al.	359/158
*	B	US-2007/0176896 A1	08-2007	Gritton et al.	345/157
*	C	US-2009/0085865 A1	04-2009	FATTAH, Eric Abdel	345/156
*	D	US-2010/0265209 A1	10-2010	Nurmi et al.	345/174
*	E	US-2011/0080349 A1	04-2011	HOLBEIN et al.	345/173
*	F	US-2011/0109540 A1	05-2011	MILNE et al.	345/156
*	G	US-2012/0062470 A1	03-2012	CHANG, Ray L.	345/173
*	H	US-2012/0154303 A1	06-2012	Lazaridis et al.	345/173
*	I	US-8,230,246 B1	07-2012	Sharkey, Jeffrey Allen	713/320
	J	US-			
	K	US-			
	L	US-			
	M	US-			

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14352727	BEZINGE ET AL.
	Examiner	Art Unit
	HONG ZHOU	2623

CPC- SEARCHED		
Symbol	Date	Examiner
G06F3/014,G06F3/0416, G06F3/017, G06F3/0488, G06F1/3262, G06F1/1613, G06F1/3203, G06F3/041, G06F3/0488	6/4/15 & 8/10/15	HZ

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
345	156-173	6/4/15-8/9/15	HZ
713	320-323	6/4/15	HZ
715	863	6/5/15	HZ

SEARCH NOTES		
Search Notes	Date	Examiner
East Search	6/4/15-8/10/15	HZ

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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PTO/SB/08a (07-09)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	Not Yet Assigned 14352727 - GAU: 2623
Filing Date	04/18/2014
First Named Inventor	Alex BEZINGE
Art Unit	N/A
Examiner Name	Not Yet Assigned
Attorney Docket Number	BEZINGE.00101

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A*	US-2009199130	08-06-2009	Tsern et al.	
	B*	US-2002118605	08-29-2002	Born et al.	
	C*	US-2009102669	04-23-2009	LIN	
	D*	US-2010235667	09-16-2010	Mucignat et al.	
	E*	US-2012092383	04-19-2012	HYSEK et al.	

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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	F	EP-1324159-A1	07-02-2003	Asulab Sa [ch]		√
	G	WO-09120292-A2	10-01-2009	Lee, Shu		
	H	WO-11000893-A1	01-06-2011	Hysek, Joerg et al.		√
	I	EP-2315101-A1	04-27-2011	Research In Motion Ltd [ca]		
	J	EP-1785808-A1	05-16-2007	Research In Motion Ltd [ca]		

Examiner Signature	/Hong Zhou/	Date Considered	07/31/2015

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Dated: April 18, 2014 Electronic Signature for Peter S. Weissman: /Peter S. Weissman/

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 2 of 2

Complete if Known	14352727 - GAU: 2623
Application Number	Not Yet Assigned
Filing Date	04/18/2014
First Named Inventor	Alex BEZINGE
Art Unit	N/A
Examiner Name	Not Yet Assigned
Attorney Docket Number	BEZINGE.00101

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	K	K. TUCK et al., "MMA8450Q Single/Double and Directional Tap Detection," Freescale Semiconductor, Inc., 2010, 16 pages.	
	L	BMA180 Digital, Triaxial Accleration Sensor," Data Sheet, Bosch Sensortec, Dec. 10, 2009, pp 1-69.	

Examiner Signature	/Hong Zhou/	Date Considered	07/31/2015

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"14352727"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/10 08:00
L2	130	(accelerometer$1 and ((idle or sleep or power) adj mode)) and wristwatch AND ((G06F1/3203 OR G06F3/017 OR G06F3/041 OR G06F3/014).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/10 08:12
L3	71	accelerometer$1 and (((idle or sleep or power) adj mode) same (tilt or turn or rotation)) AND ((G06F1/3203 OR G06F3/017 OR G06F3/041 OR G06F3/014).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/10 08:14
S3	40	"2315101"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 13:52
S5	2	("20100235667").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 13:55
S6	31094	(345/173).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 13:56
S7	2	(wristwatch same (power adj mode)) and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 13:56
S8	2	(wristwatch same (sleep$3 adj mode))	US-PGPUB;	OR	OFF	2015/06/04

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		and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			13:57
S11	36	((wristwatch or wrist-watch or watch) with power) and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 13:58
S12	13	("20010055244" | "20030214885" | "20050278757" | "20080186808" | "20120092383" | "6097390" | "6308061" | "6601988" | "6714486" | "7274375" | "7751285" | "7859947").PN. OR ("8588033").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/04 14:01
S15	43	("20020118605" | "20040113819" | "20060170649" | "20090059730" | "20090196124" | "20090199130" | "20090280861" | "20090322725" | "20100112964" | "4048796" | "4059956" | "4064688" | "4090353" | "4120148" | "4228534" | "4255802" | "4257117" | "4322833" | "5088070" | "5453960" | "5790698" | "5812498" | "6052339" | "6184871" | "6246394" | "6463011" | "6570443" | "6603708" | "6816440" | "6868046" | "6882596" | "6967903" | "7031226" | "7031228" | "7042809" | "7167689" | "7286063" | "7420881" | "7428191" | "7507929" | "7712954" | "7778118" | "7932893").PN. OR ("8824245").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/04 14:20
S19	327	(wristwatch or wrist-watch) same (sleep$3 or power) same mode$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 14:28
S20	26	("20050221790" | "20060014516" | "20070142098" | "20070184809" | "20070184870" | "20080266698" | "20100052925" | "20110009144" | "20120044542" | "20120301145" | "5359594" | "5461266" | "5586333" | "5637932" | "6263200" | "7050838" | "7062302" | "7194248" | "7224937" | "7283851" | "7685606" | "7856526" | "7920504" | "7937100" | "8135427" | "8164467").PN. OR ("8594720").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/04 14:29
S21	2	(wristwatch or wrist-watch) same gesture$1 same touchscreen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 14:33
S22	52	(wristwatch or wrist-watch) same	US-PGPUB;	OR	OFF	2015/06/04

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		touchscreen	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			14:33
S23	14	(wristwatch or wrist-watch) same tap	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 14:35
S25	337	(wristwatch or wrist-watch) same ((sav$3 or reduc$3) near5 power)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 14:37
S26	5	((wristwatch or wrist-watch) same ((sav$3 or reduc$3) near5 power)) and accelerometer	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 14:38
S28	281	(wristwatch or wrist-watch) same accelerometer	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 14:39
S29	14613	(713/320-323).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 14:45
S30	22	(wristwatch or wrist-watch) and S29	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 14:45
S31	45	(wristwatch or wrist-watch) same (sleep$3 adj (mode or state))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 14:54
S32	12	(tap$4 with (sleep$3 adj (mode or state))) and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2015/06/04 14:58

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			IBM_TDB			
S33	28	(gesture$1 with (sleep$3 adj (mode or state))) and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 15:01
S34	19	("20020036617" | "20020054013" | "20070259716" | "20080080789" | "5543591" | "5880411" | "6084572" | "6243075" | "6649905" | "6750852" | "6900793" | "6982700" | "7023536" | "7096454" | "7136710" | "7156773" | "7656393" | "7859519").PN. OR ("8159455").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/04 15:07
S35	40	"2315101"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 15:10
S36	2	(gesture$1 same accelerometer same touchscreen) and (sleep$3 adj (mode or state)) and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 15:13
S37	30	(gesture$1 same accelerometer same touchscreen) and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 15:13
S40	1	((wristwatch or (wrist adj watch)) same gesture$1 same sleep$3) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 15:23
S41	4	((wristwatch or (wrist adj watch)) same sleep$3) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 15:23
S42	254	(gesture$1 same sleep$3) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/04 15:24
S43	150	(tap$4 with (sleep$3 adj (mode or state)))	US-PGPUB; USPAT; USOCR;	OR	OFF	2015/06/05 08:47

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			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S45	31094	(345/173).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 08:50
S46	17	(tap$4 with power with (mode or state)) and S45	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 08:50
S48	38	(accelerometer same (touchscreen or (touch adj screen) or (touch adj panel)) same (power or sleep$3)) and S45	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 09:02
S49	4391	(715/863).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 09:02
S50	105	(accelerometer same (touchscreen or (touch adj screen) or (touch adj panel)) same gesture$1) and (S45 or S49)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 09:12
S52	16	(combin$3 same accelerometer same (touchscreen or (touch adj screen) or (touch adj panel)) same gesture$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 09:25
S53	3	(combin$3 same (motion adj sensor) same (touchscreen or (touch adj screen) or (touch adj panel)) same gesture$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 09:26
S54	482	(gesture$1 with accelerometer with (touchscreen or (touch adj screen) or (touch adj panel)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 09:27
S55	8	("20050159221" | "20100081501" |	US-PGPUB;	OR	OFF	2015/06/05

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		"20100153848" | "20100331079" | "20110021275" | "20110053173" | "20110319173" | "8262482").PN. OR ("8506408").URPN.	USPAT; USOCR			09:34
S56	35	("20060017692" | "20070036347" | "5488354" | "6400814").PN. OR ("7671756").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/05 09:48
S59	367	(gesture$1 near10 (switch$3 or chang$3) near10 mode$1) and (touchscreen or (touch adj screen) or (touch adj panel)) and (S45 or S49)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 09:53
S60	363	S59 not S54	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 09:54
S61	38	(gesture$1 near10 (switch$3 or chang$3) near10 mode$1) and (touchscreen or (touch adj screen) or (touch adj panel)) and (S45 or S49) and (wristwatch or wrist)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 09:54
S62	158	(gesture$1 near10 (switch$3 or chang$3) near10 mode$1) and (touchscreen or (touch adj screen) or (touch adj panel)) and (wristwatch or wrist)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 09:58
S63	120	S62 not S61	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 09:58
S65	9	(power adj mode) same (wristwatch or (wrist adj watch))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 10:05
S70	54	((gesture$1 or tap$4) same ((motion adj (sensor or detector)) or accelerometer) same (wristwatch or (wrist adj watch)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 10:18
S71	24	("20030028784" | "20050179553" | "20060101281" | "20070259716" | "20070259717" | "20080170776" | "20090284344" | "20100295781" | "5097252" | "5559961" | "5757360" |	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/05 10:20

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		"5821933" | "6192478" | "6421453" | "6681031" | "6747632" | "6950534" | "6993157" | "7000200" | "7158038" | "7173604" | "7180500" | "7240367" | "7636855").PN. OR ("8516561").URPN.				
S72	353	((recognition or identif$4) same gesture$1 same ((motion adj (sensor or detector)) or accelerometer) same (touchscreen or (touch adj screen) or (touch adj panel)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 10:22
S73	102	(gesture$1 same ((motion adj (sensor or detector)) or accelerometer) same ((sleep$3 or power) near10 (state or mode)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 10:28
S74	48	(gesture$1 same ((motion adj (sensor or detector)) or accelerometer) same (idle or sleep$3 or power)) and (S45 or S49)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 10:45
S75	19	("20020036617" | "20020054013" | "20070259716" | "20080080789" | "5543591" | "5880411" | "6084572" | "6243075" | "6649905" | "6750852" | "6900793" | "6982700" | "7023536" | "7096454" | "7136710" | "7156773" | "7656393" | "7859519").PN. OR ("8159455").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/05 10:50
S76	16	(tap$4 same ((motion adj (sensor or detector)) or accelerometer) same (idle or sleep$3 or power)) and (S45 or S49)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 10:52
S77	41	"2011000893"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 11:01
S78	43	("20020118605" | "20040113819" | "20060170649" | "20090059730" | "20090196124" | "20090199130" | "20090280861" | "20090322725" | "20100112964" | "4048796" | "4059956" | "4064688" | "4090353" | "4120148" | "4228534" | "4255802" | "4257117" | "4322833" | "5088070" | "5453960" | "5790698" | "5812498" | "6052339" | "6184871" | "6246394" | "6463011" | "6570443" | "6603708" | "6816440" | "6868046" | "6882596" | "6967903" | "7031226" | "7031228" | "7042809" | "7167689" | "7286063" |	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/05 11:10

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		"7420881" | "7428191" | "7507929" | "7712954" | "7778118" | "7932893").PN. OR ("8824245").URPN.				
S79	25	("20050001821" | "20060139320" | "5453960" | "5559761" | "6052339" | "6356512" | "6542120" | "6556222" | "6837827" | "6868046" | "6914564" | "6990047" | "7046230" | "7081905" | "7428191").PN. OR ("7778118").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/05 11:15
S80	7	"11000893"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 11:22
S82	5	("2012092383").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 11:29
S83	3	("20120092383").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/06/05 11:29
S84	1	"14352727"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/07/31 11:10
S88	3	("20120092383").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/07/31 11:15
S89	3	("20120062470").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/07/31 11:25
S90	40	"2315101"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/07/31 12:30
S91	65	("20140380249" | "8811719" | "20090085865" | "20080100572" | "20120257035" | "20060210958" |	US-PGPUB; USPAT; USOCR;	OR	OFF	2015/07/31 15:14

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		"20120249587" | "20070130547" | "7519223" | "20100283624" | "20110125929" | "20140111415" | "8743089" | "20130162527" | "20120113241" | "20110109540" | "20140191963" | "8312479" | "8351979" | "20150195474" | "20120278712" | "20150130743" | "20120242584" | "20140152537").PN.	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S92	30	("20060210958" | "20090085865" | "20100283624" | "20110109540" | "20110125929" | "20120242584" | "20120249587" | "20130162527" | "20140111415" | "20140152537" | "20140191963" | "20150130743" | "20150195474").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/07/31 15:19
S93	1	accelerometer and (tap$4 with acceleration with signal with (frequency or duration or direction or amplitude)) and (345/156-158).ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/07/31 16:38
S94	23837	(345/156-158).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/07/31 17:11
S95	9	((wrist adj turn$3) or wristturn) and S94	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/07/31 17:12
S96	4	(detect$3 near5 (wrist adj turn$3) or wristturn)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/07/31 17:13
S98	1	"14352727"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/08 12:31
S99	3	("20120092383").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/08 12:32
S100	3	("20090085865").PN.	US-PGPUB; USPAT; USOCR;	OR	OFF	2015/08/09 09:23

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			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S101	40	"2315101"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 09:24
S104	55	holbein with edward	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 09:39
S105	32040	(345/173).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 10:27
S107	15	((subset near10 (touch or electrode$1)) with power$3) and S105	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 10:27
S108	1	(subset near10 (touch or electrode$1)) and (Bezinge with Alex)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 10:31
S110	195	(power$3 with (subset near10 (touch or electrode$1)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 10:32
S111	3	(power$3 with (subset near10 (touch adj area)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 10:32
S112	4	((subset near10 electrode$1) with power$3) and S105	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 10:44
S113	4	(power$3 with (subset near10	US-PGPUB;	OR	OFF	2015/08/09

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		electrode$1)) and S105	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			10:44
S114	13	(power$3 with (subset near10 touch$3)) and S105	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 10:45
S115	2	"13221359"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 10:48
S116	3	((activat$3 with (subset near10 (electrode$1 or touch$3))) same power) and S105	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 11:13
S117	3	((activat$3 with subset with touch$3) same power) and S105	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 11:19
S118	5	((activat$3 with subset with touch$3) same power)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 11:20
S119	112	((subset with touch$3) same power)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 11:21
S120	2	("20120191993").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 11:40
S121	9	(wak$3 with subset with touch$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2015/08/09 11:42

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			IBM_TDB			
S122	29	((wak$3 or activt$3) with only with touch$3) and S105	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 11:44
S123	64599	(345/156-173).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 15:33
S124	1191	(tap$4 same (frequency$3 or amplitude$1 or duration$1 or slope$1)) and S123	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 15:34
S125	357	(tap$4 same (frequency$3 or amplitude$1 or duration$1 or slope$1)) and S123 and accelerometer$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 15:34
S126	63	(tap$4 with frequenc$4) and S123 and accelerometer$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 15:55
S127	59	(tap$4 with (frequenc$4 adj range$1)) and accelerometer$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 16:03
S128	268	(tap$4 with direction) and S123 and accelerometer$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 17:29
S129	41	(power$3 with (partial or subset) with touch$3) and S123	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 18:22
S130	187	(power$3 with (partial or subset) with touch$3)	US-PGPUB; USPAT; USOCR; FPRS;	OR	OFF	2015/08/09 18:28

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			EPO; JPO; DERWENT; IBM_TDB			
S131	26	(supply$3 with power$3 with (partial or subset) with touch$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 18:28
S132	28	(power$3 with scan$4 with (partial or subset) with touch$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 18:29
S133	4947	(power$3 with touch$3) and S123	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 18:34
S134	1168	((apply$3 or supply$3) with power$3 with touch$3) and S123	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 18:34
S135	1102	(supply$3 with power$3 with touch$3) and S123	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 18:34
S136	58	(supply$3 with power$3 with touch$3 with mode) and S123	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 18:35
S137	576	((sens$3 or detect$3) with (partial or subset) with touch$3) and S123	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 18:37
S138	626	((apply$3 or supply$3) with power$3 with touch$3) same (reduc$3 near5 power)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 18:40
S139	254	(activat$3 with touch$3) same (reduc$3 near5 power)	US-PGPUB; USPAT;	OR	OFF	2015/08/09 18:42

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			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S140	12	((apply$3 or supply$3) with power$3 with area with touch$3) same (reduc$3 near5 power)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 18:51
S141	387	(power$3 with area with touch$3) and S123	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 18:51
S142	6	(power$3 with (complet$3 or whole) with area with touch$3) and S123	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 19:01
S143	6	(power$3 with (complete$3 or whole) with area with touch$3) and S123	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 19:02
S144	42	(power$3 with (complete$3 or whole) with area with touch$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 19:02
S145	64599	(345/156-173).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 22:04
S152	474	accelerometer$1 same orientation same (wak$3 or sleep$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 22:12
S153	14	S152 and S145	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 22:13

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S154	5	accelerometer$1 and (clockwise same movement$1 same (wak$3 or sleep$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 22:23
S155	33	accelerometer$1 and (tilt adj (left or right)) and S145	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 22:42
S156	3	("20110080349").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 22:48
S157	15	accelerometer$1 and ((tilt adj (left or right)) same remain$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 23:06
S160	32	accelerometer$1 and (remain$1 near10 predetermin$3 near10 (duration or period)) and S145	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 23:13
S161	1	accelerometer$1 and (remain$1 near10 (duration or period) near10 register$3) and S145	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 23:16
S162	15	(accelerometer$1 same (remain$1 near10 (duration or period))) and S145	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 23:16
S163	9	(accelerometer$1 same (stationary near10 (duration or period))) and S145	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/08/09 23:23
S164	2	("20090326857").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	OFF	2015/08/09 23:53

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			DERWENT; IBM_TDB			

EAST Search History (Interference)

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BIB DATA SHEET

CONFIRMATION NO. 4023

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/352,727	04/18/2014 RULE	345	2623	BEZINGE-00101

APPLICANTS
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**** CONTINUING DATA ***************************
This application is a 371 of PCT/EP2012/070273 10/12/2012

**** FOREIGN APPLICATIONS ***************************
SWITZERLAND 01689/11 10/18/2011

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
06/02/2014

Foreign Priority claimed	35 USC 119(a-d) conditions met	Verified and Acknowledged	Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☑ Yes ☐ No	☑ Yes ☐ No	/HONG ZHOU/ Examiner's Signature	☐ Initials	SWITZERLAND	5	17	3

ADDRESS

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UNITED STATES

TITLE

METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

FILING FEE RECEIVED		
810	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14352727	BEZINGE ET AL.
	Examiner	Art Unit
	HONG ZHOU	2623

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/08/2015								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	-								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	-								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	)	Confirmation No. 4023
	)	
Alex BEZINGE	)	Group Art Unit: 2623
	)	
Serial No.: 14/352,727	)	Examiner: Hong ZHOU
	)	
Filed: April 18, 2014	)	Atty. Dkt. No.: 143297.00101
	)	

For: METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated August 14, 2015, kindly amend the above-identified patent application as follows:

Listing of Claims begins on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

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Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Currently Amended) A method combining gesture detection by an accelerometer and gesture detection with a touch panel for switching a wristwatch from a first power mode to a second power mode, comprising:

using an accelerometer with embedded signal processing capabilities for generating an acceleration signal used for detecting a gesture on a cover glass of said wristwatch;

discriminating between gesture and no gesture based on ~~the frequency of said acceleration signal, and/or the~~ a direction of said acceleration signal~~,~~ and~~/or~~ ~~the~~ on a slope or frequency of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer,

waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer,

using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from a touch panel underneath said cover glass.

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2. (Currently Amended) The method of claim 1, wherein the discrimination between gesture and no gesture is also based on ~~the~~ a duration of said acceleration signal.

3. (Currently Amended) The method of claim 2, wherein the discrimination between gesture and no gesture is also based on ~~the~~ an amplitude of said acceleration signal.

4. (Original) The method of claim 1, said step of discriminating between gesture and no gesture comprises determining said frequency and determining that there is no gesture if said frequency is not in a predetermined frequency range compatible with a tap.

5. (Original) The method of claim 1, said step of discriminating between gesture and no gesture comprises determining said direction and determining that there is no gesture if said direction is not substantially perpendicular to said cover glass.

6. (Canceled).

7. (Original) The method of claim 1, wherein said touch panel comprises a plurality of touch areas, said method comprising a step of applying a power supply sufficient for detecting a gesture to only a first subset of said touch areas.

8. (Currently Amended) The method of claim 1, wherein discrimination between gesture and no gesture depends on ~~the~~ a duration between a detection signal from said accelerometer and a detection signal with said touch panel.

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9. (Currently Amended) The method of claim 1, wherein said accelerometer is powered on when said wristwatch is in said first power mode, said method comprising a step of ~~at~~ partially waking up said touch panel upon detection of a gesture by said accelerometer.

10. (Original) The method of claim 7, comprising a step of waking up only a subset of the complete area of said touch panel upon detection of a gesture by said accelerometer.

11. (Original) The method of claim 1, comprising a step of waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer and with said touch panel.

12. (Canceled)

13. (Original) The method of claim 1, said gesture being a tap or a double tap.

14. (Original) The method of claim 1, further comprising a step of detecting a wristturn with said accelerometer, and switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected.

15. (Currently Amended) The method of ~~claim 11~~claim 14, said step of detecting a wristturn comprising:

detecting that ~~the~~ an orientation of the wristwatch is in a first range;

detecting that the orientation of the wristwatch is then in a second range, different from said first range,

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detecting that the wristwatch remains substantially immobile during a predetermined duration.

16. (Currently Amended) A wristwatch which can be operated in a plurality of power modes including a first power mode and a second power mode, comprising:

a display;

a touch panel underneath a cover glass of said wristwatch for detecting a gesture on said cover glass;

an accelerometer with embedded signal processing capabilities, said accelerometer being arranged for generating an acceleration signal and for discriminating between gesture and no gesture based on ~~the frequency of said acceleration signal, and/or the~~ a direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and~~/or~~ on a~~the~~ slope or frequency of said acceleration signal,

a microcontroller commanded so as to be switched to said second power mode upon gesture detection by said accelerometer and for discriminating between gesture and no gesture based at least on signals from said touch panel.

17. (Original) The wristwatch of claim 16, wherein said touch panel comprises a plurality of touch areas and powering means arranged for powering only a first subset of said touch area upon detection of a gesture by said accelerometer, and for powering a larger subset in said second power mode.

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18. (Original) A method for switching a wristwatch from a first power mode to a second power mode, comprising:

using an accelerometer for detecting a wristturn, and

switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected.

19. (Currently Amended) The method of ~~claim 14~~claim 18, said step of detecting a wristturn comprising:

detecting that the orientation of the wristwatch is in a first range;

detecting that the orientation of the wristwatch is then in a second range, different from said first range,

detecting that the wristwatch remains substantially immobile during a predetermined duration.

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REMARKS

In view of the above amendments and following remarks, favorable reconsideration is respectfully requested.

Claim Objections

The Examiner objects to certain claims. In response, the claims have been revised to comply with the Examiner's suggestions.

Claim Rejection – 35 USC §§102, 103

Claims 1-3, 5, 8, 11, 13-14, 16 were rejected over HYSEK (WO2011000893, with the Examiner relying on US2012/0092383) in view of Holbein (US2011/0080349) and Fattah (US2009/0085865); claim 4 was rejected over HYSEK, Holbein, Fattah, and Verplaetse; claims 7, 9-10, 17 were rejected over HYSEK, Holbein, Fattah, and Nurmi (US2010/0265209); claims 15, 19 were rejected over HYSEK, Holbein, Fattah, and Gritton; and claim 18 was rejected over Fattah and Holbein.

Claims 1 and 16 have been amended. Support for the amendment can be found at paragraphs [0017]-[0019] of the initially filed application.

a. Independent Claim 1

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As recognized by the Examiner, amended claim 1 is novel over the cited prior art. As indicated by the Examiner, HYSEK discloses a wristwatch capable to switch from a first power mode to a second power mode and comprising a microcontroller [0058] and an accelerometer.

More precisely, HYSEK teaches a switching of a wristwatch from a first power mode to a second power mode by switching on/off the screen of the wristwatch, in response of a touch, a tap or double tap on the touch screen [0051].

Moreover, the accelerometer of the HYSEK's wristwatch is arranged to detect shocks or accelerations on the watch mechanism so to simulate his effects on this mechanism [0107]. HYSEK discloses no accelerometer with embedded signal processing.

Amended claim 1 differs from HYSEK by following features:

C1. A method combining gesture detection by an accelerometer and gesture detection with a touch panel for switching a wristwatch from a first power mode to a second power mode, comprising:

C2. using an accelerometer with embedded signal processing capabilities for generating an acceleration signal used for detecting a gesture on a cover glass of said wristwatch;

C3. discriminating between gesture and no gesture based on a direction of said acceleration signal and on a slope or frequency of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer,

C4. waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer,

C5. using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from a touch panel underneath said cover glass.

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The Examiner cites Holbein which discloses a method of waking a portable electronic device [Abstract].

Holbein's portable device comprises a processor 102, an accelerometer 136 and a touch-sensitive display 118 interacting with the processor 102 via an electronic controller 116 [0031] (Figure1).

The accelerometer 136 can comprise a built-in electronic controller [0084].
The accelerometer can be a digital accelerometer having built-in tap detection function [0085].

More precisely, Holbein discloses a method 940 of Figure 11 that comprises steps of:

S1. (step 804) switching the processor 102 from the system clock to the sleep clock and deactivating the touch sensitive display 118 [0070];

S2. (step 902) Using the accelerometer 136 to measure an acceleration, e.g. a tap on the touch-sensitive display 118 or a movement of the device causing a change in acceleration exceeding a predetermined threshold [0083];

S3. (step 902) Using the accelerometer 136 to detect gesture discriminated by comparing the acceleration with a predetermined acceleration threshold[0083];

S4. (step 808) Upon the detection of an inertial event, reactivating the touch sensitive display 118 for a predetermined period [0102];

S5. (step 910) detection of a touch event by the touch-sensitive display [0102];

S6. (steps 812) upon a detection, the processor 102 is waked up [0102].

Combining the method of Holbein with HYSEK would thus lead to:

> a wristwatch able to switching on the screen of the wristwatch, in response of a touch a tap or double tap on the touch screen, according to following steps:

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- Using HYSEK's accelerometer to detect a shocks or accelerations on the watch mechanism exceeding a predetermined threshold;
- Using HYSEK's microprocessor to detect gesture by comparing the acceleration with a predetermined acceleration threshold;
- Upon the detection of an inertial event is detected, reactivating HYSEK's touch sensitive display.

This combination still differs from amended claim 1 by:

C2) using an accelerometer with embedded signal processing capabilities.

Without a valid incitation or expectation, the one of ordinary skill would not replace an already serviceable hardware element of such a complex and small device as a wristwatch with a more complex and voluminous accelerometer.

C3) discriminating between gesture and no gesture based on a direction of said acceleration signal and on a slope or frequency of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer;

One of ordinary skill would not introduce this step as Holbein's does not suggest a 3D accelerometer, nor a step of discriminating on a direction of said acceleration signal and on a slope or frequency of said acceleration signal.

C4) waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer;

C5) using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from a touch panel underneath said cover glass.

One of ordinary skill would not implement Holbein's steps S5 and S6 in the watch of HYSEK, because those additional steps are unnecessary. In fact, HYSEK's touch-screen is already activated upon detection of a gesture with the accelerometer. There is no point in waking it a second time with the touch panel.

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Theh Examiner further cites FATTAH, which discloses a method for controlling a device for underwater use [Abstract].

FATTAH discloses a user-interaction detection arrangement that includes an accelerometer 24, such as a 3-axis acceleration sensor [0022], connected to a microcontroller 26 [0018]. The microcontroller receives and/or digitalizes three accelerations values from the accelerometer, repeatedly [0022]. In order to detect a user's-interaction in the form of a tap on the housing of the underwater device, the microcontroller 26 continuously analyzes the x,y and z accelerations [0025]. Tap detection is provided by comparing amplitude accelerations to boundary values [0013].

The combination of FATTAH with HYSEK and Holbein would still not lead the skilled person to the subject matter of claim 1, since following features are still missing from all documents:

C2) using an accelerometer with embedded signal processing capabilities.

FATTAH's teaching states that the device's accelerometer is connected to a microcontroller that repeatedly receives and/or digitalizes provided accelerations values. The accelerometer is thus, implicitly, devoid of embedded signal processing capabilities.

C3) discriminating between gesture and no gesture based on a direction of said acceleration signal and on a slope or frequency of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer;

None of the cited document discloses such a discrimination based on slope or frequency. FATTAH teaches that taps are detected by comparing amplitude accelerations to boundary values [0013]. FATTAH doesn't disclose discriminating between gesture and no gesture based on a slope or

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a frequency of said acceleration signal.

Consequently, amended claim 1 has to be considered non obvious with respect to HYSEK in view of Holbein and in view of FATTAH.

b. Independent Claim 16

The above mentioned arguments are applied *mutatis mutandis* to amended claim 16.

c. Independent Claim 18

The Examiner cites FATTAH, which discloses a device for underwater comprising a housing, an accelerometer and a display device that is housed in the housing. The device is arranged to be wake up from a low-power state.

A controller is operable for receiving signals from the accelerometer, determining a user-interaction event based on the signals received and causing a change in the display device as results of the interaction event [0006].

More specifically and referring to Figure 1, the underwater device comprises a display 30 (e.g. OLED) [0020] and an user-interaction detection arrangement including an accelerometer 24 [0018]. A microprocessor 26 is connected to the user-interaction detection arrangement for detecting a user-interaction in the form of a tap on the electronic device [0018]. Tap detection is provided by comparing amplitude accelerations to boundary values [0013].

The device is arranged to be wake up from a low-power state by detecting a pre-set number of consecutives taps [0048][0049] (Step 50, Fig.10). FATTAH specifies that the use of a

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number of tap in sequence reduces the chance of accidental powering on the electronic device [0049]. Upon a detection of a tap (Step 45), the direction of the tap is determined (Step 56). Depending on the direction, an operation is executed (Step 58).

As the examiner notices, FATTAH does not disclose a step of:

- switching the wristwatch from a first to a second power mode when a wristturn has been detected.

At the time of the invention, one of ordinary skill in the art would have neither a logical reason, nor an incitation to modify FATTAH underwater wristwatch so to provide an activation based on a wristturn detection, as none of the cited document teaches neither a wristturn detection using an accelerometer, nor a switching in response of a wristturn detection.

The Examiner cites Holbein, which discloses a method of waking a portable electronic device [Abstract] that provides a verification of a potential wakeup event so to reduce false wakeup [0104].

Holbein's method is suitable to be implemented in a portable device such as a phone, a PDA or a laptop [003] that comprises a processor, an accelerometer and a touch-sensitive display interacting with the processor 102 via an electronic controller [0031]. Holbein's method involves a step of detecting a single gesture via the accelerometer [0083] and to confirm it through the touch-sensitive screen [0102]. Within the gestures, Holbein lists swings and tilt movements [0084].

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A skilled person would not combine the teaching of Holbein, which describes solutions for phones, PDAs or laptops, in the wristwatch of FATTAH. Even if he would do so, he would merely obtain an underwater wristwatch which can be waken up with a sequence of a predefined number of taps executed on the touch-screen as proposed by FATTAH. In fact, the one skilled in the art has no incitation to replace this wake-up gesture described by FATTAH as robust by a different and not specified sequences of gestures.

In particular, this combination would not lead to

- a detection of a wristturn and
- switching the wristwatch from a first to a second power mode when a wristturn has been detected.

Accordingly, it is respectfully submitted that the amended claims are patentable over the cited art.

In the event there are any questions relating to this Amendment or to the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that the prosecution of this application may be expedited.

Please charge any shortage or credit any overpayment of fees to BLANK ROME LLP, Deposit Account No. 23-2185 (Ref. 143297.00101). In the event that a petition for an extension of time is required to be submitted herewith and in the event that a separate petition does not accompany this response, Applicant hereby petitions under 37 CFR 1.136(a) for an extension of

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time for as many months as are required to render this submission timely. Any fee due is authorized above.

Respectfully submitted,

Date: January 14, 2016

By: _____
Peter S. Weissman
Reg. No. 40,220

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Electronic Patent Application Fee Transmittal

Application Number:	14352727
Filing Date:	18-Apr-2014
Title of Invention:	METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE
First Named Inventor/Applicant Name:	Alex Bezinge
Filer:	Peter S. Weissman/Keyla Clements
Attorney Docket Number:	BEZINGE-00101

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 2 months with $0 paid	2252	1	300	300
Miscellaneous:				
		Total in USD ($)		**300**

Electronic Acknowledgement Receipt	
EFS ID:	24629142
Application Number:	14352727
International Application Number:	
Confirmation Number:	4023
Title of Invention:	METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE
First Named Inventor/Applicant Name:	Alex Bezinge
Customer Number:	27557
Filer:	Peter S. Weissman/Keyla Clements
Filer Authorized By:	Peter S. Weissman
Attorney Docket Number:	BEZINGE-00101
Receipt Date:	14-JAN-2016
Filing Date:	18-APR-2014
Time Stamp:	18:14:40
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$300
RAM confirmation Number	5036
Deposit Account	232185
Authorized User	WEISSMAN, PETER S
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 CFR 1.492 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 CFR 1.19 (Document supply fees)

Charge any Additional Fees required under 37 CFR 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 CFR 1.21 (Miscellaneous fees and charges)

Charge any Additional Fees required under 37 CFR 1.492(a) (basic national fee only)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		14329700101Amendment.pdf	987774 164fc5aa0f8cd2d8bf2b712992da83eadf285910	yes	17

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Transmittal Letter	1	1
Extension of Time	2	2
Amendment/Req. Reconsideration-After Non-Final Reject	3	3
Claims	4	8
Applicant Arguments/Remarks Made in an Amendment	9	17

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30771 977b34163b196436483179119e2447372465ca31	no	2

Warnings:

Information:

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National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: TRAN.LET
Document Description: Transmittal Letter

USED IN LIEU OF PTO/SB/21 (07-09)

TRANSMITTAL FORM *(to be used for all correspondence after initial filing)*		Application Number	14/352,727-Conf. #4023
		Filing Date	April 18, 2014
		First Named Inventor	Alex BEZINGE
		Art Unit	2623
		Examiner Name	H. Zhou
Total Number of Pages in This Submission		Attorney Docket Number	143297.00101

ENCLOSURES ***(Check all that apply)***

☐ Fee Transmittal Form	☐ Drawing(s)	☐ After Allowance Communication to TC
☐ Fee Attached	☐ Licensing-related Papers	☐ Appeal Communication to Board of Appeals and Interferences
☒ Amendment/Reply	☐ Petition	☐ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
☐ After Final	☐ Petition to Convert to a Provisional Application	☐ Proprietary Information
☐ Affidavits/declaration(s)	☐ Power of Attorney, Revocation Change of Correspondence Address	☐ Status Letter
☒ Extension of Time Request	☐ Terminal Disclaimer	☐ Other Enclosure(s) (please Identify below):
☐ Express Abandonment Request	☐ Request for Refund	
☐ Information Disclosure Statement	☐ CD, Number of CD(s) ____	
☐ Certified Copy of Priority Document(s)	☐ Landscape Table on CD	
☐ Reply to Missing Parts/ Incomplete Application	Remarks	
☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	BLANK ROME LLP		
Signature			
Printed name	Peter S. Weissman		
Date	January 14, 2016	Reg. No.	40,220

143297.00101/101891036v.1

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PTO/AIA/22 (03-13)
Approved for use through 7/31/2016. OMB 0651-0031
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional) 143297.00101
Application Number 14/352,727-Conf. #4023	Filed April 18, 2014
For A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE	
Art Unit 2623	Examiner H. Zhou

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

	Fee	Small Entity Fee	Micro Entity Fee	
☐ One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☒ Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$ 300.00
☐ Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$
☐ Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐ Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☒ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

☒ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 23-2185 .

☒ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☒ attorney or agent of record. Registration number 40,220 .

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____ .

Signature	January 14, 2016 Date
Peter S. Weissman Typed or printed name	(202) 772-5800 Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of 1 forms are submitted.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/352,727	Filing Date 04/18/2014	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	01/14/2016	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 17	Minus	** 20	= 0	X $40 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $210 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/YOLANDA CHADWICK/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/352,727	04/18/2014	Alex Bezinge	BEZINGE-00101	4023

27557 7590 04/14/2016

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WASHINGTON, DC 20037

EXAMINER	
ZHOU, HONG	

ART UNIT	PAPER NUMBER
2623	

NOTIFICATION DATE	DELIVERY MODE
04/14/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Belay@blankrome.com
WashingtonDocketing@blankrome.com

Petitioner Samsung Ex-1004, 0415

Office Action Summary	Application No. 14/352,727	Applicant(s) BEZINGE ET AL.	
	Examiner HONG ZHOU	Art Unit 2623	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1/14/2016*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-5,7-11 and 13-19* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-5, 7-11 and 13-19* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

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DETAILED ACTION

1. The present application is being examined under the pre-AIA first to invent provisions.

Response to Amendment

2. Applicant's amendment filed on January 14, 2016 has been entered. Claims 1-3, 8-9, 15-16 and 19 have been amended. Claims 6 and 12 have been canceled. Claims 1-6, 7-11 and 13-19 are pending in this application.

Response to Arguments

3. Applicant's arguments with respect to claims 1 and 16 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

4. Applicant's arguments, filed January 14, 2016, with respect to the rejection of claim 18 have been fully considered but they are not persuasive.

On pages 12-14 of the remarks, the Applicant argues that the combination of Fattah and Holbein would not lead to (1) a detection of a wristturn (2) switching the wristwatch from a first to a second power mode when a wristturn has been detected. The Examiner respectfully disagrees with these arguments.

First, Fattah in paragraphs [0028], [0048] and [0049] discloses detecting a tap gesture based on accelerations measured by an accelerometer and switching a wristwatch from a first to a second power mode when the tap gesture has been detected. Further, paragraph [0083]-[0084], [0088] of Holbein discloses a portable electronic device that can switch from a first power mode

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to a second power mode by detecting a tilt left movement or tilt right movement of the portable electronic device using an accelerometer. Since a wristwatch is a portable electronic device that is attached to the user's wrist and a wristturn can be detected based on detected tilt movement of the wristwatch, it would have been obvious to one of ordinary skill in the art to combine the teachings of Fattah and Holbein to allow a wristwatch to detect a wristturn by detecting a tilt movement of the wristwatch using an accelerometer and to switch from a first to a second power mode when a wristturn has been detected. Therefore, the rejection is maintained.

Claim Rejections - 35 USC § 103

5. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3, 5, 8, 11, 13-14 and 16 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over HYSEK et al. (WO 2011000893, the examiner is using US 2012/0092383 which is equivalent of WO 2011000893) in view of Holbein et al. (US 2011/0080349), and further in view of Shintani et al. (US 2010/0231777).

Regarding claim 1, HYSEK discloses a method for switching a wristwatch from a first power mode to a second power mode (see Fig. 1; [0051]), comprising:

using an accelerometer for generating an acceleration signal (see [0107]);

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waking up a display upon detection of a gesture on a cover glass of said wristwatch ([0051], e.g., switching from a stand-by mode to a time reading mode in response to a tap or double tap on a cover glass 3 or touch screen of said wristwatch), and

detecting a gesture based at least on signals from a touch panel underneath said cover glass (see [0056], [0071], [0073], detecting a tap, double tap or a scrolling gesture using a touch panel).

HYSEK does not disclose the method combining gesture detection by the accelerometer and the gesture detection with the touch panel for switching the wristwatch from the first power mode to the second power mode, the method comprising:

using the accelerometer with embedded signal processing capabilities for generating the acceleration signal for detecting the gesture on the cover glass of said wristwatch;

discriminating between gesture and no gesture based on a direction of said acceleration signal; and on a slope or frequency of said acceleration signal as measured by a three dimensional accelerometer,

waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer,

using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from the touch panel.

Holbein discloses a method combining gesture detection by an accelerometer and gesture detection with the touch panel for switching a portable electronic device from a first power mode to a second power mode (Figs 1 and 11), the method comprising:

using an accelerometer with embedded signal processing capabilities for generating an acceleration signal for detecting a gesture on a touch sensitive display of the device ([0083]-[0086], e.g., the accelerometer 136 with a built-in controller can be used to generate an acceleration signal for detecting a gesture);

discriminating between gesture and no gesture based on the acceleration signal as measured by said accelerometer (e.g., discriminating a tap gesture by comparing the acceleration signal with a tap detect threshold);

waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer (Figs. 1 and 11; [0102], e.g., waking up a controller 116 of a touch-sensitive display 118 when a tap gesture is detected by the accelerometer 136),

using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from the touch panel (see [0096], [0102], [0104]-[0105], e.g., when the touch sensitive display indicates a screen press or click has occurred, a processor 102 wakes up from a sleep mode to a full power mode).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Holbein in the invention of HYSEK for combining gesture detection by an accelerometer and gesture detection with a touch panel in order to verify potential wakeup events and to reduce false wakeups (see [0104]-[0105] of Holbein).

HYSEK in view of Holbein does not disclose discriminating between gesture and no gesture based on a direction of said acceleration signal; and on a slope or frequency of said acceleration signal as measured by a three dimensional accelerometer.

Shintani discloses a method for detecting a gesture on an electronic device (Figs 3A-3C; Fig. 5B; [0047]-[0049], [0076]), the method comprising: using an accelerometer for generating an acceleration signal used for detecting the gesture on the electronic device (e.g., the acceleration sensor 28 generates acceleration signals to detect a tap gesture on a digital camera); and discriminating between gesture and no gesture based on a direction of the acceleration signal and on a frequency of said acceleration signal as measured by a three dimensional accelerometer ([0048], [0049], [0077], e.g., a direction of the acceleration signal and a frequency of about 50 Hz can be used to detect an intentional tap gesture).

It would have been obvious to one of ordinary in the art at the time of the invention to use the teachings of Shintani in the invention of HYSEKin view of Holbein for providing a three dimensional accelerometer and for detecting a tap gesture based on a direction and a frequency of an acceleration signal because, as taught by Shintani, it would prevent a false tap gesture by defining a direction of the tap gesture and its frequency.

Regarding claim 2, HYSEKin view of Holbein and Shintani further discloses the method of claim 1. Holbein further discloses wherein the discrimination between gesture and no gesture is also based on a duration of said acceleration signal (see [0063] of Holbein, e.g., a predetermined duration for a press and hold action is set to be longer than that of a typical tap event such as, for example, approximately 100 milliseconds).

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Regarding claim 3, HYSEKin view of Holbein and Shintani discloses the method of claim 2. Shintani further discloses wherein the discrimination between gesture and no gesture is also based on an amplitude of said acceleration signal (see [0093] of Shintani).

Regarding claim 5, HYSEKin view of Holbein and Shintani further discloses the method of claim 1, said step of discriminating between gesture and no gesture comprises determining said direction and determining that there is a tap gesture if said direction is substantially perpendicular to said cover glass (see Figs. 3A-3C, Fig. B; [0079] of Shintani, e.g., tap gesture in a Z direction that is substantially perpendicular to the display screen can be identified).

HYSEKin view of Holbein and Shintani does not specifically disclose determining that there is no gesture if said direction is not substantially perpendicular to said cover glass.

However, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the invention of HYSEKin view of Holbein and Shintani for detecting a Z direction tap so that a user can perform a wake up gesture by tapping the wristwatch directly on the cover glass.

Regarding claim 8, HYSEKin view of Holbein and Shintani further discloses the method of claim 1, wherein discrimination between gesture and no gesture depends on a duration between a detection signal from said accelerometer and a detection signal with said touch panel (see [0020], [0063], [0104] of Holbein, e.g., causing the portable electronic device to wake from the sleep mode in response to detection of a touch event within a first predetermined duration of the detection of inertial event).

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Regarding claim 11, HYSEKin view of Holbein and Shintani further discloses the method of claim 1, comprising a step of waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer and with said touch panel (see [0102] of Holbein, e.g., the processor 102 wakes up from a sleep mode and returns to a full power mode when the tap gesture is detected by the accelerometer and the touch panel).

Regarding claim 13, HYSEK in view of Holbein and Shintani further discloses the method of claim 1, said gesture being a tap or a double tap (see [0051] of HYSEK and [0083] and [0085] of Holbein).

Regarding claim 14, Holbein further discloses detecting a tilt left movement or tilt right movement with the accelerometer and switching a device from a sleep mode to a full power mode when the tile left movement or tilt right movement has been detected (see [0083]-[0084], the accelerometer 136 is used to detect an inertial event by detecting a predetermined movement performed by moving the device 100 and the predetermined movement used to cause the device to wake up from a sleep mode and return to a full power mode includes a horizontal and vertical tilt movements, a left tilt movement, a right tilt movement, a up tilt movement and a down tilt movement).

It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the invention of HYSEK in view of Holbein and Shintani for detecting left tilt

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movement or right tilt movement of a wristwatch so that a user can switch a wristwatch from a first power to a second power mode by turning a wrist.

Regarding claim 16, HYSEK discloses a wristwatch which can be operated in a plurality of power modes including a first power mode and a second power mode (see Fig. 1; [0051]), comprising:

a display ([0054], display 4);

a touch panel underneath a cover glass of said wristwatch for detecting a gesture on said cover glass ([0056], [0071], [0073], touch panel underneath a cover glass 3 is configured to detect a gesture on the cover glass 3); and an accelerometer bring arranged for generating an acceleration signal ([0107]).

HYSEK does not disclose using the accelerometer with embedded signal processing capabilities for generating the acceleration signal and for discriminating between gesture and no gesture based on a direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and on a slope or a frequency of said acceleration signal, and switching a microcontroller to said second power mode upon gesture detection by said accelerometer and for discriminating between gesture and no gesture at least on signals from said touch panel.

Holbein discloses a method for switching a portable electronic device from a first power mode to a second power mode (Figs 1 and 11), the method comprising:

using an accelerometer with embedded signal processing capabilities for generating an acceleration signal for detecting a gesture on a touch sensitive display of the device ([0083]-

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[0086], e.g., the accelerometer 136 with a built-in controller can be used to generate an acceleration signal for detecting a gesture);

discriminating between gesture and no gesture based on the acceleration signal as measured by said accelerometer (e.g., discriminating a tap gesture by comparing the acceleration signal with a tap detect threshold);

switching a microcontroller to the second power mode upon detection of a gesture by said accelerometer (Figs. 1 and 11; [0102], e.g., waking up a controller 116 of a touch-sensitive display 118 when a tap gesture is detected by the accelerometer 136),

using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from the touch panel (see [0096], [0102], [0104]-[0105], e.g., when the touch sensitive display indicates a screen press or click has occurred, a processor 102 wakes up from a sleep mode to a full power mode).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Holbein in the invention of HYSEK for combining gesture detection by an accelerometer and gesture detection with a touch panel in order to verify potential wakeup events and to reduce false wakeups (see [0104]-[0105] of Holbein).

HYSEK in view of Holbein does not disclose discriminating between gesture and no gesture based on a direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and on a slope or a frequency of said acceleration signal.

Shintani discloses a method for detecting a gesture on an electronic device (Figs 3A-3C; Fig. 5B; [0047]-[0049], [0076]), the method comprising: using an accelerometer for generating an acceleration signal used for detecting the gesture on the electronic device (e.g., the

acceleration sensor 28 generates acceleration signals to detect a tap gesture on a digital camera); and discriminating between gesture and no gesture based on a direction of the acceleration signal and on a frequency of said acceleration signal as measured by a three dimensional accelerometer ([0048], [0049], [0077], e.g., a direction of the acceleration signal and a frequency of about 50 Hz can be used to detect an intentional tap gesture).

It would have been obvious to one of ordinary in the art at the time of the invention to use the teachings of Shintani in the invention of HYSEKin view of Holbein for providing a three dimensional accelerometer and for detecting a tap gesture based on a direction and a frequency of an acceleration signal because, as taught by Shintani, it would prevent a false tap gesture by defining a direction of the tap gesture and its frequency.

7. Claim 4 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over HYSEK et al. (WO 2011000893, the examiner is using US 2012/0092383 which is equivalent of WO 2011000893) in view of Holbein et al. (US 2011/0080349) and Fattah (US 2009/0085865), and further in view of Verplaetse et al. (US 2002/0167699).

Regarding claim 4, HYSEKin view of Holbein and Fattah does not disclose the method of claim 1, said step of discriminating between gesture and no gesture comprises determining said frequency and determining that there is no gesture if said frequency is not in a predetermined frequency range compatible with a tap.

Verplaetse discloses a motion-input device comprising a processor for discriminating between gesture and no gesture based on a frequency of an acceleration signal measured by an accelerometer and determining that there is no gesture if the frequency is not in a predetermined

frequency range compatible with a tap. (Figs. 4, 8c, 9c; [0016]-[0017], [0056]-[0058], e.g., distinguishing between a tap command on device 54 and a position command of device 54 by comparing an acceleration signal with a predetermined frequency range).

It would have been obvious to one of ordinary in the art at the time of the invention to use the teachings of Verplaetse in the invention of HYSEKin view of Holbein and Fattah in order to distinguish between tap commands and position commands when a predetermined threshold frequency is greater than or equal to 5 Hz.

8. Claims 7, 9-10 and 17 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over HYSEK et al. (WO 2011000893, the examiner is using US 2012/0092383 which is equivalent of WO 2011000893) in view of Holbein et al. (US 2011/0080349) and Shintani et al. (US 2010/0231777), and further in view of Nurmi et al. (US 2010/0265209).

Regarding claim 7, HYSEKin view of Holbein and Shintani further discloses the method of claim 1, wherein said touch panel comprises a plurality of touch areas (see Fig. 1A and [0056] of HYSEK, e.g., the touch panel 3 comprises a plurality of touch electrodes for detecting movements of the finger in vertical or horizontal direction), said method comprising a step of applying a power supply sufficient for detecting a gesture to said touch areas ([0102], e.g., when the touch-sensitive display is reactivated, the touch-sensitive display is powered up).

HYSEKin view of Holbein and Shintani does not disclose activating and powering only a first subset of the touch-sensitive display for detecting the gesture.

Nurmi discloses a method for reducing a power consumption of a touch screen comprising activating only a subset of a touch screen for detecting a gesture in a power saving

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mode [0010]-[0011], e.g., in a sleep mode or power mode, only a small area within the whole touch screen is activated and powered up for detecting a touch gesture).

It would have been obvious to one of ordinary in the art at the time of the invention to use the teachings of Nurmi in the invention of HYSEKin view of Holbein and Shintani for activating and powering only a subset of a touch panel for detecting a gesture because activating only a subset of a touch panel can use less power than activating the whole touch panel.

Regarding claim 9, HYSEKin view of Holbein and Shintani further discloses the method of claim 1, wherein said accelerometer is powered on when said wristwatch is in said first power mode (see [0093] of Holbein), said method comprising a step of at waking up said touch panel upon detection of a gesture by said accelerometer (see [0102] of Holbein, waking up the touch sensitive display upon detection of a gesture by the accelerometer).

HYSEKin view of Holbein and Fattah does not disclose partially waking up the touch panel.

Nurmi discloses a method for reducing a power consumption of a touch screen comprising activating only a subset of a touch screen for detecting a gesture in a power saving mode [0010]-[0011], e.g., in a sleep mode or power mode, only a small area within the whole touch screen is activated for detecting a touch gesture).

It would have been obvious to one of ordinary in the art at the time of the invention to use the teachings of Nurmi in the invention of HYSEKin view of Holbein and Shintani for activating only a subset of a touch panel for detecting a gesture because activating only a subset of a touch panel can use less power than activating the whole touch panel.

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Regarding claim 10, HYSEKin view of Holbein, Shintani and Nurmi discloses the method of claim 7, comprising a step of waking up only a subset of the completed area of said touch panel upon detection of a gesture by said accelerometer (see [0102] of Holbein and [0010] of Nurmi).

Regarding claim 17, HYSEKin view of Holbein and Shintani discloses the wristwatch of claim 16, wherein said touch panel comprises a plurality of touch areas and powering means arranged for powering a larger subset of the touch panel upon detection of a gesture by said accelerometer and in said second power mode (see [0102] of Holbein).

HYSEKin view of Holbein and Shintani does not disclose powering only a first subset of said touch area.

Nurmi discloses a method for reducing a power consumption of a touch screen comprising activating only a subset of a touch screen for detecting a gesture in a power saving mode [0010]-[0011], e.g., in a sleep mode or power mode, only a small area within the whole touch screen is activated for detecting a touch gesture).

It would have been obvious to one of ordinary in the art at the time of the invention to use the teachings of Nurmi in the invention of HYSEKin view of Holbein and Shintani for activating and powering only a subset of a touch panel for detecting a gesture because activating only a subset of a touch panel can use less power than activating the whole touch panel.

9. Claim 15 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over HYSEK et al. (WO 2011000893, the examiner is using US 2012/0092383 which is equivalent of WO 2011000893) in view of Holbein et al. (US 2011/0080349) and Shintani et al. (US 2010/0231777), and further in view of Gritton et al. (US 2007/0176896).

Regarding claim 15, HYSEKin view of Holbein and Shintani further discloses the method of claim 14, said step of detecting a wristturn comprising: detecting that the orientation of the wristwatch is in a first range; detecting that the orientation of the wristwatch is then in a second range, different from said first range ([0084] of Holbein, e.g., detecting a horizontal tilt movement and a vertical tilt movement of the device).

HYSEKin view of Holbein and Shintani does not disclose said step of detecting the wristturn comprising detecting that the wristwatch remains substantially immobile during a predetermined duration.

Gritton discloses a 3D pointing device which is configured to perform a calibration process to correct accelerometer output errors, wherein the calibration of the accelerometer output uses inputs from a stationary detection function which can operate to detect that the 3D pointing device remains substantially immobile during a predetermined duration (see [0028]-[0030], e.g., a preset time period such as ½ seconds).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Gritton in the invention of HYSEKin view of Holbein and Shintani for detecting that a wristwatch remains stationary for a predetermined duration so that the wristwatch can perform a calibration process to correct accelerometer output errors.

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10. Claims 18 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Fattah (US 20090085865) in view of Holbein et al. (US 2011/0080349).

Regarding claim 18, Fattah discloses a method for switching a wristwatch from a first power mode to a second power mode (see Figs 1 and 10; [0048]-[0049], switching a wristwatch 20 from a low power mode to a second power mode), comprising: using an accelerometer for detecting a tap gesture (Fig. 1, [0028], accelerometer 24 is used to detect a tap gesture), and switching said wristwatch from said first power mode to said second power mode when a tap gesture has been detected (see [0048]-[0049]).

Fattah does not disclose switching the wristwatch from the first power mode to the second power mode when a wristturn has been detected.

Holbein discloses a method for switching an electronic device from a first power mode to a second power mode, comprising: using an accelerometer for detecting a left or right tilt movement of the electronic device and switching the electronic device from a first power mode to a second power mode when a tilt left or tilt right movement of the electronic device has been detected (Fig. 9; [0083]-[0084], e.g., switching from a sleep mode to a full power mode by detecting a tilt left or tilt right movement of the electronic device).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Holbein in the invention of Fattah for detecting a tilt left movement or tilt right movement of a wristwatch so that a user can switch a wristwatch from a first power to a second power mode by turning a wrist.

11. Claim 19 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Fattah (US 20090085865) in view of Holbein et al. (US 2011/0080349), and further in view of Gritton et al. (US 2007/0176896).

Regarding claim 19, Fattah in view of Holbein further discloses the method of claim 18, said step of detecting a wristturn comprising: detecting that the orientation of the wristwatch is in a first range; detecting that the orientation of the wristwatch is then in a second range, different from said first range ([0084] of Holbein, e.g., detecting a horizontal tilt movement and a vertical tilt movement of the device).

Fattah in view of Holbein does not disclose said step of detecting the wristturn comprising detecting that the wristwatch remains substantially immobile during a predetermined duration.

Gritton discloses a 3D pointing device which is configured to perform a calibration process to correct accelerometer output errors, wherein the calibration of the accelerometer output uses inputs from a stationary detection function which can operate to detect that the 3D pointing device remains substantially immobile during a predetermined duration (see [0028]-[0030], e.g., a preset time period such as ½ seconds).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Gritton in the invention of Fattah view of Holbein for detecting that a wristwatch remains stationary for a predetermined duration so that the wristwatch can perform a calibration process to correct accelerometer output errors.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HONG ZHOU whose telephone number is (571)270-5372. The examiner can normally be reached on Monday through Friday 8:30 A.M. - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amare Mengistu can be reached on (571)272-7674. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HONG ZHOU/
Primary Examiner, Art Unit 2623

Notice of References Cited	Application/Control No. 14/352,727	Applicant(s)/Patent Under Reexamination BEZINGE ET AL.	
	Examiner HONG ZHOU	Art Unit 2623	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2010/0231777 A1	09-2010	Shintani; Koichi	H04N5/232	348/333.06
	B	US-				
	C	US-				
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14352727	BEZINGE ET AL.
	Examiner	Art Unit
	HONG ZHOU	2623

CPC- SEARCHED		
Symbol	Date	Examiner
G06F3/014,G06F3/0416, G06F3/017, G06F3/0488, G06F1/3262, G06F1/1613, G06F1/3203, G06F3/041, G06F3/0488	6/4/15 & 8/10/15	HZ
G06F3/017, G06F1/3203, G06F1/324, G06F1/3296, G06F3/014, G06F3/0346	4/8/16	HZ

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
345	156-173	6/4/15-8/9/15	HZ
713	320-323	6/4/15	HZ
715	863	6/5/15	HZ
345	156-158	4/7/16	HZ

SEARCH NOTES		
Search Notes	Date	Examiner
East Search	6/4/15-8/10/15	HZ
Updated East Search	4/7/16-4/8/16	HZ

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	108	((watch or wristwatch) same (wakeup or wak$3 or power) same (tap or flick$3 or gesture$1 or operation$1)) AND ((G06F3/017 OR G06F1/3203 OR G06F1/324 OR G06F1/3296 OR G06F3/014 OR G06F3/0346).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/08 11:42
L7	11	(((tilt$3 or turn$3) near10 (watch or wristwatch)) same (wakeup or wak$3 or power)) AND ((G06F3/017 OR G06F1/3203 OR G06F1/324 OR G06F1/3296 OR G06F3/014 OR G06F3/0346).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/08 11:43
S177	3	("20090085865").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/07 10:17
S178	1	"14352727"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/07 10:19
S179	3733	(accelerometer or acceleration) same slope$1 same (direction or frequency)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/07 10:22
S180	25101	(345/156-158).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/07 10:22
S181	40	S179 and S180	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/07 10:22
S182	109	(accelerometer or acceleration) same	US-PGPUB;	OR	OFF	2016/04/07

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		tap$1 same slope$1 same (direction or frequency)	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			10:24
S183	506	(accelerometer or acceleration) same tap$1 same (direction same frequency)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/07 10:25
S184	13	S183 and S180	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/07 10:25
S185	3	("20090085865").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/07 11:29
S186	3	("20110080349").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/07 11:29
S187	714	(accelerometer or acceleration) same wrist same (tilt$3 or turn$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/07 11:49
S188	58	S187 and S180	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/07 11:49

EAST Search History (Interference)

<This search history is empty>

4/8/2016 11:45:32 AM
C:\Users\hzhou\Documents\EAST\Workspaces\14352727.wsp

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14352727	BEZINGE ET AL.
	Examiner	Art Unit
	HONG ZHOU	2623

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/08/2015	04/08/2016							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	-	-							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	-	-							
	13	✓	✓							
	14	✓	✓							
	15	✓	✓							
	16	✓	✓							
	17	✓	✓							
	18	✓	✓							
	19	✓	✓							

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Interview Agenda

i. Proposed Claims 1 and claim 16 are amended to claim a method (claim 1) and a wristwatch (claim 16) combining gesture detection by an inertial sensor and gesture detection with a touch panel for switching a wristwatch from a first power mode to a second power mode, wherein

-the inertial sensor comprises an accelerometer and a processor and/or other processing means, and

-the wristwatch comprises a microcontroller controlling a display of indication on a digital matrix display of the wristwatch.

ii. Proposed claim 18 is amended:

-by introducing the additional features of claim 19 and -by specifying that the step of detecting that the wristwatch remains substantially immobile is executed in response of the step of detecting the orientation of the wristwatch in a second range.

I. Claim 1 and 16

- HYSEK (WO2011000893/US2012/0092383) discloses uniquely a switching of a wristwatch from a first power mode to a second power mode by switching on/off the screen of the wristwatch, in response of a touch, a tap or double tap on the touch screen [0051].
- HYSEK is provided with an accelerometer for simulating shock on the mechanism [0107].
- HYSEK is silent about an inertial sensor comprising the accelerometer and a processor and/or other processing means.
- HYSEK provides no generalization of the switching method, nor incitation or motivation to modify it.

Advantages of the claimed invention over HYSEK:

- more efficacy low power energy
- more user-friendly activation

- HOLBEIN (US2011/0080349) discloses a method of waking a portable electronic device comprising [0031]:

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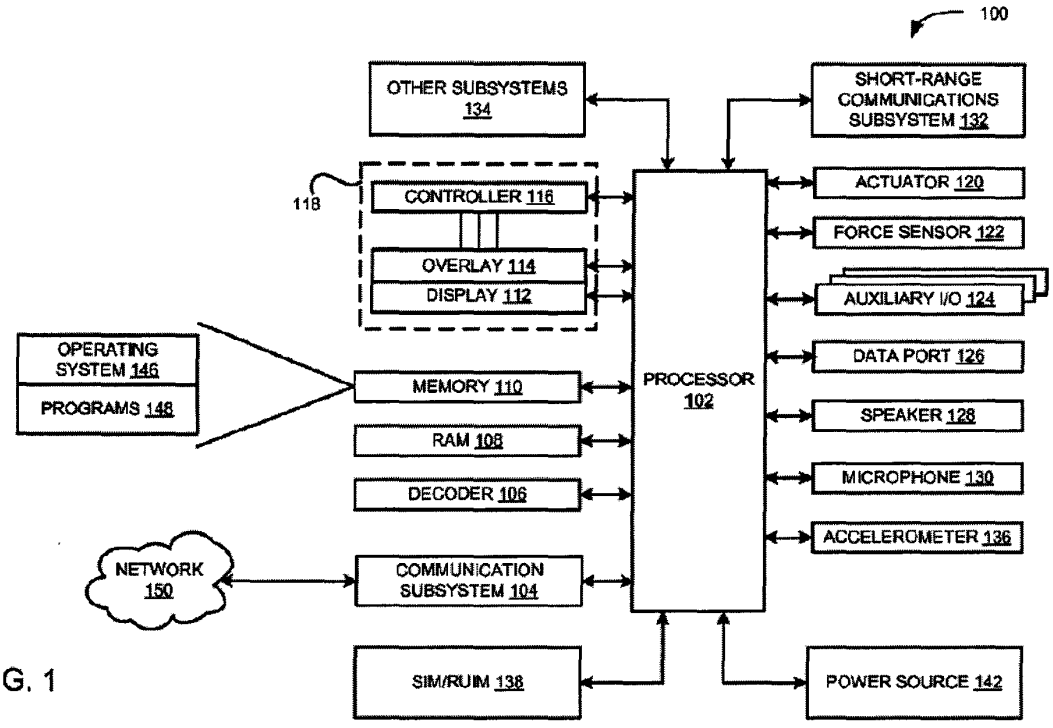


FIG. 1

- a display 118 for displaying information;
- a processor for displaying information on the touch sensitive display 118
- A controller 116 of the touch-sensitive display provides interactions between the processor and the touch-sensitive overlay 112 of the display 118.

- HOLBEIN's method comprises step of:
  - detecting a gesture by the built-in electronic controller of the accelerometer [0084];
  - in response of the detection, powering up the touch-sensitive display having the controller 116 for indicating a touch event is occurred[0102].; and
  - in response of the indication, the processor 102 is waked up [0102].

HOLBEIN discloses no three dimensional accelerometer.

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HOLBEIN discloses no discrimination between gesture and no gesture based on a direction of said acceleration signal and on a slope or frequency of said acceleration signal as measured by said accelerometer.

Advantages of the present invention over HOLBEIN:

- no need of a dedicated display controller 116 for detecting the gesture;
- single step wake up procedure is more responsive than a two-steps method for waking up the processor responsible for displaying information on the display touch-sensitive display;
- provide more reliable detection of the gesture as the inertial sensor considers direction and slope or frequency of the acceleration, reducing the occurrence of false-positive that are responsible of electrical energy wasting.
- Shintani et al. (US 2010/0231777) discloses an imaging device including a 3D accelerometer and a gesture detection method based on a direction and a 50 Hz component of the acceleration signal captured on the outer covering of the digital camera [0047]-[0049];
- Shintani disclose no wristwatches, nor waking up methods, nor gestures acquisition on tactile screens.
- Shintani disclose no generalization of the method, nor incitation to use it in wristwatch, in particular on gesture on a touch-screen display of a wristwatch.

Conclusion:

- no prior art discloses the one-step waking-up method
- no suggestions nor incitation for further modifying the combination of the three documents for obtaining the claimed one-step waking-up met;
- no reasonable expectation of success for combining the teaching of Shintani et al.

II. Claim 18

- No teaching, nor motivation, nor incitation in prior art for executing a detection of stationary situation in response of a detection of the orientation of the wristwatch in a second range different from the first one.

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PROPOSED CLAIMS FOR INTERVIEW

1. (Proposed) A method combining gesture detection by an inertial sensor~~accelerometer~~ and gesture detection with a touch panel for switching a wristwatch from a first power mode to a second power mode, wherein the inertial sensor includes an accelerometer and a processor and/or other processing means, and wherein the wristwatch includes a microcontroller controlling a display of indication on a digital matrix display of the wristwatch, the method comprising:

using ~~an~~ the accelerometer of the inertial sensor to generate ~~with embedded signal processing capabilities for generating~~ an acceleration signal used for detecting a gesture on a cover glass of said wristwatch, while the microcontroller is in a sleep power mode;

using the processor and/or other processing means of the inertial sensor to discriminate ~~discriminating~~ between gesture and no gesture based on a direction of said acceleration signal and on a slope or frequency of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer,

waking up ~~a~~ the microcontroller in said wristwatch upon detection of a gesture by said ~~accelerometer~~inertial sensor,

using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from a touch panel underneath said cover glass.

2. (Previously Presented) The method of claim 1, wherein the discrimination between gesture and no gesture is also based on a duration of said acceleration signal.

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3. (Previously Presented) The method of claim 2, wherein the discrimination between gesture and no gesture is also based on an amplitude of said acceleration signal.

4. (Original) The method of claim 1, said step of discriminating between gesture and no gesture comprises determining said frequency and determining that there is no gesture if said frequency is not in a predetermined frequency range compatible with a tap.

5. (Original) The method of claim 1, said step of discriminating between gesture and no gesture comprises determining said direction and determining that there is no gesture if said direction is not substantially perpendicular to said cover glass.

6. (Canceled).

7. (Original) The method of claim 1, wherein said touch panel comprises a plurality of touch areas, said method comprising a step of applying a power supply sufficient for detecting a gesture to only a first subset of said touch areas.

8. (Previously Presented) The method of claim 1, wherein discrimination between gesture and no gesture depends on a duration between a detection signal from said accelerometer and a detection signal with said touch panel.

9. (Previously Presented) The method of claim 1, wherein said accelerometer is powered on when said wristwatch is in said first power mode, said method comprising a step of partially waking up said touch panel upon detection of a gesture by said accelerometer.

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10. (Original) The method of claim 7, comprising a step of waking up only a subset of the complete area of said touch panel upon detection of a gesture by said accelerometer.

11. (Original) The method of claim 1, comprising a step of waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer and with said touch panel.

12. (Canceled)

13. (Original) The method of claim 1, said gesture being a tap or a double tap.

14. (Original) The method of claim 1, further comprising a step of detecting a wristturn with said accelerometer, and switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected.

15. (Previously Presented) The method of claim 14, said step of detecting a wristturn comprising:

detecting that an orientation of the wristwatch is in a first range;

detecting that the orientation of the wristwatch is then in a second range, different from said first range,

detecting that the wristwatch remains substantially immobile during a predetermined duration.

16. (Proposed) A wristwatch which can be operated in a plurality of power modes including a first power mode and a second power mode, comprising:

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a display;

a touch panel underneath a cover glass of said wristwatch for detecting a gesture on said cover glass;

an inertial sensor having an accelerometer and processor and/or other processing meanswith embedded signal processing capabilities, said accelerometer being arranged for generating an acceleration signal and the processor and/or other processing means for discriminating between gesture and no gesture based on a direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and on a slope or frequency of said acceleration signal, while the microcontroller is in a sleep power mode;

a microcontroller controlling a display of indication on the display and commanded so as to be switched to said second power mode upon gesture detection by said accelerometer inertial sensor and for discriminating between gesture and no gesture based at least on signals from said touch panel.

17. (Original) The wristwatch of claim 16, wherein said touch panel comprises a plurality of touch areas and powering means arranged for powering only a first subset of said touch area upon detection of a gesture by said accelerometer, and for powering a larger subset in said second power mode.

18. (Proposed) A method for switching a wristwatch from a first power mode to a second power mode, comprising:

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using an accelerometer for detecting a wristturn, and

switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected;

wherein said step of detecting a wristturn comprises:

detecting that the orientation of the wristwatch is in a first range;

detecting that the orientation of the wristwatch is then in a second range, different from said first range,

in response of a detection of the orientation of the wristwatch is then in the second range, detecting that the wristwatch remains substantially immobile during a predetermined duration.

19. (Canceled)

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/352,727	04/18/2014	Alex Bezinge	BEZINGE-00101	4023

27557 7590 09/16/2016

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EXAMINER
ZHOU, HONG

ART UNIT	PAPER NUMBER
2623	

NOTIFICATION DATE	DELIVERY MODE
09/16/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Belay@blankrome.com
WashingtonDocketing@blankrome.com

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Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	14/352,727	BEZINGE ET AL.	
	Examiner	Art Unit	
	HONG ZHOU	2623	

All participants (applicant, applicant's representative, PTO personnel):

(1) *HONG ZHOU*. (3)_____.

(2) *Peter S. Weissman*. (4)_____.

Date of Interview: *08 September 2016*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1, 16 and 18*.

Identification of prior art discussed: *Hysek (WO 2011/000893); Holbein (US 2011/0080349)*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The Applicant and the Examiner discussed the proposed amendments and the prior art. With respect to claims 1 and 16, the Examiner stated that the prior art would teach the amended limitation. Specifically, [0058] of Hysek teaches the wristwatch comprises a microcontroller controlling a display of indication on a digital matrix display of the wristwatch. Fig. 1 and paragraphs [0086] and [0102] of Holben teaches that the intertial sensor comprising an accelerometer and a processor and the detection of an inertial event is used to wake up the microcontroller 116 that is used to control a display 112. Therefore , the combination of the prior art can still read on the amended limitation. With respect to claim 18, the Examiner stated that the amended limitation would overcome the current rejection and would require further search and consideration. .

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/HONG ZHOU/ Primary Examiner, Art Unit 2623	

Petitioner Samsung Ex-1004, 0449

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

———

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

PTO/SB/30 (07-14)
Approved for use through 07/31/2016 OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Request for Continued Examination (RCE) Transmittal

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	14/352,727-Conf. #4023
Filing Date	April 18, 2014
First Named Inventor	Alex BEZINGE
Art Unit	2623
Examiner Name	H. Zhou
Attorney Docket Number	143297.00101

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, to any international application that does not compy with the requirements of 35 U.S.C 371, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO on page 2.)

1. Submission required under 37 CFR 1.114 Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).
   - a. [ ] Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.
     - i. [ ] Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
     - ii. [ ] Other _____
   - b. [X] Enclosed
     - i. [X] Amendment/Reply
     - ii. [ ] Affidavit(s)/ Declaration(s)
     - iii. [ ] Information Disclosure Statement (IDS)
     - iv. [ ] Other _____

2. Miscellaneous
   - a. [ ] Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)
   - b. [ ] Other _____

3. Fees The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.
   - a. [ ] The Director is hereby authorized to charge the following fees, any underpayment of fees, or credit any overpayments, to Deposit Account No. 23-2185 .
     - i. [X] RCE fee required under 37 CFR 1.17(e)
     - ii. [X] Extension of time fee (37 CFR 1.136 and 1.17)
     - iii. [ ] Other _____
   - b. [ ] Check in the amount of $ _____ enclosed
   - c. [X] Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature		Date	October 7, 2016
Name (Print/Type)	Peter S. Weissman	Registration No.	40,220

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature			
Name (Print/Type)		Date	

143297.00101/103624751

PTO/AIA/22 (03-13)
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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional) 143297.00101
Application Number 14/352,727-Conf. #4023	Filed April 18, 2014
For A METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE	
Art Unit 2623	Examiner H. Zhou

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
[ ]	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
[ ]	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
[X]	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$ 700.00
[ ]	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
[ ]	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

[X] Applicant asserts small entity status. See 37 CFR 1.27.

[ ] Applicant certifies micro entity status. See 37 CFR 1.29
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

[ ] A check in the amount of the fee is enclosed.

[X] Payment by credit card. Form PTO-2038 is attached.

[ ] The Director has already been authorized to charge fees in this application to a Deposit Account.

[X] The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 23-2185 .

[X] Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

[ ] applicant.

[X] attorney or agent of record. Registration number 40,220 .

[ ] attorney or agent acting under 37 CFR 1.34. Registration number _____ .

Signature	October 7, 2016 Date
Peter S. Weissman Typed or printed name	(202) 772-5800 Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

[ ] * Total of 1 forms are submitted.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	)	Confirmation No. 4023
	)	
Alex BEZINGE	)	Group Art Unit: 2623
	)	
Serial No.: 14/352,727	)	Examiner: Hong ZHOU
	)	
Filed: April 18, 2014	)	Atty. Dkt. No.: 143297.00101
	)	

For: METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated April 14, 2016, kindly amend the above-identified patent application as follows:

Listing of Claims begins on page 2 of this paper.

Remarks/Arguments begin on page 9 of this paper.

Petitioner Samsung Ex-1004, 0453

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Currently Amended) A method combining gesture detection by an inertial sensor ~~accelerometer~~ and gesture detection with a touch panel for switching a wristwatch from a first power mode to a second power mode, wherein the inertial sensor comprises an accelerometer and a processor and/or other processing means, and wherein the wristwatch comprises a microcontroller controlling a display of indication on a digital matrix display of the wristwatch and a touch controller for interpreting touch signal provided by a touch panel underneath a cover glass and for converting said signals into command signal , the method comprising:

using the~~an~~ accelerometer of the inertial sensor ~~with embedded signal processing capabilities~~ for generating an acceleration signal used for detecting a gesture on ~~a~~ the cover glass of said wristwatch, while the microcontroller and the touch controller are in a sleep power mode;

using the processor and/or other processing means of the inertial sensor for discriminating between gesture and no gesture based on a direction of said acceleration signal and on a slope or frequency of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer,

Petitioner Samsung Ex-1004, 0454

in response to a detection of a gesture by said inertial sensor, waking up the touch controller;

using the touch controller for detecting a tap gesture on the cover glass with the touch panel;

waking up ~~a~~ the microcontroller in said wristwatch upon detection of a tap gesture by said touch controller~~accelerometer~~,

using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from the ~~a~~ touch panel ~~underneath said cover glass~~.

2. (Previously Presented) The method of claim 1, wherein the discrimination between gesture and no gesture is also based on a duration of said acceleration signal.

3. (Previously Presented) The method of claim 2, wherein the discrimination between gesture and no gesture is also based on an amplitude of said acceleration signal.

4. (Original) The method of claim 1, said step of discriminating between gesture and no gesture comprises determining said frequency and determining that there is no gesture if said frequency is not in a predetermined frequency range compatible with a tap.

Petitioner Samsung Ex-1004, 0455

5. (Original) The method of claim 1, said step of discriminating between gesture and no gesture comprises determining said direction and determining that there is no gesture if said direction is not substantially perpendicular to said cover glass.

6. (Canceled).

7. (Original) The method of claim 1, wherein said touch panel comprises a plurality of touch areas, said method comprising a step of applying a power supply sufficient for detecting a gesture to only a first subset of said touch areas.

8. (Previously Presented) The method of claim 1, wherein discrimination between gesture and no gesture depends on a duration between a detection signal from said accelerometer and a detection signal with said touch panel.

9. (Previously Presented) The method of claim 1, wherein said accelerometer is powered on when said wristwatch is in said first power mode, said method comprising a step of partially waking up said touch panel upon detection of a gesture by said accelerometer.

10. (Original) The method of claim 7, comprising a step of waking up only a subset of the complete area of said touch panel upon detection of a gesture by said accelerometer.

11. (Original) The method of claim 1, comprising a step of waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer and with said touch panel.

12. (Canceled)

Petitioner Samsung Ex-1004, 0456

13. (Original) The method of claim 1, said gesture being a tap or a double tap.

14. (Original) The method of claim 1, further comprising a step of detecting a wristturn with said accelerometer, and switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected.

15. (Previously Presented) The method of claim 14, said step of detecting a wristturn comprising:

detecting that an orientation of the wristwatch is in a first range;

detecting that the orientation of the wristwatch is then in a second range, different from said first range,

detecting that the wristwatch remains substantially immobile during a predetermined duration.

16. (Currently Amended) A wristwatch which can be operated in a plurality of power modes including a first power mode and a second power mode, comprising:

a display;

a microcontroller;

a touch panel underneath a cover glass of said wristwatch for detecting a gesture on said cover glass;

Petitioner Samsung Ex-1004, 0457

a touch controller for interpreting touch signal provided by the touch panel and for converting said signals into command signal;

an inertial sensor comprising an accelerometer and a processor and/or other processing means~~with embedded signal processing capabilities~~, said accelerometer being arranged for generating an acceleration signal and the processor and/or other processing means being arranged for discriminating between gesture and no gesture based on a direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and on a slope or frequency of said acceleration signal, while the microcontroller and the touch controller are in a sleep power mode;

wherein touch controller is commanded so as to be switched to said second power mode upon gesture detection by said inertial sensor and for detecting a tap gesture on the cover glass with the touch panel; and

wherein the~~a~~ microcontroller is arranged for controlling a display of indication on the display and commanded so as to be switched to said second power mode upon a tap gesture detection by said touch controller ~~accelerometer~~ and for discriminating between gesture and no gesture based at least on signals from said touch panel.

17. (Original) The wristwatch of claim 16, wherein said touch panel comprises a plurality of touch areas and powering means arranged for powering only a first subset of said

Petitioner Samsung Ex-1004, 0458

touch area upon detection of a gesture by said accelerometer, and for powering a larger subset in said second power mode.

18. (Currently Amended) A method for switching a wristwatch from a first power mode to a second power mode, comprising:

using an accelerometer for detecting a wristturn, and

switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected,

wherein said step of detecting a wristturn comprises:

detecting that the orientation of the wristwatch is in a first range;

detecting that the orientation of the wristwatch is then in a second range, different from said first range,

in response to a detection that the orientation of the wristwatch is in the second range, detecting that the wristwatch remains substantially immobile during a predetermined duration.

19. (Canceled)

20. (new) The method of claim 18, wherein

said first range is an angle range from 25° to 155° relatively to the horizontal, and/or said second range is an angle range from -25° to -75° relatively to the horizontal.

Petitioner Samsung Ex-1004, 0459

21. (new) The method of claim 18, wherein

said step of detecting that the orientation of the wristwatch is in a first range and/or in the second range comprises detecting that the position of the wristwatch is held within this first and/or second range for a defined time.

22. (new) The method of claim 18, wherein

said step of detecting that the orientation of the wristwatch is then in a second range comprises detecting that a display of the wristwatch is oriented towards a face of the user.

23. (new) The method of claim 18, wherein said steps of detecting that the orientation of the wristwatch is in a first range and then in a second range comprise:

in response of a detection of the orientation of the wristwatch is in the second range, checking if the orientation of the wristwatch was in the first range during a previous step.

Petitioner Samsung Ex-1004, 0460

REMARKS

In view of the above amendments and following remarks, favorable reconsideration is respectfully requested.

Interview Summary

A telephone interview was conducted with the Examiner on September 8, 2016. During the interview, the prior art and proposed amendments to the claims were discussed. The present Amendment supplements those arguments.

Claim Rejections - - 35 USC §103

Claims 1-3, 5, 8, 11, 13-14, 16 were rejected over HYSEK (WO2011000893, with the Examiner relying on US2012/0092383) in view of Holbein (US2011/0080349) and Shintani (US2010/0231777); claim 4 was rejected over HYSEK, Holbein, Fattah (US2009/0085865), and Verplaetse (US2002/0167699); claims 7, 9-10, 17 were rejected over HYSEK, Holbein, Shintani, and Nurmi (US2010/0265209); claim 15 was rejected over HYSEK, Holbein, Shintani, and Gritton (US2007/0176896); claim 18 was rejected over Fattah and Holbein; and claim 19 was rejected over Fattah, Holbein, and Gritton.

In response, the claims have been amended. Support for the changes to claims 1, 16 is found at least at paragraphs 0048, 0051, 0053, 0057, 0068, 0069, 0071, 0072, 0076 and Fig. 2 of the specification. Support for the changes to claim 18 is found at least at paragraphs 0035, 0081-

Petitioner Samsung Ex-1004, 0461

84, Figs. 7a-7c, and original claim 19. Support for new claims 20-23 is found at least at paragraphs 0081-82.

Claim 1 and 16

The Examiner cites HYSEK. HYSEK discloses a wristwatch comprising a display [0050], a microcontroller for controlling the display [0058] and an accelerometer [0107]. More precisely, HYSEK teaches a switching of a wristwatch from a first power mode to a second power mode by switching on/off the screen of the wristwatch, in response of a touch, a tap or double tap on the touch screen [0051].

HYSEK does not teach a method for switching a wristwatch from a first power mode to a second power mode combining a gesture detection by an inertial sensor and a gesture detection with a touch panel.

The Examiner further cites HOLBEIN. HOLBEIN's portable device comprises a processor 102, an accelerometer 136 and a touch-sensitive display 118 having an electronic controller 116 [0031] (Figure1).

The accelerometer 136 can comprise a built-in electronic controller [0084] or can be a digital accelerometer having built-in tap detection function [0085].

Petitioner Samsung Ex-1004, 0462

In paragraph [0102], HOLBEIN describes a method for powering-up a portable device that combines a gesture detection by the accelerometer and a gesture detection with the touch sensitive display.

HOLBEIN teaches that the detection of an inertial event by the accelerometer powers up the electronic controller of the touch-sensitive display for detecting a touch event has occurred or is in process.

HOLBEIN does not disclose a method for powering-up a portable device comprising:

- intermediate steps of:

  - in response of to a detection of a gesture by the inertial sensor, waking up a touch controller for interpreting touch signal provided by the touch-sensitive display; and

  - waking up the microcontroller in said wristwatch upon a detection of a tap gesture by the touch controller;

- discriminating between gesture and no gesture based on a direction of the acceleration signal and on a slope or frequency of the acceleration signal.

With respect to HOLBEIN teaching, the invention provides a more effective low power energy management. The discrimination based on a direction of said acceleration signal and on a slope or frequency of the acceleration signal reduces the occurrences of false-positive detection,

Petitioner Samsung Ex-1004, 0463

while the two-step waking-up inactivates then a number of these false-positive detections before to wake up the microcontroller.

The Examiner further cites Shintani. SHINTANI discloses an imaging device including a 3D accelerometer and a gesture detection method based on a direction and a 50 Hz component of acceleration signals captured on the outer covering of the digital camera [0047]-[0049].

SHINTANI does not teach anything about wristwatches, gestures acquisition on tactile screens and about methods for switching an apparatus from a first power mode to a second power mode. The method of a gesture acquisition by an accelerometer described in this document is only used in connection with digital cameras. SHINTANI does not indicate whether this method or a similar method is also appropriate for wristwatches.

The Examiner further cites FATTAH, VERPLAETSE, NURMI, and GRITTON in points 7-9 of the Office Action. FATTAH does not teach anything about gestures acquisition on tactile screens. VERPLAETSE and GRITTON are silent about wristwatches and methods for switching an apparatus from a first power mode to a second power mode.

NURMI teaches a method for touch-screen power reduction. The touch screen has a sleep mode wherein a small area within the whole touch screen is powered up for touch detection. NURMI does not teach anything about wristwatches and does not indicate whether this method or a similar method is also appropriate for wristwatches.

Petitioner Samsung Ex-1004, 0464

None of the above-cited documents discloses the method of amended claim 1, and the wristwatch of amended claim 16 respectively. In particular none of the above-mentioned documents discloses a portable device whose powering up comprises steps of and/or means for:

- in response of to a detection of a gesture by an inertial sensor, waking up a touch controller for interpreting touch signal provided by a touch panel; and

- waking up the microcontroller in said wristwatch upon a detection of a tap gesture by the touch controller.

Consequently, amended claim 1 and amended claim 16 have to be considered novel and non-obvious with respect to cited documents, in particular over HYSEK in view of HOLBEIN and in view of SHINTANI.

Claim 18

No teaching, nor motivation, nor incitation in prior art for executing a detection of stationary situation in response of a detection of the orientation of the wristwatch in a second range different from the first one.

In the event there are any questions relating to this Amendment or to the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that the prosecution of this application may be expedited.

Petitioner Samsung Ex-1004, 0465

Please charge any shortage or credit any overpayment of fees to BLANK ROME LLP, Deposit Account No. 23-2185 (Ref. 143297.00101). In the event that a petition for an extension of time is required to be submitted herewith and in the event that a separate petition does not accompany this response, Applicant hereby petitions under 37 CFR 1.136(a) for an extension of time for as many months as are required to render this submission timely. Any fee due is authorized above.

Respectfully submitted,

Date: October 7, 2016

By: _____
Peter S. Weissman
Reg. No. 40,220

BLANK ROME LLP
600 New Hampshire Ave., N.W.
Washington, D.C. 20037
Tel.: (202) 772-5805
Fax: (202) 572-8398

Petitioner Samsung Ex-1004, 0466

Electronic Patent Application Fee Transmittal

Application Number:	14352727
Filing Date:	18-Apr-2014
Title of Invention:	METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE
First Named Inventor/Applicant Name:	Alex Bezinge
Filer:	Peter S. Weissman/Keyla Clements
Attorney Docket Number:	BEZINGE-00101

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	700	700
Miscellaneous:				
RCE- 1st Request	2801	1	600	600
		Total in USD ($)		**1300**

Electronic Acknowledgement Receipt

EFS ID:	27152342
Application Number:	14352727
International Application Number:	
Confirmation Number:	4023
Title of Invention:	METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE
First Named Inventor/Applicant Name:	Alex Bezinge
Customer Number:	27557
Filer:	Peter S. Weissman/Keyla Clements
Filer Authorized By:	Peter S. Weissman
Attorney Docket Number:	BEZINGE-00101
Receipt Date:	07-OCT-2016
Filing Date:	18-APR-2014
Time Stamp:	12:17:35
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1300
RAM confirmation Number	100716INTEFSW12185700
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		14329700101RCEandAmendment.pdf	3009157 f4f4e027651183338b56805d1d748c7304f43a55	yes	16

Multipart Description/PDF files in .zip description

Document Description	Start	End
Request for Continued Examination (RCE)	1	1
Extension of Time	2	2
Amendment Submitted/Entered with Filing of CPA/RCE	3	3
Claims	4	10
Applicant Arguments/Remarks Made in an Amendment	11	16

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	32602 6bc4f803dbaf08ac7bfe74d33ff01db27572a4da	no	2

Warnings:

Information:

Total Files Size (in bytes):	3041759

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/352,727	Filing Date 04/18/2014	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	10/07/2016	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X $40 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $210 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/MONICA FRANCIS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/352,727	04/18/2014	Alex Bezinge	143297.00101	4023

27557 7590 11/28/2016

BLANK ROME LLP
1825 Eye Street NW
WASHINGTON, DC 20006-5403

EXAMINER
ZHOU, HONG

ART UNIT	PAPER NUMBER
2623	

NOTIFICATION DATE	DELIVERY MODE
11/28/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Belay@blankrome.com
WashingtonDocketing@blankrome.com

Petitioner Samsung Ex-1004, 0473

Office Action Summary	Application No. 14/352,727	Applicant(s) BEZINGE ET AL.	
	Examiner HONG ZHOU	Art Unit 2623	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/7/2016*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-5,7-11,13-18 and 20-23* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☒ Claim(s) *1-5, 7-11 and 13-17* is/are allowed.

7)☒ Claim(s) *18 and 20-23* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

Petitioner Samsung Ex-1004, 0474

DETAILED ACTION

1. The present application is being examined under the pre-AIA first to invent provisions.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/7/2016 has been entered.

Response to Amendment

3. Applicant's amendment filed on October 7, 2016 has been entered. Claims 1, 16 and 18 have been amended. Claims 6, 12 and 19 have been cancelled. Claims 20-23 have been added. Claims 1-5, 7-11, 13-18 and 20-23 are pending in this application.

Response to Arguments

4. Applicant's arguments with respect to claim 18 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

Claim Objections

5. Claims 18 and 21 are objected to because of the following informalities:

Petitioner Samsung Ex-1004, 0475

Claim 18 recites the limitations "detecting that the orientation of the wristwatch is in a first range; detecting that the orientation of the wristwatch is then in a second range". These limitations should be amended to read ---detecting that **an** orientation of the wristwatch is in a first range; detecting that **an** orientation of the wristwatch is then in a second range---.

Claim 21 recites the limitations "the position of the wristwatch". These limitations should be amended to read ---**the orientation** of the wristwatch---.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 18 and 20-22 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Fitzgerald et al. (US 2009/0195497) in view of Hinckley (US 2011/0264928).

Regarding claim 18, Fitzgerald discloses a method for switching a wrist watch from a first power mode to a second power mode (see Figs 4-5; [0045]-[0050], switching the display 18 of the wristwatch 10 from a first power mode to a second power mode), comprising:

Petitioner Samsung Ex-1004, 0476

using an accelerometer for detecting a wristtum (see Fig. 3; [0043],e.g., inertial sensor 648 can include a MEMS accelerometer to measure tilt movement of the wristmatch 10), and

switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected (see Fig. 4; turning on the display 18 when a rotational angle range has been detected),

wherein said step of detecting a wristtum comprises:

detecting that the orientation of the wristwatch is in a first range (Fig. 4; [0046], [0048], e.g., detecting that the orientation of the wristwatch 10 is in a reference orientation);

detecting that the orientation of the wristwatch is then in a second range, different from said first range (Fig. 4; e.g., detecting that the wristwatch 10 is within a predefined rotational angle range).

Fitzgerald does not disclose the method comprising: in response to a detection that the orientation of the wristwatch is in the second range, detecting that the wristwatch remains substantially immobile during a predetermined duration.

Hinckley discloses a method comprising: in response to a detection that an orientation of a mobile device is in a predefined range, detecting that the mobile device remains substantially immobile during a predetermined duration (see [0130]-[0131]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the teachings of Hinckley in the invention of Fitzgerald for detecting that the wristwatch maintains in a second range for a required interval before turning on the display of the wristwatch in order to prevent the display from turning on due to transient signals.

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Regarding claim 20, Fitzgerald in view of Hinckley discloses the method of claim 18. Fitzgerald further discloses wherein said second range is an angle range from -45° to +45° relatively to the horizontal (see Fig. 5; [0048], e.g., relative to the X axis). Fitzgerald further discloses that the angle range can be reconfigured by the user (see [0049]-[0050]).

Fitzgerald in view of Hinckley does not disclose wherein said second range is an angle range from -25° to -75° relatively to the horizontal.

However, it would have been obvious to one of ordinary skill in the art before the effective filing date of the invention to set an angle range from -25° to -75° relatively to the horizontal according to a user's choice and an experimental value so that a display is in a viewable range to allow the user to interact with a user interface application.

Regarding claim 21, Fitzgerald in view of Hinckley further discloses the method of claim 18, wherein said step of detecting that the orientation of the wristwatch is in a first range and/or in the second range comprises detecting that the position of the wristwatch is held within this first and/or second range for a defined time (see [0131] of Hinckley).

Regarding claim 22, Fitzgerald further discloses the method of claim 18. Wherein said step of detecting that the orientation of the wristwatch is then in a second range comprises detecting that a display of the wristwatch is oriented towards a face of the user (see [0048], e.g., detecting that the display is within a viewable range).

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8. Claim 23 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Fitzgerald et al. (US 2009/0195497) in view of Hinckley (US 2011/0264928), and further in view of Linjama et al. (US 2008/0229255) and Zalewski et al. (US 2006/0256081).

Regarding claim 23, Fitzgerald in view of Hinckley does not disclose the method of claim 18, wherein said steps of detecting that the orientation of the wristwatch is in a first range and then in a second range comprise: in response of a detection of the orientation of the wristwatch is in the second range, checking if the orientation of the wristwatch was in the first range during a previous step.

Linjama discloses a method comprising: detecting that a mobile device is in a first orientation; detecting that the mobile device is in a second orientation different from the first orientation, in response to a detection that the mobile device is in the second orientation, checking if the first orientation and the second orientation correspond to a predefined gesture (see Fig. 2; step S12; [0051]).

It would have been obvious to one of ordinary skill in the art before the effective fling date of the invention to use the teachings of Linjama in the invention of Fitzgerald in view of Hinckley for conducting a step to check if detected first orientation and second orientation of a wristwatch correspond to a predefined gesture in order to generate a control signal to switch the wristwatch from a first power mode to a second power mode when the predefined gesture has been detected.

Fitzgerald in view of Hinckley and Linjama does not specifically disclose checking if the first orientation and the second orientation correspond to a predefined gesture comprising checking if the first orientation of the wristwatch was in the first range during a previous step.

However, Zalewski discloses that in determining whether or not a gesture has been identified, a system may check to see if detected position and orientation falls within a predetermine range (see [0097]).

It would have been obvious to one of ordinary skill in the art before the effective filing date of the invention to use the teachings of Zalewski in the invention of Fitzgerald in view of Hinckley and Linjama for checking if detected first orientation was in a first range in a previous step in order to determine whether a predefined gesture has been detected.

Allowable Subject Matter

9. Claims 1-5, 7-11, and 13-17 are allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HONG ZHOU whose telephone number is (571)270-5372. The examiner can normally be reached on Monday through Friday 8:30 A.M. - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amare Mengistu can be reached on (571)272-7674. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HONG ZHOU/
Primary Examiner, Art Unit 2623

Notice of References Cited	Application/Control No. 14/352,727	Applicant(s)/Patent Under Reexamination BEZINGE ET AL.	
	Examiner HONG ZHOU	Art Unit 2623	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2006/0256081 A1	11-2006	Zalewski; Gary	A63F13/06	345/156
*	B	US-2008/0229255 A1	09-2008	Linjama; Jukka	G06F3/016	715/863
*	C	US-2009/0195497 A1	08-2009	Fitzgerald; Alissa M.	G06F1/3203	345/156
*	D	US-2011/0264928 A1	10-2011	Hinckley; Kenneth P.	G06F1/1626	713/300
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Petitioner Samsung Ex-1004, 0482

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14352727	BEZINGE ET AL.
	Examiner	**Art Unit**
	HONG ZHOU	2623

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/08/2015	04/08/2016	11/17/2016						
	1	✓	✓	=						
	2	✓	✓	=						
	3	✓	✓	=						
	4	✓	✓	=						
	5	✓	✓	=						
	6	-	-	-						
	7	✓	✓	=						
	8	✓	✓	=						
	9	✓	✓	=						
	10	✓	✓	=						
	11	✓	✓	=						
	12	-	-	-						
	13	✓	✓	=						
	14	✓	✓	=						
	15	✓	✓	=						
	16	✓	✓	=						
	17	✓	✓	=						
	18	✓	✓	✓						
	19	✓	✓	-						
	20			✓						
	21			✓						
	22			✓						
	23			✓						

Petitioner Samsung Ex-1004, 0483

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S209	1	"14352727"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/08 17:07
S210	168	(power adj mode) and (accelerometer same orientation same (device or terminal)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/08 17:52
S211	101	(power adj mode) and (accelerometer same ((turn$3 or rotation or tilt) near10 (device or terminal))) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/08 17:59
S212	559	(sleep$3 adj (mode or state)) and ((sensor or accelerometer) same ((turn$3 or rotation or tilt or orientation$1) near10 (device or terminal))) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/08 18:03
S213	103	(power adj consumption) and ((sensor or accelerometer) same (first with second with orientation$1)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/08 18:31
S214	72	(power adj consumption) and (orientation near10 range$1) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/08 18:38
S215	2	("20090195497").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/08 18:48

Petitioner Samsung Ex-1004, 0484

S216	3	("8344998").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/09 13:18
S217	31	("20010048364" | "20020130822" | "20050140933" | "20050243061" | "20050243062" | "20060022963" | "20060176268" | "20060286972" | "20070208544" | "20090079701" | "20100061593" | "20100079508" | "20100167686" | "20120007801" | "3944878" | "4272045" | "6118485" | "6244873" | "6606406" | "6925850" | "7519703").PN. OR ("8344998").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/11/09 13:18
S218	238	((orientation$1 or angle$1 or position$1) near10 (remain$1 or immobile) near10 (time or period or duration$1 or interval$1)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/09 13:23
S219	79	((maintain$1 or remain$1) near10 (orientation$1 or angle$1 or position$1) near10 (time$1 or period$1 or interval$1)) and ((sensor or accelerometer) same ((turn$3 or rotation or tilt or orientation$1) near10 (device or terminal))) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/09 13:34
S220	48	(station$4 near10 (orientation$1 or angle$1 or position$1) near10 (time$1 or period$1 or interval$1)) and ((sensor or accelerometer) same ((turn$3 or rotation or tilt or orientation$1) near10 (device or terminal))) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/09 13:53
S221	92	((orientation$1 or angle$1 or position$1) near10 remain$3 near10 (time$1 or period$1 or interval$1)) and ((sensor or accelerometer) same ((turn$3 or rotation or tilt or orientation$1) near10 (device or terminal))) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/09 13:56
S223	3211	((orientation$1 or angle$1 or position$1) with (time$1 or period$1 or interval$1) with (command or function)) and ((sensor or accelerometer) same ((turn$3 or rotation or tilt or orientation$1) near10 (device or terminal)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2016/11/09 14:07

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			IBM_TDB			
S224	137	S223 and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/09 14:07
S225	26	(detect$3 with orientation$1 with (immobile or maintain$3 or remain$3 or stationary) with (time$1 or period$1 or interval$1)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/09 14:14
S226	121	(detect$3 with orientation$1 with (device or terminal) with (immobile or maintain$3 or remain$3 or stationary) with (time$1 or period$1 or interval$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/09 14:29
S227	108	S226 not S225	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/09 14:30
S228	184	(orientation$1 with (device or terminal) with stationary with (time$1 or period$1 or interval$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/09 14:32
S230	2	("20090195497").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/11 17:36
S231	2	("20070176896").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/11 21:17
S232	340	((start$3 adj (orientation$1 or position$1))with (device or terminal)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/11 21:24
S233	32	((start$3 adj orientation$1)with (device or terminal)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR	US-PGPUB; USPAT; USOCR;	OR	OFF	2016/11/11 21:30

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		G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S234	6	((final adj orientation$1)with (device or terminal)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/11 21:32
S235	436	((first adj orientation$1)with (device or terminal)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/11 21:32
S236	84	((reference adj orientation$1)with (device or terminal)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/11 21:34
S237	84	((reference adj orientation$1)with (watch or device or terminal)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/11 21:34
S241	1	"14352727"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 16:27
S243	139	(((start$3 or initial) near3 (position or orientation)) same accelerometer) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 16:34
S244	205	((((position or orientation) near10 (terminal or device)) with gesture$1) same accelerometer) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 16:46
S245	2	(((step near10 (position or orientation) near10 (terminal or device)) with gesture$1) same accelerometer) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 16:47
S246	3	(((first or previous) adj step) near10	US-PGPUB;	OR	OFF	2016/11/16

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		(position or orientation) near10 (terminal or device)) and accelerometer$1 and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			16:48
S250	170	((detect$3 near10 orientation near10 (terminal or device)) with gesture$1) and accelerometer$1 and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 16:52
S251	1	(check$3 near10 (previous adj step)) and accelerometer$1 and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:08
S252	5	(check$3 near10 (previous adj step)) and accelerometer$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:08
S253	2	(check$3 near10 (previous adj step)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:10
S256	173	(valid adj gesture$1) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:16
S258	158	(((position or orientation) near10 (terminal or device)) with ((identif$3 or recogniz$4) near10 gesture$1)) and accelerometer$1 and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:23
S259	37	(previous adj step) and accelerometer$1 and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:24
S260	271	(previous adj step) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	OFF	2016/11/16 17:26

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			DERWENT; IBM_TDB			
S261	234	S260 not S259	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:26
S262	22	((default near3 (position or orientation)) same accelerometer) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:37
S263	225	((default near3 (position or orientation)) and (wrist or watch)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:40
S264	5	((default near3 (position or orientation)) same (wrist or watch)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:40
S265	107	(step with (default near3 (position or orientation))) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:42
S266	22	(gesture$1 with (default near3 (position or orientation))) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:44
S267	237	(default near3 (position or orientation)) and accelerometer$1 and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/16 17:45
S268	11	("20040100441" | "20090303204" | "20100060569" | "20100125816" | "20100136957" | "20100208057" | "20110221667" | "20110221777" | "20120032877" | "20120212410" | "6201554").PN. OR ("9213419").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/11/16 17:47
S269	59	((reference near3 (position or orientation)) same (wrist or watch)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR	US-PGPUB; USPAT; USOCR; FPRS;	OR	OFF	2016/11/16 17:50

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		G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	EPO; JPO; DERWENT; IBM_TDB			
S270	208	(verify$3 near10 step) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 10:05
S274	49	((check$3 or verify$3) with (orientation or position) with range$1) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 10:52
S275	8331	((check$3 or verify$3) near10 (initial or start$3) near10 (orientation or position))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 11:33
S276	51	S275 and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 11:33
S277	31	(check$3 or verify$3) near10 valid near10 gesture$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 11:36
S278	1808	(check$3 or verify$3) near10 valid near10 command$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 11:42
S279	15	S278 and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 11:42
S281	80	(check$3 or verify$3) with (position or orientation range) with (previous adj step)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 11:44
S282	80	(check$3 or verify$3) with (position or orientation or range) with (previous adj	US-PGPUB; USPAT;	OR	OFF	2016/11/17 11:44

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		step)	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S283	395	((check$3 or verify$3) near10 valid) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 12:54
S284	175	(valid adj gesture$1) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 12:59
S285	31	((check$3 or verify$3) near5 (previous or start$3) near5 (location$1 or position$1)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 13:15
S286	5	((check$3 or verify$3) near5 initial near5 (location$1 or position$1)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 13:21
S287	205	((initial or start$3) adj orientation) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 13:25
S288	498	(((initial or start$3 or first or default or reference) adj orientation) same (second adj orientation)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 13:34
S289	2	("20110264928").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 13:42
S290	632	(second adj orientation) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 14:04

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S291	4	("20090009478").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 14:26
S292	549	((check$3 or verify$3) adj step) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 14:39
S293	2	("20090195497").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 15:12
S294	49	(orientation with (angle adj range$1)) and ((G06F3/0416 OR G06F3/017 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203 OR G06F3/041 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/17 16:18

EAST Search History (Interference)

< This search history is empty>

11/ 22/ 2016 1:31:52 PM
C:\ Users\ hzhou\ Documents\ EAST\ Workspaces\ 14352727.wsp

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14352727	BEZINGE ET AL.
	Examiner	Art Unit
	HONG ZHOU	2623

CPC- SEARCHED		
Symbol	Date	Examiner
G06F3/014,G06F3/0416, G06F3/017, G06F3/0488, G06F1/3262, G06F1/1613, G06F1/3203, G06F3/041, G06F3/0488	6/4/15 & 8/10/15	HZ
G06F3/017, G06F1/3203, G06F1/324, G06F1/3296, G06F3/014, G06F3/0346	4/8/16	HZ
G06F3/0416, G06F3/017, G06F3/0488, G06F1/3262, G06F1/1613, G06F1/3203, G06F3/041, G06F3/0488	11/8/16-11/17/16	HZ

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
345	156-173	6/4/15-8/9/15	HZ
713	320-323	6/4/15	HZ
715	863	6/5/15	HZ
345	156-158	4/7/16	HZ

SEARCH NOTES		
Search Notes	Date	Examiner
East Search	6/4/15-8/10/15	HZ
Updated East Search	4/7/16-4/8/16	HZ
Updated East Search	11/8/16-11/17/16	HZ

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	)	Confirmation No. 4023
	)	
Alex BEZINGE	)	Group Art Unit: 2623
	)	
Serial No.: 14/352,727	)	Examiner: Hong ZHOU
	)	
Filed: April 18, 2014	)	Atty. Dkt. No.: 143297.00101
	)	

For: METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated November 28, 2016, kindly amend the above-identified patent application as follows:

Listing of Claims begins on page 2 of this paper.

Remarks/Arguments begin on page 8 of this paper.

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Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Previously Presented) A method combining gesture detection by an inertial sensor and gesture detection with a touch panel for switching a wristwatch from a first power mode to a second power mode, wherein the inertial sensor comprises an accelerometer and a processor and/or other processing means, and wherein the wristwatch comprises a microcontroller controlling a display of indication on a digital matrix display of the wristwatch and a touch controller for interpreting touch signal provided by a touch panel underneath a cover glass and for converting said signals into command signal, the method comprising:

using the accelerometer of the inertial sensor for generating an acceleration signal used for detecting a gesture on the cover glass of said wristwatch, while the microcontroller and the touch controller are in a sleep power mode;

using the processor and/or other processing means of the inertial sensor for discriminating between gesture and no gesture based on a direction of said acceleration signal and on a slope or frequency of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer.

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in response to a detection of a gesture by said inertial sensor, waking up the touch controller;

using the touch controller for detecting a tap gesture on the cover glass with the touch panel;

waking up the microcontroller in said wristwatch upon detection of a tap gesture by said touch controller,

using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from the touch panel.

2. (Previously Presented) The method of claim 1, wherein the discrimination between gesture and no gesture is also based on a duration of said acceleration signal.

3. (Previously Presented) The method of claim 2, wherein the discrimination between gesture and no gesture is also based on an amplitude of said acceleration signal.

4. (Original) The method of claim 1, said step of discriminating between gesture and no gesture comprises determining said frequency and determining that there is no gesture if said frequency is not in a predetermined frequency range compatible with a tap.

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5. (Original) The method of claim 1, said step of discriminating between gesture and no gesture comprises determining said direction and determining that there is no gesture if said direction is not substantially perpendicular to said cover glass.

6. (Canceled).

7. (Original) The method of claim 1, wherein said touch panel comprises a plurality of touch areas, said method comprising a step of applying a power supply sufficient for detecting a gesture to only a first subset of said touch areas.

8. (Previously Presented) The method of claim 1, wherein discrimination between gesture and no gesture depends on a duration between a detection signal from said accelerometer and a detection signal with said touch panel.

9. (Previously Presented) The method of claim 1, wherein said accelerometer is powered on when said wristwatch is in said first power mode, said method comprising a step of partially waking up said touch panel upon detection of a gesture by said accelerometer.

10. (Original) The method of claim 7, comprising a step of waking up only a subset of the complete area of said touch panel upon detection of a gesture by said accelerometer.

11. (Original) The method of claim 1, comprising a step of waking up a microcontroller in said wristwatch upon detection of a gesture by said accelerometer and with said touch panel.

12. (Canceled)

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13. (Original) The method of claim 1, said gesture being a tap or a double tap.

14. (Original) The method of claim 1, further comprising a step of detecting a wristturn with said accelerometer, and switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected.

15. (Previously Presented) The method of claim 14, said step of detecting a wristturn comprising:

detecting that an orientation of the wristwatch is in a first range;

detecting that the orientation of the wristwatch is then in a second range, different from said first range,

detecting that the wristwatch remains substantially immobile during a predetermined duration.

16. (Previously Presented) A wristwatch which can be operated in a plurality of power modes including a first power mode and a second power mode, comprising:

a display;

a microcontroller;

a touch panel underneath a cover glass of said wristwatch for detecting a gesture on said cover glass;

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a touch controller for interpreting touch signal provided by the touch panel and for converting said signals into command signal;

an inertial sensor comprising an accelerometer and a processor and/or other processing means, said accelerometer being arranged for generating an acceleration signal and the processor and/or other processing means being arranged for discriminating between gesture and no gesture based on a direction of said acceleration signal as measured by said accelerometer being a three dimensional accelerometer, and on a slope or frequency of said acceleration signal, while the microcontroller and the touch controller are in a sleep power mode;

wherein touch controller is commanded so as to be switched to said second power mode upon gesture detection by said inertial sensor and for detecting a tap gesture on the cover glass with the touch panel; and

wherein the microcontroller is arranged for controlling a display of indication on the display and commanded so as to be switched to said second power mode upon a tap gesture detection by said touch controller and for discriminating between gesture and no gesture based at least on signals from said touch panel.

17. (Original) The wristwatch of claim 16, wherein said touch panel comprises a plurality of touch areas and powering means arranged for powering only a first subset of said touch area upon detection of a gesture by said accelerometer, and for powering a larger subset in said second power mode.

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18-23. (Canceled)

Petitioner Samsung Ex-1004, 0500

REMARKS

In view of the above amendments and following remarks, favorable reconsideration is respectfully requested.

The Examiner indicates that claims 1-5, 7-11, 13-17 are allowed. By this Amendment, the rejected claims 18, 20-23 are canceled. Accordingly, only the allowed claims remain.

In the event there are any questions relating to this Amendment or to the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that the prosecution of this application may be expedited.

Please charge any shortage or credit any overpayment of fees to BLANK ROME LLP, Deposit Account No. 23-2185 (Ref. 143297.00101). In the event that a petition for an extension of time is required to be submitted herewith and in the event that a separate petition does not accompany this response, Applicant hereby petitions under 37 CFR 1.136(a) for an extension of time for as many months as are required to render this submission timely. Any fee due is authorized above.

Respectfully submitted,

Date: May 25, 2017

Electronic Signature: /Peter S. Weissman/
Peter S. Weissman
Reg. No. 40,220

BLANK ROME LLP
Tel.: (202) 772-5805
Fax: (202) 572-8398

Petitioner Samsung Ex-1004, 0501

Electronic Patent Application Fee Transmittal

Application Number:	14352727
Filing Date:	18-Apr-2014
Title of Invention:	METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE
First Named Inventor/Applicant Name:	Alex Bezinge
Filer:	Peter S. Weissman/Keyla Clements
Attorney Docket Number:	143297.00101

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	700	700
Miscellaneous:				
		Total in USD ($)		**700**

Electronic Acknowledgement Receipt	
EFS ID:	29317934
Application Number:	14352727
International Application Number:	
Confirmation Number:	4023
Title of Invention:	METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE
First Named Inventor/Applicant Name:	Alex Bezinge
Customer Number:	27557
Filer:	Peter S. Weissman/Keyla Clements
Filer Authorized By:	Peter S. Weissman
Attorney Docket Number:	143297.00101
Receipt Date:	25-MAY-2017
Filing Date:	18-APR-2014
Time Stamp:	17:21:21
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$700
RAM confirmation Number	052617INTEFSW17215900
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		14329700101Amendment.pdf	1861885 ac9f1746b46a10459f566c38940627e19d92d628	yes	10

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	1
	Extension of Time	2	2
	Amendment/Req. Reconsideration-After Non-Final Reject	3	3
	Claims	4	9
	Applicant Arguments/Remarks Made in an Amendment	10	10

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30841 d2bf5004bef77276f914b74a388730c3f81a23ed	no	2

Warnings:

Information:

Total Files Size (in bytes):	1892726

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: TRAN.LET
Document Description: Transmittal Letter

USED IN LIEU OF PTO/SB/21 (07-09)

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	14/352,727-Conf. #4023
Filing Date	April 18, 2014
First Named Inventor	Alex Bezinge
Art Unit	2623
Examiner Name	H. Zhou
Total Number of Pages in This Submission	
Attorney Docket Number	143297.00101

ENCLOSURES *(Check all that apply)*

- [ ] Fee Transmittal Form
  - [ ] Fee Attached
- [x] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [x] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [ ] Other Enclosure(s) (please identify below):

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	BLANK ROME LLP		
Signature	/Peter S. Weissman/		
Printed name	Peter S. Weissman		
Date	May 25, 2017	Reg. No.	40,220

143297.00101/105756201

PTO/AIA/22 (03-13)
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional) 143297.00101
Application Number 14/352,727-Conf. #4023	Filed April 18, 2014
For METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE	
Art Unit 2623	Examiner H. Zhou

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

	Fee	Small Entity Fee	Micro Entity Fee	
☐ One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☐ Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☒ Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$ 700.00
☐ Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐ Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☒ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

☒ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 23-2185 .

☒ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☒ attorney or agent of record. Registration number 40,220 .

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____ .

/Peter S. Weissman/ — Signature
May 25, 2017 — Date

Peter S. Weissman — Typed or printed name
(202) 772-5805 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of 1 forms are submitted.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/352,727	Filing Date 04/18/2014	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	05/25/2017	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 16	Minus	** 20	= 0	X $40 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $210 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
MINNIE JACKSON

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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UNITED STATES DEPARTMENT OF COMMERCE
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P.O. Box 1450
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www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

27557 7590 06/21/2017

BLANK ROME LLP
1825 Eye Street NW
WASHINGTON, DC 20006-5403

EXAMINER
ZHOU, HONG

ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 06/21/2017

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/352,727	04/18/2014	Alex Bezinge	143297.00101	4023

TITLE OF INVENTION: METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	09/21/2017

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

Petitioner Samsung Ex-1004, 0510

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

27557 7590 06/21/2017
BLANK ROME LLP
1825 Eye Street NW
WASHINGTON, DC 20006-5403

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/352,727	04/18/2014	Alex Bezinge	143297.00101	4023

TITLE OF INVENTION: METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	09/21/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
ZHOU, HONG	2623	345-173000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29
  NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27
  NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status.
  NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Petitioner Samsung Ex-1004, 0511

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/352,727	04/18/2014	Alex Bezinge	143297.00101	4023

27557 7590 06/21/2017

BLANK ROME LLP
1825 Eye Street NW
WASHINGTON, DC 20006-5403

EXAMINER	
ZHOU, HONG	
ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 06/21/2017

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Petitioner Samsung Ex-1004, 0512

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/352,727	Applicant(s) BEZINGE ET AL.	
	Examiner HONG ZHOU	Art Unit 2623	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the amendments filed on 5/25/2017*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-5,7-11 and 13-17*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/HONG ZHOU/
Primary Examiner, Art Unit 2623

Petitioner Samsung Ex-1004, 0514

Reasons for Allowance

1. The following is an examiner's statement of reasons for allowance

The primary reason for allowance is that the independent claims each recite "in response to a detection of a gesture by said inertial sensor, waking up the touch controller; using the touch controller for detecting a tap gesture on the cover glass with the touch panel; waking up the microcontroller in said wristwatch upon detection of a tap gesture by said touch controller". The closest prior art (see references cited) disclose a method combining gesture detection by an inertial sensor and gesture detection with a touch panel for switching a wristwatch from a power mode to a second power mode and the method further comprising: in response to a detection of a gesture by said inertial sensor, waking up a microcontroller; using the microcontroller for detecting a tap gesture on the cover glass with the touch panel; and using said microcontroller for detecting said gesture and for discriminating between gesture and no gesture based at least on signals from the touch panel. However, the prior art, either singularly or in combination, fails to teach and/or suggest all of the specifically claimed limitations together as recited.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Petitioner Samsung Ex-1004, 0515

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HONG ZHOU whose telephone number is (571)270-5372. The examiner can normally be reached on Monday through Friday 8:30 A.M. - 5PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amare Mengistu can be reached on (571)272-7674. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HONG ZHOU/
Primary Examiner, Art Unit 2623

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14352727	BEZINGE ET AL.
	Examiner	**Art Unit**
	HONG ZHOU	2623

CPC						
Symbol					**Type**	**Version**
G06F		3	/	017	F	2013-01-01
G04G		17	/	045	I	2013-01-01
G04G		19	/	12	I	2013-01-01
G04G		21	/	08	I	2013-01-01
G04C		3	/	002	I	2013-01-01
G06F		1	/	3203	I	2013-01-01
G06F		3	/	041	I	2013-01-01
			/			
			/			
			/			
			/			
			/			
			/			
			/			
			/			

CPC Combination Sets							
Symbol				**Type**	**Set**	**Ranking**	**Version**
			/				
			/				

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 15	
/HONG ZHOU/ Primary Examiner.Art Unit 2623 (Primary Examiner)	06/09/2017 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1a

Petitioner Samsung Ex-1004, 0517

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14352727	BEZINGE ET AL.
	Examiner	Art Unit
	HONG ZHOU	2623

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION	
CLASS	SUBCLASS	CLAIMED	NON-CLAIMED
		G 0 6 F 1 / 32 (2006.01.01)	
CROSS REFERENCE(S)		G 0 6 F 3 / 01 (2006.01.01)	
		G 0 6 F 3 / 041 (2006.01.01)	
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)		

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	15	
/HONG ZHOU/ Primary Examiner.Art Unit 2623	06/09/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1a

Petitioner Samsung Ex-1004, 0518

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14352727	BEZINGE ET AL.
	Examiner	**Art Unit**
	HONG ZHOU	2623

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	15	17												
2	2	-	18												
3	3	-	19												
4	4	-	20												
5	5	-	21												
-	6	-	22												
6	7	-	23												
8	8														
9	9														
7	10														
10	11														
-	12														
11	13														
12	14														
13	15														
14	16														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 15	
/HONG ZHOU/ Primary Examiner.Art Unit 2623 (Primary Examiner)	06/09/2017 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1a

Petitioner Samsung Ex-1004, 0519

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14352727	BEZINGE ET AL.
	Examiner	Art Unit
	HONG ZHOU	2623

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/08/2015	04/08/2016	11/17/2016	06/09/2017					
1	1	✓	✓	=	=					
2	2	✓	✓	=	=					
3	3	✓	✓	=	=					
4	4	✓	✓	=	=					
5	5	✓	✓	=	=					
	6	-	-	-	-					
6	7	✓	✓	=	=					
8	8	✓	✓	=	=					
9	9	✓	✓	=	=					
7	10	✓	✓	=	=					
10	11	✓	✓	=	=					
	12	-	-	-	-					
11	13	✓	✓	=	=					
12	14	✓	✓	=	=					
13	15	✓	✓	=	=					
14	16	✓	✓	=	=					
15	17	✓	✓	=	=					
	18	✓	✓	✓	-					
	19	✓	✓	-	-					
	20			✓	-					
	21			✓	-					
	22			✓	-					
	23			✓	-					

Petitioner Samsung Ex-1004, 0520

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L35	3	("20120092383").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/06/09 16:45
L36	9	(("20120092383") or ("20110080349") or ("20090085865")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/06/09 16:45
L40	135	(detect$3 same gesture$1 same (accelerometer or (inertal adj sensor))) and ((touch adj (display or panel)) or touchscreen) and ((power or sleep or idle) adj mode) AND ((G04C3/002 OR G04G17/045 OR G04G19/12 OR G04G21/08 OR G06F1/3203 OR G06F3/017 OR G06F3/041 OR G06F3/0416 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/06/09 17:05
L41	1	"14352727"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/06/09 17:07
L45	1	(gesture same (accelerometer or (inertal adj sensor)) same touch same controller same discriminat$3 same power same mode) AND ((G04C3/002 OR G04G17/045 OR G04G19/12 OR G04G21/08 OR G06F1/3203 OR G06F3/017 OR G06F3/041 OR G06F3/0416 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/06/09 17:23
L46	0	(gesture same (accelerometer or (inertal adj sensor)) same touch same controller same discriminat$3 same power same mode).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/06/09 17:23
L47	1	(gesture same (accelerometer or (inertal adj sensor)) same touch same controller same discriminat$3 same power same	US-PGPUB; USPAT; USOCR;	OR	OFF	2017/06/09 17:24

Petitioner Samsung Ex-1004, 0521

		mode)	FPRS; EPO; JPO; DERWENT; IBM_TDB			
L50	60	(Bezinge with Alex) or (Mohni with Adrian) or (Pfeifer with Daniel) or (Dogan with Musa)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/06/09 17:27
L51	1	(detect$3 same gesture$1 same (accelerometer or (inertal adj sensor))) and ((touch adj (display or panel)) or touchscreen) and ((power or sleep or idle) adj mode) and l50	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/06/09 17:27
S296	5	((power adj mode) same (wristwatch or (wrist adj watch) or watch)) and (accelerometer or (inertal adj sensor)) and ((touch adj (display or panel)) or touchscreen) AND ((G04C3/002 OR G04G17/045 OR G04G19/12 OR G04G21/08 OR G06F1/3203 OR G06F3/017 OR G06F3/041 OR G06F3/0416 OR G06F3/0488 OR G06F1/3262 OR G06F1/1613 OR G06F1/3203).CPC.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/06/08 18:09

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L48	0	(gesture same (accelerometer or (inertal adj sensor)) same touch same controller same discriminat$3 same power same mode).clm.	USPAT	OR	OFF	2017/06/09 17:24

6/9/2017 5:28:13 PM
C:\Users\hzhou\Documents\EAST\Workspaces\14352727.wsp

Petitioner Samsung Ex-1004, 0522

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14352727	BEZINGE ET AL.
	Examiner	Art Unit
	HONG ZHOU	2623

CPC- SEARCHED		
Symbol	Date	Examiner
G06F3/014,G06F3/0416, G06F3/017, G06F3/0488, G06F1/3262, G06F1/1613, G06F1/3203, G06F3/041, G06F3/0488	6/4/15 & 8/10/15	HZ
G06F3/017, G06F1/3203, G06F1/324, G06F1/3296, G06F3/014, G06F3/0346	4/8/16	HZ
G06F3/0416, G06F3/017, G06F3/0488, G06F1/3262, G06F1/1613, G06F1/3203, G06F3/041, G06F3/0488	11/8/16-11/17/16	HZ
G04C3/002, G04G17/045, G04G19/12, G04G21/08, G06F1/3203, G06F3/017, G06F3/041, G06F3/0416, G06F3/0488, G06F1/3262, G06F1/1613, G06F1/3203	6/8/17-6/9/19	HZ

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
345	156-173	6/4/15-8/9/15	HZ
713	320-323	6/4/15	HZ
715	863	6/5/15	HZ
345	156-158	4/7/16	HZ

SEARCH NOTES		
Search Notes	Date	Examiner
East Search	6/4/15-8/10/15	HZ
Updated East Search	4/7/16-4/8/16	HZ
Updated East Search	11/8/16-11/17/16	HZ
Updated East Search	6/8/17-6/9/17	HZ

Petitioner Samsung Ex-1004, 0523

INTERFERENCE SEARCH			
US Class/ CPC Symbol	**US Subclass / CPC Group**	**Date**	**Examiner**
Searched	all of the above CPC Group	6/9/17	HZ

Petitioner Samsung Ex-1004, 0524

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

27557 7590 06/21/2017
BLANK ROME LLP
1825 Eye Street NW
WASHINGTON, DC 20006-5403

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/352,727	04/18/2014	Alex Bezinge	143297.00101	4023

TITLE OF INVENTION: METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	09/21/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
ZHOU, HONG	2623	345-173000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 Blank Rome LLP
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Slyde Watch SA
(B) RESIDENCE: (CITY and STATE OR COUNTRY): Switzerland

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☒ Payment by credit card. Form PTO-2038 is attached.
☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 23-2185 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ Applicant certifying micro entity status. See 37 CFR 1.29
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
☐ Applicant asserting small entity status. See 37 CFR 1.27
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
☐ Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Peter S. Weissman/ Date September 21, 2017
Typed or printed name Peter S. Weissman Registration No. 40,220

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Petitioner Samsung Ex-1004, 0525

Electronic Patent Application Fee Transmittal

Application Number:	14352727
Filing Date:	18-Apr-2014
Title of Invention:	METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE
First Named Inventor/Applicant Name:	Alex Bezinge
Filer:	Peter S. Weissman/Keyla Clements
Attorney Docket Number:	143297.00101

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	480	480

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**480**

Electronic Acknowledgement Receipt	
EFS ID:	30438127
Application Number:	14352727
International Application Number:	
Confirmation Number:	4023
Title of Invention:	METHOD AND CIRCUIT FOR SWITCHING A WRISTWATCH FROM A FIRST POWER MODE TO A SECOND POWER MODE
First Named Inventor/Applicant Name:	Alex Bezinge
Customer Number:	27557
Filer:	Peter S. Weissman/Keyla Clements
Filer Authorized By:	Peter S. Weissman
Attorney Docket Number:	143297.00101
Receipt Date:	21-SEP-2017
Filing Date:	18-APR-2014
Time Stamp:	16:32:53
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$480
RAM confirmation Number	092217INTEFSW16333301
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	14329700101IssueFee.pdf	177048 67a2f3d25cd184263242143571752 2c14474d1b3	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30731 e5dbcd5263ee10e07a550302c39efe0af2f6cfbb	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	207779		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/352,727	10/31/2017	9804678	143297.00101	4023

27557 7590 10/11/2017

BLANK ROME LLP
1825 Eye Street NW
WASHINGTON, DC 20006-5403

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Alex Bezinge, Saviese, SWITZERLAND, Deceased;
Slyde Watch SA, Luins, SWITZERLAND;
Adrian Mohni, St-Gallen, SWITZERLAND;
Daniel Pfeifer, Anton Am Arlberg, AUSTRALIA;
Musa Dogan, Heerbrugg, SWITZERLAND;

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Petitioner Samsung Ex-1004, 0530

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:23-cv-00083	2/28/2023	for the Eastern District of Texas, Marshall Division

PLAINTIFF	DEFENDANT
Slyde Analytics LLC	Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	9,804,678	10/31/2017	Slyde Analytics LLC
2	10,198,085	2/5/2019	Slyde Analytics LLC
3	8,588,033	11/19/2013	Slyde Analytics LLC
4	9,651,922	5/16/2017	Slyde Analytics LLC
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

AO 120 (Rev. 08 10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:23-cv-00172	4/14/2023	for the Eastern District of Texas, Marshall Division

PLAINTIFF	DEFENDANT
Slyde Analytics LLC	Zepp Health Corporation

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	8,588,033	11/19/2013	Slyde Analytics LLC
2	9,651,922	5/16/2017	Slyde Analytics LLC
3	9,804,678	10/31/2017	Slyde Analytics LLC
4	10,198,085	2/5/2019	Slyde Analytics LLC
5	9,320,457	4/26/2016	Slyde Analytics LLC

In the above—entitled case, the following patent(s) trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy