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FEE TRANSMITTAL		Complete if known	
		Application Number	Unassigned
		Filing Date	March 28, 2016
☐ Applicant asserts small entity status. See 37 CFR 1.27.		First Named Inventor	Il-Hyung Chung et al.
☐ 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.		Examiner Name	Unassigned
		Art Unit	Unassigned
TOTAL AMOUNT OF PAYMENT (\$)		1,600.00	Practitioner Docket No. 4500-1-458

METHOD OF PAYMENT (check all that apply)

☐ Check ☒ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☒ Deposit Account Deposit Account Number: 502-470 Deposit Account Name: CHA & REITER, LLC.

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**

☒ Charge any additional fee(s) or underpayment of fee(s) ☐ Credit any overpayment of fee(s)
under 37 CFR 1.16 and 1.17

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)

Application Type	FILING FEES			SEARCH FEES			EXAMINATION FEES			Fees Paid (\$)
	U (\$)	S (\$)	M (\$)	U (\$)	S (\$)	M (\$)	U (\$)	S (\$)	M (\$)	
Utility	280	140*	70	600	300	150	720	360	180	1,600.00
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 (\$)	Multiple Dependent Claims	Fee (\$)	Fee Paid (\$)
20	-20 or HP = 0	x	=			
HP = highest number of total claims paid for, if greater than 20.						
Indep. Claims	Extra Claims	Fee (\$)	Fee Paid (\$)			
3	-3 or HP = 0	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)

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): _____

SUBMITTED BY

Signature	/Steve Cha/	Registration No. (Attorney/Agent) 44,069	Telephone 201-226-9245
Name (Print/Type)	Steve Cha	Date	March 28, 2016

This collection of information is required by 37 CFR 1.136. 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 30 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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UTILITY PATENT APPLICATION TRANSMITTAL (Only for new nonprovisional applications under 37 CFR 1.53(b))	Attorney Docket No.	4500-1-458
	First Named Inventor	Il-Hyung Chung et al.
	Title	APPARATUS AND METHOD FOR PROCESSING SIGNAL
	Express Mail Label No.	None

APPLICATION ELEMENTS <i>See MPEP chapter 600 concerning utility patent application contents.</i>	Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450
1. ☒ Fee Transmittal Form (PTO/SB/17 or equivalent)	ACCOMPANYING APPLICATION PAPERS
2. ☐ Applicant asserts small entity status. See 37 CFR 1.27	10. ☐ Assignment Papers (cover sheet & document(s)) Name of Assignee <u>Samsung Electronics Co., Ltd.</u>
3. ☐ Applicant certifies micro entity status. See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.	11. ☐ 37 CFR 3.73(c) Statement ☒ Power of Attorney (when there is an assignee)
4. ☒ Specification [Total Pages <u>27</u>] Both the claims and abstract must start on a new page. (See MPEP § 608.01(a) for information on the preferred arrangement)	12. ☐ English Translation Document (if applicable)
5. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets <u>8</u>]	13. ☐ Information Disclosure Statement (PTO/SB/08 or PTO-1449) ☐ Copies of citations attached
6. Inventor's Oath or Declaration [Total Pages <u>2</u>] (including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))	14. ☐ Preliminary Amendment
a. ☒ Newly executed (original or copy)	15. ☐ Return Receipt Postcard (MPEP § 503) (Should be specifically itemized)
b. ☐ A copy from a prior application (37 CFR 1.63(d))	16. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)
7. ☒ Application Data Sheet * See note below. See 37 CFR 1.76 (PTO/AIA/14 or equivalent)	17. ☐ Nonpublication Request Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
8. CD-ROM or CD-R in duplicate, large table, or Computer Program (Appendix) ☐ Landscape Table on CD	18. ☒ Other: <u>PTO/SB38 & PTO/SB39</u>
9. Nucleotide and/or Amino Acid Sequence Submission (if applicable, items a. – c. are required)	
a. ☐ Computer Readable Form (CRF)	
b. ☐ Specification Sequence Listing on:	
i. ☐ CD-ROM or CD-R (2 copies); or	
ii. ☐ Paper	
c. ☐ Statements verifying identity of above copies	

***Note:** (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS					
☒ The address associated with Customer Number: <u>33942</u> OR ☐ Correspondence address below					
Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	
Signature		/Steve Cha/		Date	
				March 28, 2016	
Name (Print/Type)		Steve Cha		Registration No. (Attorney/Agent)	
				44,069	

This collection of information is required by 37 CFR 1.53(b). 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 1.11 and 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.

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		APPARATUS AND METHOD FOR PROCESSING SIGNAL		
First Named Inventor/Applicant Name:		Il-Hyung CHUNG		
Filer:		Steve S. Cha/Jeryl Bizzoco		
Attorney Docket Number:		4500-1-458		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
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 (\$)				1600

Electronic Acknowledgement Receipt	
EFS ID:	25319532
Application Number:	15082408
International Application Number:	
Confirmation Number:	5081
Title of Invention:	APPARATUS AND METHOD FOR PROCESSING SIGNAL
First Named Inventor/Applicant Name:	Il-Hyung CHUNG
Customer Number:	33942
Filer:	Steve S. Cha/Jeryl Bizzoco
Filer Authorized By:	Steve S. Cha
Attorney Docket Number:	4500-1-458
Receipt Date:	28-MAR-2016
Filing Date:	
Time Stamp:	14:56:35
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 1600
RAM confirmation Number	1180
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	Application Data Sheet	4500-1-458_ApplicationDataSheet.pdf	1823365	no	9
			ebf0cd55451cafdee6f930dbec69062c58430adb		
Warnings:					
Information:					
2	Oath or Declaration filed	4500-1-458_Declaration.pdf	70724	no	2
			6d5497ce04863821928309cc30feb43d31bde870		
Warnings:					
Information:					
3	Specification	4500-1-458_Specification.pdf	182871	no	27
			b2956660d4b8d5bc7dc85e3e82c884b86681aed0		
Warnings:					
Information:					
4	Drawings-only black and white line drawings	4500-1-458_Figures.pdf	389053	no	8
			59f340dd16e5f7d10e698e09dc9836c4415c9ec8		
Warnings:					
Information:					
5	Request for USPTO to retrieve priority docs	4500-1-458_sb0038_RequestforUSPTOtoRetrievePriorityDocs.pdf	173547	no	1
			0979c76430578411b0c1700695feb552d83d5812		
Warnings:					
Information:					
6	Auth or Resc of Auth to Access Appl by DAS/PDX Office	4500-1-458_sb0039_AuthOrRescOfAuthToAccessApplnbyDAS_PDXOffice.pdf	102294	no	2
			b4af77017c5d4d9c903e8e357674f4d7453cb0b4		
Warnings:					
Information:					
7	Power of Attorney	4500-1-458_PowerOfAttorney.pdf	140135	no	2
			e571f3cd8d0128d4fed0a9b016b25d41f584036		
Warnings:					
Information:					

8	Transmittal of New Application	4500-1-458_FeeTransmittal.pdf	169847 b57aeb938b2574163793f21cce65ee9ee0bf2171	no	1
Warnings:					
Information:					
9	Transmittal of New Application	4500-1-458_UtilityTransmittal.pdf	191419 5f8c371d23bf1a6149490b3733019c983d2e83e9	no	1
Warnings:					
Information:					
10	Fee Worksheet (SB06)	fee-info.pdf	35272 0517c478cb1e4c493295843184c9c408dc8c9728	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			3278527		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.					

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4500-1-458
		Application Number	
Title of Invention	APPARATUS AND METHOD FOR PROCESSING SIGNAL		
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	
	I-Hyung		CHUNG		
Residence Information (Select One) US Residency • Non US Residency Active US Military Service					
City	Gyeonggi-do		Country of Residence ⁱ	KR	
Mailing Address of Inventor:					
Address 1	#1303-1101, 430, Sumogwon-ro, Osan-si				
Address 2					
City	Gyeonggi-do		State/Province		
Postal Code		Country ⁱ	KR		
Inventor	2				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Cheolho		LEE		
Residence Information (Select One) US Residency • Non US Residency Active US Military Service					
City	Gyeonggi-do		Country of Residence ⁱ	KR	
Mailing Address of Inventor:					
Address 1	#8707-701, 70, Wellbeing town-ro, Yeongtong-gu,				
Address 2	Suwon-si				
City	Gyeonggi-do		State/Province		
Postal Code		Country ⁱ	KR		
Inventor	3				Remove
Legal Name					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4500-1-458
		Application Number	
Title of Invention	APPARATUS AND METHOD FOR PROCESSING SIGNAL		

Prefix	Given Name	Middle Name	Family Name	Suffix
	Dae-Woong		KIM	
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service				
City	Gyeonggi-do	Country of Residence ⁱ	KR	

Mailing Address of Inventor:

Address 1	#1108-1002, 41, Heungdeokjungang-ro 105beon-gil,			
Address 2	Giheung-gu, Yongin-si			
City	Gyeonggi-do	State/Province		
Postal Code		Country ⁱ	KR	
Inventor	4	Remove		
Legal Name				

Prefix	Given Name	Middle Name	Family Name	Suffix
	Shin-Ho		KIM	
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service				
City	Gyeonggi-do	Country of Residence ⁱ	KR	

Mailing Address of Inventor:

Address 1	#101-2002, 8, Jeonjunami-gil, Uiwang-si			
Address 2				
City	Gyeonggi-do	State/Province		
Postal Code		Country ⁱ	KR	
Inventor	5	Remove		
Legal Name				

Prefix	Given Name	Middle Name	Family Name	Suffix
	Wonseob		KIM	
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service				
City	Seoul	Country of Residence ⁱ	KR	

Mailing Address of Inventor:

Address 1	#205, 7-5, Hoenamu-ro 28ga-gil, Yongsan-gu			
Address 2				
City	Seoul	State/Province		
Postal Code		Country ⁱ	KR	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4500-1-458
		Application Number	
Title of Invention	APPARATUS AND METHOD FOR PROCESSING SIGNAL		

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	33942		
Email Address	cha@chareiter.com	Add Email	Remove Email

Application Information:

Title of the Invention	APPARATUS AND METHOD FOR PROCESSING SIGNAL		
Attorney Docket Number	4500-1-458	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4500-1-458
		Application Number	
Title of Invention	APPARATUS AND METHOD FOR PROCESSING SIGNAL		
Please Select One:	☒ Customer Number	US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	83942		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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" field blank.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

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. 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(i)(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).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)	Remove
10-2015-0046260	KR	2015-04-01		
Additional Foreign Priority Data may be generated within this form by selecting the Add button.				Add

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.
--

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4500-1-458
		Application Number	
Title of Invention	APPARATUS AND METHOD FOR PROCESSING SIGNAL		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is 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 State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4500-1-458
		Application Number	
Title of Invention	APPARATUS AND METHOD FOR PROCESSING SIGNAL		

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		Remove
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	Samsung Electronics Co., Ltd.		
Mailing Address Information For Applicant:			
Address 1	129 Samsung-ro, Yeongtong-gu, Suwon-si		
Address 2			
City	Gyeonggi-do	State/Province	
Country	KR	Postal Code	16677
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button. Add			

Assignee Information including Non-Applicant Assignee 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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4500-1-458
		Application Number	
Title of Invention	APPARATUS AND METHOD FOR PROCESSING SIGNAL		

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As a below named inventor (s), I hereby declare that:

My residence and post office address are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

APPARATUS AND METHOD FOR PROCESSING SIGNAL

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 above-identified application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 USC 1001 by fine or imprisonment of not more than five (5) years, or both.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I am aware of the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information that became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

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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 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 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.

I (we) hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the

application or any patent issued thereon.

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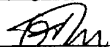
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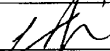
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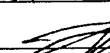
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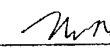
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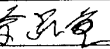
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APPARATUS AND METHOD FOR PROCESSING SIGNAL

CLAIM OF PRIORITY

5 This application claims priority under 35 U.S.C. §119(a) to Korean Application
Serial No. 10-2015-0046260, which was filed in the Korean Intellectual Property Office
on April 1, 2015, the entire content of which is hereby incorporated by reference.

TECHNICAL FIELD

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The present disclosure relates to electronic devices in general, and more particularly to an apparatus and a method for processing a signal in an electronic device.

BACKGROUND

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In general, electronic devices have various functions and can perform a complex function. The electronic devices may access each other and exchange signals. For example, the electronic devices may access each other wirelessly or through a wire. That is, the electronic devices may access each other through a cable. The electronic
20 devices may use various types of interfaces. That is, the electronic devices may include ports, and the ports may be connected through the cable. The ports of the electronic devices may have various interface structures. Accordingly, the electronic devices may exchange signals through the cable.

However, the electronic devices have a problem in that the access is not easy.
25 That is, according to interface structures of the electronic devices, the cable is determined. This is because, for the access of the electronic device, the cable should support all of the interface structures of the electronic devices. Accordingly, if users of the electronic devices do not have proper cables, the electronic devices cannot access each other. Therefore, the use efficiency of the electronic devices is low and the
30 convenience of the users is also low.

SUMMARY

According to aspects of the disclosure, a method is provided in an electronic device having an interface unit, comprising: selecting a first pin set from a plurality of pin sets that are part of the interface unit, wherein the first pin set is associated with a first communication channel; grounding a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel; and processing a signal for the first pin set.

According to aspects of the disclosure, an apparatus is provided comprising: an interface unit comprising a plurality of pin sets; a signal processing unit for processing a signal; a grounding unit for grounding at least one of the plurality of pin sets; and at least one controller configured to: select a first pin set from the plurality of pin sets, wherein the first pin set is associated with a first communication channel; ground a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel; and process a signal for the first pin set.

A non-transitory computer-readable medium storing one or more instructions which when executed by an electronic device cause the electronic device to perform a method comprising the steps of: selecting a first pin set from a plurality of pin sets that are part of an interface unit, wherein the first pin set is associated with a first communication channel; grounding a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel; and processing a signal for the first pin set.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other aspects, features, and advantages of the present disclosure will be more apparent from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a block diagram of an example of a communication system, according to aspects of the disclosure;

FIG. 2 is a block diagram of the communication system of FIG. 1, according to aspects of the disclosure;

FIG 3 is a block diagram of an example of an electronic device, according to aspects of the disclosure;

FIG 4 is a block diagram of an example of an interface, according to aspects of the disclosure;

5 FIG 5 is a block diagram of an example of a controller, according to aspects of the disclosure;

FIG 6 is a circuit diagram of an example of a connection unit, according to aspects of the disclosure;

10 FIG 7 is a flowchart of an example of a process, according to aspects of the disclosure; and

FIG 8 is a flowchart of an example of a process, according to aspects of the disclosure.

DETAILED DESCRIPTION

15

Hereinafter, embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. Here, it is noted that identical reference numerals denote the same structural elements in the accompanying drawings. FIG 1 is a block diagram of an example of a communication system, according to aspects of the disclosure. More particularly, as illustrated in FIG 1, a communication system 10 including an electronic device 110 and an electronic device 120. The electronic devices 110 and 120 may be the same or different from each other.

20

The electronic devices 110 and 120 may connect to each other and exchange signals. The electronic devices 110 and 120 may communicate through a communication network. Additionally or alternatively, the electronic devices 110 and 120 may connect to each other through a wired connection. The electronic devices 110 and 120 may connect to each other through a cable 200. The electronic devices 110 and 120 may have a signal interface structure. The cable 200 may support the single interface structure. For example, when the electronic devices 110 and 120 are the same, the electronic devices 110 and 120 may have the same interface structure. In instances in which the electronic devices 110 and 120 are different, the electronic devices 110 and 120 may have the same interface structure.

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FIG 2 is a block diagram of the communication system of FIG 1, according to aspects of the disclosure. More particularly, as illustrated in FIG 2, the first electronic device 110 and the second electronic device 120 may connect to each other and exchange signals. For example, the first electronic device 110 and the second
5 electronic device 120 may connect to each other via a wired connection. The first electronic device 110 and the second electronic device 120 may connect to each other through the cable 200.

The cable 200 may comport to an interface that is supported by both the first electronic device 110 and the second electronic device 120. In this regard, the first
10 electronic device 110 includes a first interface unit 111 and the second electronic device 120 includes a second interface unit 121. For example, the first interface unit 111 and the second interface unit 121 have a single interface structure. The cable 200 may support the single interface structure. For example, when the first electronic device
15 110 and the second electronic device 120 are the same, the first interface unit 111 and the second interface unit 121 may have the same interface structure. When the first electronic device 110 and the second electronic device 120 are different, the first interface unit 111 and the second interface unit 121 may have the same interface structure.

Between the first electronic device 110 and the second electronic device 120, a
20 plurality of communication channels 210 and 220 may be formed. That is, the first interface unit 111 and the second interface unit 121 may provide the communication channels 210 and 220. Further, the cable 200 may support the communication channels 210 and 220. The communication channels 210 and 220 may include detection paths 211 and 221, transmission paths 213 and 223, and reception paths 215 and 225,
25 respectively. The detection paths 211 and 221 may be used to detect the connection between the first electronic device 110 and the second electronic device 120 in the communication channels 210 and 220. The transmission paths 213 and 223 may be used to transmit signals from the second electronic device 120 to the first electronic device 110. The reception paths 215 and 225 may be used to transmit signals from the
30 first electronic device 110 to the second electronic device 120.

Further, the first electronic device 110 may use both the communication channels 210 and 220. For example, the first electronic device 110 may use one of the

communication channels 210 and 220 to exchange communications with the second electronic device 120. The first electronic device 110 may detect that it is connected to the second electronic device 120 through the detection paths 211 and 221. Further, the first electronic device 110 may receive signals from the second electronic device 120 through the transmission paths 213 and 223. Additionally or alternatively, the first electronic device 110 may transmit signals to the second electronic device 120 through the reception paths 215 and 225.

Additionally or alternatively, the second electronic device 120 may use one of the communication channels 210 and 220. That is, the second electronic device 120 may use one of the communication channels 210 and 220 to exchange communications with the first electronic device 110. The second electronic device 120 may detect that it is connected to the first electronic device 110 through one of the detection paths 211 and 221. Further, the second electronic device 120 may transmit a signal to the first electronic device 110 through one of the transmission paths 213 and 223. Additionally or alternatively, the second electronic device 120 may receive a signal from the first electronic device 110 through one of the reception paths 215 and 225.

FIG 3 is a block diagram of an example of an electronic device, according to aspects of the disclosure. More particularly, as illustrated in FIG 3, a signal processing device 300 according to the present embodiment includes a communication unit 310, an input unit 320, a display unit 330, an interface unit 340, a power supply unit 350, a grounding unit 360, a storage unit 370, a controller 380, and an audio processing unit 390.

The communication unit 310 may include a wireless communication unit. For example, the communication unit 310 may communicate with an external device through various communication schemes. In this regard, the communication unit 310 may connect to at least one of a mobile communication network and a data communication network. Additionally or alternatively, the communication unit 310 may perform short-range communications. The communication unit 310 may include an antenna (ANT) 311. For example, the external device may include an electronic device, a base station, a server, and a satellite. The communication schemes may include Long Term Evolution (LTE), Wideband Code Division Multiple Access (WCDMA), Global System for Mobile Communications (GSM), Wi-Fi, Bluetooth, and

Near Field Communications (NFC).

The input unit 320 generates input data in the signal processing device 300. For example, the input unit 320 may generate input data in accordance with a user input of the signal processing unit 300. The input unit 320 may include at least one input
5 means. The input unit 320 may include a keypad, a dome switch, a physical button, a touch panel, a jog & shuttle, and a sensor.

The display unit 330 outputs display data in the signal processing device 300. The display unit 330 may include a Liquid Crystal Display (LCD), a Light Emitting Diode (LED) display, an Organic LED (OLED) display, a Micro Electro Mechanical
10 System (MEMS) display, and an electronic paper display. The display unit 330 may include a plurality of light emitting diodes. The display unit 330 may be coupled with the input unit 320 to be implemented as a touch screen.

The interface unit 340 provides an interface for the signal processing device 300. For example, the interface unit 340 may have a single interface structure. To this end,
15 the interface unit 340 may be connected to the external device through the cable 200.

FIG 4 is a block diagram of an example of an interface, according to aspects of the disclosure. More particularly, as illustrated in FIG 4, the interface unit 340 of the signal processing device 300 according to the present embodiment may include a plurality of detection pins 411 and 413, a plurality of communication pin sets 420, 430,
20 440, 451, and 453, a plurality of power supply pins 461, 463, 465, and 467, and a plurality of ground pins 471, 473, 475, and 477. For example, an interface structure of the interface unit 340 is vertically symmetrical and horizontally symmetrical. The interface structure of the interface unit 340 may include twelve columns (labeled A and B) and two rows (labeled 1 through 12), such that pin addresses may be formed by
25 concatenating the pins' respective row and column labels. For example, the pin addresses may include A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, and B12.

The detection pins 411 and 413 are provided to detect a connection to an external device by the signal processing device 300. That is, the detection pins 411
30 and 413 are provided to determine the respective states of the communication channels 210 and 220. For example, the detection pins 411 and 413 detect the communication channels 210 and 220. When the signal processing device 300 forms the

communication channels 210 and 220 with the external device, one of the detection pins 311 and 314 may detect one of the communication channels 210 and 220.

5 The detection pins 411 and 413 include a first detection pin 411 and a second detection pin 413. The first detection pin 411 and the second detection pin 413 are vertically and horizontally symmetrical with respect to the center of the interface unit 340. For example, the first detection pin 411 and the second detection pin 413 may be arranged in A5 and B5. One of the first detection pin 411 or the second detection pin 413 may be an active detection pin, and the other may be an inactive detection pin. The active detection pin may be activated to indicate that one of the communication
10 channels 210 and 220 are used to form a connection with an external device. The active detection pin may identify the first communication channel 210 and the second communication channel 220. For example, the active detection pin may detect that one of the first communication channel 210 and the second communication channel 220 are used to form a connection with an external device. The inactive detection pin may
15 be deactivated and may not be used for detecting the state of the communication channels 210 and 220.

The communication pin sets 420, 430, 440, 451, and 453 are provided to exchange signals in the signal processing device 300. That is, the communication pin sets 420, 430, 440, 451, and 453 transmit or receive signals. For example, at least one
20 of the communication pin sets 420, 430, 440, 451, and 453 may transmit or receive signals.

The communication pin sets 420, 430, 440, 451, and 453 may include a first communication pin set 420, a second communication pin set 430, a third communication pin set 440, and fourth communication pin sets 451 and 453. The first
25 communication pin set 420 and the second communication pin set 430 may have the same transmission rate. Additionally or alternatively, the third communication pin set 440 and the fourth communication pin sets 451 and 453 may have transmission rates that are different from those of the first communication pin set and the second communication pin set.

30 The first communication channel 210 may be allocated to the first communication pin set 420. The first communication pin set 420 may include a first transmission pin set 421 and a first reception pin set 425. The first communication pin

set 420 may have a predetermined transmission rate. The first transmission pin set 421 may include a first positive transmission pin 422 and a first negative transmission pin 424. The first reception pin set 425 may include a first positive reception pin 426 and a first negative reception pin 428. The first transmission pin set 421 may transmit
5 signals through the first communication channel 210. The first positive transmission pin 422 may transmit a positive type signal through the first transmission path 213, and the first negative transmission pin 424 may transmit a negative type signal through the first transmission path 213. Additionally or alternatively, the first reception pin set 425 may receive signals through the first communication channel 210. The first positive
10 reception pin set 426 may receive a positive type signal through the first reception path 215, and the first negative reception pin 428 may receive a negative type signal through the first reception path 215.

The second communication channel 220 may be allocated to the second communication pin set 430. The second communication pin set 430 may include a
15 second transmission pin set 431 and a second reception pin set 435. The second communication pin set 430 may have the same transmission rate as that of the first communication pin set 420. The second transmission pin set 431 may include a second positive transmission pin 432 and a second negative transmission pin 434. The second reception pin set 435 may include a second positive reception pin 436 and a
20 second negative reception pin 438. The second transmission pin set 431 may transmit signals through the second communication channel 220. The second positive transmission pin 432 may transmit a positive type signal through the second transmission path 223, and the second negative transmission pin 434 may transmit a negative type signal through the second transmission path 223. Additionally or
25 alternatively, the second reception pin set 435 may receive signals through the second communication channel 220. The second positive reception pin 436 may receive a positive type signal through the second reception path 225, and the second negative reception pin 438 may receive a negative type signal through the second reception path 225.

30 The first communication pin set 420 and the second communication pin set 430 are vertically and horizontally symmetrical with respect to the center of the interface unit 340. That is, the first transmission pin set 421 and the second transmission pin set

431 may be vertically and horizontally symmetrical with respect to the center of the interface unit 340. More specifically, the first positive transmission pin 422 and the second positive transmission pin 432 may be vertically and horizontally symmetrical with respect to the center of the interface unit 340, and the first negative transmission pin 424 and the second negative transmission pin 434 may be vertically and horizontally symmetrical with respect to the center of the interface unit 340. For example, the first positive transmission pin 422 and the second positive transmission pin 432 may be arranged in A2 and B2, and the first negative transmission pin 424 and the second negative transmission pin 434 may be arranged in A3 and B3. Further, the first reception pin set 425 and the second reception pin set 435 may be vertically and horizontally symmetrical with respect to the center of the interface unit 340. More specifically, the first positive reception pin 426 and the second positive reception pin 436 may be vertically and horizontally symmetrical with respect to the center of the interface unit 340, and the first negative reception pin 428 and the second negative reception pin 438 may be vertically and horizontally symmetrical with respect to the center of the interface unit 340. For example, the first positive reception pin 426 and the second positive reception pin 436 may be arranged in B11 and A11, and the first negative reception pin 428 and the second negative reception pin 438 may be arranged in B10 and A10.

20 A third communication channel (not shown) may be allocated to the third communication pin set 440. The third communication channel may be different from the first communication channel 210 and the second communication channel 220. The third communication pin set 440 may have a transmission rate different from that of the first communication pin set 420 and the second communication pin set 430. The third communication pin set 440 may include two positive communication pins 441 and 443 and two negative communication pins 445 and 447. The positive communication pins 441 and 443 may transmit and receive positive type signals through the third communication channels. The negative communication pins 445 and 447 may transmit and receive negative type signals through the third communication channel.

30 The positive communication pins 441 and 443 may be vertically and horizontally symmetrical with respect to the center of the interface unit 340. For example, the positive communication pins 441 and 443 may be arranged in A6 and B6. Further, the

negative communication pins 445 and 447 may be vertically and horizontally symmetrical with respect to the center of the interface unit 340. For example, the negative communication pins 445 and 447 may be arranged in A7 and B7.

5 The fourth communication pin sets 451 and 453 in the signal processing device 300 support the interface with the external device. The fourth communication pin sets 451 and 453 may support the third communication pin set 440. That is, when the third communication pin set 440 transmits or receives a signal, the fourth communication pin sets 451 and 453 may transmit or receive an additional signal. Thus, in some implementations, the fourth communication pin sets 451 and 453 may have the same
10 transmission rate as that of the third communication pin set. The fourth communication pin sets 451 and 453 may include a first sub pin 451 and a second sub pin 453. The first sub pin 451 and the second sub pin 453 may be vertically and horizontally symmetrical with respect to the center of the interface unit 340. For example, the first sub pin 451 and the second sub pin 453 may be arranged in A8 and B8.

15 The power supply pins 461, 463, 465, and 467 are provided to receive power in the signal processing device 300. The power supply pins 461, 463, 465, and 467 may receive power for driving the signal processing device 300. The power supply pins 461, 463, 465, and 467 may be vertically and horizontally symmetrical with respect to the center of the interface unit 340. For example, the power supply pins 461, 463, 465,
20 and 467 may be arranged in A4, A9, B4, and B9.

 The ground pins 471, 473, 475, and 477 may be provided for a ground connection in the signal processing device 300. The ground pins 471, 473, 475, and 477 may ground the detection pins 411 and 413 and the power supply pins 461, 463, 465, and 467. The ground pins 471, 473, 475, and 477 may be vertically and
25 horizontally symmetrical with respect to the center of the interface unit 340. For example, the ground pins 471, 473, 475, and 477 may be arranged in A1, A12, B1, and B12.

 The power supply unit 350 supplies power to the signal processing device 300. The power supply unit 350 may receive power from the power supply pins 461, 463, 465, and 467 of the interface unit 340. Further, the power supply unit 350 may supply
30 power to the components of the signal processing device 300.

 The grounding unit 360 grounds the signal processing device 300. The

grounding unit 360 may ground the elements of the signal processing device 300. Further, the grounding unit 360 may be connected to the ground pins 471, 473, 475, and 477 of the interface unit 340.

The storage unit 370 may include any suitable type of volatile or non-volatile
5 memory, such as Random-access Memory (RAM), Read-Only Memory (ROM), Network Accessible Storage (NAS), cloud storage, a Solid State Drive (SSD), etc. The storage unit 370 stores operation programs of the signal processing device 300. The storage unit 370 may store a program for processing a signal of one of the communication channels 210 and 220. The storage unit 370 may store a program for
10 connecting the other communication channel 210 or 220 to the grounding unit 360. In some implementations, the storage unit 370 may store data generated during the execution of the operation programs.

The controller 380 may include any suitable type of processing circuitry, such as one or more general-purpose processors (e.g., ARM-based processors), a Digital Signal
15 Processor (DSP), a Programmable Logic Device (PLD), an Application-Specific Integrated Circuit (ASIC), a Field-Programmable Gate Array (FPGA), etc. In operation, the controller 380 may transmit or receive a signal through at least one of the communication pin sets 420, 430, 440, 451, and 453. To this end, the controller 380 may select one of the first communication pin set 420, the second communication pin
20 set 430, and the third communication pin set 440. When the third communication pin set 440 is selected, the controller 380 may determine whether to use the fourth communication pin sets 451 and 453.

The controller 380 may determine the states of the communication channels 210 and 220. The controller 380 may detect the state of one of the first communication
25 channel 210 and the second communication channel 220 through the detection pins 411 and 413 of the interface unit 340. In response to the detection, the controller 380 may select one of the first communication pin set 420 and the second communication pin set 430. The controller 380 may ground the other communication pin set 420 or 430. The controller 380 may process (e.g., generate) a signal for transmission over one of the
30 first communication pin set 420 and the second communication pin set 430.

FIG 5 is a block diagram of an example of a controller, according to aspects of the disclosure. More particularly, as illustrated in FIG 5, the controller 380 of the

signal processing device 300 according to the present embodiment may include a detection unit 510, a signal processing unit 520, and a connection unit 530.

The detection unit 510 may detect the states of the communication channels 210 and 220. The detection unit 510 may detect the states of the communication channels 210 and 220 by using the detection pins 411 and 413 of the interface unit 340. The detection unit 510 may detect the states of the communication channels 210 and 220 through one of the detection pins 411 and 413, for example, the active detection pin. Accordingly, the detection unit 510 detects one of the communication channels 210 and 220. When the signal processing device 300 forms the communication channels 210 and 220 with the external device, the active detection pin may detect one of the communication channels 210 and 220.

Further, the detection unit 510 may select one of the first communication pin set 420 and the second communication pin set 430. When the first communication channel 210 is detected, the detection unit 510 may select the first communication pin set 420. Additionally or alternatively, when the second communication channel 220 is detected, the detection unit 510 may select the second communication pin set 430. The detection unit 510 may generate a selection signal indicating the selection. The detection unit 510 may generate a first selection signal when the first communication pin set 420 is selected and a second selection signal when the second communication pin set 430 is selected. For example, the first selection signal may be a high signal and the second selection signal may be a low signal.

The signal processing unit 520 may process a signal for one of the communication channels 210 and 220. The signal processing unit 520 may process a signal to be transmitted to one of the communication channels 210 and 220. Additionally or alternatively, the signal processing unit 520 may process a signal received from one of the communication channels 210 and 220. The signal processing unit 520 may include a transmitter for encoding and modulating the signal to be transmitted and a receiver for demodulating and decoding the signal. The signal processing unit 520 may include a MODEM and a CODEC. The CODEC may include a data CODEC for processing packet data and the like, and an audio CODEC for processing an audio signal such as a voice and the like.

The connection unit 530 controls connections for the communication channels

210 and 220. That is, the connection unit 530 controls connections between the first communication pin set 420, the second communication pin set 430, the signal processing unit 520, and the grounding unit 360. The connection unit 530 may connect one of the first communication pin set 420 and the second communication pin set 430 to the signal processing unit 520. The connection unit 530 may connect the other communication pin set 420 or 430 to the grounding unit 360. When the detection unit 510 selects the first communication pin set 420, the connection unit 530 may connect the first communication pin set 420 to the signal processing unit 520 and the second communication pin set 430 to the grounding unit 360. Additionally or alternatively, when the detection unit 510 selects the second communication pin set 430, the connection unit 530 may connect the second communication pin set 430 to the signal processing unit 520 and the first communication pin set 420 to the grounding unit 360. For example, the connection unit 530 may include a switching device.

FIG 6 is a circuit diagram of an example of a connection unit, according to aspects of the disclosure. More particularly, as illustrated in FIG 6, the connection unit 530 may include a detection terminal 610, a first communication terminal set 620, a second communication terminal set 630, a connection terminal set 640, a ground terminal 650, a first connection switch set 660, a second connection switch set 670, a first ground switch set 680, and a second ground switch set 690.

The detection terminal 610 may be connected to the detection unit 510. The detection terminal 610 may receive a signal from the detection unit 510 in accordance with one of the first communication pin set 420 and the second communication pin set 430. The selection signal may include a first selection signal corresponding to the first communication pin set 420 and a second selection signal corresponding to the second communication pin set 430. For example, the first selection signal may be a high-level signal and the second selection signal may be a low signal.

The first communication terminal set 620 may be connected to the first communication pin set 420 of the interface unit 340. The first communication terminal set 620 may include a first transmission terminal set 621 and a first reception terminal set 625. The first transmission terminal set 621 may include a first positive transmission terminal 622 and a first negative transmission terminal 624. The first reception terminal set 625 may include a first positive reception terminal 626 and a first

negative reception terminal 628. The first transmission terminal set 621 may be connected to the first transmission pin set 421. The first positive transmission terminal 622 may be connected to the first positive transmission pin 422, and the first negative transmission terminal 624 may be connected to the first negative transmission pin 424.

5 Additionally or alternatively, the first reception terminal set 625 may be connected to the first reception pin set 425. The first positive reception terminal 626 may be connected to the first positive reception pin 426, and the first negative reception terminal 628 may be connected to the first negative reception pin 428.

The second communication terminal set 630 may be connected to the second

10 communication pin set 430 of the interface unit 340. The second communication terminal set 630 may include a second transmission terminal set 631 and a second reception terminal set 635. The second transmission terminal set 631 may include a second positive transmission terminal 632 and a second negative transmission terminal 634. The second reception terminal set 635 may include a second positive reception

15 terminal 636 and a second negative reception terminal 638. The second transmission terminal set 631 may be connected to the second transmission pin set 421. The second positive transmission terminal 632 may be connected to the second positive transmission pin 432, and the second negative transmission terminal 634 may be connected to the second negative transmission pin 434. Additionally or alternatively,

20 the second reception terminal set 635 may be connected to the second reception pin set 435. The second positive reception terminal 636 may be connected to the second positive reception pin 436, and the second negative reception terminal 638 may be connected to the second negative reception pin 438.

The connection terminal set 640 may be connected to the signal processing unit

25 520. The connection terminal set 640 may include an output terminal set 641 and an input terminal set 645. The output terminal set 641 may include a positive output terminal 642 and a negative output terminal 644. The input terminal set 645 may include a positive input terminal 646 and a negative input terminal 648.

The ground terminal 650 may be connected to the grounding unit 360.

30 The first connection switch set 660 may be disposed between the first communication terminal set 620 and the connection terminal set 640. The first connection switch set 660 may include a first positive output switch 661, a first negative

output switch 663, a first positive input switch 665, and a first negative input switch 667. The first positive output switch 661 may be arranged between the first positive transmission terminal 622 and the positive output terminal 642, and the first negative output switch 663 may be arranged between the first negative transmission terminal 624 and the negative output terminal 644. The first positive input switch 665 may be arranged between the first positive reception terminal 626 and the positive input terminal 646, and the first negative input switch 667 may be arranged between the first negative reception terminal 628 and the negative input terminal 648.

The first connection switch set 660 may connect the first communication terminal set 620 to the connection terminal set 640 or release the connection between the first communication terminal set 620 and the connection terminal set 640 in accordance with the selection signal of the detection unit 510. That is, when the first selection signal is received through the detection terminal 610, the first connection switch set 660 may be closed and may connect the first communication terminal set 620 to the connection terminal set 640. The first positive output switch 661, the first negative output switch 663, the first positive input switch 665, and the first negative input switch 667 may be collectively closed. Additionally or alternatively, when the second selection signal is received through the detection terminal 610, the first connection switch set 660 may be opened and may release the connection between the first communication terminal set 620 and the connection terminal set 640. The first positive output switch 661, the first negative output switch 663, the first positive input switch 665, and the first negative input switch 667 may be collectively opened.

The second connection switch set 670 may be disposed between the second communication terminal set 630 and the connection terminal set 640. The second connection switch set 670 may include a second positive output switch 671, a second negative output switch 673, a second positive input switch 675, and a second negative input switch 677. The second positive output switch 671 may be disposed between the second positive transmission terminal 632 and the positive output terminal 642, and the second negative output switch 673 may be disposed between the second negative transmission terminal 634 and the negative output terminal 644. The second positive input switch 675 may be disposed between the second positive reception terminal 636 and the positive input terminal 646, and the second negative input switch 677 may be

disposed between the second negative reception terminal 638 and the negative input terminal 648.

5 The second connection switch set 670 may connect the second communication terminal set 630 to the connection terminal set 640 or release the connection between the second communication terminal set 630 and the connection terminal set 640 in accordance with the selection signal of the detection unit 510. That is, when the first selection signal is received through the detection terminal 610, the second connection switch set 670 may be opened and may release the connection between the second communication terminal set 630 and the connection terminal set 640. The second
10 positive output switch 671, the second negative output switch 673, the second positive input switch 675, and the second negative input switch 667 may be collectively opened. Additionally or alternatively, when the second selection signal is received through the detection terminal 610, the second connection switch set 670 may be closed and may connect the second communication terminal set 630 and the connection terminal set 640.
15 The second positive output switch 671, the second negative output switch 673, the second positive input switch 675, and the second negative input switch 667 may be collectively closed.

The first ground switch set 680 may be disposed between the first communication terminal set 620 and the ground terminal 650. The first ground switch
20 set 680 may include a plurality of first ground switches 681, 683, 685, and 687. The first ground switches 681, 683, 685, and 687 may be disposed between the first positive transmission terminal 622 and the ground terminal 650, between the first negative transmission terminal 624 and the ground terminal 650, between the first positive reception terminal 626 and the ground terminal 650, and between the first negative
25 reception terminal 628 and the ground terminal 650.

The first ground switch set 680 may connect the first communication terminal set 620 to the ground terminal 650 or release the connection between the first communication terminal set 620 and the ground terminal 650 in accordance with the selection signal of the detection unit 510. That is, when the first selection signal is
30 received through the detection terminal 610, the first ground switch set 680 may be opened and may release the connection between the first communication terminal set 620 and the ground terminal 650. The first ground switches 681, 683, 685, and 687

may be collectively opened. Additionally or alternatively, when the second selection signal is received through the detection terminal 610, the first ground switch set 680 may be closed and may connect the first communication terminal set 620 and the ground terminal 650. The first ground switches 681, 683, 685, and 687 may be collectively closed.

The second ground switch set 690 may be disposed between the second communication terminal set 630 and the ground terminal 650. The second ground switch set 690 may include a plurality of second ground switches 691, 693, 695, and 697. The second ground switches 691, 693, 695, and 697 may be disposed between the second positive transmission terminal 632 and the ground terminal 650, between the second negative transmission terminal 634 and the ground terminal 650, between the second positive reception terminal 636 and the ground terminal 650, and between the second negative reception terminal 638 and the ground terminal 650.

The second ground switch set 690 may connect the second communication terminal set 630 to the ground terminal 650 or release the connection between the second communication terminal set 630 and the ground terminal 650 in accordance with the selection signal of the detection unit 510. Additionally or alternatively, when the first selection signal is received through the detection terminal 610, the second connection switch set 690 may be closed and may connect the second communication terminal set 630 and the ground terminal 650. The second ground switches 691, 693, 695, and 697 may be collectively closed. Additionally or alternatively, when the second selection signal is received through the detection terminal 610, the second connection switch set 690 may be opened and may connect the second communication terminal set 630 and the ground terminal 650. The second ground switches 691, 693, 695, and 697 may be collectively opened.

The audio processing unit 390 may process an audio signal. For example, the audio processing unit 390 includes a speaker (SPK) 391 and a microphone (MIC) 393. That is, the audio processing unit 390 may reproduce the audio signal through the speaker 391. The audio processing unit 390 may collect the audio signal through the microphone 393.

FIG 7 is a flowchart of an example of a process, according to aspects of the disclosure. More particularly, as illustrated in FIG 7, the signal processing method

according to the present embodiment starts detecting a connection with an external device by the controller 380 in operation 711. For example, the interface unit 340 may be connected to the external device. The interface unit 340 may be connected to the external device through the cable 200. When the interface unit 340 is connected to the external device, the controller 380 may detect the connection to the external device through one of the detection pins 411 and 413. The detection unit 510 may detect the connection of the external device by using the active detection pin. For example, when the interface unit 340 is connected to the external device, one of the communication channels 210 and 220 may be established between the active detection pin and the external device. When one of the communication channels 210 and 220 is formed, an impedance change may be generated in the active detection pin. Accordingly, the detection unit 510 detects the impedance change in the active detection pin and thus detects the connection of the external device.

Subsequently, when the connection of the external device is detected in operation 711, the controller 380 detects the respective states of the communication channels 210 and 220 in operation 713. The controller 380 may detect the respective states of the communication channels 210 and 220 through one of the detection pins 411 and 413. The detection unit 510 may identify the first communication channel 210 and the second communication channel 220 through the active detection pin. Further, the detection unit 510 may detect one of the first communication channel 210 and the second communication channel 220 through the active detection pin.

Subsequently, the controller 380 controls connections of the communication pin sets 420, 430, 440, 451, and 453 in operation 715. That is, the controller 380 controls the connections of the first communication pin set 420 and the second communication pin set 430 according to the states of the communication channels 210 and 220. For example, the connection unit 530 may control connections between the first communication pin set 420, the second communication pin set 430, the signal processing unit 520, and the grounding unit 360. The connection unit 530 may connect one of the first communication pin set 420 and the second communication pin set 430 to the signal processing unit 520. The connection unit 530 grounds the other communication pin set 420 or 430.

FIG. 8 is a flowchart of an example of a process, according to aspects of the

disclosure. More particularly, as illustrated in FIG 8, the controller 380 may select one of the communication pin sets 420, 430, 440, 451, and 453 in operation 811. The controller 380 may select one of the first communication pin set 420 and the second communication pin set 430 according to the states of the communication channels 210 and 220. The detection unit 510 may select one of the first communication pin set 420 and the second communication pin set 430 in accordance with one of the first communication channel 210 and the second communication channel 220. That is, when the first communication channel 210 is detected, the detection unit 510 may select the first communication pin set 420. Additionally or alternatively, when the second communication channel 220 is detected, the detection unit 510 may select the second communication pin set 430.

The detection unit 510 may generate a selection signal in accordance with one of the first communication pin set 420 and the second communication pin set 430. For example, when the first communication pin set 420 is selected, the detection unit 510 may generate a first selection signal. As another example, when the second communication pin set 430 is selected, the detection unit 510 may generate a second selection signal. Further, the detection unit 510 may output the selection signal to the detection terminal 610 of the connection unit 530.

Next, the controller 380 connects the selected one of the communication pin sets 420, 430, 440, 451, and 453 to the signal processing unit 520 in operation 813. For example, the controller 380 connects one of the first communication set 420 and the second communication pin set 430 to the signal processing unit 520. That is, when the first communication pin set 420 is selected, the connection unit 530 may connect the first communication pin set 420 to the signal processing unit 520. Additionally or alternatively, when the second communication pin set 430 is selected, the connection unit 530 may connect the second communication pin set 430 to the signal processing unit 520.

The connection unit 530 may connect one of the first communication pin set 420 and the second communication pin set 430 to the signal processing unit 520 in accordance with the selection signal of the detection unit 510. For example, when the first selection signal is received through the detection terminal 610, the first connection switch set 660 may be closed and the second connection switch set 670 may be opened.

Accordingly, the first connection switch set 660 may connect the first communication terminal set 620 and the connection terminal set 640, and the second connection switch set 670 may release the connection between the second communication terminal set 630 and the connection terminal set 640. Additionally or alternatively, when the second selection signal is received through the detection terminal 610, the first connection switch set 660 may be opened and the second connection switch 670 set may be closed. Accordingly, the first connection switch set 660 may release the connection between the first communication terminal set 620 and the connection terminal set 640, and the second connection switch set 670 may connect the second communication terminal set 630 to the connection terminal set 640.

Next, the controller 380 connects one or more of the remaining communication pin sets of the communication pin sets 420, 430, 440, 451, and 453 to the grounding unit 360 in operation 815. The controller 380 may connect the other communication pin set 420 or 430 to the grounding unit 360. That is, when the first communication pin set 420 is selected, the connection unit 530 may connect the second communication pin set 430 to the grounding unit 360. Additionally or alternatively, when the second communication pin set 430 is selected the connection unit 530 may connect the first communication pin set 420 to the grounding unit 360. Thereafter, the controller 380 may proceed to operation 717.

The connection unit 530 may connect the other communication pin set 420 or 430 to the grounding unit 360 in accordance with the selection signal of the detection unit 510. For example, when the first selection signal is received through the detection terminal 610, the first ground switch set 680 may be opened and the second ground switch set 690 may be closed. Accordingly, the first ground switch set 680 may release the connection between the first communication terminal set 620 and the ground terminal 650, and the second ground switch set 690 may connect the second communication terminal set 630 and the ground terminal 650. Additionally or alternatively, when the second selection signal is received through the detection terminal 610, the first ground switch set 680 may be closed and the second ground switch 690 set may be opened. Accordingly, the first ground switch set 680 may connect the first communication terminal set 620 and the ground terminal 650, and the second ground switch set 690 may release the connection between the second communication terminal

set 630 and the ground terminal 650.

Lastly, the controller 380 processes a signal for one of the communication pin sets 420, 430, 440, 451, and 453 and process/transmits the signal, in operation 717. That is, the controller 380 may process a signal for one of the communication channels 210 and 220. When the first communication pin set 420 is connected to the signal processing unit 520, the signal processing unit 520 may process a signal the first communication channel 210. The signal processing unit 520 may transmit the signal to the first communication channel 210 or receive the signal from the first communication channel 210 through the first communication pin set 420. Additionally or alternatively, when the second communication pin set 430 is connected to the signal processing unit 520, the signal processing unit 520 may process a signal for the second communication channel 220. The signal processing unit 520 may transmit the signal to the second communication channel 220 or receive the signal from the second communication channel 220 through the second communication pin set 430.

The signal processing unit 520 may process the signal and output the processed signal through the output terminal set 640 of the connection unit 530. For example, when the first connection switch set 660 is closed and the second connection switch set 670 is opened, the signal may be transmitted to the first transmission terminal set 621 from the output terminal set 641 and transmitted through the first transmission set 421. Additionally or alternatively, when the first connection switch set 660 is opened and the second connection switch set 670 is closed, the signal may be transmitted to the second transmission terminal set 631 from the output terminal set 641 and transmitted through the second transmission set 431. Additionally or alternatively, the signal processing unit 520 may receive the signal through the input terminal set 645 of the connection unit 530 and process the received signal. For example, when the first connection switch set 660 is closed and the second connection switch set 670 is opened, the signal may be received through the first reception pin set 425 and transferred to the input terminal set 645 from the first reception terminal set 625. Additionally or alternatively, when the first connection switch set 660 is opened and the second connection switch set 670 is closed, the signal may be received through the second reception pin set 435 and transferred to the input terminal set 645 from the second reception terminal set 635.

When processing a signal for one of the communication pin sets 420, 430, 440,

451, and 453, the signal processing device 300 may ground the remaining communication pin sets of the communication pin sets 420, 430, 440, 451, and 453. Accordingly, the signal processing device 300 may prevent electromagnetic interference between the communication pin sets 420, 430, 440, 451, and 453. That is, the signal
5 processing device 300 may prevent the signal from flowing into the remaining communication pin sets of the communication pin sets 420, 430, 440, 451, and 453. Further, the signal processing device 300 may suppress electromagnetic connections between the communication pin sets 420, 430, 440, 451, and 453 and the antenna 311. That is, the signal processing device 300 may prevent the signal from flowing into the
10 antenna 311 through the remaining communication pin sets of the communication pin sets 420, 430, 440, 451, and 453. Accordingly, the capability of the interface of the signal processing device 300 can be improved.

Therefore, because the electronic devices 100, 110, and 120 have the single interface structure in the communication system 10, the electronic devices 100, 110, and
15 120 can connect to each other. Accordingly, users of the electronic devices 100, 110, and 120 can easily connect the electronic devices 100, 110, and 120 through the single cable 200. As a result, the use efficiency and the convenience of the users of the electronic devices 100, 110, and 120 can be improved.

FIGS. 1-8 are provided as an example only. At least some of the operations
20 discussed with respect to these figures can be performed concurrently, performed in different order, and/or altogether omitted. It will be understood that the provision of the examples described herein, as well as clauses phrased as “such as,” “e.g.,” “including,” “in some aspects,” “in some implementations,” and the like should not be interpreted as limiting the claimed subject matter to the specific examples.

25 The above-described aspects of the present disclosure can be implemented in hardware, firmware or via the execution of software or computer code that can be stored in a recording medium such as a CD-ROM, a Digital Versatile Disc (DVD), a magnetic tape, a RAM, a floppy disk, a hard disk, or a magneto-optical disk or computer code downloaded over a network originally stored on a remote recording medium or a non-
30 transitory machine-readable medium and to be stored on a local recording medium, so that the methods described herein can be rendered via such software that is stored on the recording medium using a general purpose computer, or a special processor or in

programmable or dedicated hardware, such as an ASIC or FPGA. As would be understood in the art, the computer, the processor, microprocessor controller or the programmable hardware include memory components, e.g., RAM, ROM, Flash, etc. that may store or receive software or computer code that when accessed and executed
5 by the computer, processor or hardware implement the processing methods described herein. In addition, it would be recognized that when a general purpose computer accesses code for implementing the processing shown herein, the execution of the code transforms the general purpose computer into a special purpose computer for executing the processing shown herein. Any of the functions and steps provided in the Figures
10 may be implemented in hardware, software or a combination of both and may be performed in whole or in part within the programmed instructions of a computer. No claim element herein is to be construed under the provisions of 35 U.S.C. 112, sixth paragraph, unless the element is expressly recited using the phrase "means for".

Moreover, the embodiments disclosed in this specification are suggested for the
15 description and understanding of technical content but do not limit the range of the present disclosure. Accordingly, the range of the present disclosure should be interpreted as including all modifications or various other embodiments based on the technical idea of the present disclosure.

WHAT IS CLAIMED IS:

1. A method in an electronic device having an interface unit, comprising:
selecting a first pin set from a plurality of pin sets that are part of the interface
5 unit, wherein the first pin set is associated with a first communication channel;
grounding a second pin set in the plurality of pin sets, wherein the second pin set
is associated with a second communication channel; and
processing a signal for the first pin set.
- 10 2. The method of claim 1, wherein the first communication channel and the
second communication channel have an equal transmission rate.
3. The method of claim 1, further comprising
connecting the first pin set to a signal processing unit,
15 wherein the signal is processed by the signal processing unit.
4. The method of claim 3, wherein grounding the second pin set comprises
connecting the second pin set to a grounding unit.
- 20 5. The method of claim 1, the first pin set is selected based on respective states
of the first communication channel and the second communication channel.
6. The method of claim 1, further comprising establishing a connection with an
external device by using the interface unit.
25
7. The method of claim 6, wherein the interface unit includes a plurality of
detection pins for detecting a connection with one of the first communication channel
and the second communication channel.
- 30 8. The method of claim 7, wherein one of the detection pins is designated as an
active detection pin that is activated when the connection with one of the first
communication channel and the second communication channel is established.

9. The method of claim 8, wherein the first communication channel is selected by using the active detection pin.

10. The method of claim 1, wherein each of the first pin set and the second pin set comprises a respective transmission pin set and a respective reception pin set.

11. An apparatus comprising:
an interface unit comprising a plurality of pin sets;
a signal processing unit for processing a signal;
10 a grounding unit for grounding at least one of the plurality of pin sets; and
at least one controller configured to:
select a first pin set from the plurality of pin sets, wherein the first pin set is associated with a first communication channel;
ground a second pin set in the plurality of pin sets, wherein the second pin set is
15 associated with a second communication channel; and
process the signal for the first pin set.

12. The apparatus of claim 11, wherein the at least one controller is further configured to connect any of the first pin set and the second pin set to the signal processing unit or the grounding unit according to states of the first communication channel and the second communication channel.

13. The apparatus of claim 11, wherein the interface unit includes a plurality of detection pins for detecting a connection with one of the first communication channel and the second communication channel.

14. The apparatus of claim 13, wherein one of the detection pins is designated as an active detection pin that is activated when the connection with one of the first communication channel and the second communication channel is established.

15. The apparatus of claim 14, wherein the at least one controller is further configured to detect that the first communication channel is connected to an external

device by using the active detection pin.

16. The apparatus of claim 15, wherein the at least one controller comprises a connection unit configured to connect the first pin set to the signal processing unit.

5

17. The apparatus of claim 16, wherein the connection unit comprises a switch device.

18. The apparatus of claim 17, wherein the at least one controller is further
10 configured to apply to the switch device a high signal for connecting the first pin set to the signal processing unit and a low signal for connecting the second pin set to the signal processing unit.

19. The apparatus of claim 11, wherein each of the first pin set and the second
15 pin set comprises a respective transmission pin set and a respective reception pin set.

20. A non-transitory computer-readable medium storing one or more instructions which when executed by an electronic device cause the electronic device to perform a method comprising the steps of:

20 selecting a first pin set from a plurality of pin sets that are part of an interface unit, wherein the first pin set is associated with a first communication channel;

grounding a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel; and

processing a signal for the first pin set.

25

ABSTRACT

A method for use in an electronic device having an interface unit, comprising:
selecting a first pin set from a plurality of pin sets that are part of the interface unit,
5 wherein the first pin set is associated with a first communication channel; grounding a
second pin set in the plurality of pin sets, wherein the second pin set is associated with a
second communication channel; and processing a signal for the first pin set.

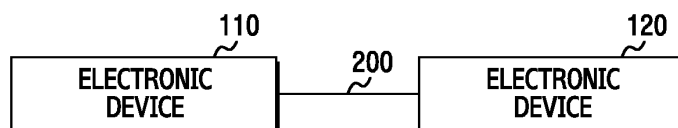


FIG.1

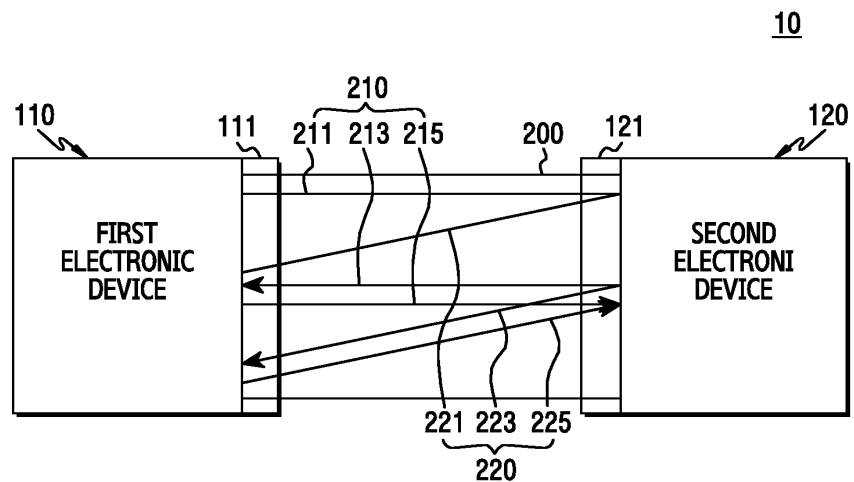


FIG.2

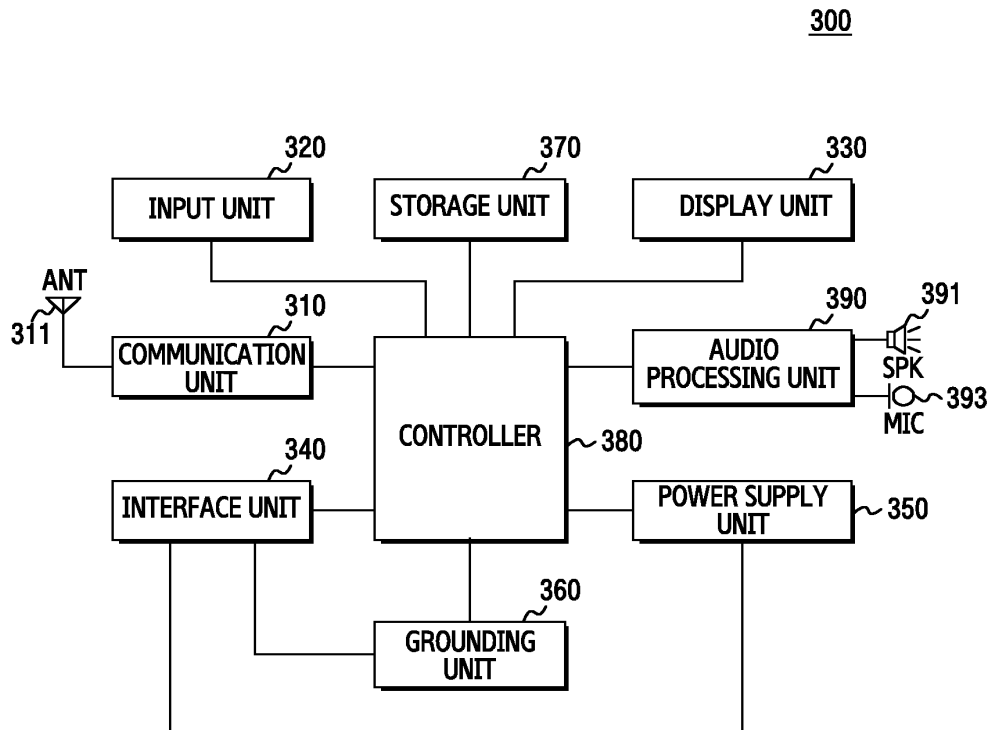


FIG.3

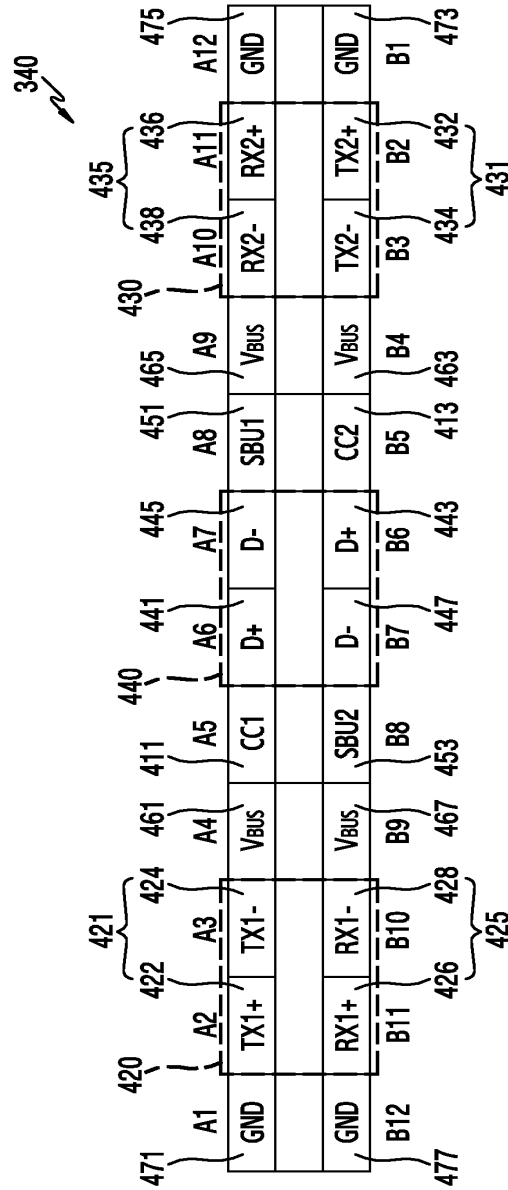


FIG. 4

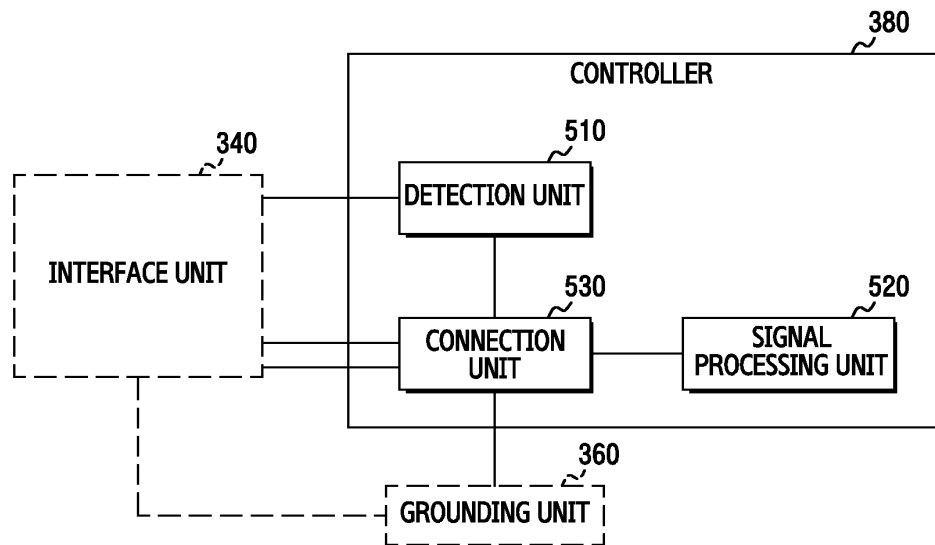


FIG.5

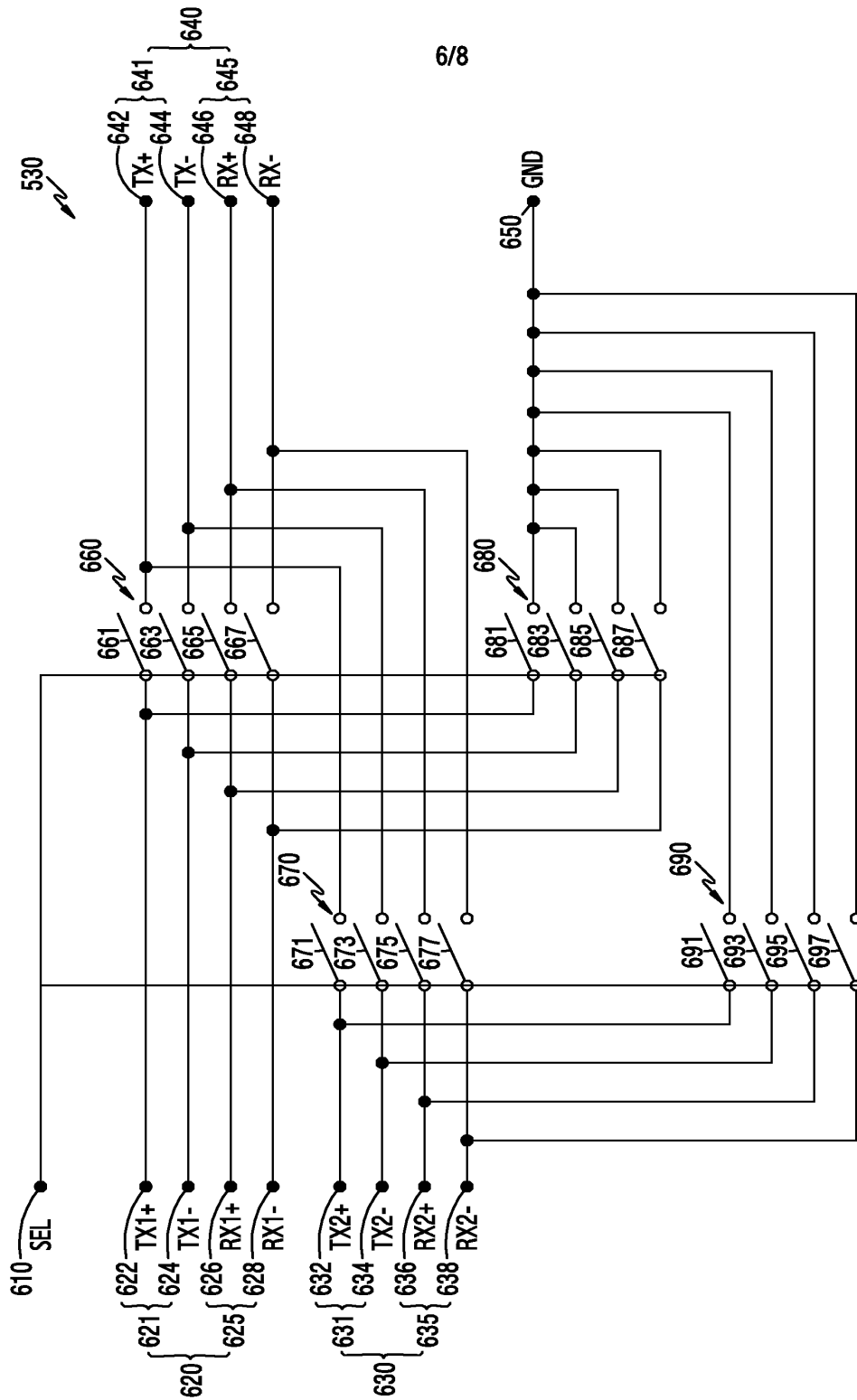


FIG. 6

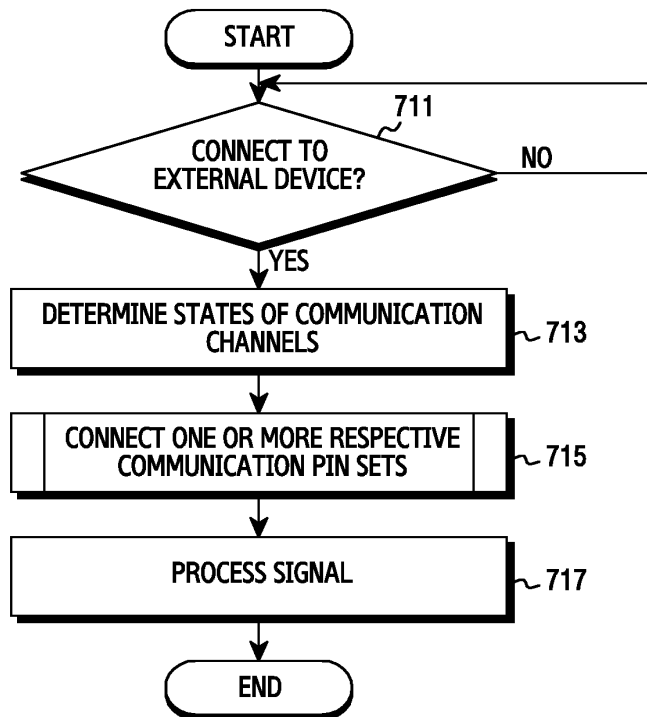


FIG.7

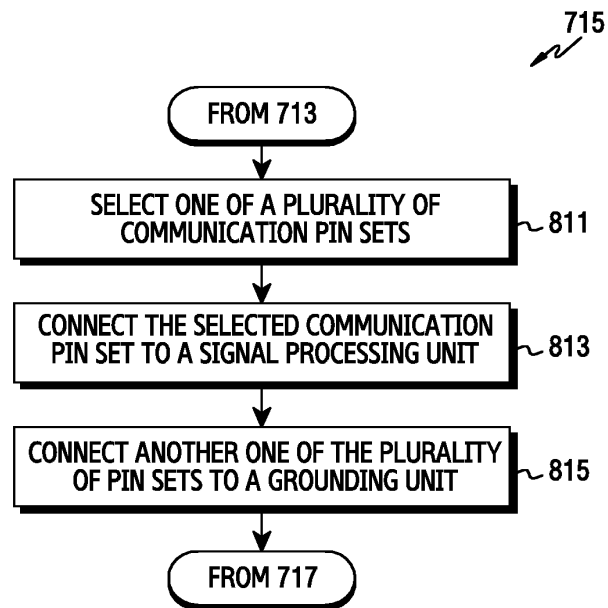


FIG.8

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COMPLETE IF KNOWN

Application Number	Unassigned
Filing Date	March 28, 2016
First Named Inventor	Il-Hyung Chung et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	4500-1-458

Pursuant to 37 CFR 1.55(h), the undersigned hereby requests that the USPTO retrieve an electronic copy of each of the following foreign applications for which priority has been claimed under 35 U.S.C. 119(a)-(d) from a foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement. This Request must be submitted:

- within the later of sixteen months from the filing date of the prior foreign application or four months from the actual filing date of an application under 35 U.S.C. 111(a),
- within four months from the later of the date of commencement (37 CFR 1.491(a)) or the date of the initial submission under 35 U.S.C. 371 of an application entering the national stage under 35 U.S.C. 371, or
- with a petition under 37 CFR 1.55(e).

☐ **OPTION A**

Please retrieve the priority application identified in Column C, a certified copy of which is contained in the EP or JP application identified in Columns A and B:

A	B		C	
Code for Participating Office (EP or JP only)	Application containing the non-participating priority application		Non-participating priority application to be retrieved	
	App. No.	Filing Date	Country Code	App. No.
1				

☒ **OPTION B**

This Request may be used for the infrequent circumstance when a claim for priority to an application filed in a participating foreign intellectual property office was made prior to that foreign intellectual property office becoming a participating foreign intellectual property office.

Please retrieve the priority application identified in Columns A and B:

A	B		
Code for Participating Office (e.g., EP, JP, KR, CN) or WIPO DAS Depositing Office (e.g., AU, DK, ES, FI, GB, IB, SE)	Application to be retrieved		
	App. No.	Filing Date	Access Code (for WIPO DAS Depositing Office)
1	KR	10-2015-0046260	April 1, 2015
2			

The USPTO will not attempt to retrieve the identified priority application(s) unless an identical claim for foreign priority to the application identified above is made pursuant to 37 CFR 1.55(d) or a petition is granted under 37 CFR 1.55(e). Applicants are advised to consult Private PAIR (accessed through www.uspto.gov) to assure that the retrieval has been successful. The 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 set forth in 37 CFR 1.55(g)(1).

I hereby declare that I have the authority to grant access to the above-identified foreign application(s).

/Steve Cha/

Signature

Steve Cha

Printed or Typed Name

Attorney for Applicant(s)

Title

March 28, 2016

Date

201-226-9245

Telephone Number

44,069

Registration Number, if applicable

This collection of information is required by 37 CFR 1.55(d). 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 1.11 and 1.14. This collection is estimated to take 8 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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AUTHORIZATION OR RESCISSION OF AUTHORIZATION TO PERMIT ACCESS TO APPLICATION-AS-FILED BY PARTICIPATING OFFICES

Send completed form to: Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450

Application Number (if known): Unassigned	Filing Date: March 28, 2016
First Named Inventor: Il-Hyung Chung et al.	Attorney Docket Number: 4500-1-458
Title (Required) APPARATUS AND METHOD FOR PROCESSING SIGNAL	

Check either box 1 or 2 below, but **not** both:

1. ☒ By checking this box, 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 State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

2. ☐ By checking this box, the undersigned hereby **rescinds the previous authority granted to the USPTO** to provide the EPO, JPO, KIPO, SIPO, WIPO or any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement access to the documents and information identified in paragraph 1 above.

This rescission of the previous authorization will not be effective unless and until an appropriate USPTO official recognizes and acts on the rescission.

However, once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

NOTE: This form must be signed by an authorized party in accordance with 37 CFR 1.14(c). Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below.*

Signature /Steve Cha/	Date March 28, 2016
Name (Print/Typed) Steve Cha	Practitioner Registration Number 44,069 (if applicable)
Name of Assignee (if applicable) Samsung Electronics Co., Ltd.	Title (if applicable) Attorney for Applicant

☒ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.14(h). 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 1.11 and 1.14. This collection is estimated to take 6 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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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.

Doc Code: PA..

Document Description: Power of Attorney

PTO/AIA/82A (07-12)

Approved for use through 11/30/2014. OMB 0651-0035

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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**TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE
REGISTERED PRACTITIONERS**

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B or equivalent) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5. If the Power of Attorney by Applicant form is not accompanied by this transmittal form or an equivalent, the Power of Attorney will not be recognized in the application.

Application Number	Unassigned
Filing Date	March 28, 2016
First Named Inventor	Il-Hyung Chung et al.
Title	APPARATUS AND METHOD FOR PROCESSING SIGNAL
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	4500-1-458

SIGNATURE of Applicant or Patent Practitioner

Signature	/Steve Cha/	Date	March 28, 2016
Name	Steve Cha	Telephone	201-226-9245
Registration Number	44,069		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications.

☐ *Total of 2 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. 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 1.11 and 1.14. This collection is estimated to take 3 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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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in the attached transmittal letter.

- ☒ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent):

33942

OR

- ☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent):

Name	Registration Number	Name	Registration Number

Please recognize or change the correspondence address for the application identified in the attached transmittal letter to:

- ☒ The address associated with the above-mentioned Customer Number.

OR

- ☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name

Address

City

State

Zip

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Telephone

Email

I am the Applicant:

- ☐ Inventor or Joint Inventor
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign
- ☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document)

SIGNATURE of Applicant for Patent

Signature	<i>Heungmo Lee</i>	Date	2012.10.11
Name	Heungmo Lee	Telephone	+82-31-279-4761
Title and Company Vice President, Samsung Electronics Co., Ltd.			

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms for more than one signature, see below *.

- ☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. 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 1.11 and 1.14. This collection is estimated to take 3 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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Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)

Approved for use through 07/31/2012. OMB 0651-0031

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15082408
	Filing Date		2016-03-28
	First Named Inventor		Il-Hyung Chung et al.
	Art Unit		N/A
	Examiner Name		N/A
	Attorney Docket Number		4500-1-458

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	1	20040177207	A1	2004-09-09	Lim et al.			
	2	20070255885	A1	2007-11-01	Bohm et al.			
	3	20140244890	A1	2014-08-28	Park et al.			
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	1	10-2004-0066970	KR	A	2004-07-30	Lim et al.		×

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15082408	
	Filing Date		2016-03-28	
	First Named Inventor	II-Hyung Chung et al.		
	Art Unit	N/A		
	Examiner Name	N/A		
Attorney Docket Number		4500-1-458		

	2	10-2007-0105855	KR	A	2007-10-31	Bohm et al.	☒
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Examiner Initials*	Cite No	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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
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EXAMINER SIGNATURE			
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Examiner Signature		Date Considered	
--------------------	--	-----------------	--

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

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15082408
	Filing Date	2016-03-28
	First Named Inventor	Il-Hyung Chung et al.
	Art Unit	N/A
	Examiner Name	N/A
	Attorney Docket Number	4500-1-458

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☒ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Steve Cha/	Date (YYYY-MM-DD)	2016-03-28
Name/Print	Steve Cha	Registration Number	44,069

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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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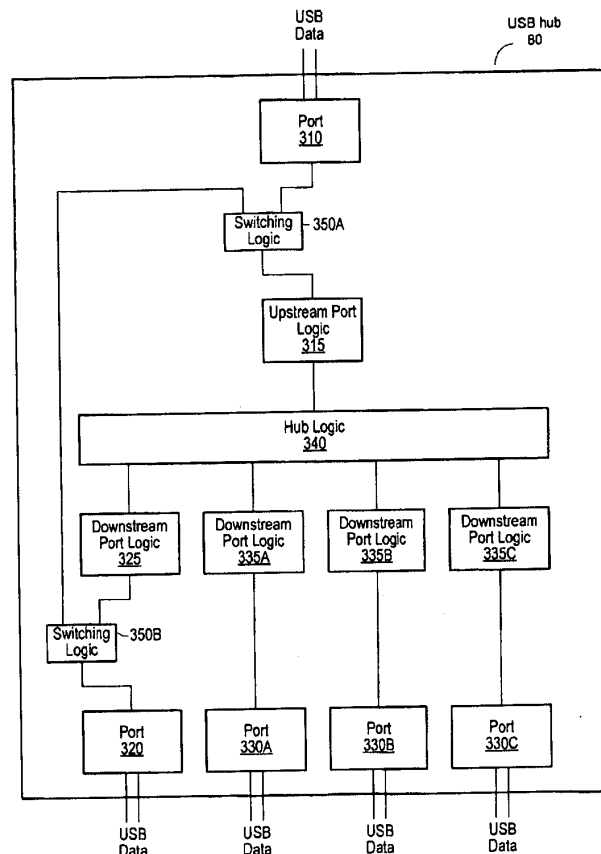
1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
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 inspections 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.



US 20070255885A1

(19) **United States**(12) **Patent Application Publication** (10) **Pub. No.: US 2007/0255885 A1****Bohm et al.**(43) **Pub. Date: Nov. 1, 2007**(54) **SYSTEM AND METHOD FOR UNIVERSAL
SERIAL BUS HUB PORT REVERSAL****Publication Classification**(51) **Int. Cl.**
G06F 13/00 (2006.01)(52) **U.S. Cl.** **710/316**(75) **Inventors:** **Mark R. Bohm**, Village of Bear Creek,
TX (US); **Donald L. Perkins**, Austin,
TX (US); **Carl J. Crawford**, Austin,
TX (US)**Correspondence Address:****MEYERTONS, HOOD, KIVLIN, KOWERT &
GOETZEL, P.C.**
P.O. BOX 398
AUSTIN, TX 78767-0398 (US)(73) **Assignee: Standard Microsystems Corporation**(21) **Appl. No.: 11/412,431**(22) **Filed: Apr. 27, 2006**(57) **ABSTRACT**

System and method for switching logic in a Universal Serial Bus hub. The USB hub may include upstream logic and downstream logic for sending and receiving information from a host controller and a USB device respectively. The USB hub may include a plurality of ports operable to couple to a plurality of devices, including a first port coupled to the upstream logic and a second port coupled to the downstream logic. The USB hub may also include switching logic operable to switch the upstream and the downstream logic with respect to the first port and the second port respectively. The switching logic may switch the upstream and downstream logic by decoupling the first port from the upstream logic, decoupling the second port from the downstream logic, and coupling the second port to the upstream logic. Additionally, the first port may be coupled to the downstream logic.





(19) 대한민국특허청(KR)
(12) 공개특허공보(A)

(11) 공개번호 10-2007-0105855
(43) 공개일자 2007년10월31일

(51) Int. Cl.

G06F 1/00 (2006.01) G06F 13/00 (2006.01)

(21) 출원번호 10-2007-0038292

(22) 출원일자 2007년04월19일

심사청구일자 2007년04월19일

(30) 우선권주장

11/412,431 2006년04월27일 미국(US)

(71) 출원인

스탠다드 마이크로시스템즈 코퍼레이션

미국 뉴욕주 호포지 아케이 드라이브 80 (우편번호: 11788)

(72) 발명자

봄 마크 알.

미국 78737 텍사스주 오스틴 노쓰 마드론 트레일 8904

퍼킨스 도날드 엘.

미국 78717 텍사스주 오스틴 로얄 뉴 켄트 드라이브 9901

크로포드 칼 제이.

미국 78732 텍사스주 오스틴 서머 캐니언 드라이브 3220

(74) 대리인

주성민, 이중희, 백만기

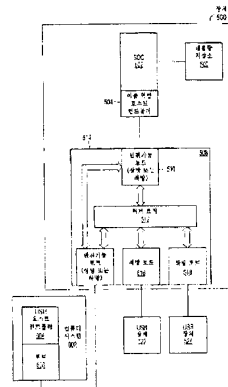
전체 청구항 수 : 총 32 항

(54) USB 허브 포트 반전을 위한 시스템 및 방법

(57) 요약

본 발명은 USB 허브 내의 로직을 교환하기 위한 시스템 및 방법에 관한 것이다. USB 허브는 호스트 컨트롤러 및 USB 장치 각기와 정보를 송수신하기 위한 상방 로직 및 하방 로직을 포함할 수 있다. USB 허브는 복수의 장치들에 결합하도록 동작가능한, 상방 로직에 결합된 제1 포트 및 하방 로직에 결합된 제2 포트를 포함하는, 복수의 포트들을 포함할 수 있다. USB 허브는 제1 포트 및 제2 포트 각각에 관한 상방 및 하방 로직을 교환하도록 동작가능한 스위칭 로직을 포함할 수 있다. 스위칭 로직은 상방 로직으로부터 제1 포트를 분리하고, 하방 로직으로부터 제2 포트를 분리하며, 제2 포트를 상방 로직에 결합시킴으로써 상방 및 하방 로직을 교환할 수 있다. 추가적으로, 제1 포트는 하방 로직에 결합될 수 있다.

도면 - 506



특허청구의 범위

청구항 1

호스트 컨트롤러와 정보를 송수신하기 위한 상방 로직(upstream logic);

USB 장치와 정보를 송수신하기 위한 하방 로직(downstream logic);

복수의 장치들에 결합하도록 동작할 수 있는(operable) 복수의 포트들로서, 상기 상방 로직에 결합된 제1 포트, 및 상기 하방 로직에 결합된 제2 포트를 포함하는 복수의 포트들; 및

상기 제1 포트 및 제2 포트 각각에 대하여 상기 상방 로직 및 하방 로직을 교환(switch)하도록 동작할 수 있는 스위칭 로직(switching logic)

을 포함하는 USB 허브.

청구항 2

제1항에 있어서,

상기 상방 및 하방 로직들을 교환하기 위해, 상기 스위칭 로직은, 상기 상방 로직으로부터 상기 제1 포트를 분리하고, 상기 하방 로직으로부터 상기 제2 포트를 분리하며, 상기 상방 로직에 제2 포트를 결합시키도록 동작할 수 있는 USB 허브.

청구항 3

제2항에 있어서,

상기 상방 및 하방 로직들을 교환하기 위해, 상기 스위칭 로직은 상기 하방 로직에 상기 제1 포트를 결합시키도록 더 동작할 수 있는 USB 허브.

청구항 4

제1항에 있어서,

상기 스위칭 로직은,

상기 상방 로직 및/또는 상기 하방 로직에 관한 스위칭 조건(switching condition)을 자동으로 탐지하고;

상기 자동 탐지에 응답하여 상기 상방 로직 및/또는 상기 하방 로직을 교환하도록

더 동작할 수 있는 USB 허브.

청구항 5

제4항에 있어서,

상기 자동 탐지는 상기 복수의 포트들 중 하나 이상에서의 임피던스 변화에 기초하는 USB 허브.

청구항 6

제1항에 있어서,

상기 스위칭 로직은 사용자-사용자(user-user) 호출원(invoked) 스위칭 조건에 응답하여 상기 상방 로직 및/또는 하방 로직을 교환하도록 동작할 수 있는 USB 허브.

청구항 7

제1항에 있어서,

상기 상방 로직이 상기 제1 포트로부터 상기 제2 포트로 교환된 후에, 상기 제2 포트에 결합된 상기 복수의 장치들 중 하나의 장치가, USB 허브의 다른 포트들 각각에 결합된 상기 복수의 장치들 중 다른 장치들을 제어하도록 동작할 수 있고, 상기 각각의 다른 포트들은 각각의 하방 로직에 결합되는 USB 허브.

청구항 8

제1항에 있어서,

상기 허브는 복수의 하방 로직들을 포함하고, 상기 복수의 하방 로직들은 상기 하방 로직을 포함하며,

상기 복수의 하방 로직들 각각은 상기 복수의 포트들 중 하나와 관련되고,

상기 스위칭 로직은, 상기 복수의 포트들 중 임의의 두 포트들 간에서 상기 상방 로직 및 하방 로직을 교환하도록 더 동작할 수 있는 USB 허브.

청구항 9

제1항에 있어서,

상기 USB 허브는 주변 장치에 포함되는 USB 허브.

청구항 10

제8항에 있어서,

상기 복수의 장치들의 부분 집합은

상기 주변 장치에 내장된 하나 이상의 장치; 및

상기 주변 장치에 외장된 하나 이상의 장치

중 하나 이상을 포함하는 USB 허브.

청구항 11

제1항에 있어서,

상기 USB 허브는 휴대폰에 포함되는 USB 허브.

청구항 12

제1항에 있어서,

상기 USB 허브는 휴대용 음악 플레이어 장치에 포함되는 USB 허브.

청구항 13

제1항에 있어서,

상기 USB 허브는 외부 하우징(housing)에 포함되고, 상기 USB 허브는, 상기 복수의 장치들 중 제1 장치로서의 시스템에 부착(attach)되어 상기 시스템 및 상기 복수의 장치들 간의 USB 통신을 제공하도록 동작할 수 있는 USB 허브.

청구항 14

제1항에 있어서,

상기 복수의 장치들은

하나 이상의 휴대폰;

하나 이상의 휴대용 음악 플레이어 장치;

하나 이상의 컴퓨터;

하나 이상의 프린터;

하나 이상의 하드 드라이브;

하나 이상의 디지털 카메라;

하나 이상의 메모리 매체;
하나 이상의 오디오 장치;
하나 이상의 키보드;
하나 이상의 마우스;
하나 이상의 조이스틱;
하나 이상의 무정전 전원 공급장치(uninterrupted power supply; UPS);
하나 이상의 추가적인 USB 허브;
하나 이상의 이더넷(Ethernet) 장치;
하나 이상의 블루투스 장치;
하나 이상의 기억 장치;
하나 이상의 비디오 장치; 및
하나 이상의 통신 컨버터 장치
중 하나 이상을 포함하는 USB 허브.

청구항 15

제1항에 있어서,

상기 USB 허브는, 하나 이상의 각각의 호스트 컨트롤러와 정보를 송수신하기 위해 상기 복수의 포트들 중 하나 이상의 포트 각각에 결합된 하나 이상의 추가적인 상방 로직을 포함하고, 상기 USB 허브는 상기 하나 이상의 호스트 컨트롤러로 하여금 상기 복수의 장치들 중 각각의 부분집합들을 제어하도록 구성가능하고,

상기 스위칭 로직은 상기 하나 이상의 호스트 컨트롤러로 하여금 상기 복수의 장치들 중 다른(other) 각각의 부분집합들을 제어하도록 하기 위해 상기 USB 허브의 구성을 변경하도록 더 동작할 수 있는 USB 허브.

청구항 16

제15항에 있어서,

상기 USB 허브는, 상기 복수의 포트들 중 다른 하나 이상의 포트 각각에 결합된 하나 이상의 USB 장치 각각과 정보를 송수신하기 위해 상기 다른 하나 이상의 각각의 포트에 결합된 하나 이상의 추가적인 하방 로직을 더 포함하고,

상기 스위칭 로직은, 상기 복수의 장치들 사이의 제어 관계를 교환하기 위해 상기 하나 이상의 추가적인 상방 로직 및/또는 상기 상방 로직 중 임의의 상방 로직을 하나 이상의 하방 로직들 중 임의의 각각의 하방 로직과 교환하도록 더 동작할 수 있는 USB 허브.

청구항 17

복수의 장치들에 결합하도록 동작할 수 있는 복수의 포트들; 및

상기 복수의 포트들 중 하나의 포트를, 상기 복수의 포트들 중 다른 포트들에 결합된 장치들을 제어하기 위해 상방 로직에 결합하도록 동작할 수 있는 스위칭 로직

을 포함하는 USB 허브.

청구항 18

제17항에 있어서,

상기 스위칭 로직은 상기 복수의 포트들 중 임의의 두 포트들 각각 간에서 상방 로직 및 하방 로직을 교환하도록 더 동작할 수 있는 USB 허브.

청구항 19

제17항에 있어서,
상기 USB 허브는 주변 장치에 포함되는 USB 허브.

청구항 20

제17항에 있어서,
상기 스위칭 로직은,
상기 상방 로직 및/또는 하방 로직에 대한 스위칭 조건(switching condition)을 자동으로 탐지하고; 및
상기 자동 탐지에 응답하여 상기 상방 로직 및/또는 하방 로직을 교환하도록
더 동작할 수 있는 USB 허브.

청구항 21

제17항에 있어서,
상기 USB 허브는 외부 하우징(housing)에 포함되고, 상기 USB 허브는, 상기 복수의 장치들 중 제1 장치로서의
시스템에 부착(attach)되어 상기 시스템 및 상기 복수의 장치들 간의 USB 통신을 제공하도록 작동할 수 있는
USB 허브.

청구항 22

제17항에 있어서,
상기 복수의 장치들은
하나 이상의 휴대폰;
하나 이상의 휴대용 음악 플레이어 장치;
하나 이상의 컴퓨터;
하나 이상의 프린터;
하나 이상의 하드 드라이브;
하나 이상의 디지털 카메라;
하나 이상의 메모리 매체;
하나 이상의 오디오 장치;
하나 이상의 키보드;
하나 이상의 마우스;
하나 이상의 조이스틱;
하나 이상의 무정전 전원 공급장치(uninterrupted power supply; UPS);
하나 이상의 추가적인 USB 허브;
하나 이상의 이더넷 장치;
하나 이상의 블루투스 장치;
하나 이상의 기억 장치;
하나 이상의 비디오 장치; 및
하나 이상의 통신 컨버터 장치

중 하나 이상을 포함하는 USB 허브.

청구항 23

제1항에 있어서,

상기 USB 허브는 루트(root) USB 허브인 USB 허브.

청구항 24

USB 허브로의 입력을 수신하는 단계로서, 상기 USB 허브는 복수의 장치들에 결합하기 위한 복수의 포트들을 포함하고, 상기 입력은 제1 포트에 결합된 제1 장치에 의한 상기 복수의 장치들 중 적어도 하나의 부분집합의 제어를 제2 포트에 결합된 제2 장치에 의한 상기 복수의 장치들 중 상기 적어도 하나의 부분집합의 제어로 변경하는 것을 지정하는 단계; 및

상기 USB 허브에 포함된 상방 로직을, 상기 제1 포트를 통해 호스트 컨트롤러로서의 상기 제1 장치와 정보를 송수신하는 것에서 상기 제2 포트를 통해 호스트 컨트롤러로서의 상기 제2 장치와 정보를 송수신하는 것으로 교환하는 단계

를 포함하는 방법.

청구항 25

제24항에 있어서,

상기 상방 로직을 교환하는 단계는

상기 제1 포트로부터 상기 상방 로직을 분리하는 단계;

상기 제2 포트를 통해 USB 장치로서의 상기 제2 장치와 정보를 송수신하기 위한 하방 로직을 분리하는 단계; 및

상기 상방 로직을 상기 제2 포트에 결합시키는 단계

를 포함하는 방법.

청구항 26

제24항에 있어서,

상기 제1 포트를 통해 USB 장치로서의 상기 제1 장치와 정보를 송수신하기 위해 상기 제1 포트에 상기 하방 로직을 결합시키는 단계

를 더 포함하는 방법.

청구항 27

제24항에 있어서,

상기 USB 허브는 주변 장치에 포함되는 방법.

청구항 28

제24항에 있어서,

상기 상방 로직 및/또는 하방 로직에 대한 스위칭 조건을 자동으로 탐지하는 단계를 더 포함하고,

상기 상방 로직 및/또는 하방 로직을 교환하는 상기 단계는 상기 자동 탐지에 응답하여 수행되는 방법.

청구항 29

제24항에 있어서,

상기 USB 허브는 외장형 USB 허브인 방법.

청구항 30

제24항에 있어서,
상기 복수의 장치들은
하나 이상의 휴대폰;
하나 이상의 휴대용 음악 플레이어 장치;
하나 이상의 컴퓨터;
하나 이상의 프린터;
하나 이상의 하드 드라이브;
하나 이상의 디지털 카메라;
하나 이상의 메모리 매체;
하나 이상의 오디오 장치;
하나 이상의 키보드;
하나 이상의 마우스;
하나 이상의 조이스틱;
하나 이상의 부정전 전원 공급장치(uninterrupted power supply: UPS);
하나 이상의 추가적인 USB 허브;
하나 이상의 이더넷(Ethernet) 장치;
하나 이상의 블루투스 장치;
하나 이상의 기억 장치;
하나 이상의 비디오 장치; 및
하나 이상의 통신 컨버터 장치
중 하나 이상을 포함하는 방법.

청구항 31

제24항에 있어서,
상기 USB 허브는, 하나 이상의 각각의 호스트 컨트롤러와 정보를 송수신하기 위해 상기 복수의 포트들 중 하나 이상의 포트 각각에 결합된 하나 이상의 추가적인 상방 로직을 포함하고, 상기 USB 허브는 상기 하나 이상의 호스트 컨트롤러로 하여금 상기 복수의 장치들의 각각 부분집합들을 제어하도록 구성가능하고,
상기 방법은 상기 하나 이상의 호스트 컨트롤러로 하여금 상기 복수의 장치들의 다른 각 부분집합들을 제어하도록 하기 위해 상기 USB 허브의 구성을 변경할 수 있도록 하는 단계를 더 포함하는 방법.

청구항 32

제31항에 있어서,
상기 USB 허브는, 상기 복수의 포트들 중 다른 하나 이상의 포트 각각에 결합된 하나 이상의 USB 장치 각각과 정보를 송수신하기 위해 상기 다른 하나 이상의 각각의 포트에 결합된 하나 이상의 하방 로직을 더 포함하고,
상기 방법은, 상기 복수의 장치들 사이의 제어 관계를 교환하기 위해, 상기 하나 이상의 추가적인 상방 로직 및 /또는 상기 상방 로직 중 하나를 상기 하나 이상의 하방 로직들 중 다른 하나와 각각 교환하는 단계를 더 포함하는 방법.

명세서

발명의 상세한 설명

발명의 목적

발명이 속하는 기술 및 그 분야의 종래기술

- <8> 본 발명은 USB 허브 분야에 관한 것이고, 특히 USB 허브 내의 로직을 반전시키기 위한 시스템 및 방법에 관한 것이다.
- <9> 최근, 전자 시장에 USB 전자기기 및 장치들이 급격하게 확산되고 있다. 이 장치 및 전자기기들은 일반 사용자들에게 컴퓨터에 접속된 많은 장치들, 예컨대, 키보드, 마우스, 오디오 장치, 디지털 카메라, 디지털 비디오-레코더, 휴대폰, 디지털 음악 플레이어, 파워 서플라이, 기억 장치, 레코딩 장비, 및 신호 컨버터 등과 같은 장치들에 대한 액세스를 제공해왔다. USB 전자기기의 널리 보급된 사용 및 방법 때문에, 호스트 컴퓨터의 필요 없이도, USB 2.0 온-더-고(On-The-Go; OTG) 사양을 이용하여 장치들간의 직접(direct) 통신이 구현되었다. 그러나, 두 USB 장치가 OTG 사양을 이용하여 통신할 때, 제1 장치는 호스트 컨트롤러로서 작동해야 하고 나머지 장치는 USB (주변) 장치로서 작동해야 한다. OTG 장치가 이러한 이중-역할 능력(dual-role capability)을 가지므로, 어느 장치가 호스트 컨트롤러로서 작동할 것인지에 관하여 모호함이 발생한다. 예를 들어, 휴대폰과 같은 소형의 장치가 한 상황에서는 호스트가 되어 예컨대, 이 휴대폰에 찍힌 사진을 프린트하고, 또 다른 상황에서는 주변 장치가 되어 예컨대, 호스트 컴퓨터로부터 음악을 다운로드할 수 있다. 이 문제를 다루기 위해, OTG 보충 규격(supplement)은, 연결 케이블에 기초한 디폴트 구성 및 호스트 협상 프로토콜(HNP)을 정의하는데, 여기서는 즉, 케이블의 연결 편이 디폴트 호스트 및 주변 장치를 지시한다.

발명이 이루고자 하는 기술적 과제

- <10> 그러나, OTG 보충 규격은 USB 허브, 즉, 복수의 장치들 사이에서 USB 통신을 가능하게 하는 회로 내에서 이중-역할 장치를 사용하기 위한 프로토콜을 정의하지 않는다. USB 허브는 일반적으로, 호스트 또는 호스트 컨트롤러와 통신하기 위한 포트와 연결된 상방(upstream) 로직을 가지고, 복수의 USB 장치들과 통신하기 위한 포트들과 연결된 하방(downstream) 로직들을 가진다. 한 종래기술에 있어서는 USB 장치들 중 하나로 하여금 (지금은 하나의 장치로 작동하는) 이전 호스트 컨트롤러에 대해 호스트로 작동하도록 한다. 그러나, 이 방법은 이중-역할 장치들로 하여금 허브에 연결된 다른 장치들에 대한 호스트들로 작동하도록 하지 못한다. 즉, USB 허브는 새로운 호스트 및 이전 호스트 사이의 두 방향의(two-way) 통신 경로가 되고, 다른 연결된 장치로의 통신을 무시한다.
- <11> 따라서, USB 허브에서의 장치 통신에 대한 개선된 방법 및 시스템이 요구된다.

발명의 구성 및 작용

- <12> USB 허브 내의 로직을 반전시키기 위한 시스템 및 방법의 실시예가 본 명세서에 기술되어 있다.
- <13> 본 발명의 일 실시예에 따라, USB 허브는 호스트 컨트롤러와 정보를 주고 받기 위한 상방 로직, USB 장치와 정보를 주고 받기 위한 하방 로직, 상방 또는 하방 로직 및 하나 이상의 USB 장치에 결합하여 각각 동작할 수 있는 복수의 포트들, 및 제1 포트 및 제2 포트 사이의 상방 및 하방 로직을 교환(switch)하도록 작동할 수 있는 스위칭 로직(switching logic)을 포함할 수 있다. 일부 실시예에서, 제1 포트에 결합된 제1 장치에 의한, USB 허브에 결합된 하나 이상의 장치들의 제어를 제2 포트에 결합된 제2 장치에 의한 제어로 변경하는 내용의 입력이, USB 허브에 수신될 수 있다. 예를 들어, 장치들 중 하나가 온-더-고(on-the-go; OTG) 또는 이중-역할 장치이면, 이것은 USB 허브의 호스트 컨트롤러로 작동하도록 요구하거나 지시받을 수 있다. 이 예에서, 입력은 다양한 소스들 중 임의의 하나로부터 수신될 수 있고, 스위칭 조건을 설정하거나 호출할 수 있으며, 이것은 USB 허브에 의해 탐지될 수 있다.
- <14> 일부 실시예에서, 스위칭 조건은 예컨대 플리핑(flippping), 즉, USB 허브 상의 기계적 스위치를 켜거나 끄는 것, 또는 이와 달리 USB 허브가 장치에 포함되는 경우 장치 상의 스위치를 켜거나 끄는 것에 의해 기계적으로 호출될 수 있다. 일 실시예에서, 스위칭 조건은 접속 케이블 방위(orientation)의 변경을 포함할 수 있다. 특히, 현재의 USB OTG 사양에서, USB 접속 케이블은 (한 쪽에) 디폴트 호스트 컨트롤러 접속을 가지고 (다른 편에) 디폴트 장치 접속을 가질 수 있다. 이 경우, 스위칭 조건은, 이 두 접속을 반전(reverse)시킴으로써 호출될 수 있는데, 예컨대 케이블 말단의 커넥터(connector)들의 각각과 관련된 핀(pin)들을 변경하여 스위칭 조

건을 호출할 수 있다.

- <15> 이와 달리, 또는 추가적으로, 사용자 또는 다른 시스템은 전자 수단(electronic means)을 통해 스위칭 조건을 불러올 수 있다; 예를 들어, 사용자는, USB 허브에 결합된 장치의 개수에 따른, 가능한 복수의 버튼들 또는 옵션들로부터 선택할 수 있다. 예컨대, 만약 USB 허브가 휴대폰, PDA 및/또는 디지털 음악 플레이어와 같은 주변 장치에 포함되어 있다면, 사용자에게 주변 장치 디스플레이 상에서 복수의 옵션이 제공되고, 가능한 옵션들 중 하나 이상을 선택함으로써 스위칭 조건을 호출할 수 있다. 특히, 주변 장치는 USB 허브와 관련된 메뉴를 포함할 수 있다; 사용자는 예컨대 스타일러스(stylus), 음성 기동(voice activation), 및/또는 키패드를 통해 메뉴를 선택할 수 있고, 하나 이상의 옵션으로부터 선택하여, 예컨대 스위칭 조건을 호출함으로써 특정한 호스트 변경을 호출할 수 있다. 또는, 사용자는 상기 기술된 방법과 동일하게 USB 허브에 결합된 장치로부터 스위칭 조건을 호출할 수 있다.
- <16> 일부 실시예에서, USB 허브가 자동으로 스위칭 조건을 탐지할 수 있다. 예를 들어, USB 허브는 스위칭 조건을 특히 탐지하기 위해 USB 허브로의 접속들의 물리층(PHY)에 존재하는 감지 메커니즘(sensing mechanism)을 가질 수 있다. 일 실시예에서, 스위칭 조건은 USB 허브로의 접속들 중 한 접속의 하나 이상의 핀, 예컨대 하나 이상의 포트에서의 임피던스 변화를 포함할 수 있다. 예를 들어, 일 실시예에서, 상기 기술된 수단을 통해 호출된 스위칭 조건은, 로직 반전(reversal)을 요구하는 주변 장치에 접속된 USB 케이블의 D+ 및 D- 핀의 임피던스 변화를 포함할 수 있다. 특정 예로서, PHY의 핀들 중 두 개는 일반적으로 15kΩ의 임피던스를 가지는데, 연결(tying) 후에는, 두 핀은 합쳐서 임피던스가 7.5kΩ로 감소한다. 그러므로, USB 허브는 스위칭 조건에 따른 임피던스의 변화를 탐지한다. 따라서, USB 허브는, 허브의 로직 변화를 표시하는 스위칭 조건을 호출하는 입력을 수신할 수 있다.
- <17> 복수의 상방 로직들과 이와 연관된 호스트 컨트롤러들이 있는 다양한 실시예에서, 입력은 결합된(coupled) 장치들 중 어느 것이 제2 장치로 제어되어야 하는지를 또한 지정한다. 즉, 상기 기재된 바와 같이, USB 허브는 복수의 호스트 컨트롤러들을 가질 수 있는데, 이 각각의 호스트 컨트롤러는 결합된 장치들의 각각의 부분집합 - 중복되지 수 있음 - 을 제어하며, 입력은 하나 이상의 결합된 장치가, 경우에 따라 이전 호스트 컨트롤러도 포함하는 다른 결합된 장치들을 제어하는 호스트 컨트롤러가 되도록 지정할 수 있다. 일부 실시예에서, 입력은 새로운 호스트 컨트롤러에 의해 제어되는 장치들의 부분집합의 변화를 지정할 수 있다. 또 다른 방법으로, 입력은 복수의 결합된 장치의 제어를 새로운 호스트 컨트롤러 집합에 의하도록 지정할 수 있고, 새로운 및/또는 이전 호스트 컨트롤러들 각각은 새롭게 결합된 장치들의 부분집합 각각을 제어할 수 있다.
- <18> 본 명세서에 기술된 입력, 방법, 및 스위칭 조건은 복수의 호스트 컨트롤러들에 관한 상기 기술에 역시 적용될 수 있다. 예를 들어, 입력은 예컨대 상기와 동일하게 스위치를 통해 기계적으로 수신될 수 있는데, 이 경우에, 스위치는 새로운 호스트 컨트롤러와 이전 호스트 컨트롤러 및 새롭게 제어되는 결합된 장치들의 부분집합과 각각 관련된 복수의 옵션들을 가질 수 있다. 이와 달리, 또는 추가적으로, 입력은 상기 기술된 메뉴 및 방법을 이용하여 전자적으로 수신될 수 있다. 상기 기술된 스위칭 조건들 및 이들의 호출은 예시적인 것에 불과하고, 다른 방법 및 스위칭 조건들을 구상할 수 있다. 따라서, USB 허브는 하나 이상의 호스트 컨트롤러에 의한 USB 허브에 결합된 복수의 장치들의 제어를, 예컨대 기존에 주변 장치로서 작동했던 하나 이상의 다른 호스트 컨트롤러에 의한 제어로 변경하도록 지정하는 입력을 수신할 수 있다.
- <19> 일 실시예에서, USB 허브에 포함된 상방 로직은, 이전 호스트 컨트롤러에 결합된 제1 포트로부터 정보를 수신하는 것에서, 새로운 호스트 컨트롤러에 결합된 제2 포트로부터 정보를 수신하는 것으로 교환될 수 있다. 즉, USB 허브는 수신된 입력, 예컨대, 상기 기술된 입력에 응답하여, 허브에 결합된 장치들의 제어를 하나의 장치에서 다른 장치로 변경할 수 있다. 일 실시예에서, 허브는, 상방 로직으로부터 제1 포트를 분리시키고, 하방 로직으로부터 제2 포트를 분리시키며, 제2 포트를 상방 로직에 결합시킴으로써, 상기 변경을 수행할 수 있다. 일부 실시예에서, 허브는 이전 호스트 컨트롤러가 새로운 호스트 컨트롤러에 대한 주변 장치로 작동하도록 할 수 있다; 즉, 허브는 예컨대 제2 포트에 의해 사용되었던 하방 로직을 제1 포트에 결합시킬 수 있다. 그러므로, 상방 및 하방 로직은 호스트 컨트롤러 및 장치 사이에서 효과적으로 교환된다. 따라서, 다양한 실시예에서, 새로운 호스트 컨트롤러는, 관련 하방 로직을 통해 허브에 결합된 다른 장치들에 대해, 경우에 따라 이전 호스트 컨트롤러에 대해서도, 호스트로 작동할 수 있다.
- <20> 상기 기술된 스위칭은 허브에 포함된 임의의 특정 두 포트들에 제한되는 것은 아니고, 여러 포트들과 관련된 임의의 복수 로직들이 상기 기술된 방법에 따라 교환될 수 있다. 그러므로, 일 실시예에서, USB 허브에 포함된 상방 로직, 하방 로직, 및/또는 다른 로직들은 교환될 수 있다.

- <21> 따라서, 본 명세서에 기술된 방법을 이용하여, USB 허브는 수신된 입력에 따라 상방 및 하방 로직을 교환할 수 있다.
- <22> 다음의 문헌들은 그 전체가 본 명세서에서 참조로서 인용된다.
- <23> 발명자가, Henry Wurzburg, Jaems E. Bowles, Robert E. Hollingsworth, Mark R. Bohm 및 Drew J. Dutton인 2004년 9월 14일 출원한 미국 특허출원 번호 10/940,406, "USB 스위칭 허브(Universal Serial Bus Switching Hub)"; 및
- <24> 발명자가 Mark R.Bohm, Mark Fu, Henry Wurzburg, James E. Bowles, Robert E. Hollingsworth 및 Drew J. Dutton인 2005년 3월 6일 출원한 미국 특허출원 번호 11/100,299, '주변장치 공유 USB 허브(Peripheral Sharing USB HUB).'
- <25> 아래는 본 출원서에서 사용되는 용어의 해설이다.
- <26> 메모리 매체(Memory Medium) - 임의의 다양한 유형의 메모리 장치 또는 기억 장치. "메모리 매체" 용어는, 예컨대, CD-ROM, 플로피 디스크, 또는 테이프 장치와 같은 설치(installation) 매체; DRAM, DDR RAM, SRAM, EDO RAM, Rambus RAM 등과 같은 컴퓨터 시스템 메모리 또는 랜덤 액세스 메모리; 또는 예컨대 하드 드라이브 등의 마그네틱 매체와 같은 비휘발성 메모리, 또는 광기억 장치(optical storage)를 포함한다. 메모리 매체는 다른 유형의 메모리나 이들의 조합을 포함할 수 있다. 또한, 메모리 매체는, 프로그램이 실행되는 제1 컴퓨터에 위치하거나, 인터넷과 같은 네트워크를 통해 제1 컴퓨터에 접속하는 다른 제2 컴퓨터에 위치할 수 있다. 후자의 경우, 제2 컴퓨터는 실행하기 위한 프로그램 명령어를 제1 컴퓨터에 보낼 수 있다. "메모리 매체" 용어는 여러 위치, 예컨대, 네트워크를 통해 접속되는 여러 컴퓨터들에 있는 2 이상의 메모리 매체를 포함할 수 있다.
- <27> 캐리어 매체(Carrier Medium) - 버스, 네트워크 및/또는 무선 링크와 같은 통신 매체를 경유하여 전달되는, 전기, 전자기, 또는 디지털 신호와 같은 신호 및 상기 기술된 메모리 매체.
- <28> 매체(Medium) - 하나 이상의 메모리 매체, 캐리어 매체, 및/또는 프로그램가능 하드웨어 요소를 포함하고; 프로그램 명령어/데이터 구조를 저장하거나 하드웨어 구성 프로그램으로 구성될 수 있는 여러 유형의 매체를 포함한다. 예를 들어, "기능(function)을 수행하거나 소프트웨어 객체(object)를 구현하도록 구성된" 매체는 1)기능을 수행하거나 소프트웨어 객체를 구현하기 위해 프로세서에 의해 실행가능한 프로그램 명령어를 저장하는 메모리 매체 또는 캐리어 매체; 2)기능을 수행하거나 소프트웨어 객체를 구현하는 것과 관련되는 신호를 운반하는 매체; 및/또는 3)기능을 수행하거나 소프트웨어 객체를 구현하기 위해 하드웨어 구성 프로그램으로 구성되는 프로그램가능 하드웨어 요소가 될 수 있다.
- <29> 컴퓨터 시스템(Computer System) - 임의의 여러 유형의 컴퓨팅 또는 프로세싱 시스템으로, 개인용 컴퓨터 시스템(PC), 메인프레임(mainframe) 컴퓨터 시스템, 워크스테이션, 네트워크 설비(appliance), 인터넷 설비, PDA, 텔레비전 시스템, 그리드(grid) 컴퓨팅 시스템, 또는 다른 장치나 이들 장치의 조합을 포함한다. 일반적으로, "컴퓨터 시스템" 용어는, 메모리 매체의 명령어를 실행하는 적어도 하나의 프로세서를 가지는 임의의 장치(또는 장치들의 조합)를 포함하도록 넓게 정의될 수 있다.
- <30> 도 1은 본 발명의 다양한 실시예를 구현하기에 적합한 시스템 예를 도시한다. 보이는 바와 같이, 장치, 예컨대 장치(50)는 USB 허브, 예컨대 USB 허브(80)에 결합될 수 있고, 이 허브는 호스트 컴퓨터 예컨대, 컴퓨터 시스템(82)에 결합될 수 있다. 일부 실시예에서, 장치 및/또는 컴퓨터 시스템은 네트워크, 예컨대, 허브를 통해 서로 결합될 수 있다. 예를 들어, 컴퓨터 시스템(82) 및/또는 장치(50)는 원격 위치에 있을 수 있고, 인터넷 네트워크, 광역 네트워크(WAN), 인터넷 등과 같은 네트워크를 통해 USB 허브(80)에 결합할 수 있다.
- <31> 장치(50)는 USB 통신을 할 수 있는 다양한 장치들 중 임의의 하나가 될 수 있다; 예를 들어, 장치(50)는, PDA, 애플 컴퓨터 주식회사의 IPODTM과 같은 휴대용 디지털 음악 플레이어, 휴대폰, 프린터, 디지털 카메라, 비디오 플레이어, 오디오 장치, 디지털 보이스 레코더나 퍼스널 비디오 레코더(PVR)와 같은 레코딩 장치, 셋-톱 박스(set-top box), 무정전 전원 공급장치(uninterrupted power supply; UPS), 하드 드라이브나 집(zip) 드라이브 등과 같은 대용량 기억장치, 플래시 메모리나 섬드라이브(thumb drive) 등과 같은 메모리 매체, 키보드, 마우스, 조이스틱, 블루투스 장치나 이더넷(Ethernet) 장치 등과 같은 통신 장치, 신호 포맷을 변환하는 통신 컨버터 장치, 추가적인 USB 허브, 컴퓨터 시스템, 및 모니터가 될 수 있거나 이를 포함할 수 있다. 바람직한 실시예에서, 장치는 USB OTG 장치와 같은 이중-역할 장치가 될 수 있다. 상기 장치 목록 및 유형은 예시적인 것에 불과하고, 다른 장치들도 구성할 수 있다.

- <32> 또한, 컴퓨터 시스템(82)은 다양한 컴퓨터 유형 중 임의의 하나가 될 수 있다. 예를 들어, 컴퓨터 시스템(82)은, 하나 이상의 컴퓨터 프로그램 또는 소프트웨어 구성요소가 저장될 수 있는 적어도 하나의 메모리 매체를 포함한다. 메모리 매체는 컴퓨터 시스템의 동작(operation)을 위한 오퍼레이팅 시스템 소프트웨어 및 다른 소프트웨어를 저장할 수 있다. 다양한 실시예들은 상기 기술에 따라 구현된 데이터 및/또는 명령어를 캐리어 매체 상에 저장하거나 수신하는 것을 더 포함한다. 보이는 바와 같이, 컴퓨터 시스템(82)은, 하나 이상의 결합된 입력 장치, 예컨대, 키보드 및 마우스, 및 다른 입력 장치들을 포함하고, 컴퓨터 시스템(82)에서 실행되는 소프트웨어 구성요소와 관련된 그래픽을 디스플레이하기 위한 디스플레이 장치를 포함한다.
- <33> 다양한 실시예에서, USB 허브(80)는 다양한 허브들 중 임의의 하나가 될 수 있다. 예를 들어, USB 허브(80)는 외장형 허브일 수 있고, 장치(50) 및/또는 컴퓨터 시스템(82)과 같은 호스트는 허브에 결합된 하나 이상의 다른 장치들을 제어할 수 있다. 일 실시예에서, USB 허브(80)는 루트(root) 허브일 수 있다. 추가적으로 또는 이와 달리, USB 허브(80)는 장치(50) 또는 컴퓨터 시스템(82)에 포함될 수 있다. 예를 들어, 장치는 컴퓨터 시스템(82)에 포함된 허브에 직접 연결될 수 있다. 추가적으로 또는 이와 달리, 장치는 다른 USB 허브를 직접 포함하며 예컨대, 컴퓨터 시스템(82) 및 장치(50) 각각의 허브 또는 컴퓨터 시스템(82)과 같은 다른 USB 장치들에 접속될 수 있다. 일 실시예에서, USB 허브는, 예컨대 상기의 USB 허브(80)가 장치 또는 컴퓨터 시스템에 포함되는 것과 유사하게, USB 복합(composite) 또는 조합(compound) 장치의 일부가 되거나 이를 포함할 수 있다. USB 허브 및 시스템 예는 아래에서 좀 더 자세히 기술될 것이다.
- <34> 도 2는 본 발명의 다양한 실시예를 구현하기에 적합한 시스템의 또 다른 예를 도시한다. 도 2에 도시된 바와 같이, 장치(50)는 USB 허브(80)에 결합될 수 있고, 이 허브는 장치(75)와 같은 또 다른 장치에 결합될 수 있다. 상기와 동일하게, USB 허브는 장치(50) 및 장치(75) 모두 또는 이들 중 하나에 포함될 수 있는데, 즉, 장치들 중 하나는 USB 허브를 포함할 수 있고, 다른 장치도 동일한 USB 허브를 포함할 수 있다; 추가적으로, 장치(75)는 USB 통신을 할 수 있는 상기 연결된 장치들 중 임의의 하나를 포함하거나 임의의 하나가 될 수 있다.
- <35> 그리고, 일 실시예에서, 장치(75) 및 USB 허브(80)는 장치(50)에 내장될 수 있다. 예를 들어, 장치(50)는, 내부 및 외부 장치와 통신하기 위한 USB 허브(80)를 포함하는, 휴대폰, PDA, 및/또는 휴대용 음악 플레이어와 같은, 주변 장치가 될 수 있다. 예를 들어, 휴대폰은, 카메라, 하드 드라이브 또는 그 밖의 메모리 매체, 블루투스 장치, 디지털 음악 파일 플레이어, 또는 상기 기술된 것과 같은 다양한 적절한 장치들 중 임의의 하나와 같은, USB 허브에 결합될 수 있는 수많은 내부 장치들 중 임의의 하나를 가질 수 있다. 상기 예에서, 휴대폰은 휴대폰 안에 있는 USB 허브를 통해, PDA와 같은 외부 시스템 및 디지털 카메라와 같은 내부 장치에 결합될 수 있다. 상기 기술된 시스템은 예시적인 것에 불과하고, 본 명세서에 기술된 다른 장치 및 시스템을 구성할 수 있다.
- <36> 도 3은 본 발명의 일 실시예에 따라, USB 허브(80)와 같은 USB 허브의 블록 다이어그램을 도시한다. 일부 실시예에서, 주변 장치는 인터페이스를 통해 USB 허브에 결합할 수 있다. 예를 들어, USB 허브는, USB 2.0 트랜시버 매크로셀 인터페이스(Transceiver Macrocell Interface; TMI) 또는 UTM+ 로우 핀 인터페이스(UTM+ low pin interface; ULPI)와 같은, 물리층(PHY) 인터페이스들 및/또는 다른 인터페이스들을 포함할 수 있다. 일 실시예에서, USB 허브는, 상기 기술된 인터페이스들을 이용하여, 장치(50), 장치(75) 및/또는 다른 장치와 같은 하나 이상의 장치들에 결합하기 위한, 복수의 포트들, 예컨대, 도 3에 도시된 포트(310, 320, 330A, 330B 및 330C)들을 포함한다. 각 포트는 장치에 신호를 전송하고 장치로부터의 신호를 해석하기 위한 로직에 결합될 수 있다. 예를 들어, 호스트 컨트롤러는, 호스트로서 작동하는 장치와만 정보를 송수신하도록 동작할 수 있는 상방 로직, 예컨대, 상방 포트 로직(315)에 결합될 수 있다. 반대로, 장치는, 주변 장치로 작동하는 장치와 정보를 송수신하도록 동작할 수 있는 하방 로직, 예컨대, 하방 포트 로직(325, 335A, 335B, 및 335C)에 결합될 수 있다. 허브는 이들 각각의 로직들 중 하나 이상을 포함할 수 있다. 예를 들어, 일 실시예에서, USB 허브는 하나 이상의 호스트 컨트롤러에 관한 복수의 상방 로직들을 가질 수 있는데, 이 컨트롤러들 각각은 USB 허브에 결합된 USB 장치들을 따로따로 또는 겹쳐서(overlapping) 제어한다. 또한, 상기 표시된 바와 같이, USB 허브는 하나 이상의 주변 장치와 연결된 복수의 하방 로직들을 가질 수 있다.
- <37> 그리고, 일부 실시예에서, USB 허브는, 적어도 하나의 호스트 컨트롤러 및 장치들로부터의 정보를 해석하고 이들과 정보를 송수신하기 위한, 허브 로직, 예컨대, 허브 로직(340)을 포함할 수 있다. 예를 들어, 허브 로직(340)은, 호스트 컨트롤러로부터 적절한 타겟 장치로의 방향 및 그 반대 방향으로 정보를 지능적으로 라우팅하도록 동작할 수 있다; 추가적으로, 허브 로직은, 실질적으로 동일 시간에 복수의 장치들로부터 보내진 신호와 같은, 신호 대립(conflict) 및 충돌(collision)을 해결하도록 동작할 수 있다. 일 실시예에서, USB 허브는, 아래에서 자세히 기술될, 두 개 이상의 장치들에 관한 상방 또는 하방 로직들을 교환(switch)하고 및/또는 결합

(couple)시킴으로써 작동하는, 하나 이상의 스위치 및/또는 스위칭 로직, 예컨대, 스위칭 로직(350A 및 350B)을 포함할 수 있다. 스위칭 로직은 예컨대, 도 3에 도시된 두 구성요소들과 같이 복수의 구성요소로 나누어질 수 있거나, 단일 스위칭 로직 구성요소로 합쳐질 수 있다. 이와 달리, 스위칭 로직은 메모리 매체에 저장되고 및/또는 USB 허브 전체에 걸쳐 분배될 수 있다. 도 3에 나타난 바와 같이, 스위칭 로직은 포트(310)와 같은 제1 포트 및 포트(320)와 같은 제2 포트에 연결될 수 있다; 그러나, 이 구성은 예시적인 것일 뿐이고, 다른 시스템 및 설계도 고려할 수 있다. 예를 들어, 스위칭 로직은 USB 허브에 포함된 포트들 전부 또는 이 중 임의의 것과 결합되어, 동작하는 동안, 포함된 로직들 중 임의의 것을 교환할 수 있다.

- <38> 일부 실시예에서, USB 허브는, 관련된 상방 로직을 가지고 호스트 컨트롤러에 결합되는 제1 포트 및 관련된 하방 로직을 가지고 USB 장치에 결합되는 제2 포트를 포함할 수 있다. 상기 표시된 바와 같이, USB 허브에 포함된 하나 이상의 추가적인 포트에 결합된 하나 이상의 추가적인 장치들이 있을 수 있다. 따라서, 호스트 컨트롤러는, 상기 기재된 허브 로직을 이용하여, 복수의 USB 장치들을 제어할 수 있다. 만약 USB 장치들 중 하나가 이중-역할 장치 장치라면, 예컨대, 아래 기술된 바와 같이 USB 허브에 결합된 다른 USB 장치들을 제어하기 위해, 이 장치는 허브의 호스트 컨트롤러가 되도록 요구(request)하거나 요구받을 수 있다.
- <39> 도 4는 도 3의 USB 허브와 같은 USB 허브의 로직을 교환하는 방법의 예를 도시한다. 도 4에 도시된 방법은, 본 명세서에 기술된 컴퓨터 시스템 또는 장치들 중 임의의 것과 함께 사용될 수 있다. 다양한 실시예에서, 표시된 방법 요소들 중 일부는 표시된 것과 다른 순서로 수행될 수 있거나, 생략될 수 있다. 방법 요소들을 추가적으로 바람직하게 수행할 수 있다. 표시된 바와 같이, 이 방법은 다음과 같이 동작할 수 있다.
- <40> 단계(402)에서, 제1 포트(310)에 결합된 제1 장치에 의한, USB 허브(80)에 결합된 하나 이상의 장치들의 제어를 제2 포트(320)에 결합된 제2 장치에 의한 제어로 변경하는 내용의 입력이 USB 허브, 예컨대, USB 허브(80)에 수신될 수 있다. 예를 들어, 상기 기술에 따라, 장치들 중 하나가 OTG 또는 이중-역할 장치이면, 이것은 USB 허브의 호스트 컨트롤러로 작동하도록 요구하거나 지시받을 수 있다. 이 예에서, 입력은 다양한 소스들 중 임의의 하나로부터 수신될 수 있고, 스위칭 조건을 설정하거나 호출할 수 있으며, 이것은 USB 허브에 의해 탐지될 수 있다.
- <41> 일부 실시예에서, 스위칭 조건은 예컨대 플리핑(flipping), 즉, USB 허브 상의 기계적 스위치를 켜거나 끄는 것, 또는 이와 달리 USB 허브가 장치에 포함되는 경우 장치 상의 스위치를 켜거나 끄는 것에 의해 기계적으로 호출될 수 있다. 일 실시예에서, 스위칭 조건은 접속 케이블 방위(orientation)의 변경을 포함할 수 있다. 특히, 상기 기재된 바와 같이, 현재의 USB OTG 사양에서, USB 접속 케이블은 (한 쪽에) 디폴트 호스트 컨트롤러 접속을 가지고 (다른 편에) 디폴트 장치 접속을 가질 수 있다. 이 경우, 스위칭 조건은, 이 두 접속을 반전(reverse)시킴으로써 호출될 수 있는데, 예컨대 케이블 말단의 커넥터(connector)들의 각각과 관련된 핀(pin)들을 변경하여 스위칭 조건을 호출할 수 있다.
- <42> 이와 달리, 또는 추가적으로, 사용자 또는 다른 시스템은 전자 수단(electronic means)을 통해 스위칭 조건을 불러올 수 있다; 예를 들어, 사용자는, USB 허브에 결합된 장치의 개수에 따른, 가능한 복수의 버튼들 또는 옵션들로부터 선택할 수 있다. 예컨대, 만약 USB 허브가 휴대폰, PDA 및/또는 디지털 음악 플레이어와 같은 주변 장치에 포함되어 있다면, 사용자에게 주변 장치 디스플레이 상에서 복수의 옵션이 제공되고, 가능한 옵션들 중 하나 이상을 선택함으로써 스위칭 조건을 호출할 수 있다. 특히, 주변 장치는 USB 허브와 관련된 메뉴를 포함할 수 있다: 사용자는 예컨대 스타일러스(stylus), 음성 기동(voice activation), 및/또는 키패드를 통해 메뉴를 선택할 수 있고, 하나 이상의 옵션으로부터 선택하여, 예컨대 스위칭 조건을 호출함으로써 특정한 호스트 변경을 호출할 수 있다. 또는, 사용자는 상기 기술된 방법과 동일하게 USB 허브에 결합된 장치로부터 스위칭 조건을 호출할 수 있다.
- <43> 일부 실시예에서, USB 허브가 자동으로 스위칭 조건을 탐지할 수 있다. 예를 들어, USB 허브는 스위칭 조건을 특히 탐지하기 위해 USB 허브로의 접속들의 물리층(PHY)에 존재하는 감지 메커니즘(sensing mechanism)을 가질 수 있다. 일 실시예에서, 스위칭 조건은 USB 허브로의 접속들 중 한 접속의 하나 이상의 핀, 예컨대 하나 이상의 포트에서의 임피던스 변화를 포함할 수 있다. 예를 들어, 일 실시예에서, 상기 기술된 수단을 통해 호출된 스위칭 조건은, 로직 반전(reversal)을 요구하는 주변 장치에 접속된 USB 케이블의 D+ 및 D- 핀의 임피던스 변화를 포함할 수 있다. 특정 예로서, PHY의 핀들 중 두 개는 일반적으로 15kΩ의 임피던스를 가지는데, 연결(tying) 후에는, 두 핀은 합쳐서 임피던스가 7.5kΩ로 감소한다. 그러므로, USB 허브는 스위칭 조건에 따른 임피던스의 변화를 탐지한다. 따라서, USB 허브는, 허브의 로직 변화를 표시하는 스위칭 조건을 호출하는 입력을 수신할 수 있다.

- <44> 복수의 상방 로직들과 이와 연관된 호스트 컨트롤러들이 있는 다양한 실시예에서, 입력은 결합된(coupled) 장치들 중 어느 것이 제2 장치로 제어되어야 하는지를 또한 지정한다. 즉, 상기 기재된 바와 같이, USB 허브는 복수의 호스트 컨트롤러들을 가질 수 있는데, 이 각각의 호스트 컨트롤러는 결합된 장치들의 각각의 부분집합 - 중복되지 수 있음 - 을 제어하며, 입력은 하나 이상의 결합된 장치가, 경우에 따라 이전 호스트 컨트롤러도 포함하는 다른 결합된 장치들을 제어하는 호스트 컨트롤러가 되도록 지정할 수 있다. 일부 실시예에서, 입력은 새로운 호스트 컨트롤러에 의해 제어되는 장치들의 부분집합의 변화를 지정할 수 있다. 또 다른 방법으로, 입력은 복수의 결합된 장치의 제어를 새로운 호스트 컨트롤러 집합에 의하도록 지정할 수 있고, 새로운 및/또는 이전 호스트 컨트롤러들 각각은 새롭게 결합된 장치들의 부분집합 각각을 제어할 수 있다.
- <45> 예를 들어, USB 허브는 우선, 컴퓨터 및 PDA와 같은 두 개의 호스트 컨트롤러를 포함하고 휴대폰, 프린터, 디지털 카메라와 같은 복수의 주변장치를 포함할 수 있다. 여기서, 컴퓨터는 프린터 및 휴대폰을 제어하고, PDA는 디지털 카메라를 제어할 수 있다. 후속적으로, USB 허브는, 사진을 출력하기 위해 휴대폰이 예컨대 PDA를 대체하여 새로운 호스트 컨트롤러가 되는, 내용의 입력을 수신할 수 있다. 이 경우, 입력은 새로운 호스트 컨트롤러, 즉 휴대폰이 프린터 및 디지털 카메라를 제어하고, 컴퓨터가 PDA를 제어하는 내용을 지정한다. 따라서, 입력은 하나 이상의 호스트 컨트롤러, 예컨대, PDA에 의한 제어를, 하나 이상의 주변 장치, 예컨대, 휴대폰에 의한 제어로 변경하는 내용을 지정할 수 있다. 추가적으로, 입력은 새로운 컨트롤러 각각에 대해 설정된 새로운 제어, 예컨대 휴대폰이 프린터 및 디지털 카메라를 제어하고, 컴퓨터가 PDA를 제어하는 것을 지정한다.
- <46> 간단한 예로서, USB 허브는, 호스트 컨트롤러 및 복수의 USB 장치, 예컨대, 이중-역할 PDA, 키보드, 및 디지털 비디오 레코더를 제어하는 이중-역할 디지털 음악 플레이어 장치에 결합될 수 있다. 이 예에서, USB 허브는, 키보드를 제어하는 상방 로직이 PDA에 결합되도록 하고, 디지털 음악 플레이어가 USB 허브에 결합된 디지털 비디오 레코더를 계속해서 제어하도록 지정하는 입력을 수신할 수 있다. 따라서, 일부 실시예에서, 입력은, 이전 호스트 컨트롤러가 결합된 장치들의 새로운 부분집합, 예컨대 디지털 비디오 레코더만을 제어하고, 새로운 호스트 컨트롤러가 다른 부분집합, 예컨대 키보드를 제어하는 내용을 지정할 수 있다.
- <47> 본 명세서에 기술된 입력, 방법, 및 스위칭 조건은 복수의 호스트 컨트롤러들에 관한 상기 기술에 역시 적용될 수 있다. 예를 들어, 입력은 예컨대 상기와 동일하게 스위치를 통해 기계적으로 수신될 수 있는데, 이 경우에, 스위치는 새로운 호스트 컨트롤러와 이전 호스트 컨트롤러 및 새롭게 제어되는 결합된 장치들의 부분집합과 각각 관련된 복수의 옵션들을 가질 수 있다. 이와 달리, 또는 추가적으로, 입력은 상기 기술된 메뉴 및 방법을 이용하여 전자적으로 수신될 수 있다. 상기 기술된 스위칭 조건들 및 이들의 호출은 예시적인 것에 불과하고, 다른 방법 및 스위칭 조건들을 구성할 수 있다. 따라서, USB 허브는 하나 이상의 호스트 컨트롤러에 의한 USB 허브에 결합된 복수의 장치들의 제어를, 예컨대 기존에 주변 장치로서 작동했던 하나 이상의 다른 호스트 컨트롤러에 의한 제어로 변경하도록 지정하는 입력을 수신할 수 있다.
- <48> 단계 404에서, USB 허브에 포함된 상방 로직은, 이전 호스트 컨트롤러에 결합된 제1 포트로부터 정보를 수신하는 것에서, 새로운 호스트 컨트롤러에 결합된 제2 포트로부터 정보를 수신하는 것으로 교환될 수 있다. 즉, USB 허브는 수신된 입력, 예컨대, 상기 기술된 입력에 응답하여, 허브에 결합된 장치들의 제어를 하나의 장치에서 다른 장치로 변경할 수 있다. 일 실시예에서, 허브는, 상방 로직으로부터 제1 포트를 분리시키고, 하방 로직으로부터 제2 포트를 분리시키며, 제2 포트를 상방 로직에 결합시킴으로써, 상기 변경을 수행할 수 있다. 일부 실시예에서, 허브는 이전 호스트 컨트롤러가 새로운 호스트 컨트롤러에 대한 주변 장치로 작동하도록 할 수 있다; 즉, 허브는 예컨대 제2 포트에 의해 사용되었던 하방 로직을 제1 포트에 결합시킬 수 있다. 그러므로, 상방 및 하방 로직은 호스트 컨트롤러 및 장치 사이에서 효과적으로 교환된다. 따라서, 다양한 실시예에서, 새로운 호스트 컨트롤러는, 관련 하방 로직을 통해 허브에 결합된 다른 장치들에 대해, 경우에 따라 이전 호스트 컨트롤러에 대해서도, 호스트로 작동할 수 있다. 또한 이 스위칭 예는 아래에서 좀 더 자세히 기술될 것이다.
- <49> 상기 기술된 스위칭은 허브에 포함된 임의의 특정 두 포트들에 제한되는 것은 아니고, 여러 포트들과 관련된 임의의 복수 로직들이 상기 기술된 방법에 따라 교환될 수 있다. 따라서, 일 실시예에서, 임의의 하방 로직은 USB 허브에 포함된 임의의 상방 로직 및/또는 다른 로직들과 교환될 수 있다.
- <50> 컴퓨터, PDA, 및 휴대폰에 관한 상기 예에 이어서, USB 허브가 PDA 및 휴대폰 각각과 관련된 상방 및 하방 로직을 변경할 수 있다. USB 허브는, 컴퓨터의 상방 로직으로부터의 신호를 휴대폰의 상방 로직으로 리라우팅(rerouting)함으로써 주변 장치의 제어를 교환할 수 있는데, 예컨대, 컴퓨터에 의해 제어되는 프린터를 휴대폰에 의해 제어되도록 하는 것이다. 즉, 프린터와 관련된 하방 로직은 컴퓨터로부터 신호를 수신하는 것에서 휴대폰으로부터 신호를 수신하는 것으로 교환될 수 있다. 따라서, 로직이 교환된 후에, 휴대폰은 프린터 및 디지

털 카메라를 제어하고, 컴퓨터는 PDA를 제어할 수 있다. USB 허브 내의 제어되는 장치들의 부분집합의 변경에 관한 자세한 내용은, 본 명세서에서 참조로 인용되는 미국 출원 10/940,406 및 11/100,299에 나와 있다.

- <51> 따라서, 본 명세서에 기술된 방법을 사용하여, USB 허브는 수신된 입력에 따라 상방 및 하방 로직을 교환할 수 있다.
- <52> 도 5 및 6은 장치(500)와 같은 USB 장치 내에 포함된 USB 허브의 블록 다이어그램 예를 도시한다. 장치는, 상기 설명된 도면에 관하여 기술된 바와 같이, 임의의 상기 기술된 장치를 포함하거나 장치가 될 수 있다. 상기 와 동일하게, USB 허브(508)는, 적어도 하나의 호스트 컨트롤러 및 하나 이상의 주변 장치에 결합하기 위해, 반전가능(reversible) 포트(510 및 514) 및 하방 포트(516 및 518)와 같은, 복수의 포트를 포함할 수 있다. 상기 기술된 바와 같이, 결합되는 장치들은 USB 장치에 대해 내부 또는 외부 장치가 될 수 있다. USB 장치는 장치들을 제어하고 주변 장치로서 동작하기 위한 로직, 예컨대 이중 역할 호스트 컨트롤러 블록(504)을 포함할 수 있는데, 이중 역할 호스트 컨트롤러 블록(504)은 주변 장치를 제어하는 시스템-온-어-칩(system-on-a-chip; SoC, 502)에 포함되거나 결합될 수 있다. 일부 실시예에서, 주변 장치는, 정보를 저장하기 위한 대용량 기억 장치, 예컨대, 하드 드라이브와 같은 대용량 저장소(506)를 포함할 수 있다. 도시된 바와 같이, 대용량 기억 장치는 USB 허브(508) 밖의 SoC(502)에 결합될 수 있다; 이와 달리, 대용량 기억 장치는, USB 장치(520, 522 또는 524)와 같이, USB 허브에 외부 또는 내부 기억 장치로 결합될 수 있다. 또한, 상기와 동일하게, USB 허브는 호스트 컨트롤러 및 결합된 장치들 사이의 신호들을 라우팅하기 위한 허브 로직(512)을 포함할 수 있다.
- <53> 도시된 바와 같이, USB 허브는, 상기 기술된 스위칭 로직 방법 및 조건을 이용하여, 포트들 중 적어도 두 개, 예컨대, 반전가능 포트(510 및 514)를 반전시킬 수 있다. 이 특정 시스템은 예시적인 것에 불과하고, USB 허브에 포함되는 임의의 포트들이 반전가능할 수 있는 추가적인 실시예를 구상할 수 있다.
- <54> 도 6은 상기 설명된 컴퓨터 시스템(82)과 동일한 컴퓨터 시스템(602)과 같은 컴퓨터 시스템에 결합된 USB 장치, 예컨대 장치(500)를 도시한다. 컴퓨터 시스템은, 컴퓨터 시스템에 결합된 장치들(예컨대, USB 장치(522 및 524))과 통신하거나 이를 관리하기 위한 USB 호스트 컨트롤러, 예컨대 USB 호스트 컨트롤러(604)를 포함할 수 있다. 컴퓨터 시스템은 다른 USB 장치들에 결합하기 위한 포트, 예컨대, 포트(606)를 또한 포함할 수 있다. 따라서, 도시된 바와 같이, 컴퓨터 시스템은 USB 허브를 경유하여 주변 장치에 결합할 수 있고, 결합된 장치들의 호스트 컨트롤러 및 주변 장치에 포함된 호스트 컨트롤러를 가지는 장치로서 교대로 기능할 수 있다. 즉, 컴퓨터 시스템 및/또는 SoC(502)는 USB 허브에 결합된 장치들의 각 부분집합(또는 전부)을 제어할 수 있다. 일 실시예에서, 컴퓨터 시스템은 호스트로서 작동하고, SoC를 경유하여 대용량 기억 장치를 제어할 수 있다. 즉, 컴퓨터 시스템은 SoC를 통해 명령을 보냄으로써 대용량 기억 장치를 제어할 수 있다. 일 실시예에서, SoC는 명령을 해석하고 대응하는 명령을 컴퓨터 시스템의 대용량 기억 장치에 보낸다. 대용량 기억 장치가 USB 허브에 직접 결합되는 실시예에서, 컴퓨터 시스템은 SoC를 사용하지 않고 대용량 기억 장치를 제어할 수 있다.
- <55> 일례로, 주변 장치는, 관련 하드 드라이브, 예컨대, 대용량 기억 장치(506)를 포함하는 휴대폰 뿐만 아니라 디지털 카메라 및 블루투스 장치가 될 수 있다. 휴대폰은, 다른 장치들에, 여기서는 컴퓨터 시스템에 결합하기 위한 USB 포트를 가질 수 있다. 따라서, SoC가 USB 허브의 호스트 컨트롤러로서 작동하는 경우, 휴대폰은 결합된 장치들 각각을 제어하고, 호스트 컨트롤러로서 호스트 컴퓨터와 정보를 통신할 수 있다. 제어의 변경을 지정하는 입력을 수신한 경우, USB 허브는 휴대폰 및 호스트 컴퓨터와 관련된 각각의 상방 및 하방 로직들을 교환할 수 있다. 결과적으로, 호스트 컴퓨터는 휴대폰의 각 장치들을 제어할 수 있다. 예를 들어, 호스트 컴퓨터는, SoC를 통해 하드 드라이브 상의 파일들을 업데이트 하고, 디지털 카메라를 이용하여 사진을 찍고, 블루투스 장치를 이용하여 통신할 수 있다. 이와 달리, 상기 기술된 바와 같이, 호스트 컨트롤러는 장치들의 부분집합을 제어할 수 있고, SoC는 또 다른 부분집합을 계속하여 제어할 수 있다.
- <56> 따라서, 본 명세서에 기재된 시스템 및 방법을 이용하여, USB 허브는 복수의 결합된 장치들의 제어를, 호스트 컨트롤러로 작동하는 제1 장치에 의한 것에서 이전에 주변 장치였던 제2 장치에 의한 것으로 변경할 수 있다.
- <57> 상기 실시예들은 매우 자세하게 기술되었지만, 당업자라면 상기 내용을 통해 다양한 변경 및 수정을 할 수 있다. 다음의 청구항은 이러한 모든 변경 및 수정을 포함하도록 해석되어야 한다.

발명의 효과

- <58> 일 실시예에서, USB 허브에 포함된 상방 로직은, 이전 호스트 컨트롤러에 결합된 제1 포트로부터 정보를 수신하는 것에서, 새로운 호스트 컨트롤러에 결합된 제2 포트로부터 정보를 수신하는 것으로 교환될 수 있다. 즉, USB 허브는 수신된 입력, 예컨대, 상기 기술된 입력에 응답하여, 허브에 결합된 장치들의 제어를 하나의 장치에

서 다른 장치로 변경할 수 있다. 일 실시예에서, 허브는, 상방 로직으로부터 제1 포트를 분리시키고, 하방 로직으로부터 제2 포트를 분리시키며, 제2 포트를 상방 로직에 결합시킴으로써, 상기 변경을 수행할 수 있다. 일 부 실시예에서, 허브는 이전 호스트 컨트롤러가 새로운 호스트 컨트롤러에 대한 주변 장치로 작동하도록 할 수 있다; 즉, 허브는 예컨대 제2 포트에 의해 사용되었던 하방 로직을 제1 포트에 결합시킬 수 있다. 그러므로, 상방 및 하방 로직은 호스트 컨트롤러 및 장치 사이에서 효과적으로 교환된다. 따라서, 다양한 실시예에서, 새로운 호스트 컨트롤러는, 관련 하방 로직을 통해 허브에 결합된 다른 장치들에 대해, 경우에 따라 이전 호스트 컨트롤러에 대해서도, 호스트로 작동할 수 있다.

<59> 상기 기술된 스위칭은 허브에 포함된 임의의 특정 두 포트들에 제한되는 것은 아니고, 여러 포트들과 관련된 임의의 복수 로직들이 상기 기술된 방법에 따라 교환될 수 있다. 그러므로, 일 실시예에서, USB 허브에 포함된 상방 로직, 하방 로직, 및/또는 다른 로직들은 교환될 수 있다.

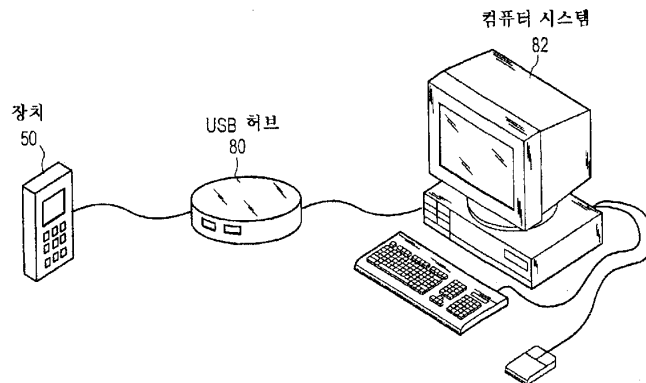
<60> 따라서, 본 명세서에 기술된 방법을 이용하여, USB 허브는 수신된 입력에 따라 상방 및 하방 로직을 교환할 수 있다.

도면의 간단한 설명

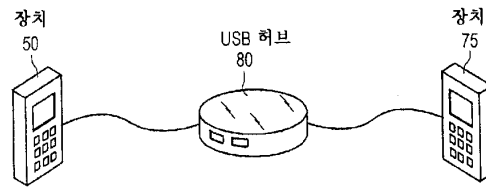
- <1> 아래의 상세한 설명의 바람직한 실시예를 아래의 도면과 함께 고려할 때 본 발명을 좀 더 잘 이해할 수 있다.
- <2> 도 1 및 2는 본 발명의 다양한 실시예를 구현하기에 적합한 시스템 예를 도시한 도면.
- <3> 도 3은 USB 허브의 일 실시예를 도시하는 블록 다이어그램.
- <4> 도 4는 본 발명의 일 실시예에 따라, USB 허브의 로직을 교환하는 방법의 일 실시예를 도시한 흐름도.
- <5> 도 5는 USB 장치에 포함된 USB 허브의 일 실시예를 도시한 블록 다이어그램.
- <6> 도 6은 컴퓨터 시스템에 결합된 USB장치에 포함된 USB 허브의 일 실시예를 도시한 블록 다이어그램.
- <7> 본 발명은 다양한 수정을 가하고 형태를 변경할 수 있는 반면, 이들의 특정 실시예만이 도면을 통해 도시되고 자세하기 기술되어 있다. 그러나, 이 도면 및 상세한 설명이 발명을 특정 형태에 한정하는 것이 아니고, 첨부된 청구항에서 정의된 본 발명의 사상 및 범위 내에서 모든 수정, 균등 및 치환 등을 할 수 있는 것을 의미한다.

도면

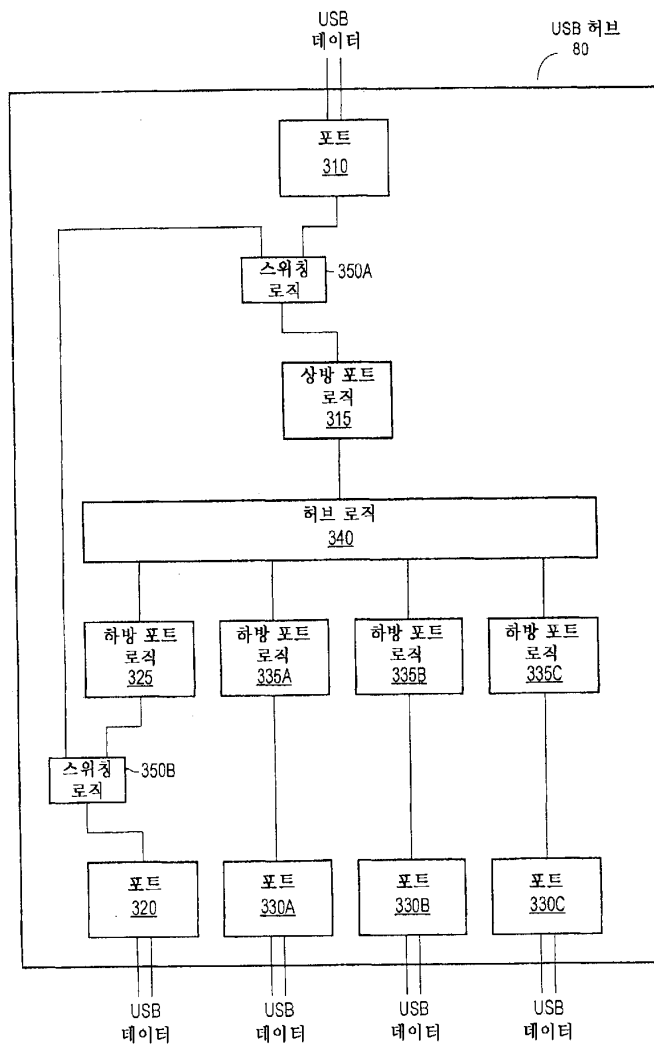
도면1



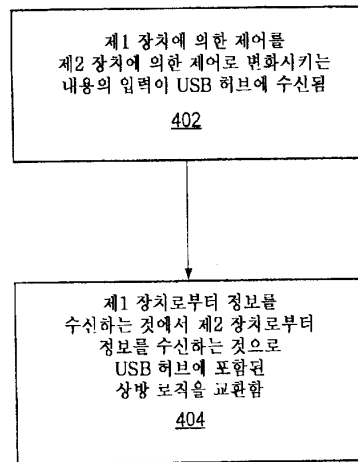
도면2



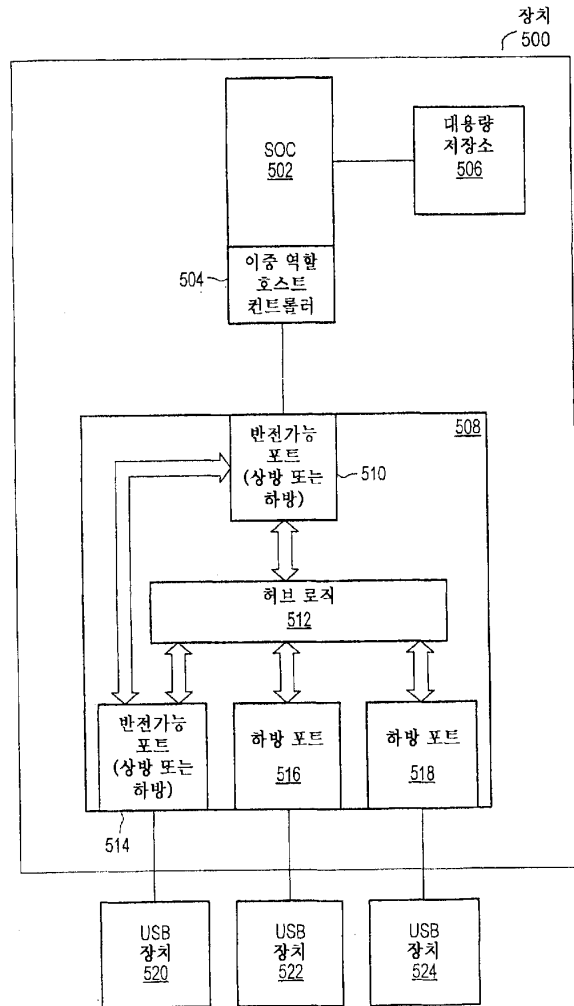
도면3



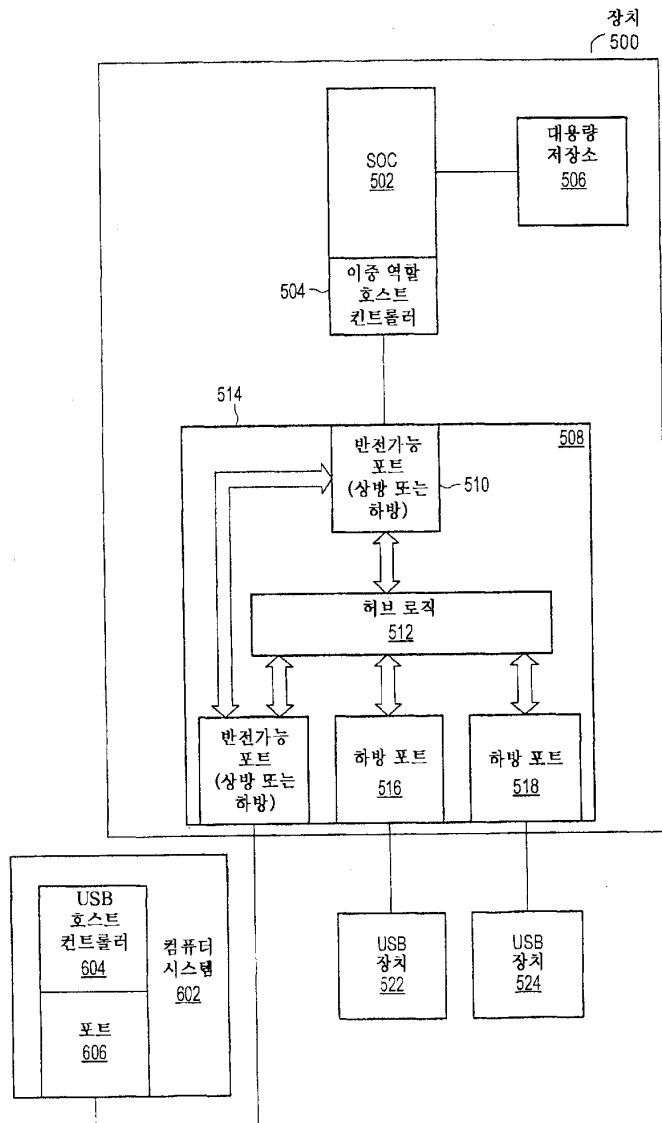
도면



도면5



도 26





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(19) **United States**(12) **Patent Application Publication** (10) **Pub. No.: US 2004/0177207 A1****Lim et al.**(43) **Pub. Date:****Sep. 9, 2004**(54) **USB INTERFACE DEVICE HAVING A SWITCHING FUNCTION**(52) **U.S. Cl. 710/305**(76) **Inventors:** **Hun Il Lim**, Kyongki-do (KR); **Hyun Duk Roh**, Kyongki-do (KR); **Dong Uk Min**, Kyongki-do (KR)(57) **ABSTRACT**

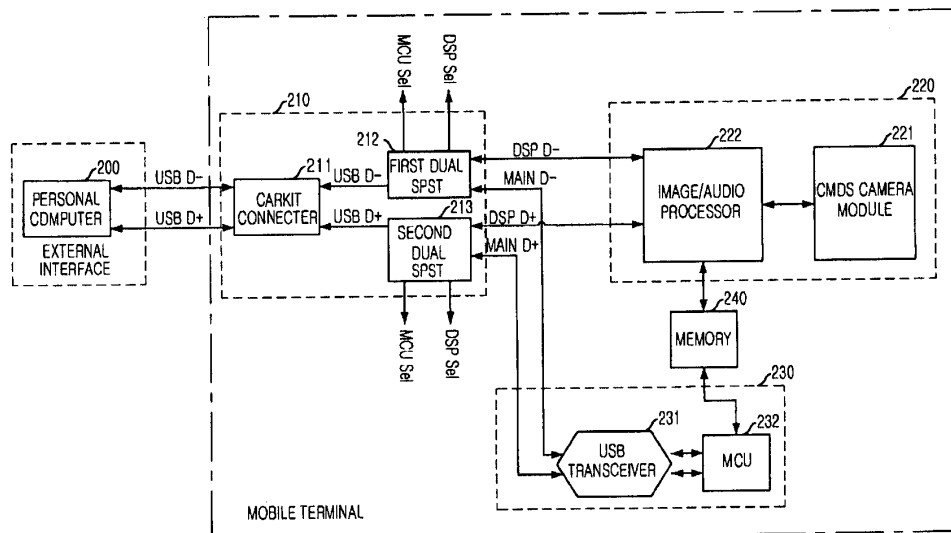
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The present invention provides an interface device using a function of switch that can execute various applications in a mobile terminal by multi-switching USB_D+ and USB_D-, or RS232C data line to an external interface; and, particularly, that can make the mobile terminal used as a PC camera. A universal serial bus (USB) interface device using function of switch includes a dual interface unit for multi-switching data according to a microcontroller (MCU) selection signal and a digital signal processor (DSP) selection signal; an image processing unit for digitalizing the image data; a signal processing unit for activating the MCU selection signal or the DSP selection signal, and processing the data; and a memory unit for saving the data according to control of the image processing unit or the signal processing unit.

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참사장부 : 없음

(54) 스위칭 기능을 이용한 인터페이스 장치

요약

본 발명의 스위칭 기능을 이용한 인터페이스 장치는, 외부 기기 인터페이스 단자의 USB_D+ 및 USB_D-의 라인(또는 RS232C 데이터 라인)을 다중 스위칭함으로써 휴대용 단말기 상에서 다양한 애플리케이션(Application)을 가능케 하고, 특히, 휴대용 단말기를 이용한 PC 카메라로의 응용으로 발전시킬 수 있는 스위칭 기능을 이용한 인터페이스 장치를 제공하는데 그 목적이 있다.

상기 목적을 달성하기 위하여 본 발명은, 외부 기기와의 통신 라인에 연결되고, 일반 선택 신호 및 디지털 선택 신호에 의하여 다중 스위칭 동작을 수행하는 이중 인터페이스부; 외부의 영상 및 음성을 획득하며, 획득된 음성 데이터 및 영상 데이터를 디지털화하고, 디지털화된 데이터를 상기 이중 인터페이스부로 출력하는 영상/오디오 처리부; 상기 디지털 선택 신호 또는 상기 일반 선택 신호를 활성화하고, 상기 이중 인터페이스부를 통하여 상기 외부 기기와 데이터를 주고받으며, 주고받는 데이터를 처리하는 신호 처리부; 및 상기 영상/오디오 처리부 또는 상기 신호 처리부의 제어에 따라 데이터를 저장하거나 출력하는 메모리를 포함한다.

배치도

도 2

색인어

USB, 휴대용 단말기, 화상용 카메라

발견기

도면의 간단한 설명

도 1은 종래의 USB 인터페이스 장치를 나타낸 블록도,

도 2는 본 발명의 일 실시예에 의한 스위칭 기능을 이용한 인터페이스 장치를 나타낸 블록도.

* 도면의 주요 부분에 대한 부호의 설명 *

210 : 이중 인터페이스부 220 : 영상/오디오 처리부

230 : 신호 처리부 240 : 메모리

발명의 상세한 설명

발명의 목적

본 발명이 속하는 기술 및 그 분야의 종래기술

본 발명은 스위칭 기능을 이용한 인터페이스 장치에 관한 것으로, 특히, 휴대용 단말기의 외부기기 인터페이스 단자를 이용하여 다양한 외부기기와의 인터페이스 활용도를 극대화시키기 위한 스위칭 기능을 이용한 인터페이스 장치에 관한 것이다.

도 1은 종래의 USB 인터페이스 장치를 나타낸 블록도로서, 이러한 종래의 USB 인터페이스 장치는, 외부 기기로서, 그림 파일, 멜로디 및 주소록 등의 텍스트 데이터를 제공하는 개인용 컴퓨터(110); 외부 기기와 휴대용 단말기 간의 인터페이스를 담당하는 USB 트랜시버(120); USB 트랜시버(120)로부터 입력받은 데이터를 단말기에 적합한 형식으로 변환하고, 단말기의 데이터를 USB 트랜시버(120) 인터페이스에 적합한 데이터로 변환하는 MCU(microcontroller unit)(130); 및 MCU(130)로부터 입력받은 데이터를 저장하고, 저장된 데이터를 MCU(130)의 제어에 따라 출력하는 메모리(140)를 포함한다.

상술한 종래의 USB 인터페이스 장치에 의하면, 휴대용 단말기 상에서 USB 트랜시버(120)를 통하여 구현하는 기능은 단순히 그림 파일, 멜로디 및 주소록 등의 텍스트 데이터를 주고 받을 뿐, 현재의 휴대용 단말기에 대부분 내장되어 있는 디지털 카메라 등과 관련한 인터페이스 기능을 제공하지 못하는 문제점이 있다.

발명이 이루고자 하는 기술적 과제

상기 문제점을 해결하기 위하여 안출된 본 발명은, 외부 기기 인터페이스 단자의 USB_D+ 및 USB_D-의 라인(또는 RS232C 데이터 라인)을 다중 스위칭함으로써 휴대용 단말기 상에서 다양한 애플리케이션(Application)을 가능케 하고, 특히, 휴대용 단말기를 이용한 PC 카메라로의 응용으로 발전시킬 수 있는 스위칭 기능을 이용한 인터페이스 장치를 제공하는데 그 목적이 있다.

발명의 구성 및 작용

상기 목적을 달성하기 위하여 본 발명의 스위칭 기능을 이용한 인터페이스 장치는, 외부 기기와의 통신 라인에 연결되고, 일반 선택 신호 및 디지털 선택 신호에 의하여 다중 스위칭 동작을 수행하는 이중 인터페이스부; 외부의 영상 및 음성 데이터를 획득하며, 획득된 음성 데이터 및 영상 데이터를 디지털화하고, 디지털화된 데이터를 상기 이중 인터페이스부로 출력하는 영상/오디오 처리부; 상기 디지털 선택 신호 또는 상기 일반 선택 신호를 활성화하고, 상기 이중 인터페이스부를 통하여 상기 외부 기기와 데이터를 주고받으며, 주고받는 데이터를 처리하는 신호 처리부; 및 상기 영상/오디오 처리부 또는 상기 신호 처리부의 제어에 따라 데이터를 저장하거나 출력하는 메모리를 포함한다.

이하, 본 발명이 속하는 기술분야에서 통상의 지식을 가진 자가 본 발명의 기술적 사상을 용이하게 실시할 수 있을 정도로 상세히 설명하기 위하여 본 발명의 가장 바람직한 실시예들을 첨부된 도면을 참조하여 설명하기로 한다.

도 2는 본 발명의 일 실시예에 의한 스위칭 기능을 이용한 인터페이스 장치를 나타낸 블록도로서, 이러한 본 발명의 스위칭 기능을 이용한 인터페이스 장치는, 이중 인터페이스부(210), 영상/오디오 처리부(220), 신호 처리부(230) 및 메모리(240)를 포함한다.

개인용 컴퓨터(200)는, 외부 기기의 일례로서, USB라인(USB D-, USB D+)을 통하여 단말기 측으로부터 데이터를 제공받거나, 단말기 측으로 데이터를 제공하는 역할을 한다. 본 발명의 일 실시예에서는, 외부 기기의 일례를 개인용 컴퓨터(200)로 들고 있으나, USB 마스터(Master)로서의 기능을 할 수 있는 기기(예를 들면, 프린터, 확장 USB 메모리, USB 키보드, 오디오 컴포넌트 등)는 무엇이든 가능하다. 또한, 이러한 외부 기기는 USB라인 뿐 아니라 RS232C 데이터 라인으로도 연결가능하다.

또한, 이중 인터페이스부(210)는, 외부 기기와의 통신 라인에 연결되고, 일반 선택 신호(MCU Sel) 및 디지털 선택 신호(DSP Sel)에 의하여 다중 스위칭 동작을 수행하는 역할을 한다. 여기서, 상기 이중 인터페이스부(210)에 관하여 상세히 설명하면 다음과 같다. 이 때, 상기 일반 선택 신호(MCU Sel) 및 상기 디지털 선택 신호(DSP Sel)는 후술하는 MCU(232)의 GPIO 명령이다.

상기 이중 인터페이스부(210) 내에 장착된 카키트 커넥터(211)는, 외부 기기와의 통신 라인에 연결되어 표준 인터페이스를 제공하는 역할을 한다. 여기서, 상기 통신 라인은, 제1 USB 라인(USB D-) 및 제2 USB 라인(USB D+)을 포함할 수 있다.

또한, 상기 이중 인터페이스부(210) 내에 장착된 제1 듀얼 SPST(Single Pole Single Through)(212)는, 상기 카키트 커넥터(211)를 통하여 상기 통신 라인 중 제1 USB 라인(USB D-)과 연결되고, 상기 일반 선택 신호(MCU Sel)가 활성화 된 경우에는 후술하는 신호 처리부(230)로의 데이터 경로를 제공하며, 상기 디지털 선택 신호(DSP Sel)가 활성화 된 경우에는 후술하는 영상/오디오 처리부(220)로의 데이터 경로를 제공하는 역할을 한다. 이 때, 상기 제1 듀얼 SPST(Single Pole Single Through)(212)는, 상기 일반 선택 신호(MCU Sel) 및 상기 디지털 선택 신호(DSP Sel)가 모두 비활성화 상태인 경우에, 오픈 상태를 유지할 수 있다.

한편, 상기 이중 인터페이스부(210) 내에 장착된 제2 듀얼 SPST(Single Pole Single Through)(213)는, 상기 카키트 커넥터(211)를 통하여 상기 통신 라인 중 제2 USB 라인(USB D+)과 연결되고, 상기 일반 선택 신호(MCU Sel)가 활성화 된 경우에는 후술하는 신호 처리부(230)로의 데이터 경로를 제공하며, 상기 디지털 선택 신호(DSP Sel)가 활성화 된 경우에는 후술하는 영상/오디오 처리부(220)로의 데이터 경로를 제공하는 역할을 한다. 이 때, 상기 제2 듀얼 SPST(Single Pole Single Through)(213)는, 상기 일반 선택 신호(MCU Sel) 및 상기 디지털 선택 신호(DSP Sel)가 모두 비활성화 상태인 경우에, 오픈 상태를 유지할 수 있다.

한편, 영상/오디오 처리부(220)는, 외부의 영상 및 음성 데이터를 획득하며, 획득된 음성 데이터 및 영상 데이터를 디지털화 하고, 디지털화된 데이터를 상기 이중 인터페이스부(210)로 출력하는 역할을 한다. 여기서, 상기 영상/오디오 처리부(220)에 관하여 상세히 설명하면 다음과 같다.

상기 영상/오디오 처리부(220) 내에 장착된 CMOS 카메라 모듈(221)은, 외부 영상을 획득하여 영상 데이터로서 출력하는 역할을 한다.

또한, 상기 영상/오디오 처리부(220) 내에 장착된 영상 및 오디오 프로세서(222)는, 상기 CMOS 카메라 모듈(221)로부터 상기 영상 데이터를 입력받아 처리하고, 외부 음성 데이터를 입력받아 처리하며, 처리된 데이터를 상기 이중 인터페이스부(210)로 출력하는 역할을 한다. 한편, 영상 및 오디오 프로세서(222)는, 외부 기기와 단말기가 연결되지 않은 경우에, 상기 영상 데이터를 LCD(도시되지 않음)를 통하여 사용자에게 표시하는 역할도 수행한다.

또한, 신호 처리부(230)는, 상기 디지털 선택 신호(DSP Sel) 또는 상기 일반 선택 신호(MCU Sel)를 활성화하고, 상기 이중 인터페이스부(210)를 통하여 상기 외부 기기와 데이터를 주고받으며, 주고받는 데이터를 처리하는 역할을 한다. 여기서, 상기 신호 처리부(230)에 관하여 상세히 설명하면 다음과 같다.

상기 신호 처리부(230) 내에 장착된 USB 트랜시버(231)는, 상기 이중 인터페이스부(210)를 통하여 입력된 데이터를 논리 레벨 신호(Logic Level Signal)로 변환하여 전달하고, 후술하는 MCU(microcontroller unit)(232)로부터의 데이터를 상기 이중 인터페이스부(210)로 전달하는 역할을 한다.

또한, 상기 신호 처리부(230) 내에 장착된 MCU(microcontroller unit)(232)는, 상기 USB 트랜시버(231)로부터 입력받은 데이터를 단말기에 적합한 형식으로 변환하고, 단말기의 데이터를 상기 USB 트랜시버(231) 인터페이스에 적합한 데이터로 변환하며, 상기 디지털 선택 신호(DSP Sel) 또는 상기 일반 선택 신호(MCU Sel)를 활성화하는 역할을 한다.

한편, 메모리(240)는, 상기 신호 처리부(230)의 제어에 따라 데이터(영상/오디오, 기타 데이터)를 저장하거나 출력하는 역할을 한다.

상술한 본 발명의 스위칭 기능을 이용한 인터페이스 장치의 동작에 관하여 설명하면 다음과 같다.

먼저, 일반 선택 신호(MCU Sel)가 활성화된 경우에는, 제1 듀얼 SPST(Single Pole Single Through)(212) 및 제2 듀얼 SPST(Single Pole Single Through)(213)는 외부 기기와 신호 처리부(230) 간의 인터페이스를 제공하고, 종래의 단말기에서 이루어지는 외부 기기 인터페이스 동작이 수행된다.

한편, 디지털 선택 신호(DSP Sel)가 활성화된 경우에는, 제1 듀얼 SPST(Single Pole Single Through)(212) 및 제2 듀얼 SPST(Single Pole Single Through)(213)는 외부 기기와 영상/오디오 처리부(220) 간의 인터페이스를 제공하고, 이를 통하여 단말기는 개인용 컴퓨터(200)의 화상용 카메라로서 동작할 수 있다.

본 발명의 일 실시예에 있어서는, 화상용 카메라로서의 동작 예를 들고 있으나, 휴대용 단말기의 보다 다양한 멀티미디어 기술에 스위칭 기법이 적용될 수 있다. 예를 들면, 휴대용 단말기와 프린터의 인터페이스에 있어서, 휴대용 단말기 내부에 그림 이미지 디코딩 프로세서를 통하여 휴대용 단말기의 내장 카메라로 촬영한 이미지를 직접 프린터로 출력할 수도 있다. 또한, 휴대용 단말기와 외장형 USB 메모리의 인터페이스에 있어서, 카트 커넥터(211)에 외장형 마스터 USB와 인터페이스함으로써 내장 카메라로 찍은 이미지 및 동영상을 저장할 수도 있다. 한편, 휴대용 단말기와 키보드의 인터페이스에 있어서, 휴대용 단말기 내부의 키 매트릭스 인코더 프로세서를 통하여 보다 빠르고 쉬운 메시지 입력 장치를 구현할 수도 있다. 또한, 휴대용 단말기와 오디오 컴포넌트의 인터페이스에 있어서, 휴대용 단말기 상에 구현된 MP3 기능과 외부 PC 또는 USB 포트나 RSC232C 통신 포트가 부착된 컴포넌트 간에 음악 파일을 전송하거나 직접 재생할 수 있다.

이상에서 설명한 본 발명은, 본 발명이 속하는 기술분야에서 통상의 지식을 가진 자에 있어 본 발명의 기술적 사상을 벗어나지 않는 범위 내에서 여러 가지로 치환, 변형 및 변경이 가능하므로 전술한 실시예 및 첨부된 도면에 한정되는 것이 아니다.

발명의 효과

본 발명은 외부 기기 인터페이스 단자의 USB_D+ 및 USB_D-의 라인(또는 RS232C 데이터 라인)을 다중 스위칭함으로써 휴대용 단말기 상에서 다양한 애플리케이션(Application)을 가능케 하고, 특히, 휴대용 단말기를 이용한 PC 카메라로의 응용으로 발전시킬 수 있는 장점이 있다.

(37) 발명의 범위

청구항 1.

외부 기기와의 통신 라인에 연결되고, 일반 선택 신호 및 디지털 선택 신호에 의하여 다중 스위칭 동작을 수행하는 이중 인터페이스부;

외부의 영상 및 음성을 획득하며, 획득된 음성 데이터 및 영상 데이터를 디지털화하고, 디지털화된 데이터를 상기 이중 인터페이스부로 출력하는 영상/오디오 처리부;

상기 디지털 선택 신호 또는 상기 일반 선택 신호를 활성화하고, 상기 이중 인터페이스부를 통하여 상기 외부 기기와 데이터를 주고받으며, 주고받는 데이터를 처리하는 신호 처리부; 및

상기 영상/오디오 처리부 또는 상기 신호 처리부의 제어에 따라 데이터를 저장하거나 출력하는 메모리

를 포함하는 것을 특징으로 하는 스위칭 기능을 이용한 인터페이스 장치.

청구항 2.

제1항에 있어서,

상기 통신 라인은 USB 라인인

것을 특징으로 하는 스위칭 기능을 이용한 인터페이스 장치.

청구항 3.

제1항에 있어서,

상기 통신 라인은 RS232C 데이터 라인인

것을 특징으로 하는 스위칭 기능을 이용한 인터페이스 장치.

청구항 4.

제1항에 있어서, 상기 이중 인터페이스부는,

상기 외부 기기와의 통신 라인에 연결되어 표준 인터페이스를 제공하는 카카트 커넥터;

상기 카카트 커넥터를 통하여 상기 통신 라인 중 제1 USB 라인과 연결되고, 상기 일반 선택 신호가 활성화된 경우에는 상기 신호 처리부로의 데이터 경로를 제공하며, 상기 디지털 선택 신호가 활성화된 경우에는 상기 영상/오디오 처리부로의 데이터 경로를 제공하는 제1 듀얼 SPST; 및

상기 카카트 커넥터를 통하여 상기 통신 라인 중 제2 USB 라인과 연결되고, 상기 일반 선택 신호가 활성화된 경우에는 상기 신호 처리부로의 데이터 경로를 제공하며, 상기 디지털 선택 신호가 활성화된 경우에는 상기 영상/오디오 처리부로의 데이터 경로를 제공하는 제2 듀얼 SPST

를 포함하는 것을 특징으로 하는 스위칭 기능을 이용한 인터페이스 장치.

청구항 5.

제1항에 있어서, 상기 영상/오디오 처리부는,

외부 영상을 획득하여 영상 데이터로서 출력하는 CMOS 카메라 모듈;

상기 영상 데이터를 입력받아 처리하고, 외부 음성 데이터를 입력받아 처리하며, 처리된 데이터를 상기 이중 인터페이스부로 출력하는 영상 및 오디오 프로세서

를 포함하는 것을 특징으로 하는 스위칭 기능을 이용한 인터페이스 장치.

청구항 6.

제1항에 있어서, 상기 신호 처리부는,

상기 이중 인터페이스부를 통하여 입력된 데이터를 논리 레벨 신호로 변환하여 전달하고, 입력 데이터를 상기 이중 인터페이스부로 전달하는 USB 트랜시버; 및

상기 USB 트랜시버로부터 입력받은 데이터를 단말기에 적합한 형식으로 변환하고, 단말기의 데이터를 상기 USB 트랜시버 인터페이스에 적합한 데이터로 변환하며, 상기 디지털 선택 신호 또는 상기 일반 선택 신호를 활성화하는 MCU

를 포함하는 것을 특징으로 하는 스위칭 기능을 이용한 인터페이스 장치.

청구항 7.

제1항에 있어서,

상기 외부 기기는, 개인용 컴퓨터인

것을 특징으로 하는 스위칭 기능을 이용한 인터페이스 장치.

청구항 8.

제1항에 있어서,

상기 외부 기기는, 프린터인

것을 특징으로 하는 스위칭 기능을 이용한 인터페이스 장치.

청구항 9.

제1항에 있어서,

상기 외부 기기는, 외장형 USB 메모리인

것을 특징으로 하는 스위칭 기능을 이용한 인터페이스 장치.

청구항 10.

제1항에 있어서,

상기 외부 기기는, 키보드인

것을 특징으로 하는 스위칭 기능을 이용한 인터페이스 장치.

청구항 11.

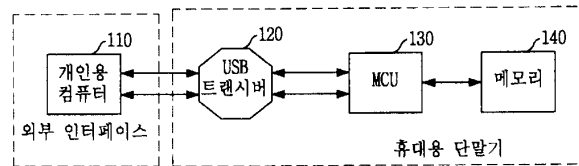
제1항에 있어서,

상기 외부 기기는, 오디오 컴포넌트인

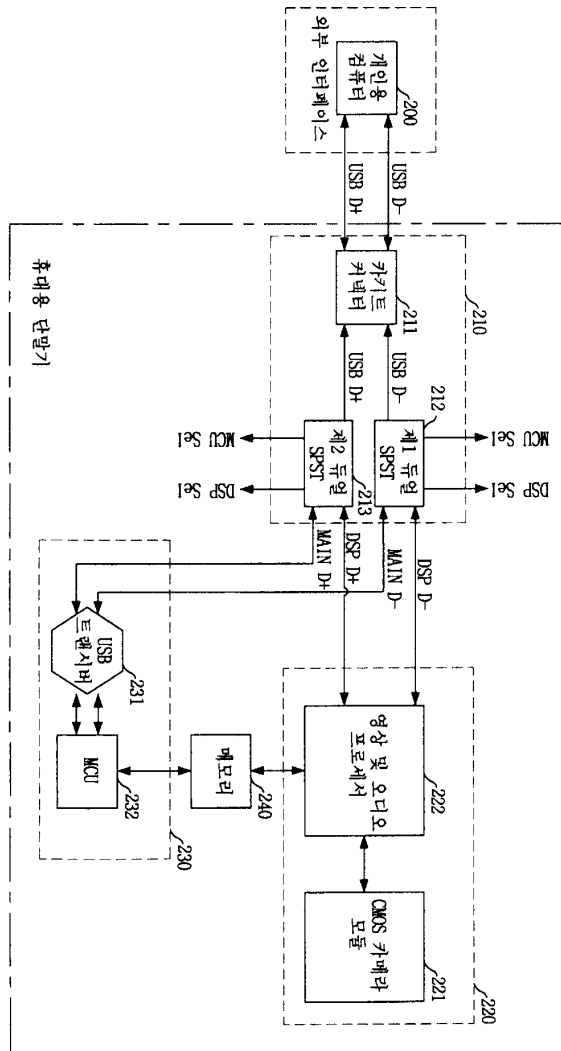
것을 특징으로 하는 스위칭 기능을 이용한 인터페이스 장치.

도면

도면1



도면 2



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2	Non Patent Literature	4500-1-458_TypeCConnectorApplications.pdf	76589 6406e4a5e7e8bd68b5d2b68b4781e7d9402b74bc	no	1
Warnings:					
Information:					
3	Foreign Reference	4500-1-458_Reference_KR1020070105855.pdf	401044 41243118ad620eb04bcf1cc84f5438e441e61091	no	20
Warnings:					
Information:					
4	Foreign Reference	4500-1-458_Reference_KR1020040066970.pdf	129810 a647f8e74b926dfcd35488ec43fa04c026ff5d1	no	8
Warnings:					
Information:					
Total Files Size (in bytes):			1219911		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.					

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/082,408			
APPLICATION AS FILED - PART I									
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY			
FOR	NUMBER FILED	NUMBER EXTRA		RATE(\$)	FEE(\$)				
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A		N/A	280		
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A		N/A		N/A	600		
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A		N/A	720		
TOTAL CLAIMS (37 CFR 1.16(i))	20	minus 20 =	*			x 80 =	0.00		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 =	*			x 420 =	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		TOTAL	1600		
APPLICATION AS AMENDED - PART II									
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	x	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	x	
	Application Size Fee (37 CFR 1.16(s))								
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
				TOTAL ADD'L FEE		TOTAL ADD'L FEE			
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	x	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	x	
	Application Size Fee (37 CFR 1.16(s))								
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
				TOTAL ADD'L FEE		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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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
15/082,408	03/28/2016		1600	4500-1-458	20	3

CONFIRMATION NO. 5081

FILING RECEIPT



000000082079714

33942
Cha & Reiter, LLC
17 Arcadian Avenue
Suite 208
Paramus, NJ 07652

Date Mailed: 04/11/2016

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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Power of Attorney: The patent practitioners associated with Customer Number 33942

Domestic Applications for which benefit is claimed - None.

A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

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.)
REPUBLIC OF KOREA 10-2015-0046260 04/01/2015

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

Request to Retrieve - This application either claims priority to one or more applications filed in an intellectual property Office that participates in the Priority Document Exchange (PDX) program or contains a proper **Request to Retrieve Electronic Priority Application(s)** (PTO/SB/38 or its equivalent). Consequently, the USPTO will attempt to electronically retrieve these priority documents.

If Required, Foreign Filing License Granted: 04/08/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/082,408**

Projected Publication Date: 10/06/2016

Non-Publication Request: No

Early Publication Request: No
Title

APPARATUS AND METHOD FOR PROCESSING SIGNAL

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

page 2 of 4

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).

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Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

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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 Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

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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).

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is a true copy from the records of the Korean Intellectual
Property Office

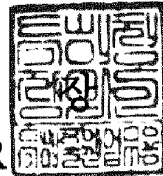
출 원 번 호 : 10-2015-0046260
Application Number

출 원 년 월 일 : 2015년 04월 01일
Filing Date APR. 01, 2015

출 원 인 : 삼성전자주식회사
Applicant(s) SAMSUNG ELECTRONICS CO., LTD.

2016년 06월 08일

특 허 청
COMMISSIONER



제출 일자 : 2015-04-01

【서지사항】

【서류명】	특허출원서
【출원구분】	특허출원
【출원인】	
【명칭】	삼성전자주식회사
【출원인코드】	1-1998-104271-3
【대리인】	
【성명】	권혁록
【대리인코드】	9-1998-000115-1
【포괄위임등록번호】	2002-060519-2
【대리인】	
【성명】	이정순
【대리인코드】	9-1998-000404-2
【포괄위임등록번호】	2005-005297-6
【발명의 국문명칭】	신호 처리 장치 및 방법
【발명의 영문명칭】	APPARATUS AND METHOD FOR PROCESSING SIGNAL
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【주민등록번호】 790516-1XXXXXX
【우편번호】 446-831
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【성명의 영문표기】 KIM Won-Seob

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【주민등록번호】 750323-1XXXXXX

【우편번호】 140-857

【주소】 서울특별시 용산구 회나무로28가길 7-5, 205호 (이태원동,
이원연립)

【국적】 KR

【취지】 위와 같이 특허청장에게 제출합니다.

대리인 권혁록 (서명 또는 인)

대리인 이정순 (서명 또는 인)

【수수료】

【출원료】 0 면 46,000 원

【가산출원료】 39 면 0 원

【우선권주장료】 0 건 0 원

【심사청구료】 0 항 0 원

【합계】 46,000 원

【명세서】

【발명의 명칭】

신호 처리 장치 및 방법{APPARATUS AND METHOD FOR PROCESSING SIGNAL}

【기술분야】

<1> 본 발명은 전자 장치 및 그의 동작 방법에 관한 것으로, 특히 전자 장치에서 신호 처리 장치 및 방법에 관한 것이다.

【배경기술】

<2> 일반적으로 전자 장치들은 다양한 기능들이 부가되어 복합적인 기능을 수행한다. 이러한 전자 장치들은 상호에 접속하여, 신호를 교환할 수 있다. 이 때 전자 장치들은 무선으로 접속할 수 있으며, 유선으로 접속할 수도 있다. 즉 전자 장치들은 케이블을 통해 상호에 접속할 수 있다. 그리고 전자 장치들은 다양한 인터페이스 구조들에 따라 인터페이스를 수행할 수 있다. 즉 전자 장치들은 포트들을 구비하며, 케이블이 포트들을 연결할 수 있다. 여기서, 전자 장치들의 포트들은 다양한 인터페이스 구조들을 가질 수 있다. 이를 통해, 전자 장치들은 케이블을 통해 신호를 교환할 수 있다.

【발명의 내용】

【해결하려는 과제】

<3> 그런데, 상기와 같은 전자 장치들은, 접속이 용이하지 않은 문제점이 있다. 즉 전자 장치들의 인터페이스 구조들에 따라, 케이블이 결정된다. 이는, 전자 장치

제출 일자 : 2015-04-01

들의 접속을 위하여, 케이블이 전자 장치들의 인터페이스 구조들을 모두 지원해야 하기 때문이다. 이로 인하여, 전자 장치들의 사용자들이 적절한 케이블을 구비하고 있지 않으면, 전자 장치들의 접속이 불가능하다. 이에 따라, 전자 장치들의 이용 효율성 및 사용자들의 편의성이 낮다.

【과제의 해결 수단】

<4> 본 발명에 따른 신호 처리 방법은, 다수개의 통신 채널들이 각각 할당된 다수개의 통신 핀 세트들을 갖는 인터페이스부를 포함하는 전자 장치에서, 상기 통신 핀 세트들 중 어느 하나를 결정하는 동작, 상기 통신 핀 세트들 중 나머지를 접지시키는 동작 및 상기 결정된 통신 핀 세트를 위한 신호를 처리하는 동작을 포함한다.

<5> 본 발명에 따른 신호 처리 장치는, 다수개의 통신 채널들이 각각 할당된 다수개의 통신 핀 세트들을 포함하는 인터페이스부, 상기 통신 핀 세트들 중 어느 하나를 위한 신호를 처리하는 신호 처리부, 상기 통신 핀 세트들 중 나머지를 접지시키는 접지부 및 상기 통신 핀 세트들, 신호 처리부 및 접지부 사이의 연결을 제어하는 제어부를 포함한다.

【발명의 효과】

<6> 본 발명의 신호 처리 장치 및 방법에 따르면, 전자 장치들이 단일 인터페이스 구조를 갖더라도, 전자 장치들의 접속이 가능하다. 이로 인하여, 전자 장치들의 사용자들은 단일 케이블을 구비함으로써, 전자 장치들을 용이하게 연결할 수 있다.

이에 따라, 전자 장치들의 이용 효율성 및 사용자들의 편의성이 향상될 수 있다.

【도면의 간단한 설명】

- <7> 도 1은 본 발명이 적용되는 통신 시스템을 도시하는 블록도,
 도 2는 도 1에서 통신 시스템의 통신 채널들을 설명하기 위한 흐름도,
 도 3은 본 발명의 실시예에 따른 신호 처리 장치의 구성을 도시하는 블록도,
 도 4는 도 3에서 인터페이스부의 인터페이스 구조를 설명하기 위한 블록도,
 도 5는 도 3에서 제어부의 구성을 도시하는 블록도,
 도 6은 도 5에서 연결부의 구성을 도시하는 회로도,
 도 7은 본 발명의 실시예에 따른 신호 처리 방법의 수행 절차를 도시하는 순서도, 그리고
 도 8은 도 7에서 통신 편 세트들의 연결 제어 동작의 수행 절차를 도시하는 순서도이다.

【발명을 실시하기 위한 구체적인 내용】

- <8> 이하, 첨부된 도면을 참조하여 본 발명의 실시예들을 보다 상세하게 설명하고자 한다. 이 때 첨부된 도면에서 동일한 구성 요소는 가능한 동일한 부호로 나타내고 있음에 유의해야 한다. 그리고 본 발명의 요지를 흐리게 할 수 있는 공지 기능 및 구성에 대한 상세한 설명은 생략할 것이다.
- <9> 도 1은 본 발명이 적용되는 통신 시스템을 도시하는 블록도이다.
- <10> 도 1을 참조하면, 본 발명이 적용되는 통신 시스템 10은 다수개의 전자 장치

100들을 포함한다. 여기서, 전자 장치 100들은 동일할 수 있으며, 상이할 수도 있다.

<11> 전자 장치 100들은 상호에 접속하여, 신호를 교환할 수 있다. 이 때 전자 장치 100들은 무선으로 접속할 수 있다. 여기서, 전자 장치 100들은 통신망을 통해 상호에 접속할 수 있다. 그리고 전자 장치 100들은 통신망을 통해 통신할 수 있다. 한편, 전자 장치 100들은 유선으로 접속할 수 있다. 여기서, 전자 장치 100들은 케이블 200을 통해 상호에 접속할 수 있다. 또한 전자 장치 100들은 케이블 200을 통해 인터페이스를 수행할 수 있다.

<12> 이러한 전자 장치 100들은 단일 인터페이스 구조를 갖는다. 그리고 케이블 200이 단일 인터페이스 구조를 지원한다. 예를 들면, 전자 장치 100들이 동일하면, 전자 장치 100들은 동일한 인터페이스 구조를 갖는다. 뿐만 아니라, 전자 장치 100들이 상이하더라도, 전자 장치 100들은 동일한 인터페이스 구조를 갖는다.

<13> 도 2는 도 1에서 통신 시스템의 통신 채널들을 설명하기 위한 예시도이다.

<14> 도 2를 참조하면, 본 발명이 적용되는 통신 시스템 10에서 전자 장치 100들은, 제 1 전자 장치 110과 제 2 전자 장치 120을 포함한다. 여기서, 제 1 전자 장치 110과 제 2 전자 장치 120은 동일할 수 있으며, 상이할 수도 있다.

<15> 제 1 전자 장치 110과 제 2 전자 장치 120은 상호에 접속하여, 신호를 교환할 수 있다. 이 때 제 1 전자 장치 110과 제 2 전자 장치 120은 유선으로 접속할 수 있다. 여기서, 제 1 전자 장치 110과 제 2 전자 장치 120은 케이블 200을 통해

상호에 접속할 수 있다. 그리고 제 1 전자 장치 110과 제 2 전자 장치 120은 케이블 200을 통해 인터페이스를 수행할 수 있다.

<16> 이를 위해, 제 1 전자 장치 110은 제 1 인터페이스부 111을 포함하고, 제 2 전자 장치 120은 제 2 인터페이스부 121을 포함한다. 이 때 제 1 인터페이스부 111과 제 2 인터페이스부 121은 단일 인터페이스 구조를 갖는다. 그리고 케이블 200이 단일 인터페이스 구조를 지원한다. 예를 들면, 제 1 전자 장치 110과 제 2 전자 장치 120이 동일하면, 제 1 인터페이스부 111과 제 2 인터페이스부 121은 동일한 인터페이스 구조를 갖는다. 뿐만 아니라, 제 1 전자 장치 110과 제 2 전자 장치 120이 상이하더라도, 제 1 인터페이스부 111과 제 2 인터페이스부 121은 동일한 인터페이스 구조를 갖는다.

<17> 그리고 제 1 전자 장치 110과 제 2 전자 장치 120 사이에, 다수개의 통신 채널 210, 220들이 형성된다. 즉 제 1 인터페이스부 111과 제 2 인터페이스부 121이 통신 채널 210, 220들을 제공한다. 또한 케이블 200이 통신 채널 210, 220들을 지원한다. 여기서, 각각의 통신 채널 210, 220은 검출 경로 211, 221, 송신 경로 213, 223 및 수신 경로 215, 225를 포함한다. 검출 경로 211, 221은 각각의 통신 채널 210, 220에서 제 1 전자 장치 110과 제 2 전자 장치 120의 접속을 검출하는 데 이용된다. 송신 경로 213, 223은 제 2 전자 장치 120로부터 제 1 전자 장치 110으로 신호를 전달하는 데 이용된다. 수신 경로 215, 225는 제 1 전자 장치 110로부터 제 2 전자 장치 120으로 신호를 전달하는 데 이용된다.

<18> 또한 제 1 전자 장치 110은 통신 채널 210, 220들을 모두 이용할 수 있다.

제출 일자 : 2015-04-01

즉 제 1 전자 장치 110은 통신 채널 210, 220들에 접속하여, 통신할 수 있다. 여기서, 제 1 전자 장치 110은 검출 경로 211, 221들을 통해 제 2 전자 장치 120의 접속을 검출할 수 있다. 그리고 제 1 전자 장치 110은 송신 경로 213, 223들을 통해 제 2 전자 장치 120으로부터 신호를 수신할 수 있다. 또는 제 1 전자 장치 110은 수신 경로 215, 225들을 통해 제 2 전자 장치 120으로 신호를 송신할 수 있다.

<19> 한편, 제 2 전자 장치 120은 통신 채널 210, 220들 중 어느 하나를 이용할 수 있다. 즉 제 2 전자 장치 120은 통신 채널 210, 220들 중 어느 하나에 접속하여, 통신할 수 있다. 여기서, 제 2 전자 장치 120은 검출 경로 2211, 221들 중 어느 하나를 통해 제 1 전자 장치 110의 접속을 검출할 수 있다. 그리고 제 2 전자 장치 120은 송신 경로 213, 223들 중 어느 하나를 통해 제 1 전자 장치 110으로 신호를 송신할 수 있다. 또는 제 2 전자 장치 120은 수신 경로 215, 225들 중 어느 하나를 통해 제 1 전자 장치 110으로부터 신호를 수신할 수 있다.

<20> 도 3은 본 발명의 실시예에 따른 신호 처리 장치의 구성을 도시하는 블록도이다.

<21> 도 3을 참조하면, 본 실시예의 신호 처리 장치 300은 통신부 310, 입력부 320, 표시부 330, 인터페이스부 340, 전력 공급부 350, 접지부 360, 저장부 370, 제어부 380 및 오디오 처리부 390을 포함한다. 이 때 제 2 전자 장치 120이 본 발명의 실시예에 따른 신호 처리 장치 300을 포함할 수 있다. 그리고 제 1 전자 장치 110이 제 2 전자 장치 120의 외부 장치일 수 있다.

<22> 통신부 310은 신호 처리 장치 300에서 무선 통신을 수행한다. 이 때 통신부

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310은 다양한 통신 방식으로, 외부 장치와 통신할 수 있다. 이를 위해, 통신부 310은 이동 통신망 또는 데이터 통신망 중 적어도 어느 하나에 접속할 수 있다. 또는 통신부 310은 근거리 통신을 수행할 수 있다. 여기서, 통신부 310은 공중으로 신호를 송신하거나 공중으로부터 신호를 수신하기 위한 안테나(ANT) 311을 구비할 수 있다. 예를 들면, 외부 장치는 전자 장치, 기지국, 서버 및 위성을 포함할 수 있다. 그리고 통신 방식은 LTE(Long Term Evolution), WCDMA(Wideband Code Division Multiple Access), GSM(Global System for Mobile Communications), WiFi(Wireless Fidelity), 블루투스(bluetooth) 및 NFC(Near Field Communications)를 포함할 수 있다.

<23> 입력부 320은 신호 처리 장치 300에서 입력 데이터를 발생시킨다. 이 때 입력부 320은 신호 처리 장치 300의 사용자 입력에 대응하여, 입력 데이터를 발생시킬 수 있다. 그리고 입력부 320은 적어도 하나의 입력 수단을 포함할 수 있다. 이러한 입력부 320은 키 패드(key pad), 돔 스위치(dome switch), 물리 버튼, 터치 패널(touch panel), 조그 셔플(jog & shuttle) 및 센서(sensor)를 포함할 수 있다.

<24> 표시부 330은 신호 처리 장치 300에서 표시 데이터를 출력한다. 이러한 표시부 330은 액정 디스플레이(LCD; Liquid Crystal Display), 발광 다이오드(LED; Light Emitting Diode) 디스플레이, 유기 발광 다이오드(OLED; Organic LED) 디스플레이, 마이크로 전자기계 시스템(MEMS; Micro Electro Mechanical Systems) 디스플레이 및 전자 종이(electronic paper) 디스플레이를 포함할 수 있다. 여기서, 표시부 330은 다수개의 발광 소자들을 포함할 수 있다. 그리고 표시부 330은 입력부

320과 결합되어, 터치 스크린(touch screen)으로 구현될 수 있다.

<25> 인터페이스부 340은 신호 처리 장치 300에서 인터페이스를 수행한다. 이 때 인터페이스부 340은 단일 인터페이스 구조를 갖는다. 그리고 인터페이스부 340은 단일 인터페이스 구조를 이용하여, 외부 장치와 인터페이스를 수행할 수 있다. 이를 위해, 인터페이스부 340은 케이블 200을 통해 외부 장치와 연결될 수 있다.

<26> 도 4는 도 3에서 인터페이스부의 인터페이스 구조를 설명하기 위한 블록도이다.

<27> 도 4를 참조하면, 본 실시예의 신호 처리 장치 300에서, 인터페이스부 340은 다수개의 검출 핀 411, 413들, 다수개의 통신 핀 세트 420, 430, 440, 451, 453들, 다수개의 전력 공급 핀 461, 463, 465, 467들 및 다수개의 접지 핀 471, 473, 475, 477들을 포함한다. 이 때 인터페이스부 340의 인터페이스 구조는 상하 대칭이며, 좌우 대칭이다. 여기서, 인터페이스부 340의 인터페이스 구조는 열 두 개의 행들과 두 개의 열들로 이루어지며, 행들과 열들의 교차 지점에 핀 주소들이 형성될 수 있다. 예를 들면, 핀 주소들이 A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11 및 B12를 포함할 수 있다.

<28> 검출 핀 411, 413들은 신호 처리 장치 300에서 외부 장치의 접속을 검출하기 위해 제공된다. 즉 검출 핀 411, 413들은 통신 채널 210, 220들의 상태를 파악하기 위해 제공된다. 이 때 검출 핀 411, 413들은 통신 채널 210, 220들을 검출한다. 여기서, 신호 처리 장치 300에서 외부 장치와 통신 채널 210, 220들이 형성되면, 검출 핀 311, 314들 중 어느 하나가 통신 채널 210, 220들 중 어느 하나를 검출할 수

있다.

<29> 이러한 검출 핀 411, 413들은 제 1 검출 핀 411과 제 2 검출 핀 413을 포함한다. 여기서, 제 1 검출 핀 411과 제 2 검출 핀 413은 상호에 상하 대칭 및 좌우 대칭되도록 배치된다. 예를 들면, 제 1 검출 핀 411과 제 2 검출 핀 413은 A5 및 B5에 배치될 수 있다. 이 때 제 1 검출 핀 411 또는 제 2 검출 핀 413 중 어느 하나가 활성 검출 핀이고, 제 1 검출 핀 411 또는 제 2 검출 핀 413 중 나머지가 비활성 검출 핀일 수 있다. 활성 검출 핀은 활성화되어, 통신 채널 210, 220들을 검출할 수 있다. 여기서, 활성 검출 핀은 제 1 통신 채널 210과 제 2 통신 채널 220을 식별할 수 있다. 즉 활성 검출 핀이 제 1 통신 채널 210 또는 제 2 통신 채널 220 중 어느 하나를 검출할 수 있다. 비활성 검출 핀은 비활성화되어, 통신 채널 210, 220들을 검출하는 데 이용되지 않을 수 있다.

<30> 통신 핀 세트 420, 430, 440, 451, 453들은 신호 처리 장치 300에서 신호를 교환하기 위해 제공된다. 즉 통신 핀 세트 420, 430, 440, 451, 453들은 신호를 송신하거나, 수신한다. 이 때 통신 핀 세트 420, 430, 440, 451, 453들 중 적어도 어느 하나가 신호를 송신하거나, 수신할 수 있다.

<31> 이러한 통신 핀 세트 420, 430, 440, 451, 453들은 제 1 통신 핀 세트 420, 제 2 통신 핀 세트 430, 제 3 통신 핀 세트 440 및 제 4 통신 핀 세트 451, 453을 포함한다. 이 때 제 1 통신 핀 세트 420과 제 2 통신 핀 세트 430은 동일한 전송 속도를 갖는다. 한편, 제 3 통신 핀 세트 440 및 제 4 통신 핀 세트 451, 453은 제 1 통신 핀 세트 및 제 2 통신 핀 세트와 상이한 전송 속도를 갖는다.

<32> 제 1 통신 편 세트 420에, 제 1 통신 채널 210이 할당된다. 이러한 제 1 통신 편 세트 420은 제 1 송신 편 세트 421과 제 1 수신 편 세트 425를 포함한다. 이 때 제 1 통신 편 세트 420은 미리 정해진 전송 속도를 갖는다. 제 1 송신 편 세트 421은 제 1 정 송신 편 422 및 제 1 부 송신 편 424를 포함한다. 제 1 수신 편 세트 425는 제 1 정 수신 편 426 및 제 1 부 수신 편 428을 포함한다. 이 때 제 1 송신 편 세트 421은 제 1 통신 채널 210을 통해 신호를 송신할 수 있다. 여기서, 제 1 정 송신 편 422는 제 1 송신 경로 213을 통해 정(positive) 형태의 신호를 송신하고, 제 1 부 송신 편 424는 제 1 송신 경로 213을 통해 부(negative) 형태의 신호를 송신할 수 있다. 한편, 제 1 수신 편 세트 425는 제 1 통신 채널 210을 통해 신호를 수신할 수 있다. 여기서, 제 1 정 수신 편 426은 제 1 수신 경로 215를 통해 정 형태의 신호를 수신하고, 제 1 부 수신 편 428은 제 1 수신 경로 215를 통해 부 형태의 신호를 수신할 수 있다.

<33> 제 2 통신 편 세트 430에, 제 2 통신 채널 220이 할당된다. 이러한 제 2 통신 편 세트 430은 제 2 송신 편 세트 431과 제 2 수신 편 세트 435를 포함한다. 이 때 제 2 통신 편 세트 430은 제 1 통신 편 세트 420과 동일한 전송 속도를 갖는다. 제 2 송신 편 세트 431은 제 2 정 송신 편 432 및 제 2 부 송신 편 434를 포함한다. 제 2 수신 편 세트 435는 제 2 정 수신 편 436 및 제 2 부 수신 편 438을 포함한다. 이 때 제 2 송신 편 세트 431은 제 2 통신 채널 220을 통해 신호를 송신할 수 있다. 여기서, 제 2 정 송신 편 432는 제 2 송신 경로 223을 통해 정 형태의 신호를 송신하고, 제 2 부 송신 편 434는 제 2 송신 경로 223을 통해 부 형태

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의 신호를 송신할 수 있다. 한편, 제 2 수신 편 세트 435는 제 2 통신 채널 220을 통해 신호를 수신한다. 여기서, 제 2 정 수신 편 436은 제 2 수신 경로 225를 통해 정 형태의 신호를 수신하고, 제 2 부 수신 편 438은 제 2 수신 경로 225를 통해 부 형태의 신호를 수신할 수 있다.

<34> 이 때 제 1 통신 편 세트 420와 제 2 통신 편 세트 430은 상호에 상하 대칭 및 좌우 대칭되도록 배치된다. 즉 제 1 송신 편 세트 421과 제 2 송신 편 세트 431이 상호에 상하 대칭 및 좌우 대칭되도록 배치된다. 구체적으로, 제 1 정 송신 편 422와 제 2 정 송신 편 432가 상하 대칭 및 좌우 대칭이고, 제 1 부 송신 편 424와 제 2 부 송신 편 434가 상하 대칭 및 좌우 대칭되도록 배치된다. 예를 들면, 제 1 정 송신 편 422와 제 2 정 송신 편 432가 A2 및 B2에 배치되고, 제 1 부 송신 편 424와 제 2 부 송신 편 434가 A3 및 B3에 배치될 수 있다. 그리고 제 1 수신 편 세트 425와 제 2 수신 편 세트 435가 상하 대칭 및 좌우 대칭되도록 배치된다. 구체적으로, 제 1 정 수신 편 426과 제 2 정 수신 편 436이 상하 대칭 및 좌우 대칭이고, 제 1 부 수신 편 428과 제 2 부 수신 편 438이 상하 대칭 및 좌우 대칭되도록 배치된다. 예를 들면, 제 1 정 수신 편 426과 제 2 정 수신 편 436이 B11 및 A11에 배치되고, 제 1 부 수신 편 428과 제 2 부 수신 편 438이 B10 및 A10에 배치될 수 있다.

<35> 제 3 통신 편 세트 440에, 제 3 통신 채널(도시되지 않음)이 할당된다. 여기서, 제 3 통신 채널은 제 1 통신 채널 210 및 제 2 통신 채널 220과 상이하다. 이 때 제 3 통신 편 세트 440은 제 1 통신 편 세트 420 및 제 2 통신 편 세트 430과

상이한 전송 속도를 갖는다. 이러한 제 3 통신 핀 세트 440은 두 개의 정 통신 핀 441, 443들과 두 개의 부 통신 핀 445, 447들을 포함한다. 이 때 정 통신 핀 441, 443들은 제 3 통신 채널을 통해 정 형태의 신호를 송신하거나, 수신할 수 있다. 그리고 부 통신 핀 445, 447들은 제 3 통신 채널을 통해 부 형태의 신호를 송신하거나, 수신할 수 있다. 여기서, 정 통신 핀 441, 443들은 상호에 상하 대칭 및 좌우 대칭되도록 배치된다. 예를 들면, 정 통신 핀 441, 443들은 A6 및 B6에 배치될 수 있다. 또한 부 통신 핀 445, 447들은 상호에 상하 대칭 및 좌우 대칭되도록 배치된다. 예를 들면, 부 통신 핀 445, 447들은 A7 및 B7에 배치될 수 있다.

<36> 제 4 통신 핀 세트 451, 453은 신호 처리 장치 300에서 외부 장치와 인터페이스를 지원한다. 이 때 제 4 통신 핀 세트 451, 453은 제 3 통신 핀 세트 440을 지원할 수 있다. 즉 제 3 통신 핀 세트 440에서 신호 송신 또는 수신 시, 제 4 통신 핀 세트 451, 453이 부가적인 신호를 송신하거나, 수신할 수 있다. 이를 위해, 제 4 통신 핀 세트 451, 453은 제 3 통신 핀 세트 440과 동일한 전송 속도를 가질 수 있다. 이러한 제 4 통신 핀 세트 451, 453은 제 1 서브 핀 451과 제 2 서브 핀 453을 포함한다. 여기서, 제 1 서브 핀 451과 제 2 서브 핀 453은 상하 대칭 및 좌우 대칭되도록 배치된다. 예를 들면, 제 1 서브 핀 451과 제 2 서브 핀 453은 A8 및 B8에 배치될 수 있다.

<37> 전력 공급 핀 461, 463, 465, 467들은 신호 처리 장치 300에서 전력 수신을 위해 제공된다. 이 때 전력 공급 핀 461, 463, 465, 467들은 신호 처리 장치 300의 구동을 위한 전력을 수신한다. 여기서, 전력 공급 핀 461, 463, 465, 467들은 상호

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에 상하 대칭 및 좌우 대칭되도록 배치된다. 예를 들면, 전력 공급 핀 461, 463, 465, 467들은 A4, A9, B4 및 B9에 배치될 수 있다.

<38> 접지 핀 471, 473, 475, 477들은 신호 처리 장치 300에서 접지를 위해 제공된다. 이 때 접지 핀 471, 473, 475, 477들은 검출 핀 411, 413들과 전력 공급 핀 461, 463, 465, 467들을 접지시킨다. 여기서, 접지 핀 471, 473, 475, 477들은 신호에 상하 대칭 및 좌우 대칭되도록 배치된다. 예를 들면, 접지 핀 471, 473, 475, 477들은 A1, A12, B1 및 B12에 배치될 수 있다.

<39> 전력 공급부 350은 신호 처리 장치 300에서 전력을 공급한다. 이 때 전력 공급부 350은 인터페이스부 340의 전력 공급 핀 461, 463, 465, 467들로부터 전력을 수신하여, 충전될 수 있다. 그리고 전력 공급부 350은 신호 처리 장치 300의 구성 요소들에 전력을 공급할 수 있다.

<40> 접지부 360은 신호 처리 장치 300을 접지시킨다. 이 때 접지부 360은 신호 처리 장치 300의 구성 요소들을 접지시킬 수 있다. 그리고 접지부 360은 인터페이스부 340의 접지 핀 471, 473, 475, 477들과 연결될 수 있다.

<41> 저장부 370은 신호 처리 장치 300의 동작 프로그램들을 저장한다. 이 때 저장부 370은 통신 채널 210, 220들 중 어느 하나를 위한 신호를 처리하기 위한 프로그램을 저장할 수 있다. 그리고 저장부 370은 통신 채널 210들 중 나머지를 접지부 360에 연결하기 위한 프로그램을 저장할 수 있다. 또한 저장부 370은 동작 프로그램들을 수행하는 중에 발생하는 데이터를 저장한다.

<42> 제어부 380은 신호 처리 장치 300에서 전반적인 동작을 제어한다. 이 때 제어부 380은 통신 핀 세트 420, 430, 440, 451, 453들 중 적어도 어느 하나를 통해 신호를 송신하거나, 수신한다. 이를 위해, 제어부 380은 제 1 통신 핀 세트 420, 제 2 통신 핀 세트 430 또는 제 3 통신 핀 세트 440 중 어느 하나를 결정한다. 여기서, 제 3 통신 핀 세트 440이 결정되면, 제어부 380은 제 4 통신 핀 세트 451, 453의 이용 여부를 결정할 수 있다.

<43> 이 때 제어부 380은 통신 채널 210, 220들의 상태를 파악할 수 있다. 그리고 제어부 380은 인터페이스부 340의 검출 핀 411, 413들을 통해 제 1 통신 채널 210 또는 제 2 통신 채널 220 중 어느 하나를 검출할 수 있다. 이에 대응하여, 제어부 380은 제 1 통신 핀 세트 420 또는 제 2 통신 핀 세트 430 중 어느 하나를 결정할 수 있다. 또한 제어부 380은 제 1 통신 핀 세트 420 또는 제 2 통신 핀 세트 430 중 나머지를 접지시킬 수 있다. 게다가, 제어부 380은 제 1 통신 핀 세트 420 또는 제 2 통신 핀 세트 430 중 어느 하나를 위한 신호를 처리할 수 있다.

<44> 도 5는 도 3에서 제어부의 구성을 도시하는 블록도이다.

<45> 도 5를 참조하면, 본 실시예의 신호 처리 장치 300에서, 제어부 380은 검출부 510, 신호 처리부 520 및 연결부 530을 포함한다.

<46> 검출부 510은 통신 채널 210, 220들의 상태를 파악한다. 이 때 검출부 510은 인터페이스부 340의 검출 핀 411, 413들을 통해 통신 채널 210, 220들의 상태를 파악한다. 여기서, 검출부 510은 검출 핀 411, 413들 중 어느 하나, 예컨대 활성 검

출 편을 통해 통신 채널 210, 220들의 상태를 파악할 수 있다. 이를 통해, 검출부 510은 통신 채널 210, 220들 중 어느 하나를 검출한다. 여기서, 신호 처리 장치 300에서 외부 장치와 통신 채널 210, 220들이 형성되면, 활성 검출 편이 통신 채널 210, 220들 중 어느 하나를 검출할 수 있다.

<47> 그리고 검출부 510은 제 1 통신 편 세트 420 또는 제 2 통신 편 세트 430 중 어느 하나를 결정한다. 이 때 제 1 통신 채널 210이 검출되면, 검출부 510이 제 1 통신 편 세트 420을 결정할 수 있다. 한편, 제 2 통신 채널 220이 검출되면, 검출부 510이 제 2 통신 편 세트 430을 결정할 수 있다. 그리고 검출부 510은 제 1 통신 편 세트 420 또는 제 2 통신 편 세트 430 중 어느 하나에 대응하여, 선택 신호를 발생시킨다. 여기서, 검출부 510은 제 1 통신 편 세트 420에 대응하여, 제 1 선택 신호를 발생시키고, 제 2 통신 편 세트 430에 대응하여, 제 2 선택 신호를 발생시킬 수 있다. 예를 들면, 제 1 선택 신호는 하이 레벨 명령이고, 제 2 선택 신호를 로우 레벨 명령일 수 있다.

<48> 신호 처리부 520은 통신 채널 210, 220들 중 어느 하나를 위한 신호를 처리한다. 이 때 신호 처리부 520은 통신 채널 210, 220들 중 어느 하나로 송신하기 위한 신호를 처리할 수 있다. 또는 신호 처리부 520은 통신 채널 210, 220들 중 어느 하나로부터 수신되는 신호를 처리할 수 있다. 이러한 신호 처리부 520은 송신하기 위한 신호를 부호화 및 변조하는 송신기와 신호를 복조 및 복호화하는 수신기를 포함할 수 있다. 여기서, 신호 처리부 520은 모뎀(MODEM) 및 코덱(CODEC)을 포함할 수 있다. 그리고 코덱은 패킷 데이터 등을 처리하는 데이터 코덱과 음성 등의 오디오

오 신호를 처리하는 오디오 코덱을 포함할 수 있다.

<49> 연결부 530은 통신 채널 210, 220들을 위한 연결을 제어한다. 즉 연결부 530은 제 1 통신 핀 세트 420, 제 2 통신 핀 세트 430, 신호 처리부 520 및 접지부 350 사이의 연결을 제어한다. 이 때 연결부 530은 제 1 통신 핀 세트 420 또는 제 2 통신 핀 세트 430 중 어느 하나를 신호 처리부 520에 연결한다. 그리고 연결부 530은 제 1 통신 핀 세트 420 또는 제 2 통신 핀 세트 430 중 나머지를 접지부 350에 연결한다. 여기서, 검출부 510에서 제 1 통신 핀 세트 420이 결정되면, 연결부 530은 제 1 통신 핀 세트 420을 신호 처리부 520에 연결하고, 제 2 통신 핀 세트 430을 접지부 350에 연결할 수 있다. 또는 검출부 510에서 제 2 통신 핀 세트 430이 결정되면, 연결부 530은 제 2 통신 핀 세트 430을 신호 처리부 520에 연결하고, 제 1 통신 핀 세트 420을 접지부 350에 연결할 수 있다. 예를 들면, 연결부 530은 스위치 소자를 포함할 수 있다.

<50> 도 6은 도 5에서 연결부의 구성을 도시하는 회로도이다.

<51> 도 6을 참조하면, 연결부 530은 검출 단자 610, 제 1 통신 단자 세트 620, 제 2 통신 단자 세트 630, 연결 단자 세트 640, 접지 단자 650, 제 1 연결 스위치 세트 660, 제 2 연결 스위치 세트 670, 제 1 접지 스위치 세트 680 및 제 2 접지 스위치 세트 690을 포함한다.

<52> 검출 단자 610은 검출부 510에 연결된다. 이 때 검출 단자 610은 검출부 510으로부터 제 1 통신 핀 세트 420 또는 제 2 통신 핀 세트 430 중 어느 하나에 대응하여, 선택 신호를 수신한다. 여기서, 선택 신호는 제 1 통신 핀 세트 420에 대응

하는 제 1 선택 신호 및 제 2 통신 편 세트 430에 대응하는 제 2 선택 신호를 포함할 수 있다. 예를 들면, 제 1 선택 신호는 하이 레벨 명령이고, 제 2 선택 신호를로우 레벨 명령일 수 있다.

<53> 제 1 통신 단자 세트 620은 인터페이스부 340의 제 1 통신 편 세트 420에 연결된다. 이러한 제 1 통신 단자 세트 620은 제 1 송신 단자 세트 621과 제 1 수신 단자 세트 625를 포함한다. 제 1 송신 단자 세트 621은 제 1 정 송신 단자 622와 제 1 부 송신 단자 624를 포함한다. 제 1 수신 단자 세트 625는 제 1 정 수신 단자 626과 제 1 부 수신 단자 628을 포함한다. 이 때 제 1 송신 단자 세트 621은 제 1 송신 편 세트 421에 연결된다. 여기서, 제 1 정 송신 단자 622는 제 1 정 송신 편 422에 연결되고, 제 1 부 송신 단자 624는 제 1 부 송신 편 424에 연결된다. 한편, 제 1 수신 단자 세트 625는 제 1 수신 편 세트 425에 연결된다. 여기서, 제 1 정 수신 단자 626은 제 1 정 수신 편 426에 연결되고, 제 1 부 수신 단자 628은 제 1 부 수신 편 428에 연결된다.

<54> 제 2 통신 단자 세트 630은 인터페이스부 340의 제 2 통신 편 세트 430에 연결된다. 이러한 제 2 통신 단자 세트 630은 제 2 송신 단자 세트 631과 제 2 수신 단자 세트 635를 포함한다. 제 2 송신 단자 세트 631은 제 2 정 송신 단자 632와 제 2 부 송신 단자 634를 포함한다. 제 2 수신 단자 세트 635는 제 2 정 수신 단자 636과 제 2 부 수신 단자 638을 포함한다. 이 때 제 2 송신 단자 세트 631은 제 2 송신 편 세트 431에 연결된다. 여기서, 제 2 정 송신 단자 632는 제 2 정 송신 편 432에 연결되고, 제 2 부 송신 단자 634는 제 2 부 송신 편 434에 연결된다. 한편,

제 2 수신 단자 세트 635는 제 2 수신 핀 세트 435에 연결된다. 여기서, 제 2 정 수신 단자 636은 제 2 정 수신 핀 436에 연결되고, 제 2 부 수신 단자 638은 제 2 부 수신 핀 438에 연결된다.

<55> 연결 단자 세트 640은 신호 처리부 520에 연결된다. 이러한 연결 단자 세트 640은 출력 단자 세트 641과 입력 단자 세트 645를 포함한다. 출력 단자 세트 641은 정 출력 단자 642와 부 출력 단자 644를 포함한다. 입력 단자 세트 645는 정 입력 단자 646과 부 입력 단자 648을 포함한다.

<56> 접지 단자 650은 접지부 350에 연결된다.

<57> 제 1 연결 스위치 세트 660은 제 1 통신 단자 세트 620과 연결 단자 세트 640 사이에 배치된다. 이러한 제 1 연결 스위치 세트 660은 제 1 정 출력 스위치 661, 제 1 부 출력 스위치 663, 제 1 정 입력 스위치 665 및 제 1 부 입력 스위치 667을 포함한다. 여기서, 제 1 정 출력 스위치 661은 제 1 정 송신 단자 622와 정 출력 단자 642 사이에 배치되고, 제 1 부 출력 스위치 663은 제 1 부 송신 단자 624와 부 출력 단자 644 사이에 배치된다. 그리고 제 1 정 입력 스위치 665는 제 1 정 수신 단자 626과 정 입력 단자 646 사이에 배치되고, 제 1 부 입력 스위치 667은 제 1 부 수신 단자 628과 부 입력 단자 648 사이에 배치된다.

<58> 이 때 제 1 연결 스위치 세트 660은 검출부 510의 선택 신호에 대응하여, 제 1 통신 단자 세트 620과 연결 단자 세트 640을 연결하거나, 제 1 통신 단자 세트 620과 연결 단자 세트 640의 연결을 해제할 수 있다. 즉 검출 단자 610을 통해 제 1 선택 신호가 수신되면, 제 1 연결 스위치 세트 660은 단락(short)되어, 제 1 통

신 단자 세트 620과 연결 단자 세트 640을 연결할 수 있다. 여기서, 제 1 정 출력 스위치 661, 제 1 부 출력 스위치 663, 제 1 정 입력 스위치 665 및 제 1 부 입력 스위치 667이 일괄적으로 단락될 수 있다. 한편, 검출 단자 610을 통해 제 2 선택 신호가 수신되면, 제 1 연결 스위치 세트 660은 오픈(open)되어, 제 1 통신 단자 세트 620과 연결 단자 세트 640의 연결을 해제할 수 있다. 여기서, 제 1 정 출력 스위치 661, 제 1 부 출력 스위치 663, 제 1 정 입력 스위치 665 및 제 1 부 입력 스위치 667이 일괄적으로 오픈될 수 있다.

<59> 제 2 연결 스위치 세트 670은 제 2 통신 단자 세트 630과 연결 단자 세트 640 사이에 배치된다. 이러한 제 2 연결 스위치 세트 670은 제 2 정 출력 스위치 671, 제 2 부 출력 스위치 673, 제 2 정 입력 스위치 675 및 제 2 부 입력 스위치 677을 포함한다. 여기서, 제 2 정 출력 스위치 671은 제 2 정 송신 단자 632와 정 출력 단자 642 사이에 배치되고, 제 2 부 출력 스위치 673은 제 2 부 송신 단자 634와 부 출력 단자 644 사이에 배치된다. 그리고 제 2 정 입력 스위치 675는 제 2 정 수신 단자 636과 정 입력 단자 646 사이에 배치되고, 제 2 부 입력 스위치 677은 제 2 부 수신 단자 638과 부 입력 단자 648 사이에 배치된다.

<60> 이 때 제 2 연결 스위치 세트 670은 검출부 510의 선택 신호에 대응하여, 제 2 통신 단자 세트 630과 연결 단자 세트 640을 연결하거나, 제 2 통신 단자 세트 630과 연결 단자 세트 640의 연결을 해제할 수 있다. 즉 검출 단자 610을 통해 제 1 선택 신호가 수신되면, 제 2 연결 스위치 세트 670은 오픈되어, 제 2 통신 단자 세트 630과 연결 단자 세트 640의 연결을 해제할 수 있다. 여기서, 제 2 정 출력

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스위치 671, 제 2 부 출력 스위치 673, 제 2 정 입력 스위치 675 및 제 2 부 입력 스위치 677이 일괄적으로 오픈될 수 있다. 한편, 검출 단자 610을 통해 제 2 선택 신호가 수신되면, 제 2 연결 스위치 세트 670은 단락되어, 제 2 통신 단자 세트 630과 연결 단자 세트 640을 연결할 수 있다. 여기서, 제 2 정 출력 스위치 671, 제 2 부 출력 스위치 673, 제 2 정 입력 스위치 675 및 제 2 부 입력 스위치 677이 일괄적으로 단락될 수 있다.

<61> 제 1 접지 스위치 세트 680은 제 1 통신 단자 세트 620과 접지 단자 650 사이에 배치된다. 이러한 제 1 접지 스위치 세트 680은 다수개의 제 1 접지 스위치 681, 683, 685, 687들을 포함한다. 여기서, 제 1 접지 스위치 681, 683, 685, 687들은 제 1 정 송신 단자 622와 접지 단자 650, 제 1 부 송신 단자 624와 접지 단자 650, 제 1 정 수신 단자 626과 접지 단자 650 및 제 1 부 수신 단자 628과 접지 단자 650 사이에 각각 배치된다.

<62> 이 때 제 1 접지 스위치 세트 680은 검출부 510의 선택 신호에 대응하여, 제 1 통신 단자 세트 620과 접지 단자 650을 연결하거나, 제 1 통신 단자 세트 620과 접지 단자 650의 연결을 해제할 수 있다. 즉 검출 단자 610을 통해 제 1 선택 신호가 수신되면, 제 1 접지 스위치 세트 680은 오픈되어, 제 1 통신 단자 세트 620과 접지 단자 650의 연결을 해제할 수 있다. 여기서, 제 1 접지 스위치 681, 683, 685, 687들이 일괄적으로 오픈될 수 있다. 한편, 검출 단자 610을 통해 제 2 선택 신호가 수신되면, 제 1 접지 스위치 세트 680은 단락되어, 제 1 통신 단자 세트 620과 접지 단자 650을 연결할 수 있다. 여기서, 제 1 접지 스위치 681, 683, 685,

687들이 일괄적으로 단락될 수 있다.

<63> 제 2 접지 스위치 세트 690은 제 2 통신 단자 세트 630과 접지 단자 650 사이에 배치된다. 이러한 제 2 접지 스위치 세트 690은 다수개의 제 2 접지 스위치 691, 693, 695, 697들을 포함한다. 여기서, 제 2 접지 스위치 691, 693, 695, 697들은 제 2 정 송신 단자 632와 접지 단자 650, 제 2 부 송신 단자 634와 접지 단자 650, 제 2 정 수신 단자 636과 접지 단자 650 및 제 2 부 수신 단자 638과 접지 단자 650 사이에 각각 배치된다.

<64> 이 때 제 2 접지 스위치 세트 690은 검출부 510의 선택 신호에 대응하여, 제 2 통신 단자 세트 630과 접지 단자 650을 연결하거나, 제 2 통신 단자 세트 630과 접지 단자 650의 연결을 해제할 수 있다. 즉 검출 단자 610을 통해 제 1 선택 신호가 수신되면, 제 2 접지 스위치 세트 690은 단락되어, 제 2 통신 단자 세트 630과 접지 단자 650을 연결할 수 있다. 여기서, 제 2 접지 스위치 691, 693, 695, 697들이 일괄적으로 단락될 수 있다. 한편, 검출 단자 610을 통해 제 2 선택 신호가 수신되면, 제 2 접지 스위치 세트 690은 오픈되어, 제 2 통신 단자 세트 630과 접지 단자 650을 연결할 수 있다. 여기서, 제 2 접지 스위치 691, 693, 695, 697들이 일괄적으로 오픈될 수 있다.

<65> 오디오 처리부 390은 오디오 신호를 처리할 수 있다. 이 때 오디오 처리부 390은 스피커(SPK) 391과 마이크(MIC) 393을 포함한다. 즉 오디오 처리부 390은 스피커 391을 통해 오디오 신호를 재생할 수 있다. 그리고 오디오 처리부 390은 마이크 433을 통해 오디오 신호를 수집할 수 있다.

<66> 도 7은 본 발명의 실시예에 따른 신호 처리 방법의 수행 절차를 도시하는 순서도이다.

<67> 도 7을 참조하면, 본 실시예의 신호 처리 방법은, 제어부 380이 711 동작에서 외부 장치의 연결을 감지하는 것으로부터 출발한다. 이 때 인터페이스부 340이 외부 장치와 연결될 수 있다. 여기서, 인터페이스부 340이 케이블 200을 통해 외부 장치와 연결될 수 있다. 그리고 인터페이스부 340가 외부 장치와 연결되면, 제어부 380은 검출 핀 411, 413들 중 어느 하나를 통해 외부 장치의 접속을 검출할 수 있다. 여기서, 검출부 510이 활성 검출 핀을 통해 외부 장치의 접속을 검출할 수 있다. 즉 인터페이스부 340가 외부 장치와 연결되면, 통신 채널 210, 220들 중 어느 하나가 활성 검출 핀과 외부 장치 사이에 형성될 수 있다. 그리고 통신 채널 210, 220들 중 어느 하나가 형성되면, 활성 검출 핀에서 임피던스 변화가 발생할 수 있다. 이를 통해, 검출부 510이 활성 검출 핀에서 임피던스 변화를 감지함으로써, 외부 장치의 접속을 검출할 수 있다.

<68> 이어서, 711 동작에서 외부 장치의 연결이 감지되면, 제어부 380은 713 동작에서 통신 채널 210, 220들의 상태를 파악한다. 이 때 제어부 380은 검출 핀 411, 413들 중 어느 하나를 통해 통신 채널 210, 220들의 상태를 파악할 수 있다. 여기서, 검출부 510이 활성 검출 핀을 통해 제 1 통신 채널 210과 제 2 통신 채널 220을 식별할 수 있다. 그리고 검출부 5410이 활성 검출 핀을 통해 제 1 통신 채널 210 또는 제 2 통신 채널 220 중 어느 하나를 검출할 수 있다.

<69> 계속해서, 제어부 380은 715 동작에서 통신 핀 세트 420, 430, 440, 451,

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453들의 연결을 제어한다. 즉 제어부 380은 통신 채널 210, 220들의 상태에 따라, 제 1 통신 핀 세트 420 및 제 2 통신 핀 세트 430의 연결을 제어한다. 이 때 연결부 530이 제 1 통신 핀 세트 420, 제 2 통신 핀 세트 430, 신호 처리부 520 및 접지부 350 사이의 연결을 제어한다. 여기서, 연결부 530은 제 1 통신 핀 세트 420 또는 제 2 통신 핀 세트 430 중 어느 하나를 신호 처리부 520에 연결한다. 그리고 연결부 530은 제 1 통신 핀 세트 420 또는 제 2 통신 핀 세트 430 중 나머지를 접지시킨다.

<70> 도 8은 도 7에서 통신 핀 세트들의 연결 제어 동작의 수행 절차를 도시하는 순서도이다.

<71> 도 8을 참조하면, 제어부 380은 811 동작에서 통신 핀 세트 420, 430, 440, 451, 453들 중 어느 하나를 결정한다. 이 때 제어부 380은 통신 채널 210, 220들의 상태에 따라, 제 1 통신 핀 세트 420 또는 제 2 통신 핀 세트 430 중 어느 하나를 결정한다. 여기서, 검출부 510이 제 1 통신 채널 210 또는 제 2 통신 채널 220 중 어느 하나에 대응하여, 제 1 통신 핀 세트 420 또는 제 2 통신 핀 세트 430 중 어느 하나를 결정한다. 즉 제 1 통신 채널 210이 검출되면, 검출부 510은 제 1 통신 핀 세트 420을 결정한다. 한편, 제 2 통신 채널 220이 검출되면, 검출부 510은 제 2 통신 핀 세트 430을 결정한다.

<72> 여기서, 검출부 510은 제 1 통신 핀 세트 420 또는 제 2 통신 핀 세트 430 중 어느 하나에 대응하여, 선택 신호를 발생시킬 수 있다. 예를 들면, 제 1 통신 핀 세트 420이 결정되면, 검출부 510은 제 1 선택 신호를 발생시킬 수 있다. 한편,

제 2 통신 편 세트 430이 결정되면, 검출부 510은 제 2 선택 신호를 발생시킬 수 있다. 또한 검출부 510은 선택 신호를 연결부 530의 검출 단자 610으로 출력할 수 있다.

<73> 다음으로, 제어부 380은 813 동작에서 통신 편 세트 420, 430, 440, 451, 453들 중 어느 하나를 신호 처리부 520에 연결한다. 이 때 제어부 380은 제 1 통신 편 세트 420 또는 제 2 통신 편 세트 430 중 어느 하나를 신호 처리부 520에 연결한다. 즉 제 1 통신 편 세트 420이 결정되면, 연결부 530이 제 1 통신 편 세트 420을 신호 처리부 520에 연결할 수 있다. 한편, 제 2 통신 편 세트 430이 결정되면, 연결부 530이 제 2 통신 편 세트 430을 신호 처리부 520에 연결할 수 있다.

<74> 여기서, 연결부 530이 검출부 510의 선택 신호에 대응하여, 제 1 통신 편 세트 420 또는 제 2 통신 편 세트 430 중 어느 하나를 신호 처리부 520에 연결할 수 있다. 예를 들면, 검출 단자 610을 통해 제 1 선택 신호가 수신되면, 제 1 연결 스위치 세트 660이 단락되고, 제 2 연결 스위치 세트 670이 오픈될 수 있다. 이를 통해, 제 1 연결 스위치 세트 660이 제 1 통신 단자 세트 620과 연결 단자 세트 640을 연결하고, 제 2 연결 스위치 세트 670이 제 2 통신 단자 세트 630과 연결 단자 세트 640의 연결을 해제할 수 있다. 한편, 검출 단자 610을 통해 제 2 선택 신호가 수신되면, 제 1 연결 스위치 세트 660이 오픈되고, 제 2 연결 스위치 세트 670이 단락될 수 있다. 이를 통해, 제 1 연결 스위치 세트 660이 제 1 통신 단자 세트 620과 연결 단자 세트 640의 연결을 해제하고, 제 2 연결 스위치 세트 670이 제 2 통신 단자 세트 630과 연결 단자 세트 640을 연결할 수 있다.

<75> 다음으로, 제어부 380은 815 동작에서 통신 편 세트 420, 430, 440, 451, 453들 중 나머지를 접지부 350에 연결한다. 이 때 제어부 380은 제 1 통신 편 세트 420 또는 제 2 통신 편 세트 430 중 나머지를 접지부 350에 연결한다. 즉 제 1 통신 편 세트 420이 결정되면, 연결부 530이 제 2 통신 편 세트 430을 접지부 350에 연결할 수 있다. 한편, 제 2 통신 편 세트 430이 결정되면, 연결부 530이 제 1 통신 편 세트 420을 접지부 350에 연결할 수 있다. 이 후 제어부 380은 도 7로 리턴할 수 있다.

<76> 여기서, 연결부 530이 검출부 510의 선택 신호에 대응하여, 제 1 통신 편 세트 420 또는 제 2 통신 편 세트 430 중 나머지를 접지부 350에 연결할 수 있다. 예를 들면, 검출 단자 610을 통해 제 1 선택 신호가 수신되면, 제 1 접지 스위치 세트 680이 오픈되고, 제 2 접지 스위치 세트 690이 단락될 수 있다. 이를 통해, 제 1 접지 스위치 세트 680이 제 1 통신 단자 세트 620과 접지 단자 650의 연결을 해제하고, 제 2 접지 스위치 세트 690이 제 2 통신 단자 세트 630과 접지 단자 650을 연결할 수 있다. 한편, 검출 단자 610을 통해 제 2 선택 신호가 수신되면, 제 1 접지 스위치 세트 680이 단락되고, 제 2 접지 스위치 세트 690이 오픈될 수 있다. 이를 통해, 제 1 접지 스위치 세트 680이 제 1 통신 단자 세트 620과 접지 단자 650을 연결하고, 제 2 접지 스위치 세트 690이 제 2 통신 단자 세트 630과 접지 단자 650의 연결을 해제할 수 있다.

<77> 마지막으로, 제어부 380은 717 동작에서 통신 편 세트 420, 430, 440, 451, 453들 중 어느 하나를 위한 신호를 처리한다. 즉 제어부 380은 통신 채널 210, 220

들 중 어느 하나를 위한 신호를 처리한다. 이 때 제 1 통신 편 세트 420이 신호 처리부 520에 연결되면, 신호 처리부 520이 제 1 통신 채널 210을 위한 신호를 처리할 수 있다. 여기서, 신호 처리부 520이 제 1 통신 편 세트 420을 통해 제 1 통신 채널 210로 신호를 송신하거나, 제 1 통신 채널 210로부터 신호를 수신할 수 있다. 한편, 제 2 통신 편 세트 430이 신호 처리부 520에 연결되면, 신호 처리부 520이 제 2 통신 채널 220을 위한 신호를 처리할 수 있다. 여기서, 신호 처리부 520이 제 2 통신 편 세트 430을 통해 제 2 통신 채널 220로 신호를 송신하거나, 제 2 통신 채널 220로부터 신호를 수신할 수 있다.

<78> 여기서, 신호 처리부 520은 신호를 처리하여, 연결부 530의 출력 단자 세트 641을 통해 출력할 수 있다. 예를 들면, 제 1 연결 스위치 세트 660이 단락되고, 제 2 연결 스위치 세트 670이 오픈되면, 신호가 출력 단자 세트 641로부터 제 1 송신 단자 세트 621로 전달되어, 제 1 송신 편 세트 421을 통해 송신될 수 있다. 한편, 제 1 연결 스위치 세트 660이 오픈되고, 제 2 연결 스위치 세트 670이 단락되면, 신호가 출력 단자 세트 641로부터 제 2 송신 단자 세트 631로 전달되어, 제 2 송신 편 세트 431을 통해 송신될 수 있다. 또는 신호 처리부 520은 연결부 530의 입력 단자 세트 645를 통해 신호를 수신하여, 처리할 수 있다. 예를 들면, 제 1 연결 스위치 세트 660이 단락되고, 제 2 연결 스위치 세트 670이 오픈되면, 신호가 제 1 수신 편 세트 425를 통해 수신되어, 제 1 수신 단자 세트 625로부터 입력 단자 세트 645로 전달될 수 있다. 한편, 제 1 연결 스위치 세트 660이 오픈되고, 제 2 연결 스위치 세트 670이 단락되면, 신호가 제 2 수신 편 세트 435를 통해 수신되

어, 제 2 수신 단자 세트 635로부터 입력 단자 세트 645로 전달될 수 있다.

<79> 본 발명에 따른 신호 처리 장치 300은, 통신 편 세트 420, 430, 440, 451, 453들 중 어느 하나를 위한 신호 처리 시, 통신 편 세트 420, 430, 440, 451, 453들 중 나머지를 접지시킨다. 이로 인하여, 신호 처리 장치 300은, 통신 편 세트 420, 430, 440, 451, 453들 간 전자기적 결합을 방지할 수 있다. 즉 신호 처리 장치 300은, 통신 편 세트 420, 430, 440, 451, 453들 중 나머지로 신호의 유입을 방지할 수 있다. 나아가, 신호 처리 장치 300은, 통신 편 세트 420, 430, 440, 451, 453들과 안테나 311 간 전자기적 결합을 억제할 수 있다. 즉 신호 처리 장치 300은, 통신 편 세트 420, 430, 440, 451, 453들 중 나머지를 통한 안테나 311로 신호의 유입을 방지할 수 있다. 이를 통해, 신호 처리 장치 300의 인터페이스 성능이 향상될 수 있다.

<80> 이에 따라, 본 발명이 적용되는 통신 시스템 10에서 전자 장치 100, 110, 120들이 단일 인터페이스 구조를 갖더라도, 전자 장치 100, 110, 120들의 접속이 가능하다. 이로 인하여, 전자 장치 100, 110, 120들의 사용자들은 단일 케이블 200을 구비함으로써, 전자 장치 100, 110, 120들을 용이하게 연결할 수 있다. 이에 따라, 전자 장치 100, 110, 120들의 이용 효율성 및 사용자들의 편의성이 향상될 수 있다.

<81> 한편, 본 명세서와 도면에 개시된 본 발명의 실시예들은 본 발명의 기술 내용을 쉽게 설명하고 본 발명의 이해를 돕기 위해 특정 예를 제시한 것일 뿐이며, 본 발명의 범위를 한정하고자 하는 것은 아니다. 즉 본 발명의 기술적 사상에 바탕

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을 둔 다른 변형 예들이 실시 가능하다는 것은 본 발명이 속하는 기술 분야에서 통상의 지식을 가진 자에게 자명한 것이다.

【특허 청구범위】

【청구항 1】

다수개의 통신 채널들이 각각 할당된 다수개의 통신 핀 세트들을 갖는 인터페이스부를 포함하는 전자 장치의 신호 처리 방법에 있어서,
상기 통신 핀 세트들 중 어느 하나를 결정하는 동작;
상기 통신 핀 세트들 중 나머지를 접지시키는 동작; 및
상기 결정된 통신 핀 세트를 위한 신호를 처리하는 동작을 포함하는 신호 처리 방법.

【청구항 2】

제 1 항에 있어서,
상기 통신 채널들은 동일한 전송 속도를 갖는 신호 처리 방법.

【청구항 3】

제 1 항에 있어서,
상기 결정된 통신 핀 세트를 신호 처리부에 연결하는 동작을 더 포함하며,
상기 처리 동작은,
상기 신호 처리부에 의해 수행되는 신호 처리 방법.

【청구항 4】

제 3 항에 있어서, 상기 접지 동작은,

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상기 통신 편 세트들 중 나머지를 접지부에 연결하는 신호 처리 방법.

【청구항 5】

제 1 항에 있어서, 상기 결정 동작은,

상기 통신 채널들의 상태에 따라, 상기 통신 편 세트들 중 어느 하나를 결정하는 신호 처리 방법.

【청구항 6】

제 1 항에 있어서,

상기 인터페이스부를 통해 상기 신호를 교환하기 위한 외부 장치와 연결하는 동작을 더 포함하는 신호 처리 방법.

【청구항 7】

제 6 항에 있어서, 상기 인터페이스부는,

상기 통신 채널들 중 어느 하나와 접속을 검출하기 위한 다수개의 검출 핀들을 더 포함하는 신호 처리 방법.

【청구항 8】

제 7 항에 있어서, 상기 검출 핀들은,

상기 통신 채널들 중 어느 하나와 접속을 검출하도록 활성화된 활성 검출 핀을 포함하는 신호 처리 방법.

【청구항 9】

제 8 항에 있어서, 상기 결정 동작은,

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상기 외부 장치와 연결되면, 상기 활성 검출 핀을 통해 상기 통신 채널들 중 어느 하나를 검출하는 동작; 및

상기 통신 핀 세트들 중 상기 검출된 통신 채널이 할당된 어느 하나를 결정하는 동작을 포함하는 신호 처리 방법.

【청구항 10】

제 1 항에 있어서, 상기 통신 핀 세트들 각각은,

송신 핀 세트와 수신 핀 세트를 포함하는 신호 처리 방법.

【청구항 11】

다수개의 통신 채널들이 각각 할당된 다수개의 통신 핀 세트들을 포함하는 인터페이스부;

상기 통신 핀 세트들 중 어느 하나를 위한 신호를 처리하는 신호 처리부;

상기 통신 핀 세트들 중 나머지를 접지시키는 접지부; 및

상기 통신 핀 세트들, 신호 처리부 및 접지부 사이의 연결을 제어하는 제어부를 포함하는 신호 처리 장치.

【청구항 12】

제 11 항에 있어서, 상기 제어부는,

상기 통신 채널들의 상태에 따라, 상기 통신 핀 세트들, 신호 처리부 및 접지부 사이의 연결을 제어하는 신호 처리 장치.

【청구항 13】

제 11 항에 있어서, 상기 인터페이스부는,

상기 통신 채널들 중 어느 하나와 접속을 검출하기 위한 다수 개의 검출 핀들을 더 포함하는 신호 처리 장치.

【청구항 14】

제 13 항에 있어서, 상기 검출 핀들은,

상기 통신 채널들 중 어느 하나와 접속을 검출하도록 활성화된 활성 검출 핀을 포함하는 신호 처리 장치.

【청구항 15】

제 14 항에 있어서, 상기 제어부는,

상기 인터페이스부를 통해 상기 신호를 교환하기 위한 외부 장치와 연결되면, 상기 활성 검출 핀을 통해 상기 통신 채널들 중 어느 하나를 검출하는 신호 처리 장치.

【청구항 16】

제 15 항에 있어서, 상기 제어부는,

상기 통신 핀 세트들 중 상기 검출된 통신 채널이 할당된 어느 하나를 상기 신호 처리부에 연결하고, 상기 통신 핀 세트들 중 나머지를 상기 접지부에 연결하는 연결부를 포함하는 신호 처리 장치.

【청구항 17】

제 16 항에 있어서, 상기 연결부는,
스위치 소자를 포함하는 신호 처리 장치.

【청구항 18】

제 17 항에 있어서, 상기 통신 핀 세트들은,
제 1 통신 핀 세트와 제 2 통신 핀 세트를 포함하는 신호 처리 장치.

【청구항 19】

제 18 항에 있어서, 상기 제어부는,
상기 제 1 통신 핀 세트를 상기 신호 처리부에 연결하기 위한 하이 레벨 명령 또는 상기 제 2 통신 핀 세트를 상기 신호 처리부에 연결하기 위한 로우 레벨 명령을 상기 스위치 소자에 인가하는 신호 처리 장치.

【청구항 20】

제 11 항에 있어서, 상기 통신 핀 세트들 각각은,
송신 핀 세트와 수신 핀 세트를 포함하는 신호 처리 장치.

제출 일자 : 2015-04-01

【요약서】

【요약】

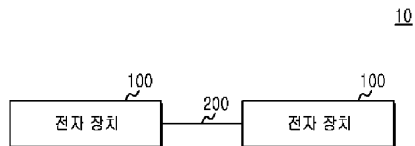
본 발명은 신호 처리 장치 및 방법에 관한 것으로, 다수개의 통신 채널들이 각각 할당된 다수개의 통신 편 세트들을 갖는 인터페이스부를 포함하는 전자 장치에서, 통신 편 세트들 중 어느 하나를 결정하고, 통신 편 세트들 중 나머지를 접지시키고, 결정된 통신 편 세트를 위한 신호를 처리하도록 구성된다.

【대표도】

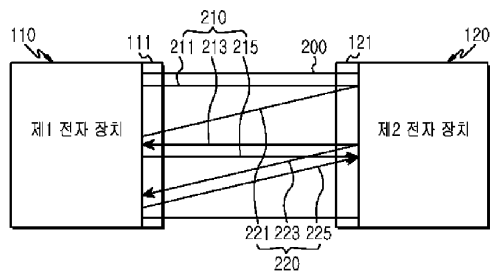
도 3

【도면】

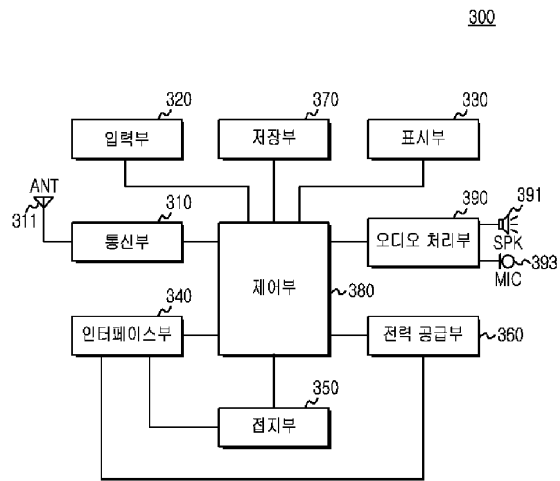
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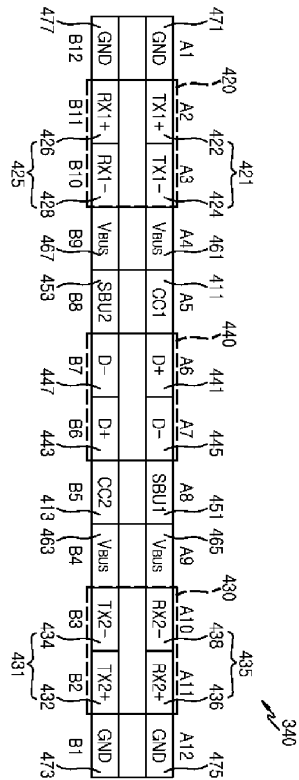
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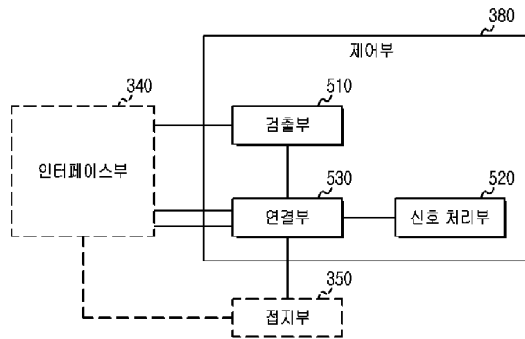
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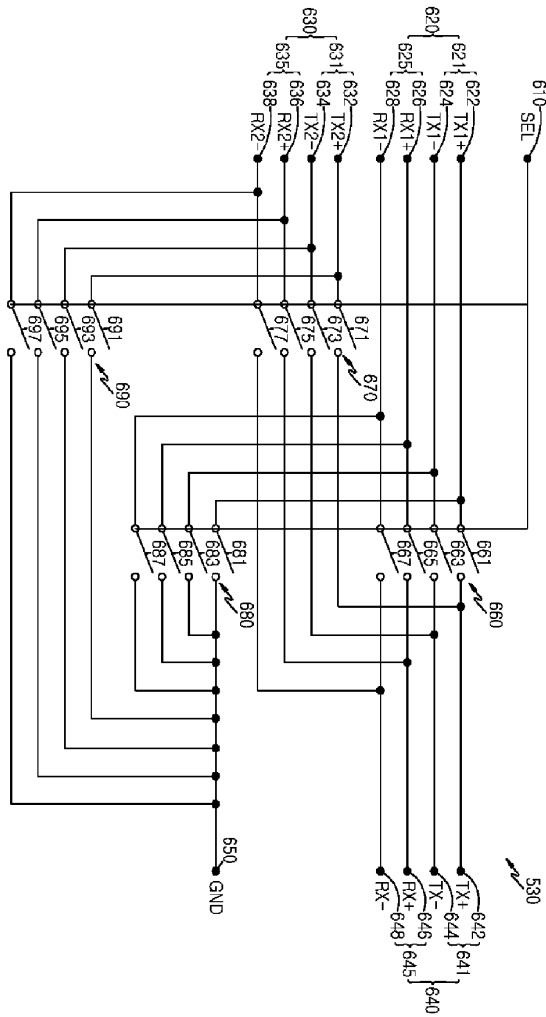
【 나 4 】



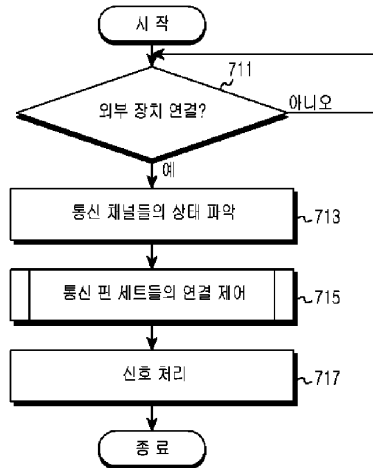
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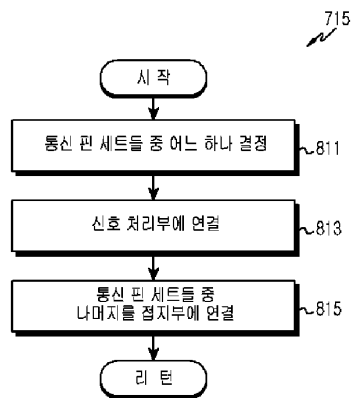
【도 6】



【도 7】



【도 8】





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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/082,408	03/28/2016	Il-Hyung CHUNG	4500-1-458

CONFIRMATION NO. 5081

PUBLICATION NOTICE



OC000000086314366

33942
Cha & Reiter, LLC
17 Arcadian Avenue
Suite 208
Paramus, NJ 07652

Title: APPARATUS AND METHOD FOR PROCESSING SIGNAL

Publication No. US-2016-0292121-A1

Publication Date: 10/06/2016

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 publicly 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 Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PLUS Search Results for S/N 15082408, Searched Thu Jan 18 12:27:13 EST 2018
 The Patent Linguistics Utility System (PLUS) is a USPTO automated search system for U.S. Patents from 1971 to the present PLUS is a query-by-example search system which produces a list of patents that are most closely related linguistically to the application searched. This search was prepared by the staff of the Scientific and Technical Information Center, SIRA.

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5615344 88	4381211 86	
5625580 88	4383880 86	

Notice of References Cited	Application/Control No. 15/082,408	Applicant(s)/Patent Under Reexamination CHUNG et al.	
	Examiner Henry Yu	Art Unit 2181	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-20070226571-A1	09-2007	Lanning; Eric J.	G06F11/25	714/742
*	B	US-20130244455-A1	09-2013	IMAMAKI; Takashi	G06F13/387	439/65
*	C	US-20030041193-A1	02-2003	Chang, Nai-Shung	G06F13/4068	710/100
*	D	US-20030208646-A1	11-2003	MULJONO, HARRY	G06F13/4086	710/100
*	E	US-20060129702-A1	06-2006	Koertel; Andreas H.	G06F13/4068	710/14
*	F	US-20130332642-A1	12-2013	Capezza; Steve	G06F13/4081	710/304
*	G	US-20130179603-A1	07-2013	Tu; Chun-An	G06F13/00	710/15
*	H	US-20160092393-A1	03-2016	Nge; Chee Lim	G06F13/382	710/14
*	I	US-20160179648-A1	06-2016	Srivastava; Amit Kumar	G06F11/3051	710/16
*	J	US-5559964-A	09-1996	Klimek; John R.	G06F13/4068	439/46
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	L					
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FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
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	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.

Search Notes 	Application/Control No. 15/082,408	Applicant(s)/Patent Under Reexamination CHUNG et al.
	Examiner Henry Yu	Art Unit 2181

CPC - Searched*		
Symbol	Date	Examiner
G06F13/4221, G06F13/4068	02/13/2018	

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
710		02/13/2018	HY

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
PLUS Search	01/18/2018	HY
EAST Search (Inventor Search)	02/15/2018	HY
EAST Search	02/13/2018	HY
EAST Search	02/14/2018	HY
EAST Search	02/15/2018	HY

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/H.W.Y/ Examiner, Art Unit 2181	
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/082,408	03/28/2016	Il-Hyung CHUNG	4500-1-458	5081
33942	7590	02/21/2018		
Cha & Reiter, LLC 17 Arcadian Avenue Suite 208 Paramus, NEW JERSEY 07652			EXAMINER YU, HENRY W	
			ART UNIT	PAPER NUMBER
			2181	
			MAIL DATE	DELIVERY MODE
			02/21/2018	PAPER

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.

Office Action Summary	Application No. 15/082,408	Applicant(s) CHUNG et al.	
	Examiner Henry Yu	Art Unit 2181	AIA Status Yes

-- 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 03/28/2016

☐ 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) 1-20 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) 1-20 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 28 March 2016 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 03/28/2016

3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____

4) ☐ Other: _____

DETAILED ACTION

The instant application having Application No. 15/082,408 has a total of 20 claims pending in the application; there are 3 independent claims and 17 dependent claims, all of which are ready for examination by the examiner.

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Priority

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119 (a)-(d).

INFORMATION CONCERNING DRAWINGS

Drawings

3. The applicant's drawings submitted are acceptable for examination purposes.

OBJECTIONS TO THE SPECIFICATION

Specification

4. The disclosure is objected to because of the following informalities:
On [Page 3, line 23], "120may" should be –120 may–.
Appropriate correction is required.

Claim Objections

5. **Claim 1** is objected to because of the following informalities:

Claim 1: On line 3, “assoicated” should be replaced with –associated–.

Appropriate correction is required.

REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

7. **Claims 1-9, 11-18, and 20** are rejected under 35 U.S.C. 102() as being anticipated by Lanning (Publication Number US 2007/0226571 A1).

As per **claim 1**, Lanning discloses “*a method in an electronic device having an interface unit, comprising: selecting a first pin set from a plurality of pin sets that are part of the interface unit, wherein the first pin set is assoicated with a first communication channel (the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).*”

Lanning discloses “*grounding a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel (unused channels are grounded so that they do not float; Paragraph 0051).*”

Lanning discloses “*and processing a signal for the first pin set (as they pertain to active/used pins; Paragraphs 0050-0051).*”

As per **claim 2**, Lanning discloses “*wherein the first communication channel and the second communication channel have an equal transmission rate (pin set 410 and 412 can be used for the same purpose and hence can be seen as being capable of the same transmission rate; Paragraphs 0050-0051).*”

As per **claim 3**, Lanning discloses “*connecting the first pin set to a signal processing unit, wherein the signal is processed by the signal processing unit (Paragraph 0050).*”

As per **claim 4**, Lanning discloses “*wherein grounding the second pin set comprises connecting the second pin set to a grounding unit (Paragraph 0051).*”

As per **claim 5**, Lanning discloses “*the first pin set is selected based on respective states of the first communication channel and the second communication channel (depending on whether a particular channel is used or unused; Paragraph 0051).*”

As per **claim 6**, Lanning discloses “*establishing a connection with an external device by using the interface unit (whether a channel is used to provide a pod ID to an analyzer 114 (with the analyzer 114 being considered the external device); Paragraph 0050; FIG. 3A-D, FIG. 4).*”

As per **claim 7**, Lanning discloses “*wherein the interface unit includes a plurality of detection pins for detecting a connection with one of the first communication channel and the second communication channel (through a tap ID; Paragraphs 0047-0048).*”

As per **claims 8 and 14**, Lanning discloses “wherein one of the detection pins is designated as an active detection pin that is activated when the connection with one of the first communication channel and the second communication channel is established **(Paragraphs 0047-0048 and 0051).**”

As per **claim 9**, Lanning discloses “wherein the first communication channel is selected by using the active detection pin **(Paragraphs 0047-0048).**”

As per **claim 11**, Lanning discloses “an apparatus comprising: an interface unit comprising a plurality of pin sets **(the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).**”

Lanning discloses “a signal processing unit for processing a signal **(as they pertain to active/used pins; Paragraphs 0050-0051).**”

Lanning discloses “a grounding unit for grounding at least one of the plurality of pin sets **(unused channels are grounded so that they do not float; Paragraph 0051).**”

Lanning discloses “and at least one controller configured to: select a first pin set from the plurality of pin sets, wherein the first pin set is associated with a first communication channel **(the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).**”

Lanning discloses “ground a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel **(unused channels are grounded so that they do not float; Paragraph 0051).**”

Lanning discloses “*and process the signal for the first pin set (as they pertain to active/used pins; Paragraphs 0050-0051).*”

As per **claim 12**, Lanning discloses “*wherein the at least one controller is further configured to connect any of the first pin set and the second pin set to the signal processing unit or the grounding unit according to states of the first communication channel and the second communication channel (depending on whether a particular channel is used or unused; Paragraph 0051).*”

As per **claim 13**, Lanning discloses “*wherein the interface unit includes a plurality of detection pins for detecting a connection with one of the first communication channel and the second communication channel (through a tap ID; Paragraphs 0047-0048).*”

As per **claim 15**, Lanning discloses “*wherein the at least one controller is further configured to detect that the first communication channel is connected to an external device by using the active detection pin (whether a channel is used to provide a pod ID to an analyzer 114 (with the analyzer 114 being considered the external device); Paragraph 0050; FIG. 3A-D, FIG. 4).*”

As per **claim 16**, Lanning discloses “*wherein the at least one controller comprises a connection unit configured to connect the first pin set to the signal processing unit (whether a channel is used to provide a pod ID to an analyzer 114 (with the analyzer 114 being considered the external device); Paragraph 0050; FIG. 3A-D, FIG. 4).*”

As per **claim 17**, Lanning discloses “*wherein the connection unit comprises a switch device (through the FPGA; Paragraphs 0047 and 0051).*”

As per **claim 18**, Lanning discloses “*wherein the at least one controller is further configured to apply to the switch device a high signal for connecting the first pin set to the signal processing unit and a low signal for connecting the second pin set to the signal processing unit (a grounding signal can result in a low signal (signal ‘0’ as opposed to a signal ‘1’); Paragraph 0051).*”

As per **claim 20**, Lanning discloses “*a non-transitory computer-readable medium storing one or more instructions which when executed by an electronic device cause the electronic device to perform a method comprising the steps of: selecting a first pin set from a plurality of pin sets that are part of an interface unit, wherein the first pin set is associated with a first communication channel (the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).*”

Lanning discloses “*grounding a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel (unused channels are grounded so that they do not float; Paragraph 0051).*”

Lanning discloses “*and processing a signal for the first pin set (as they pertain to active/used pins; Paragraphs 0050-0051).*”

Claim Rejections - 35 USC § 103

8. The following is a quotation of 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 negated by the manner in which the invention was made.

9. **Claims 10 and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lanning (Publication Number US 2007/0226571 A1) in view of Imamaki et al. (Publication Number US 2013/0244445 A1).

As per **claims 10 and 19**, Lanning discloses “*the method*” (see rejection to **claim 1** above). However, Lanning does not disclose “*wherein each of the first pin set and the second pin set comprises a respective transmission pin set and a respective reception pin set.*”

Imamaki et al. discloses “*wherein each of the first pin set and the second pin set comprises a respective transmission pin set and a respective reception pin set (pins TX and TX# for transmission and RX and RX# for reception; FIG. 2; Paragraph 0040).*”

Lanning and Imamaki et al. are analogous art in that they in the field of data communications and connections.

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Imamaki et al. in order to allow for transmission standards that utilize differential signals [Paragraph 0023].

ACKNOWLEDGEMENT OF REFERENCES CITED BY APPLICANT

10. As required by **M.P.E.P. 609(c)**, the applicant's submission of the Information Disclosure Statement dated March 28, 2016, is acknowledged by the examiner and the cited references have been considered in the examination of the claims now pending. As required by **M.P.E.P 609 C(2)**, a copy of the PTOL-1449 initialed and dated by the examiner is attached to the instant office action.

RELEVANT ART CITED BY THE EXAMINER

11. The following prior art made of record and relied upon is cited to establish the level of skill in the applicant's art and those arts considered reasonably pertinent to applicant's disclosure. See **MPEP 707.05(c)**.

12. The following references teach pin selection in data communications.

U.S. PATENT NUMBERS:

2003/0041193 A1 – [Paragraph 0010]

2003/0208646 A1 – [Paragraph 0021]

2006/0129702 A1 – [Paragraph 0039]

2013/0332642 A1

2013/0179603 A1

2016/0092393 A1 – [Paragraph 0014]

2016/0179648 A1 – [Paragraph 0043]

5,559,964

CLOSING COMMENTS

Conclusion

13. The examiner requests, in response to this Office action, support be shown for language added to any original claims on amendment and any new claims. That is, indicate support for newly added claim language by specifically pointing to page(s) and line no(s) in the specification and/or drawing figure(s). This will assist the examiner in prosecuting the application.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Henry Yu whose telephone number is (571) 272-9779.

The examiner can normally be reached on Monday - Friday.

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, IDRIS ALROBAYE can be reached on (571) 270-1023. 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.

/H.W.Y/
Examiner, Art Unit 2181
February 16, 2018

Application/Control Number: 15/082,408
Art Unit:2181

Page11

/Farley Abad/
Primary Examiner, Art Unit 2181

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15082408
	Filing Date	2016-03-28
	First Named Inventor	Il-Hyung Chung et al.
	Art Unit	N/A
	Examiner Name	N/A
	Attorney Docket Number	4500-1-458

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/H.W.Y/	1	20040177207	A1	2004-09-09	Lim et al.			
/H.W.Y/	2	20070255885	A1	2007-11-01	Bohm et al.			
/H.W.Y/	3	20140244890	A1	2014-08-28	Park et al.			
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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²ⁱ	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
/H.W.Y/	1	10-2004-0066970	KR	A	2004-07-30	Lim et al.		×

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15082408	
	Filing Date		2016-03-28	
	First Named Inventor	II-Hyung Chung et al.		
	Art Unit	N/A		
	Examiner Name	N/A		
Attorney Docket Number		4500-1-458		

/H.W.Y/ 2	10-2007-0105855	KR	A	2007-10-31	Bohm et al.	☒
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NON-PATENT LITERATURE DOCUMENTS

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Examiner Initials*	Cite No	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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
/H.W.Y/ 1		Type-C Connector Applications, Pericom, April 7, 2015, http://go.pericom.com/Type-C	☒

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Add

EXAMINER SIGNATURE

Examiner Signature	/HENRY W YU/	Date Considered	02/16/2018
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15082408
	Filing Date		2016-03-28
	First Named Inventor	II-Hyung Chung et al.	
	Art Unit	N/A	
	Examiner Name	N/A	
	Attorney Docket Number	4500-1-458	

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☒ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Steve Cha/	Date (YYYY-MM-DD)	2016-03-28
Name/Print	Steve Cha	Registration Number	44,069

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

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 the Freedom of Information Act requires disclosure of these records.
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 inspections 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.

EAST Search History**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	296	((("5574311") or ("5843798") or ("5764485") or ("4340266") or ("4834660") or ("4931723") or ("4934945") or ("4994732") or ("5222907") or ("5712858") or ("5736862") or ("5815057") or ("6139341") or ("4254446") or ("4263582") or ("4322120") or ("4333696") or ("4468072") or ("4531799") or ("4557540") or ("4611123") or ("4620304") or ("4763066") or ("4764848") or ("4766406") or ("4775917") or ("4784550") or ("4789011") or ("4799589") or ("4922492") or ("4946708") or ("5215140") or ("5243911") or ("5329693") or ("5331285") or ("5342992") or ("5353243") or ("5386189") or ("5391993") or ("5431244") or ("5460093") or ("5475215") or ("5483461") or ("5489798") or ("5551430") or ("5554985") or ("5613181") or ("5615344") or ("5625580") or ("5639562") or ("5655213") or ("5677663") or ("5689179") or ("5712504") or ("5712855") or ("5727963") or ("5734621") or ("5742256") or ("5743009") or ("5743457") or ("5758418") or ("5790830") or ("5801536") or ("5821825") or ("5831556") or ("5861663") or ("5905381") or ("5909124") or ("5923676") or ("5921817") or ("5929355") or ("5952843") or ("6000132") or ("RE36495") or ("6023568") or ("6051119") or ("6084267") or ("6105749") or ("6127204") or ("6132221") or ("6213786") or ("6223813") or ("6213786") or ("6223813") or ("4258566") or ("4265512") or ("4265013") or ("4272141") or ("4295060") or ("4307966") or ("4310753") or ("4314217") or ("4323631") or ("4348759") or ("4361372") or ("4380248") or ("4381211") or ("4383880") or ("4383760") or ("4384757"))).PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/02/13 20:42
S2	3076	(@ay<="2015" OR @rlad<="20150401") AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (plurality OR multiple)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/13 20:46
S3	9	(@ay<="2015" OR @rlad<="20150401") AND (G06F13/4221 OR G06F13/4068).cpc. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (plurality OR multiple)	US-PGPUB; USPAT; USOCR; EPO; JPO;	OR	ON	2018/02/13 20:46

			DERWENT			
S4	70	(@ay<="2015" OR @rlad<="20150401") AND (G06F13/4221 OR G06F13/4068).cpc. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/13 20:49
S5	500	(@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/14 13:32
S6	100	(@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (select\$3 OR choos\$3)	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/14 13:52
S7	15	"016744".ap.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/14 16:36
S8	1	(@ay<="2015" OR @rlad<="20150401") AND (G06F13/4221 OR G06F13/4068).cpc. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (select\$3 OR choos\$3)	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/14 16:40
S9	242	(@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (device OR peripheral)	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/14 16:41
S10	4	((("20050120384") or ("8190786")).PN.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/02/14 17:08
S11	15	"203557".ap.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/02/14 17:09
S12	335	(@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin WITH ground\$3 SAME (channel OR lane OR link OR path)	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/14 17:34
S13	1	(@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin WITH ground\$3 WITH unused SAME (channel OR lane OR link OR path)	US- PGPUB; USPAT; USOCR; EPO; JPO;	OR	ON	2018/02/14 17:34

			DERWENT			
S14	48	((@ay<="2015" OR @rlad<="20150401") AND pin WITH ground\$3 WITH unused SAME (channel OR lane OR link OR path)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/15 14:18
S15	82	((@ay<="2015" OR @rlad<="20150401") AND pin SAME ground\$3 SAME unused SAME channel	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/15 15:52
S16	3	("20040177207" "20070255885" "20140244890").PN.	US-PGPUB; USPAT	OR	OFF	2018/02/15 18:04
S17	83	((CHUNG NEAR "Il-Hyung") OR (LEE NEAR Cheolho) OR (KIM NEAR "Dae-Woong") OR (KIM NEAR "Shin-Ho") OR (KIM NEAR Wonseob)).in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/15 18:06
S18	4	((CHUNG NEAR "Il-Hyung") OR (LEE NEAR Cheolho) OR (KIM NEAR "Dae-Woong") OR (KIM NEAR "Shin-Ho") OR (KIM NEAR Wonseob)).in. AND (pin).clm.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/15 18:06
S19	2	((CHUNG NEAR "Il-Hyung") OR (LEE NEAR Cheolho) OR (KIM NEAR "Dae-Woong") OR (KIM NEAR "Shin-Ho") OR (KIM NEAR Wonseob)).in. AND (pin AND ground).clm.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/15 18:07
S20	265	((@ay<="2015" OR @rlad<="20150401") AND pin SAME ground\$3 SAME channel SAME detect\$3 WITH connect\$3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/15 18:42
S21	50	((@ay<="2015" OR @rlad<="20150401") AND pin SAME ground\$3 SAME channel SAME reception SAME transmission	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/02/15 19:34

2/16/2018 6:23:05 PM

C:\Users\hyu\Documents\EAST\Workspaces\15082408.wsp

Bibliographic Data

Application No: 15082408

Foreign Priority claimed:

☒ Yes ☐ No

35 USC 119 (a-d) conditions met:

☒ Yes ☐ No

☐ Met After Allowance

Verified and Acknowledged:

/HENRY W YU/

Examiner's Signature

Initials

Title:

APPARATUS AND METHOD FOR PROCESSING SIGNAL

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
03/28/2016	710	2181	4500-1-458
RULE			

APPLICANTS

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CONTINUING DATA

FOREIGN APPLICATIONS

KOREA, REPUBLIC OF 10-2015-0046260 04/01/2015

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04/08/2016

STATE OR COUNTRY

KOREA, REPUBLIC OF

ADDRESS

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Paramus, NJ 07652

UNITED STATES

FILING FEE RECEIVED

\$1,600

Serial No: 15/082,408
Reply to Office Action of: February 21, 2018
Amendment Dated: 5/1/2018

Docket No: 4500-1-458

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT :	Il-Hyung CHUNG	DOCKET NO.:	4500-1-458
SERIAL NO. :	15/082,408	EXAMINER :	Henry W. Yu
FILED :	March 28, 2016	ART UNIT :	2181
		CONFIRMATION NO:	5081
FOR :	APPARATUS AND METHOD FOR PROCESSING SIGNAL		

AMENDMENT

MAIL STOP AMENDMENT
COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA, VA. 22313

Dear Sir:

Responsive to the Office Action dated February 21, 2018, issued in connection with the above-identified Application, please consider the following:

IN THE SPECIFICATION:

Kindly replace the paragraph beginning on page 3, line 23 with the following:

The electronic devices 110 and ~~120 may~~ 120 may connect to each other and exchange signals. The electronic devices 110 and 120 may communicate through a communication network. Additionally or alternatively, the electronic devices 110 and 120 may connect to each other through a wired connection. The electronic devices 110 and 120 may connect to each other through a cable 200. The electronic devices 110 and 120 may have a signal interface structure. The cable 200 may support the single interface structure. For example, when the electronic devices 110 and 120 are the same, the electronic devices 110 and 120 may have the same interface structure. In instances in which the electronic devices 110 and 120 are different, the electronic devices 110 and 120 may have the same interface structure.

IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A method in an electronic device having an interface unit, comprising:
 - selecting a first pin set from a plurality of pin sets that are part of the interface unit,
 - wherein the first pin set is ~~assoicated~~ associated with a first communication channel;
 - grounding a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel; and
 - processing a signal for the first pin set,
 - wherein the first pin set and the second pin set are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.
2. (Original) The method of claim 1, wherein the first communication channel and the second communication channel have an equal transmission rate.
3. (Original) The method of claim 1, further comprising connecting the first pin set to a signal processing unit, wherein the signal is processed by the signal processing unit.
4. (Original) The method of claim 3, wherein grounding the second pin set comprises connecting the second pin set to a grounding unit.
5. (Original) The method of claim 1, the first pin set is selected based on respective states of the first communication channel and the second communication channel.
6. (Original) The method of claim 1, further comprising establishing a connection with an external device by using the interface unit.
7. (Currently Amended) The method of claim 6~~3~~, wherein the interface unit includes a first detection pin for detecting a connection with the first communication channel and a second

detection pin for detecting a connection with the second communication channel, and
wherein the first detection pin and the second detection pin are arrayed to be vertically
and horizontally symmetrical with respect to the center of the interface unit~~a plurality of~~
~~detection pins for detecting a connection with one of the first communication channel and the~~
~~second communication channel.~~

8. (Currently Amended) The method of claim 7, further comprising detecting the
connection with the first communication channel through the first detection pin~~wherein one of~~
~~the detection pins is designated as an active detection pin that is activated when the connection~~
~~with one of the first communication channel and the second communication channel is~~
~~established.~~

9. (Currently Amended) The method of claim ~~8~~1, wherein the first pin set comprises a
first transmission pin set and a first reception pin set, and
wherein the second pin set comprises a second transmission pin set and a second
reception pin set~~the first communication channel is selected by using the active detection pin.~~

10. (Currently Amended) The method of claim ~~4~~9, wherein the first transmission pin set
and the second transmission pin set are arrayed to be vertically and horizontally symmetrical
with respect to the center of the interface unit, and
wherein the first reception pin set and the second reception pin set are arrayed to be
vertically and horizontally symmetrical with respect to the center of the interface unit~~each of the~~
~~first pin set and the second pin set comprises a respective transmission pin set and a respective~~
~~reception pin set.~~

11. (Currently Amended) An apparatus comprising:
an interface unit comprising a plurality of pin sets;
a signal processing unit for processing a signal;
a grounding unit for grounding at least one of the plurality of pin sets; and
at least one controller configured to:
select a first pin set from the plurality of pin sets, wherein the first pin set is associated

with a first communication channel;

ground a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel; and

process the signal for the first pin set,

wherein the first pin set and the second pin set are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.

12. (Currently Amended) The apparatus of claim 11, wherein the at least one controller is further configured to select the first pin set based on states of the first communication channel and the second communication channel~~connect any of the first pin set and the second pin set to the signal processing unit or the grounding unit according to states of the first communication channel and the second communication channel.~~

13. (Currently Amended) The apparatus of claim 11, wherein the interface unit includes a first detection pin for detecting a connection with the first communication channel and a second detection pin for detecting a connection with the second communication channel, and wherein the first detection pin and the second detection pin are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit~~a plurality of detection pins for detecting a connection with one of the first communication channel and the second communication channel.~~

14. (Currently Amended) The apparatus of claim 13, wherein the at least one controller is further configured to:

detect the connection with the first communication channel through the first detection pin~~one of the detection pins is designated as an active detection pin that is activated when the connection with one of the first communication channel and the second communication channel is established.~~

15. (Currently Amended) The apparatus of claim 14, wherein the at least one controller is further configured to detect that the first communication channel is connected to an external device by using the ~~active~~ first detection pin.

16. (Currently Amended) The apparatus of claim ~~15~~11, wherein the at least one controller comprises a connection unit configured to connect the first pin set to the signal processing unit, and to connect the second pin set to the grounding unit.

17. (Original) The apparatus of claim 16, wherein the connection unit comprises a switch device.

18. (Currently Amended) The apparatus of claim 17, wherein the at least one controller is further configured to apply ~~to the switch device~~ a high signal for connecting the first pin set to the signal processing unit ~~and/or~~ a low signal for connecting the second pin set to the signal processing unit to the switch device.

19. (Currently Amended) The apparatus of claim 11, wherein the first pin set comprises a first transmission pin set and a first reception pin set,

wherein the second pin set comprises a second transmission pin set and a second reception pin set,

wherein the first transmission pin set and the second transmission pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit, and

wherein the first reception pin set and the second reception pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit~~each of the first pin set and the second pin set comprises a respective transmission pin set and a respective reception pin set.~~

20. (Currently Amended) A non-transitory computer-readable medium storing one or more instructions which when executed by an electronic device cause the electronic device to perform a method comprising the steps of:

selecting a first pin set from a plurality of pin sets that are part of an interface unit, wherein the first pin set is associated with a first communication channel;

grounding a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel; and

processing a signal for the first pin set,
wherein the first pin set and the second pin set are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.

REMARKS

Entry of this Amendment and reconsideration are respectfully requested in view of the amendments made to the claims and the remarks made herein.

1. Claims 1-9, 11-18 and 20 have been rejected under 35 U.S.C. §102 as being anticipated by Lanning, U.S. Patent Application Publication No. 2007/0226571 (hereinafter Lanning).
2. Claims 10 and 19 have been rejected under 35 U.S.C. §103(a) as being obvious over Lanning in view of Imamaki et al, U.S. Patent Application Publication No. 2013/0244455 (hereinafter Imamaki).

Claims 1-20 are pending, with claims 1, 11 and 20 being independent. By this Amendment, claims 1, 7-16 and 18-20 have been amended. No new matter has been added.

I. Objections to the Specification and Claims

The various informalities identified by the Examiner have been corrected. Accordingly, withdrawal of the objections is requested.

II. Rejection Under 35 U.S.C. §§102 and 103

Claims 1-9, 11-18 and 20 have been rejected under 35 U.S.C. §102 as being anticipated by Lanning. Claims 10 and 19 have been rejected under 35 U.S.C. §103(a) as being obvious over Lanning in view of Imamaki. Applicants respectfully submit that the claims, as amended, are not anticipated or rendered obvious by the prior art.

Claim 1, for example, has been amended as:

1. *(Currently Amended) A method in an electronic device having an interface unit, comprising:
selecting a first pin set from a plurality of pin sets that are part of the interface unit,*

*wherein the first pin set is associated with a first communication channel;
grounding a second pin set in the plurality of pin sets, wherein the second pin set is
associated with a second communication channel; and
processing a signal for the first pin set,
wherein the first pin set and the second pin set are arrayed to be vertically and
horizontally symmetrical with respect to a center of the interface unit.*

The other independent claims 11 and 20 are correspondingly amended.

Applicants respectfully submit that the limitation “*the first pin set and the second pin set are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit*” is not taught or suggest by Lanning.

Lanning discloses at [0050]:

The interface 408 between the pod 112 and the analyzer 114 includes multiple channels that are connected or represented by the pins 410 and 412. The pins 410 are used, in one embodiment, to provide a pod ID to the analyzer 114. A pod ID enables the analyzer 114 to either program the pod 112 and the FPGA 113 appropriately as well as interpret the data that the analyzer 114 receives from the pod 112. The interface 408 is preferably an LVDS interface when the analyzer 114 requires LVDS signaling. As a result, the pod 112 may perform some signal translation if necessary. One of skill in the art can appreciate that other signaling schemes can be used at the interface 406 and/or the interface 408.

Thus, Lanning fails to disclose the limitation “*the first pin set and the second pin set are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit*” in amended claims 1, 11 and 20. Accordingly, withdrawal of the §102 rejection is respectfully requested.

The remaining claims in this application are patentable over the cited references due to at least their respective dependencies from independent claims. Further, Imamaki does not cure the deficiency of Lanning. And because Lanning and Imamaki, individually or in combination, do

not disclose the limitations of the as-amended claim 1, even if Lanning can be combined with and Imamaki, no combination of Lanning with Imamaki conceivable to one of ordinary skill in the art discloses or suggests the claimed subject matter of claim 1. Therefore, even if Lanning were to be have been combined with Imamaki, such combination would fail to arrive at all the recited elements of the claims, thus the combination cannot render claim 1 obvious under 35 U.S.C. §103(a). For at least the above reasons, neither Lanning, nor any combination of Lanning, Imamaki, and/or the ordinary skill in the art conceivable to one of ordinary skill in the art renders claim 1 obvious under 35 U.S.C. §103(a). *KSR International v. Teleflex*, 127 S.Ct. 1727, 82 USPQ2d 1385 (2007). Claims 10 and 20 then are not obvious in light of Lanning and Imamaki at least due to their respective dependencies to claims 1 and 11.

In view of above, with regard to the rejection of the claims under 35 U.S.C. §§102 and 103, Applicants submit that for the amendments made to the claims, the reason for the rejection is no longer applicable. Applicants respectfully request that the rejections be withdrawn.

If the Examiner believes that the amendments provided herein raise any issues, Applicants' representative cordially invites the Examiner to contact the representative to resolve such issues.

Applicants authorize charges to Deposit Account No. 502-470 for any underpayment, or credit any overages.

Serial No: 15/082,408
Reply to Office Action of: February 21, 2018
Amendment Dated: 5/1/2018

Docket No: 4500-1-458

In view of the above, entry of this Amendment is requested and a Notice of Allowance be issued.

Respectfully submitted,

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/SteveCha/

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Attorney for Applicant(s)
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Date: May 1, 2018

Electronic Acknowledgement Receipt	
EFS ID:	32500879
Application Number:	15082408
International Application Number:	
Confirmation Number:	5081
Title of Invention:	APPARATUS AND METHOD FOR PROCESSING SIGNAL
First Named Inventor/Applicant Name:	Il-Hyung CHUNG
Customer Number:	33942
Filer:	Steve S. Cha/Lorraine Callahan
Filer Authorized By:	Steve S. Cha
Attorney Docket Number:	4500-1-458
Receipt Date:	01-MAY-2018
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Application Type:	Utility under 35 USC 111(a)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	4500-1-458_AmendMay2018.pdf	150947	no	11
			48d61b3299427bc4aa83f69ce664d1814b6dab3f		

Warnings:

Information:	
Total Files Size (in bytes):	150947
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.	

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 15/082,408	Filing Date 03/28/2016	☐ To be Mailed
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO						
APPLICATION AS FILED - PART I						
	(Column 1)	(Column 2)				
FOR	NUMBER FILED	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), (l), 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(j))	minus 20 = *			x \$80 =		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 = *			x \$420 =		
☐ 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						
	(Column 1)	(Column 2)	(Column 3)			
AMENDMENT	05/01/2018	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 20	Minus ** 20	= 0	x \$100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus *** 3	= 0	x \$460 =	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	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	*	Minus **	=	x \$ 0 =	
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x \$ 0 =	
	☐ 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.					LIE	
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".					sheila D chapman	
*** 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.						

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.
15/082,408	03/28/2016	Il-Hyung CHUNG	4500-1-458	5081
33942	7590	08/23/2018		
Cha & Reiter, LLC 17 Arcadian Avenue Suite 208 Paramus, NJ 07652			EXAMINER YU, HENRY W	
			ART UNIT 2181	PAPER NUMBER
			MAIL DATE 08/23/2018	DELIVERY MODE PAPER

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.

Office Action Summary	Application No. 15/082,408	Applicant(s) CHUNG et al.	
	Examiner Henry Yu	Art Unit 2181	AIA Status Yes

-- 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 05/01/2018.
☐ 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) 1-20 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) 1-20 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 05/01/2018 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: ____.

DETAILED ACTION

INFORMATION CONCERNING RESPONSES

Response to Amendment

1. This Office Action is in response to applicant's communication filed on May 1, 2018, in response to PTO Office Action mailed on February 21, 2018. The Applicant's remarks and amendments to the claims and/or the specification were considered with the results that follow.
2. In response to the last Office Action, **claims 1, 7-16, and 18-20** have been amended. As a result, **claims 1-20** are now pending in this application.
3. The objections to the specification have been withdrawn due to the amendment filed May 1, 2018.

Notice of Pre-AIA or AIA Status

4. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Priority

5. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119 (a)-(d).

Response to Arguments

6. Applicant's arguments filed on May 1, 2018, in response to PTO Office Action mailed on February 21, 2018, have been fully considered and are persuasive. Hence, the rejection has been withdrawn. However, upon further review a new ground of rejection has been made in view of Rohrbach et al. (Patent Number US 8,177,560 B2).

REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 103

7. The following is a quotation of 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 negated by the manner in which the invention was made.

8. **Claims 1-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lanning (Publication Number US 2007/0226571 A1) in view of Rohrbach et al. (Patent Number US 8,177,560 B2).

As per **claim 1**, Lanning discloses “*a method in an electronic device having an interface unit, comprising: selecting a first pin set from a plurality of pin sets that are part of the interface unit, wherein the first pin set is associated with a first communication channel (the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).*”

Lanning discloses “*grounding a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel (unused channels are grounded so that they do not float; Paragraph 0051).*”

Lanning discloses “*and processing a signal for the first pin set (as they pertain to active/used pins; Paragraphs 0050-0051).*”

However, Lanning does not disclose “*wherein the first pin and the second pin set are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.*”

Rohrbach et al. discloses “*wherein the first pin and the second pin set are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit (Column 5, lines 4-20).*”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Rohrbach et al. in order to minimize physical damage to the plug **[Column 1, lines 30-67]**, which can be particularly problematic for asymmetrical plug shapes.

As per **claim 2**, the combination of Lanning and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*wherein the first communication channel and the second communication channel have an equal transmission rate (pin set 410 and 412 can be used for the same purpose and hence can be seen as being capable of the same transmission rate; Paragraphs 0050-0051).*”

As per **claim 3**, the combination of Lanning and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*connecting the first pin set to a signal processing unit, wherein the signal is processed by the signal processing unit (Paragraph 0050).*”

As per **claim 4**, the combination of Lanning and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*wherein grounding the*

*second pin set comprises connecting the second pin set to a grounding unit (**Paragraph 0051**).*"

As per **claim 5**, the combination of Lanning and Rohrbach et al. discloses "*the method*" (see rejection to **claim 1** above). Lanning discloses "*the first pin set is selected based on respective states of the first communication channel and the second communication channel (**depending on whether a particular channel is used or unused; Paragraph 0051**).*"

As per **claim 6**, the combination of Lanning and Rohrbach et al. discloses "*the method*" (see rejection to **claim 1** above). Lanning discloses "*establishing a connection with an external device by using the interface unit (**whether a channel is used to provide a pod ID to an analyzer 114 (with the analyzer 114 being considered the external device); Paragraph 0050; FIG. 3A-D, FIG. 4**).*"

As per **claim 7**, the combination of Lanning and Rohrbach et al. discloses "*the method*" (see rejection to **claim 1** above). Lanning discloses "*wherein the interface unit includes a first detection pin for detecting a connection with the first communication channel and a second detection pin for detecting a connection with the second communication channel (**through a tap ID, where there are multiple taps; Paragraphs 0047-0048**).*"

Rohrbach et al. discloses "*and wherein the first detection pin and second detection pin are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (**Column 5, lines 4-20**).*"

As per **claims 8 and 14**, the combination of Lanning and Rohrbach et al. discloses "*the method*" (see rejection to **claim 1** above). Lanning discloses "*further*

comprising detecting the connection with the first communication channel through the first detection pin (through a tap ID, which then determines the appropriate bus to process; Paragraphs 0047-0048 and 0051)."

As per **claim 9**, the combination of Lanning and Rohrbach et al. discloses "*the method*" (see rejection to **claim 1** above). Lanning discloses "*wherein the first pin set comprises a first transmission pin set and a first reception pin set, and wherein the second pin set comprises a second transmission pin set and a second reception pin set (the various buses 370 with a plurality of vias 360; FIG. 3C; Paragraph 0044).*"

As per **claim 10**, the combination of Lanning and Rohrbach et al. discloses "*the method*" (see rejection to **claim 1** above). Rohrbach et al. discloses "*wherein the first transmission pin set and the second transmission pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (Column 5, lines 4-20).*"

Rohrbach et al. discloses "*wherein the first reception pin set and the second reception pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (Column 5, lines 4-20).*"

As per **claim 11**, Lanning discloses "*an apparatus comprising: an interface unit comprising a plurality of pin sets (the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).*"

Lanning discloses "*a signal processing unit for processing a signal (as they pertain to active/used pins; Paragraphs 0050-0051).*"

Lanning discloses “a grounding unit for grounding at least one of the plurality of pin sets (**unused channels are grounded so that they do not float; Paragraph 0051).**”

Lanning discloses “and at least one controller configured to: select a first pin set from the plurality of pin sets, wherein the first pin set is associated with a first communication channel (**the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).**”

Lanning discloses “ground a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel (**unused channels are grounded so that they do not float; Paragraph 0051).**”

Lanning discloses “and process the signal for the first pin set (**as they pertain to active/used pins; Paragraphs 0050-0051).**”

However, Lanning does not disclose “wherein the first pin set and the second pin set are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.”

Rohrbach et al. discloses “wherein the first pin set and the second pin set are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit (**Column 5, lines 4-20).**”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Rohrbach et al. in order to minimize physical damage to the plug [**Column 1, lines 30-67**], which can be particularly problematic for asymmetrical plug shapes.

As per **claim 12**, the combination of Lanning and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the at least one controller is further configured to select the first pin set based on states of the first communication channel and the second communication channel (depending on whether a particular channel is used or unused; Paragraph 0051).*”

As per **claim 13**, the combination of Lanning and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the interface unit includes a first detection pin for detecting a connection with the first communication channel and a second detection pin for detecting a connection with the second communication channel (through a tap ID, where there are multiple taps; Paragraphs 0047-0048).*”

Rohrbach et al. discloses “*wherein the first detection pin and the second detection pin are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (Column 5, lines 4-20).*”

As per **claim 15**, the combination of Lanning and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the at least one controller is further configured to detect that the first communication channel is connected to an external device by using the first detection pin (whether a channel is used to provide a pod ID to an analyzer 114 (with the analyzer 114 being considered the external device); Paragraph 0050; FIG. 3A-D, FIG. 4).*”

As per **claim 16**, the combination of Lanning and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the at least one controller comprises a connection unit configured to connect the first pin set to the*

signal processing unit (**whether a channel is used to provide a pod ID to an analyzer 114 (with the analyzer 114 being considered the external device); Paragraph 0050; FIG. 3A-D, FIG. 4), and to connect the second pin set to the grounding unit (Paragraph 0051).**)”

As per **claim 17**, the combination of Lanning and Rohrbach et al. discloses “the apparatus” (see rejection to **claim 11** above). Lanning discloses “wherein the connection unit comprises a switch device (**through the FPGA; Paragraphs 0047 and 0051).**)”

As per **claim 18**, the combination of Lanning and Rohrbach et al. discloses “the apparatus” (see rejection to **claim 11** above). Lanning discloses “wherein the at least one controller is further configured to apply a high signal for connecting the first pin set to the signal processing unit or a low signal for connecting the second pin set to the signal processing unit to the switch device (**a grounding signal can result in a low signal (signal ‘0’ as opposed to a signal ‘1’); Paragraph 0051).**)”

As per **claim 19**, the combination of Lanning and Rohrbach et al. discloses “the apparatus” (see rejection to **claim 11** above). Lanning discloses “wherein the first pin set comprises a first transmission pin set and a first reception pin set (**connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).**)”

Lanning discloses “wherein the second pin set comprises a second transmission pin set and a second reception pin set (**connector contains a series of pins 410 and**

412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).

Rohrbach et al. discloses “wherein the first transmission pin set and the second transmission pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit **(Column 5, lines 4-20).**”

Rohrbach et al. discloses “wherein the first reception pin set and the second reception pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit **(Column 5, lines 4-20).**”

As per **claim 20**, Lanning discloses “a non-transitory computer-readable medium storing one or more instructions which when executed by an electronic device cause the electronic device to perform a method comprising the steps of: selecting a first pin set from a plurality of pin sets that are part of an interface unit, wherein the first pin set is associated with a first communication channel **(the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).**”

Lanning discloses “grounding a second pin set in the plurality of pin sets, wherein the second pin set is associated with a second communication channel **(unused channels are grounded so that they do not float; Paragraph 0051).**”

Lanning discloses “and processing a signal for the first pin set **(as they pertain to active/used pins; Paragraphs 0050-0051).**”

However, Lanning does not disclose “wherein the first pin and the second pin set are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.”

Rohrbach et al. discloses “*wherein the first pin and the second pin set are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit (Column 5, lines 4-20).*”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Rohrbach et al. in order to minimize physical damage to the plug **[Column 1, lines 30-67]**, which can be particularly problematic for asymmetrical plug shapes.

RELEVANT ART CITED BY THE EXAMINER

9. The following prior art made of record and relied upon is cited to establish the level of skill in the applicant’s art and those arts considered reasonably pertinent to applicant’s disclosure. See **MPEP 707.05(c)**.

10. The following references teach data transfer as they pertain to physical pin arrangements in a plug connector:

U.S. PATENT NUMBERS:

2006/0121801 A1

7,448,918 B2

8,198,563 B2

CONCLUDING REMARKS

Conclusions

11. 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.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Henry Yu whose telephone number is (571)272-9779. The examiner can normally be reached on Monday - Friday.

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, IDRISS ALROBAYE can be reached on (571) 270-1023. 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.

/H.W.Y/
Examiner, Art Unit 2181
August 14, 2018

/Farley Abad/
Primary Examiner, Art Unit 2181

<i>Notice of References Cited</i>	Application/Control No. 15/082,408		Applicant(s)/Patent Under Reexamination CHUNG et al.	
	Examiner Henry Yu		Art Unit 2181	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-8177560-B2	05-2012	Rohrbach; Matthew Dean	H01R13/6205	439/39
*	B	US-20060121801-A1	06-2006	Pischl; Neven	H01F19/08	439/894
*	C	US-7448918-B2	11-2008	Lappoehn; Juergen	H01R13/41	439/660
*	D	US-8198563-B2	06-2012	Tsai; Chou Hsien	H01R23/10	218/118
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

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.

<i>Index of Claims</i> 	Application/Control No. 15/082,408	Applicant(s)/Patent Under Reexamination CHUNG et al.
	Examiner Henry Yu	Art Unit 2181

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	02/16/2018	08/14/2018							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
	13	✓	✓							
	14	✓	✓							
	15	✓	✓							
	16	✓	✓							
	17	✓	✓							
	18	✓	✓							
	19	✓	✓							
	20	✓	✓							

Search Notes 	Application/Control No. 15/082,408	Applicant(s)/Patent Under Reexamination CHUNG et al.
	Examiner Henry Yu	Art Unit 2181

CPC - Searched*		
Symbol	Date	Examiner
G06F13/4221, G06F13/4068	02/13/2018	
G06F13/4221, G06F13/4068	08/03/2018	

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
710		02/13/2018	HY
710		08/03/2018	HY

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
PLUS Search	01/18/2018	HY
EAST Search (Inventor Search)	02/15/2018	HY
EAST Search	02/13/2018	HY
EAST Search	02/14/2018	HY
EAST Search	02/15/2018	HY
EAST Search (Update)	08/03/2018	HY
EAST Search (Update)	08/09/2018	HY
EAST Search (Update)	08/10/2018	HY
EAST Search (Update)	08/14/2018	HY

/H.W.Y/ Examiner, Art Unit 2181	
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<i>Search Notes</i> 	Application/Control No. 15/082,408	Applicant(s)/Patent Under Reexamination CHUNG et al.
	Examiner Henry Yu	Art Unit 2181

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/H.W.Y/ Examiner, Art Unit 2181	
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	296	((("5574311") or ("5843798") or ("5764485") or ("4340266") or ("4834660") or ("4931723") or ("4934945") or ("4994732") or ("5222907") or ("5712858") or ("5736862") or ("5815057") or ("6139341") or ("4254446") or ("4263582") or ("4322120") or ("4333696") or ("4468072") or ("4531799") or ("4557540") or ("4611123") or ("4620304") or ("4763066") or ("4764848") or ("4766406") or ("4775917") or ("4784550") or ("4789011") or ("4799589") or ("4922492") or ("4946708") or ("5215140") or ("5243911") or ("5329693") or ("5331285") or ("5342992") or ("5353243") or ("5386189") or ("5391993") or ("5431244") or ("5460093") or ("5475215") or ("5483461") or ("5489798") or ("5551430") or ("5554985") or ("5613181") or ("5615344") or ("5625580") or ("5639562") or ("5655213") or ("5677663") or ("5689179") or ("5712504") or ("5712855") or ("5727963") or ("5734621") or ("5742256") or ("5743009") or ("5743457") or ("5758418") or ("5790830") or ("5801536") or ("5821825") or ("5831556") or ("5861663") or ("5905381") or ("5909124") or ("5923676") or ("5921817") or ("5929355") or ("5952843") or ("6000132") or ("RE36495") or ("6023568") or ("6051119") or ("6084267") or ("6105749") or ("6127204") or ("6132221") or ("6213786") or ("6223813") or ("6213786") or ("6223813") or ("4258566") or ("4265512") or ("4265013") or ("4272141") or ("4295060") or ("4307966") or ("4310753") or ("4314217") or ("4323631") or ("4348759") or ("4361372") or ("4380248") or ("4381211") or ("4383880") or ("4383760") or ("4384757"))).PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/08/03 21:16
S2	9	(@ay<="2015" OR @rlad<="20150401") AND (G06F13/4221 OR G06F13/4068).cpc. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (plurality OR multiple)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/03 21:16
S3	100	(@ay<="2015" OR @rlad<="20150401") AND (G06F13/4221 OR G06F13/4068).cpc. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3	US-PGPUB; USPAT; USOCR; EPO; JPO;	OR	ON	2018/08/03 21:16

			DERWENT			
S4	500	((@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/03 21:16
S5	100	((@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (select\$3 OR choos\$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/03 21:16
S6	15	"016744".ap.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/03 21:16
S7	242	((@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (device OR peripheral)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/03 21:16
S8	4	((("20050120384") or ("8190786")).PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/08/03 21:16
S9	15	"203557".ap.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/08/03 21:16
S10	48	((@ay<="2015" OR @rlad<="20150401") AND pin WITH ground\$3 WITH unused SAME (channel OR lane OR link OR path)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/03 21:16
S11	83	((@ay<="2015" OR @rlad<="20150401") AND pin SAME ground\$3 SAME unused SAME channel	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/03 21:16
S12	3	("20040177207" "20070255885" "20140244890").PN.	US-PGPUB; USPAT	OR	OFF	2018/08/03 21:16
S13	87	((CHUNG NEAR "II-Hyung") OR (LEE NEAR Cheolho) OR (KIM NEAR "Dae-Woong") OR (KIM NEAR "Shin-Ho") OR (KIM NEAR Wonseob)).in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/03 21:16
S14	6	((CHUNG NEAR "II-Hyung") OR (LEE NEAR Cheolho) OR (KIM NEAR "Dae-Woong") OR	US-PGPUB;	OR	ON	2018/08/03 21:16

		(KIM NEAR "Shin-Ho") OR (KIM NEAR Wonseob)).in. AND (pin).clm.	USPAT; USOCR; EPO; JPO; DERWENT			
S15	2	((CHUNG NEAR "Il-Hyung") OR (LEE NEAR Cheolho) OR (KIM NEAR "Dae-Woong") OR (KIM NEAR "Shin-Ho") OR (KIM NEAR Wonseob)).in. AND (pin AND ground).clm.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/03 21:16
S16	266	((@ay<="2015" OR @rlad<="20150401") AND pin SAME ground\$3 SAME channel SAME detect\$3 WITH connect\$3	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/03 21:16
S17	50	((@ay<="2015" OR @rlad<="20150401") AND pin SAME ground\$3 SAME channel SAME reception SAME transmission	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/03 21:16
S18	13	((@ay<="2015" OR @rlad<="20150401") AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (select\$3 OR choos\$3) SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/09 18:02
S19	3865	((@ay<="2015" OR @rlad<="20150401") AND (channel OR lane OR link OR path) SAME (select\$3 OR choos\$3) SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/09 18:51
S20	156	((@ay<="2015" OR @rlad<="20150401") AND pin SAME (channel OR lane OR link OR path) SAME (select\$3 OR choos\$3) SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/09 18:52
S21	757	((@ay<="2015" OR @rlad<="20150401") AND pin SAME plug SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/09 19:14
S22	2	((@ay<="2015" OR @rlad<="20150401") AND (G06F13/4221 OR G06F13/4068).cpc. AND pin SAME (plug OR interface) SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/09 19:15
S23	0	((@ay<="2015" OR @rlad<="20150401") AND ("710").cls. AND pin SAME plug SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/09 19:16
S24	21	((@ay<="2015" OR @rlad<="20150401") AND ("710").clas. AND pin SAME plug SAME	US- PGPUB;	OR	ON	2018/08/09 19:16

EAST Search History

		symmetrical	USPAT; USOCR; EPO; JPO; DERWENT			
S25	233	((@ay<="2015" OR @rlad<="20150401") AND (pin AND (plug OR interface) AND symmetrical).ti,ab.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/09 19:17
S26	129	((@ay<="2015" OR @rlad<="20150401") AND pin SAME (channel OR lane OR link OR path) SAME (plug OR interface) SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/10 18:04
S27	317	((@ay<="2015" OR @rlad<="20150401") AND (pin AND (plug OR interface) AND symmetric\$2).ti,ab.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/08/10 18:14
S28	2	("8177560").PN.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/08/14 17:04

EAST Search History (Interference)

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8/ 14/ 2018 8:24:18 PM**C:\ Users\ hyu\ Documents\ EAST\ Workspaces\ 15082408 _A.wsp**

Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (02-18)

Approved for use through 11/30/2020. OMB 0851-0031

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 (Submitted Only via EFS-Web)

Application Number	15/082,408	Filing Date	2016-03-28	Docket Number (if applicable)	4500-1-458	Art Unit	2181
First Named Inventor	Il-Hyung Chung			Examiner Name	Henry W. Yu		

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, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

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).

☐ 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.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☒ Amendment/Reply

☐ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ 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)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to
Deposit Account No 502470

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature
Applicant Signature

Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (02-18)

Approved for use through 11/30/2020. OMB 0851-0031

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.

Signature of Registered U.S. Patent Practitioner			
Signature	Steve Cha/	Date (YYYY-MM-DD)	2018-10-11
Name	Steve Cha	Registration Number	44069

This collection of information is required by 37 CFR 1.114. 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 1.11 and 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.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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 the Freedom of Information Act requires disclosure of these records.
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 inspections 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.

Electronic Patent Application Fee Transmittal				
Application Number:		15082408		
Filing Date:		28-Mar-2016		
Title of Invention:		APPARATUS AND METHOD FOR PROCESSING SIGNAL		
First Named Inventor/Applicant Name:		Il-Hyung CHUNG		
Filer:		Steve S. Cha/Gabriella Zisa		
Attorney Docket Number:		4500-1-458		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
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(\$)
Miscellaneous:				
RCE- 1ST REQUEST	1801	1	1300	1300
Total in USD (\$)				1300

Electronic Acknowledgement Receipt	
EFS ID:	33982164
Application Number:	15082408
International Application Number:	
Confirmation Number:	5081
Title of Invention:	APPARATUS AND METHOD FOR PROCESSING SIGNAL
First Named Inventor/Applicant Name:	Il-Hyung CHUNG
Customer Number:	33942
Filer:	Steve S. Cha/Gabriella Zisa
Filer Authorized By:	Steve S. Cha
Attorney Docket Number:	4500-1-458
Receipt Date:	11-OCT-2018
Filing Date:	28-MAR-2016
Time Stamp:	14:06:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$1300
RAM confirmation Number	101218INTEFSW14065500
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	Amendment Submitted/Entered with Filing of CPA/RCE	4500-1-458_FOA_RCE_Oct2018.pdf	930701 f6a1591555ac4e51f2014e056bc727bbd9370f2d	no	10
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	4500-1-458_RequestForContinuedExamination.pdf	1350074 43dd6e317dc04a55dd7775570d8c4f77163755bb	no	3
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30095 5c5dc5c04947b08ebf2f0fe15680ee26f8e98d6f	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			2310870		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.					

Serial No: 15/082,408
Reply to Final Office Action of: August 23, 2018
Amendment Dated: October 11, 2018

Docket No: 4500-1-458

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT : Il-Hyung CHUNG DOCKET NO.: 4500-1-458
SERIAL NO. : 15/082,408 EXAMINER : Henry W. Yu
FILED : March 28, 2016 ART UNIT : 2181
CONFIRMATION NO: 5081
FOR : APPARATUS AND METHOD FOR PROCESSING SIGNAL

REQUEST FOR CONTINUED EXAMINATION

MAIL STOP RCE
COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA, VA. 22313

Dear Sir:

Responsive to the Final Office Action dated August 23, 2018, issued in connection with the above-identified Application, please consider the following:

IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A method in an electronic device having an interface unit comprising a plurality of pin sets to which a plurality of communication channels are allocated, comprising:

in response to detecting a cable which supports a first communication channel and a second communication channel, selecting one of the plurality of pin sets a first pin set from a plurality of pin sets that are part of the interface unit, wherein the first pin set is associated with a first communication channel;

grounding a remaining second pin set in the plurality of pin sets of the plurality of pin sets, wherein the second pin set is associated with a second communication channel; and

processing a signal for the selected one of the plurality of pin sets first pin set,
wherein the processing the signal comprising:

when a first pin set associated with a first communication channel is selected,
transmit the signal to an external device or receive the signal from the external device through the first communication channel,

when a second pin set associated with a second communication channel is selected,
transmit the signal to the external device or receive the signal from the external device through the second communication channel, and

wherein the one of the plurality of first pin sets and the remaining second pin sets are
arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.

2. (Original) The method of claim 1, wherein the first communication channel and the second communication channel have an equal transmission rate.

3. (Original) The method of claim 1, further comprising
connecting the first pin set to a signal processing unit,
wherein the signal is processed by the signal processing unit.

4. (Original) The method of claim 3, wherein grounding the second pin set comprises connecting the second pin set to a grounding unit.

5. (Original) The method of claim 1, the first pin set is selected based on respective states of the first communication channel and the second communication channel.

6. (Canceled)

7. (Previously Presented) The method of claim 3, wherein the interface unit includes a first detection pin for detecting a connection with the first communication channel and a second detection pin for detecting a connection with the second communication channel, and

wherein the first detection pin and the second detection pin are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit.

8. (Previously Presented) The method of claim 7, further comprising detecting the connection with the first communication channel through the first detection pin.

9. (Previously Presented) The method of claim 1, wherein the first pin set comprises a first transmission pin set and a first reception pin set, and

wherein the second pin set comprises a second transmission pin set and a second reception pin set.

10. (Previously Presented) The method of claim 9, wherein the first transmission pin set and the second transmission pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit, and

wherein the first reception pin set and the second reception pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit.

11. (Currently Amended) An apparatus comprising:
an interface unit comprising a plurality of pin sets;
a signal processing unit for processing a signal;

a grounding unit for grounding at least one of the plurality of pin sets; and
at least one controller configured to:

~~in response to detecting a cable which is supports a first communication channel and a second communication channel, select one pin set a first pin set from the plurality of pin sets; wherein the first pin set is associated with a first communication channel;~~

~~ground remaining pin sets of the plurality of pin sets a second pin set in the plurality of pin sets; wherein the second pin set is associated with a second communication channel; and~~

~~process the signal for the selected one first pin set,~~

~~wherein the at least one controller is further configured to:~~

~~when a first pin set associated with a first communication channel is selected, transmit the signal to an external device or receive the signal from the external device through the first communication channel,~~

~~when a second pin set associated with a second communication channel is selected, transmit the signal to the external device or receive the signal from the external device through the second communication channel, and~~

~~wherein the selected one first pin set and the remaining second pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.~~

12. (Previously Presented) The apparatus of claim 11, wherein the at least one controller is further configured to select the first pin set based on states of the first communication channel and the second communication channel.

13. (Previously Presented) The apparatus of claim 11, wherein the interface unit includes a first detection pin for detecting a connection with the first communication channel and a second detection pin for detecting a connection with the second communication channel, and

wherein the first detection pin and the second detection pin are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit.

14. (Previously Presented) The apparatus of claim 13, wherein the at least one controller is further configured to:

detect the connection with the first communication channel through the first detection

pin.

15. (Previously Presented) The apparatus of claim 14, wherein the at least one controller is further configured to detect that the first communication channel is connected to an external device by using the first detection pin.

16. (Previously Presented) The apparatus of claim 11, wherein the at least one controller comprises a connection unit configured to connect the first pin set to the signal processing unit, and to connect the second pin set to the grounding unit.

17. (Original) The apparatus of claim 16, wherein the connection unit comprises a switch device.

18. (Previously Presented) The apparatus of claim 17, wherein the at least one controller is further configured to apply a high signal for connecting the first pin set to the signal processing unit or a low signal for connecting the second pin set to the signal processing unit to the switch device.

19. (Previously Presented) The apparatus of claim 11, wherein the first pin set comprises a first transmission pin set and a first reception pin set,

wherein the second pin set comprises a second transmission pin set and a second reception pin set,

wherein the first transmission pin set and the second transmission pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit, and

wherein the first reception pin set and the second reception pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit.

20. (Currently Amended) A non-transitory computer-readable medium storing one or more instructions which when executed by an electronic device cause the electronic device to perform a method comprising the steps of:

in response to detecting a cable which supports a first communication channel and a

~~second communication channel, selecting one a first-pin set from a plurality of pin sets that are part of an interface unit, wherein the first pin set is associated with a first communication channel;~~

~~grounding remaining a second-pin sets of the plurality of pin sets in the plurality of pin sets, wherein the second pin set is associated with a second communication channel; and~~

~~processing a signal for the selected one first-pin set,~~

~~wherein the processing the signal comprising:~~

~~when a first pin set associated with a first communication channel is selected, transmit the signal to an external device or receive the signal from the external device through the first communication channel,~~

~~when a second pin set associated with a second communication channel is selected, transmit the signal to the external device or receive the signal from the external device through the second communication channel, and~~

~~wherein the selected one first-pin set and the remaining second-pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.~~

REMARKS

Entry of this Amendment and reconsideration are respectfully requested in view of the amendments made to the claims and the remarks made herein.

1. Claims 1-20 are rejected under 35 U.S.C. 103 as allegedly unpatentable over Lanning (US 2007/0226571) in view of Rohrbach (US 8177560).

Claims 1-5 and 7-20 are pending, with claims 1, 11, and 20 being independent. Claim 6 has been cancelled without prejudice or disclaimer. Claims 1, 11, and 20 have been amended. No new subject matter has been added.

The 35 U.S.C. 103 Rejections – Independent Claims 1, 11 and 20

Applicant respectfully submits that independent claims 1, 11 and 20 have been amended to clarify the invention. Claim 1 for example now recites:

“...in response to detecting a cable which supports a first communication channel and a second communication channel, selecting one of the plurality of pin sets; grounding remaining pin sets of the plurality of pin sets; and processing a signal for the selected one of the plurality of pin sets, wherein the processing the signal comprising: when a first pin set associated with a first communication channel is selected, transmit the signal to an external device or receive the signal from the external device through the first communication channel, when a second pin set associated with a second communication channel is selected, transmit the signal to the external device or receive the signal from the external device through the second communication channel, and wherein the one of the plurality of pin sets and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.”

Support for the amendments may be found in, for example paras. [0021] and [0076] of the Specification, reciting for example:

“...the cable 200 may support the communication channels 210 and 220,” and “the

signal processing unit 520 may transmit the signal to the first communication channel 210 or receive the signal from the first communication channel 210 through the first communication pin set 420. Additionally or alternatively, when the second communication pin set 430 is connected to the signal processing unit 520, the signal processing unit 520 may process a signal for the second communication channel 220. The signal processing unit 520 may transmit the signal to the second communication channel 220 or receive the signal from the second communication channel 220 through the second communication pin set 430”.

Applicant notes the present invention presents a distinct advantage in that electronic devices have the single interface structure in the communication system, and as such, the electronic devices can connect to each other. Accordingly, users of the electronic devices can easily connect the electronic devices through the single cable, and the use efficiency and the convenience of the users of the electronic devices can be improved.

In contrast, applicant notes Lanning, paragraphs [0050] and [0051]:

[0050] The interface 408 between the pod 112 and the analyzer 114 includes multiple channels that are connected or represented by the pins 410 and 412. The pins 410 are used, in one embodiment, to provide a pod ID to the analyzer 114. A pod ID enables the analyzer 114 to either program the pod 112 and the FPGA 113 appropriately as well as interpret the data that the analyzer 114 receives from the pod 112. The interface 408 is preferably an LVDS interface when the analyzer 114 requires LVDS signaling. As a result, the pod 112 may perform some signal translation if necessary. One of skill in the art can appreciate that other signaling schemes can be used at the interface 406 and/or the interface 408.

[0051] The pins 412 represent that channels over which data (including commands, programming, etc.) is communicated between the pod 112 and the analyzer 114. In some embodiments, the system 400 may not require use of all channels that exist at the interface 408. In this case, additional logic pods may be used on the extra channels. If any of the channels are unused, the FPGA 113 typically ties these signals to ground so they do not float.

<Lanning, paras. [0050]-[0051]>

Lanning recites: “*The pins 410 are used ... to provide a pod ID to the analyzer 114*” and “*The pins 412 represent that channels over which data (including commands, programming, etc.) is communicated between the pod 112 and the analyzer 114*”.

Lanning thus fails to show:

“...in response to detecting a cable which supports a first communication channel and a second communication channel, selecting one of the plurality of pin sets; ...when a first pin set associated with a first communication channel is selected, transmit the signal to an external device or receive the signal from the external device through the first communication channel, when a second pin set associated with a second communication channel is selected, transmit the signal to the external device or receive the signal from the external device through the second communication channel...”

Applicant further acknowledges Rohrbach as cited, but notes that the disclosures indicated therein do not remedy the defect of Lanning with respect to the amended claims. Therefore, even if *Lanning* were to be have been combined with *Rohrbach*, such combination would fail to arrive at all the recited elements of claim 1, thus the combination cannot render claim 1 obvious under 35 U.S.C. 103(a). For at least the above reasons, neither *Lanning*, nor any combination of *Rohrbach* and/or the ordinary skill in the art conceivable to one of ordinary skill in the art renders claim 1 obvious under 35 U.S.C. §103(a).

Entry of the amendments and reconsideration of the rejection are respectfully requested.

Conclusion

Accordingly, for at least the above reasons, neither Lanning, nor any proper combination of Lanning and Rohrbach and/or the ordinary skill in the art results in all the recited elements of the independent claims; thus, the cited references cannot render Applicant’s independent claims obvious under 35 U.S.C. §103(a) (*KSR International v. Teleflex*, 127 S.Ct. 1727, 82 USPQ2d 1385 (2007)). Reconsideration and withdrawal of this ground of rejection are respectfully requested.

The remaining claims in this application are patentable over the cited references based at least upon their respective dependencies from independent claims.

In view of above, with regard to the rejection of the claims under 35 U.S.C. 102, applicant submits that for the amendments made to the claims, the reason for the rejection is no longer applicable. Applicant respectfully requests that the rejections be withdrawn.

If the Examiner believes that the amendments provided herein raise any issues, applicant's representative cordially invites the Examiner to contact the representative to resolve such issues.

Applicant authorizes to charge Deposit Account No. 502-470 for any underpayment, or credit any overages.

In view of the above, entry of this Amendment is requested and a Notice of Allowance be issued.

Respectfully submitted,

CHA & REITER, LLC

/SteveCha/

Steve S. Cha
Attorney for Applicant(s)
Registration No. 44,069

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Date: October 11, 2018

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 15/082,408		Filing Date 03/28/2016		☐ To be Mailed		
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO										
APPLICATION AS FILED - PART I										
		(Column 1)		(Column 2)						
FOR		NUMBER FILED		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), (l), 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(j))		minus 20 = *				x \$80 =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 = *				x \$420 =				
☐ 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										
		(Column 1)		(Column 2)		(Column 3)				
AMENDMENT	10/11/2018		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))		* 19	Minus	** 20	= 0			x \$100 =	0
	Independent (37 CFR 1.16(h))		* 3	Minus	*** 3	= 0			x \$460 =	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
		(Column 1)		(Column 2)		(Column 3)				
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))		*	Minus	**	=			x \$0 =	
	Independent (37 CFR 1.16(h))		*	Minus	***	=			x \$0 =	
	☐ 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.								LIE		
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".								paula D mccray stanley		
*** 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.										

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.
15/082,408	03/28/2016	Il-Hyung CHUNG	4500-1-458	5081
33942	7590	11/27/2018		
Cha & Reiter, LLC 17 Arcadian Avenue Suite 208 Paramus, NJ 07652			EXAMINER YU, HENRY W	
			ART UNIT	PAPER NUMBER
			2181	
			MAIL DATE	DELIVERY MODE
			11/27/2018	PAPER

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.

Office Action Summary	Application No. 15/082,408	Applicant(s) CHUNG et al.	
	Examiner Henry Yu	Art Unit 2181	AIA Status Yes

-- 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 10/11/2018.
 ☐ 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 and 7-20 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 and 7-20 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 05/01/2018 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: ____.

DETAILED ACTION

INFORMATION CONCERNING RESPONSES

Response to Amendment

1. This Office Action is in response to applicant's communication filed on October 11, 2018, in response to PTO Office Action mailed on August 23, 2018. The Applicant's remarks and amendments to the claims and/or the specification were considered with the results that follow.
2. In response to the last Office Action, claims 1, 11, and 20 have been amended. Claim 6 has been cancelled. As a result, claims 1-5 and 7-20 are now pending in this application.

Notice of Pre-AIA or AIA Status

3. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Priority

4. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119 (a)-(d).

Response to Arguments

5. Applicant's arguments filed on October 11, 2018, in response to PTO Office Action mailed on August 23, 2018, have been fully considered and are persuasive. Hence, the rejection has been withdrawn. However, upon further review a new ground of rejection has been made in view of Imamaki et al. (Publication Number US 2013/0244455 A1).

OBJECTIONS TO THE SPECIFICATION

Claim Objections

6. **Claim 11** is objected to because of the following informalities:

Claim 11: On line 6, "*a cable which is supports a first communication channel*" should be replaced with *–a cable which supports a first communication channel–*.

Appropriate correction is required.

REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 103

7. The following is a quotation of 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 negated by the manner in which the invention was made.

8. **Claims 1-5 and 7-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lanning (Publication Number US 2007/0226571 A1) in view of Rohrbach et al. (Patent Number US 8,177,560 B2) and Imamaki et al. (Publication Number US 2013/0244455 A1).

As per **claim 1**, Lanning discloses "*a method in an electronic device having an interface unit comprising a plurality of pin sets to which a plurality of communication channels are allocated, comprising: in response to detecting a cable which supports a first communication channel and a second communication channel, selecting one of the plurality of pin sets (the connector contains a series of pins 410 and 412 (FIG. 4),*

where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).

Lanning discloses “*grounding remaining pin sets of the plurality of pin sets (unused channels are grounded so that they do not float; Paragraph 0051).*”

Lanning discloses “*and processing a signal for the selected one of the plurality of pine sets (as they pertain to active/used pins; Paragraphs 0050-0051).*”

However, Lanning does not disclose “*wherein the processing the signal comprising: when a first pin set associated with a first communication channel is selected transmit the signal to an external device or receive the signal from the external device through the first communication channel, when a second pin set associated with a second communication channel is selected, transmit the signal to the external device or receive the signal for the external device through the second communication channel.*”

Imamaki et al. discloses “*wherein the processing the signal comprising: when a first pin set associated with a first communication channel is selected transmit the signal to an external device or receive the signal from the external device through the first communication channel (selection in the switcher 104 where USB+ and USB- is selected; FIG. 3), when a second pin set associated with a second communication channel is selected, transmit the signal to the external device or receive the signal for the external device through the second communication channel (selection in the switcher 104 where GND and MD are selected; FIG. 3).*”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and

Imamaki et al. in order to utilize common connectors among different types and functions of devices.

However, Lanning and Imamaki et al. do not disclose “*wherein the one of the plurality of pin sets and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.*”

Rohrbach et al. discloses “*wherein the one of the plurality of pin sets and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit (Column 5, lines 4-20).*”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Imamaki et al. with elements of Rohrbach et al. in order to minimize physical damage to the plug [Column 1, lines 30-67], which can be particularly problematic for asymmetrical plug shapes.

As per **claim 2**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*wherein the first communication channel and the second communication channel have an equal transmission rate (pin set 410 and 412 can be used for the same purpose and hence can be seen as being capable of the same transmission rate; Paragraphs 0050-0051).*”

As per **claim 3**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*connecting the first pin set to a signal processing unit, wherein the signal is processed by the signal processing unit (Paragraph 0050).*”

As per **claim 4**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*wherein grounding the second pin set comprises connecting the second pin set to a grounding unit (Paragraph 0051).*”

As per **claim 5**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*the first pin set is selected based on respective states of the first communication channel and the second communication channel (depending on whether a particular channel is used or unused; Paragraph 0051).*”

As per **claim 7**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*wherein the interface unit includes a first detection pin for detecting a connection with the first communication channel and a second detection pin for detecting a connection with the second communication channel (through a tap ID, where there are multiple taps; Paragraphs 0047-0048).*”

Rohrbach et al. discloses “*and wherein the first detection pin and second detection pin are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (Column 5, lines 4-20).*”

As per **claims 8 and 14**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*further comprising detecting the connection with the first communication channel through the first detection pin (through a tap ID, which then determines the appropriate bus to process; Paragraphs 0047-0048 and 0051).*”

As per **claim 9**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*wherein the first pin set comprises a first transmission pin set and a first reception pin set, and wherein the second pin set comprises a second transmission pin set and a second reception pin set (the various buses 370 with a plurality of vias 360; FIG. 3C; Paragraph 0044).*”

As per **claim 10**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Rohrbach et al. discloses “*wherein the first transmission pin set and the second transmission pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (Column 5, lines 4-20).*”

Rohrbach et al. discloses “*wherein the first reception pin set and the second reception pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (Column 5, lines 4-20).*”

As per **claim 11**, Lanning discloses “*an apparatus comprising: an interface unit comprising a plurality of pin sets (the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).*”

Lanning discloses “*a signal processing unit for processing a signal (as they pertain to active/used pins; Paragraphs 0050-0051).*”

Lanning discloses “*a grounding unit for grounding at least one of the plurality of pin sets (unused channels are grounded so that they do not float; Paragraph 0051).*”

Lanning discloses “*and at least one controller configured to: in response to detecting a cable which is supports a first communication channel and a second communication channel, select one pin set from the plurality of pin sets **(the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).***”

Lanning discloses “*ground remaining pin sets of the plurality of pin sets **(unused channels are grounded so that they do not float; Paragraph 0051).***”

Lanning discloses “*and process the signal for the first pin set **(as they pertain to active/used pins; Paragraphs 0050-0051).***”

However, Lanning does not disclose “*wherein the at least one controller is further configure to: when a first pin set associated with a first communication channel is selected, transmit the signal to an external device or receive the signal from the external device through the first communication channel, when a second pin set associated with a second communication channel is selected, transmit the signal to the external device or receive the signal from the external device through the second communication channel.*”

Imamaki et al. discloses “*wherein the at least one controller is further configure to: when a first pin set associated with a first communication channel is selected, transmit the signal to an external device or receive the signal from the external device through the first communication channel **(selection in the switcher 104 where USB+ and USB- is selected; FIG. 3)**, when a second pin set associated with a second communication channel is selected, transmit the signal to the external device or receive*

*the signal from the external device through the second communication channel
(selection in the switcher 104 where GND and MD are selected; FIG. 3)."*

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Imamaki et al. in order to utilize common connectors among different types and functions of devices.

However, Lanning and Imamaki et al. do not disclose "*wherein the selected one pin set and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.*"

Rohrbach et al. discloses "*wherein the selected one pin set and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit (Column 5, lines 4-20).*"

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Imamaki et al. with elements of Rohrbach et al. in order to minimize physical damage to the plug [Column 1, lines 30-67], which can be particularly problematic for asymmetrical plug shapes.

As per **claim 12**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses "*the apparatus*" (see rejection to **claim 11** above). Lanning discloses "*wherein the at least one controller is further configured to select the first pin set based on states of the first communication channel and the second communication channel (depending on whether a particular channel is used or unused; Paragraph 0051).*"

As per **claim 13**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the interface unit includes a first detection pin for detecting a connection with the first communication channel and a second detection pin for detecting a connection with the second communication channel (through a tap ID, where there are multiple taps; Paragraphs 0047-0048).*”

Rohrbach et al. discloses “*wherein the first detection pin and the second detection pin are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (Column 5, lines 4-20).*”

As per **claim 15**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the at least one controller is further configured to detect that the first communication channel is connected to an external device by using the first detection pin (whether a channel is used to provide a pod ID to an analyzer 114 (with the analyzer 114 being considered the external device); Paragraph 0050; FIG. 3A-D, FIG. 4).*”

As per **claim 16**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the at least one controller comprises a connection unit configured to connect the first pin set to the signal processing unit (whether a channel is used to provide a pod ID to an analyzer 114 (with the analyzer 114 being considered the external device); Paragraph 0050; FIG. 3A-D, FIG. 4), and to connect the second pin set to the grounding unit (Paragraph 0051).*”

As per **claim 17**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the connection unit comprises a switch device (through the FPGA; Paragraphs 0047 and 0051).*”

As per **claim 18**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the at least one controller is further configured to apply a high signal for connecting the first pin set to the signal processing unit or a low signal for connecting the second pin set to the signal processing unit to the switch device (a grounding signal can result in a low signal (signal ‘0’ as opposed to a signal ‘1’); Paragraph 0051).*”

As per **claim 19**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the first pin set comprises a first transmission pin set and a first reception pin set (connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).*”

Lanning discloses “*wherein the second pin set comprises a second transmission pin set and a second reception pin set (connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).*”

Rohrbach et al. discloses “*wherein the first transmission pin set and the second transmission pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (Column 5, lines 4-20).*”

Rohrbach et al. discloses “*wherein the first reception pin set and the second reception pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (Column 5, lines 4-20).*”

As per **claim 20**, Lanning discloses “*a non-transitory computer-readable medium storing one or more instructions which when executed by an electronic device cause the electronic device to perform a method comprising the steps of: in response to detecting a cable which supports a first communication channel and a second communication channel, selecting one pin set from a plurality of pin sets that are part of an interface unit (the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).*”

Lanning discloses “*grounding remaining pin sets of the plurality of pin sets (unused channels are grounded so that they do not float; Paragraph 0051).*”

Lanning discloses “*and processing a signal for the selected one pin set (as they pertain to active/used pins; Paragraphs 0050-0051).*”

However, Lanning does not disclose “*wherein the processing the signal comprising: when a first pin set associated with a first communication channel is selected transmit the signal to an external device or receive the signal from the external device through the first communication channel, when a second pin set associated with a second communication channel is selected, transmit the signal to the external device or receive the signal for the external device through the second communication channel.*”

Imamaki et al. discloses “*wherein the processing the signal comprising: when a first pin set associated with a first communication channel is selected transmit the signal to an external device or receive the signal from the external device through the first communication channel (selection in the switcher 104 where USB+ and USB- is selected; FIG. 3), when a second pin set associated with a second communication channel is selected, transmit the signal to the external device or receive the signal for the external device through the second communication channel (selection in the switcher 104 where GND and MD are selected; FIG. 3).*”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Imamaki et al. in order to utilize common connectors among different types and functions of devices.

However, Lanning and Imamaki et al. do not disclose “*wherein the selected one pin and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.*”

Rohrbach et al. discloses “*wherein the selected one pin and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit (Column 5, lines 4-20).*”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Imamaki et al. with elements of Rohrbach et al. in order to minimize physical damage to the plug [Column 1, lines 30-67], which can be particularly problematic for asymmetrical plug shapes.

RELEVANT ART CITED BY THE EXAMINER

9. The following prior art made of record and relied upon is cited to establish the level of skill in the applicant's art and those arts considered reasonably pertinent to applicant's disclosure. See **MPEP 707.05(c)**.

10. The following references teach data transfer as they pertain to physical pin arrangements in a plug connector:

U.S. PATENT NUMBERS:

2008/0299964 A1 – [Paragraph 0011; FIG. 4]

2009/0219184 A1 – [Paragraph 0082 and 0088]

CONCLUDING REMARKS

Conclusions

11. The examiner requests, in response to this Office action, support be shown for language added to any original claims on amendment and any new claims. That is, indicate support for newly added claim language by specifically pointing to page(s) and line no(s) in the specification and/or drawing figure(s). This will assist the examiner in prosecuting the application.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Henry Yu whose telephone number is (571)272-9779. The examiner can normally be reached on Monday - Friday.

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, IDRIS ALROBAYE can be reached on (571) 270-1023. 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.

/H.W.Y/
Examiner, Art Unit 2181
November 21, 2018

/Farley Abad/
Primary Examiner, Art Unit 2181

<i>Notice of References Cited</i>	Application/Control No. 15/082,408	Applicant(s)/Patent Under Reexamination CHUNG et al.	
	Examiner Henry Yu	Art Unit 2181	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-20130244455-A1	09-2013	IMAMAKI; Takashi	G06F13/387	439/65
*	B	US-20080299964-A1	12-2008	JOUNG; Jinsoup	H04M1/24	455/424
*	C	US-20090219184-A1	09-2009	TAKANO; Hiroaki	H04B1/0057	341/108
	D					
	E					
	F					
	G					
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	J					
	K					
	L					
	M					

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.

<i>Index of Claims</i> 	Application/Control No. 15/082,408	Applicant(s)/Patent Under Reexamination CHUNG et al.
	Examiner Henry Yu	Art Unit 2181

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	02/16/2018	08/14/2018	11/21/2018						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
	6	✓	✓	-						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	✓	✓						
	10	✓	✓	✓						
	11	✓	✓	✓						
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	14	✓	✓	✓						
	15	✓	✓	✓						
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	17	✓	✓	✓						
	18	✓	✓	✓						
	19	✓	✓	✓						
	20	✓	✓	✓						

<i>Search Notes</i> 	Application/Control No. 15/082,408	Applicant(s)/Patent Under Reexamination CHUNG et al.
	Examiner Henry Yu	Art Unit 2181

CPC - Searched*		
Symbol	Date	Examiner
G06F13/4221, G06F13/4068	02/13/2018	HY
G06F13/4221, G06F13/4068	08/03/2018	HY
G06F13/4221, G06F13/4068	11/21/2018	HY

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
710		02/13/2018	HY
710		08/03/2018	HY
710		11/21/2018	HY

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

/H.W.Y/ Examiner, Art Unit 2181	
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<i>Search Notes</i> 	Application/Control No. 15/082,408	Applicant(s)/Patent Under Reexamination CHUNG et al.
	Examiner Henry Yu	Art Unit 2181

Search Notes		
Search Notes	Date	Examiner
PLUS Search	01/18/2018	HY
EAST Search (Inventor Search)	02/15/2018	HY
EAST Search	02/13/2018	HY
EAST Search	02/14/2018	HY
EAST Search	02/15/2018	HY
EAST Search (Update)	08/03/2018	HY
EAST Search (Update)	08/09/2018	HY
EAST Search (Update)	08/10/2018	HY
EAST Search (Update)	08/14/2018	HY
EAST Search (Update)	11/21/2018	HY

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/H.W.Y/ Examiner, Art Unit 2181	
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	296	((("5574311") or ("5843798") or ("5764485") or ("4340266") or ("4834660") or ("4931723") or ("4934945") or ("4994732") or ("5222907") or ("5712858") or ("5736862") or ("5815057") or ("6139341") or ("4254446") or ("4263582") or ("4322120") or ("4333696") or ("4468072") or ("4531799") or ("4557540") or ("4611123") or ("4620304") or ("4763066") or ("4764848") or ("4766406") or ("4775917") or ("4784550") or ("4789011") or ("4799589") or ("4922492") or ("4946708") or ("5215140") or ("5243911") or ("5329693") or ("5331285") or ("5342992") or ("5353243") or ("5386189") or ("5391993") or ("5431244") or ("5460093") or ("5475215") or ("5483461") or ("5489798") or ("5551430") or ("5554985") or ("5613181") or ("5615344") or ("5625580") or ("5639562") or ("5655213") or ("5677663") or ("5689179") or ("5712504") or ("5712855") or ("5727963") or ("5734621") or ("5742256") or ("5743009") or ("5743457") or ("5758418") or ("5790830") or ("5801536") or ("5821825") or ("5831556") or ("5861663") or ("5905381") or ("5909124") or ("5923676") or ("5921817") or ("5929355") or ("5952843") or ("6000132") or ("RE36495") or ("6023568") or ("6051119") or ("6084267") or ("6105749") or ("6127204") or ("6132221") or ("6213786") or ("6223813") or ("6213786") or ("6223813") or ("4258566") or ("4265512") or ("4265013") or ("4272141") or ("4295060") or ("4307966") or ("4310753") or ("4314217") or ("4323631") or ("4348759") or ("4361372") or ("4380248") or ("4381211") or ("4383880") or ("4383760") or ("4384757")).PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/11/21 16:36
S2	9	(@ay<="2015" OR @rlad<="20150401") AND (G06F13/4221 OR G06F13/4068).cpc. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (plurality OR multiple)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S3	105	(@ay<="2015" OR @rlad<="20150401") AND (G06F13/4221 OR G06F13/4068).cpc. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36

S4	500	(@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S5	100	(@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (select\$3 OR choos\$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S6	15	"016744".ap.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S7	242	(@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (device OR peripheral)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S8	4	((("20050120384") or ("8190786")).PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/11/21 16:36
S9	16	"203557".ap.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/11/21 16:36
S10	48	(@ay<="2015" OR @rlad<="20150401") AND pin WITH ground\$3 WITH unused SAME (channel OR lane OR link OR path)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S11	83	(@ay<="2015" OR @rlad<="20150401") AND pin SAME ground\$3 SAME unused SAME channel	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S12	3	("20040177207" "20070255885" "20140244890").PN.	US-PGPUB; USPAT	OR	OFF	2018/11/21 16:36
S13	88	((CHUNG NEAR "II-Hyung") OR (LEE NEAR Cheolho) OR (KIM NEAR "Dae-Woong") OR (KIM NEAR "Shin-Ho") OR (KIM NEAR Wonseob)).in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S14	6	((CHUNG NEAR "II-Hyung") OR (LEE NEAR Cheolho) OR (KIM NEAR "Dae-Woong") OR (KIM NEAR "Shin-Ho") OR (KIM NEAR	US-PGPUB; USPAT;	OR	ON	2018/11/21 16:36

		Wonseob)).in. AND (pin).clm.	USOCR; EPO; JPO; DERWENT			
S15	2	((CHUNG NEAR "Il-Hyung") OR (LEE NEAR Cheolho) OR (KIM NEAR "Dae-Woong") OR (KIM NEAR "Shin-Ho") OR (KIM NEAR Wonseob)).in. AND (pin AND ground).clm.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S16	268	(@ay<="2015" OR @rlad<="20150401") AND pin SAME ground\$3 SAME channel SAME detect\$3 WITH connect\$3	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S17	50	(@ay<="2015" OR @rlad<="20150401") AND pin SAME ground\$3 SAME channel SAME reception SAME transmission	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S18	156	(@ay<="2015" OR @rlad<="20150401") AND pin SAME (channel OR lane OR link OR path) SAME (select\$3 OR choos\$3) SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S19	2	(@ay<="2015" OR @rlad<="20150401") AND (G06F13/4221 OR G06F13/4068).opc. AND pin SAME (plug OR interface) SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S20	21	(@ay<="2015" OR @rlad<="20150401") AND ("710").clas. AND pin SAME plug SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S21	233	(@ay<="2015" OR @rlad<="20150401") AND (pin AND (plug OR interface) AND symmetrical).ti,ab.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S22	132	(@ay<="2015" OR @rlad<="20150401") AND pin SAME (channel OR lane OR link OR path) SAME (plug OR interface) SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S23	317	(@ay<="2015" OR @rlad<="20150401") AND (pin AND (plug OR interface) AND symmetric\$2).ti,ab.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:36
S24	2	("8177560").PN.	US- PGPUB; USPAT;	OR	OFF	2018/11/21 16:36

EAST Search History

			USOCR; EPO; JPO; DERWENT			
S26	97	(@ay<="2015" OR @rlad<="20150401") AND pin SAME (select\$3 OR choos\$3) SAME channel SAME reception SAME transmission	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2018/11/21 16:43

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Electronic Acknowledgement Receipt	
EFS ID:	35224707
Application Number:	15082408
International Application Number:	
Confirmation Number:	5081
Title of Invention:	APPARATUS AND METHOD FOR PROCESSING SIGNAL
First Named Inventor/Applicant Name:	Il-Hyung CHUNG
Customer Number:	33942
Filer:	Steve S. Cha/Gabriella Zisa
Filer Authorized By:	Steve S. Cha
Attorney Docket Number:	4500-1-458
Receipt Date:	22-FEB-2019
Filing Date:	28-MAR-2016
Time Stamp:	13:22:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	4500-1-458_AmendFeb2019.pdf	165245 7a9fec7c6ec5d357707b682ee391680cc3d720f1	no	11

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Serial No: 15/082,408
Reply to Office Action of: November 27, 2018
Amendment Dated: February 22, 2019

Docket No: 4500-1-458

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT : Il-Hyung CHUNG DOCKET NO.: 4500-1-458
SERIAL NO. : 15/082,408 EXAMINER : Henry W. Yu
FILED : March 28, 2016 ART UNIT : 2181
CONFIRMATION NO: 5081
FOR : APPARATUS AND METHOD FOR PROCESSING SIGNAL

AMENDMENT

MAIL STOP AMENDMENT
COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA, VA 22313

Dear Sir:

Responsive to the Office Action dated November 27, 2018, issued in connection with the above-identified Application, please consider the following:

IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A method in an electronic device having an interface unit comprising a plurality of pin sets to which a plurality of communication channels are allocated, comprising:

determine whether an external device is connected through ~~in response to detecting a cable which supports a plurality of first communication channels; and a second communication channel;~~

in response to determining that the external device is connected, selecting one of the plurality of pin sets based on a communication channel established between electronic device and the external device;

grounding remaining pin sets of the plurality of pin sets; and

processing a signal for the selected one of the plurality of pin sets,

wherein the processing the signal comprising:

when a first communication channel is established ~~pin set associated with a first communication channel is selected,~~ transmit the signal to the an external device or receive the signal from the external device through a the first pin set and the first communication channel,

when a second communication channel is established is established ~~pin set associated with a second communication channel is selected,~~ transmit the signal to the external device or receive the signal from the external device through a the second pin set and the second communication channel, and

wherein the one of the plurality of pin sets and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.

2. (Original) The method of claim 1, wherein the first communication channel and the second communication channel have an equal transmission rate.

3. (Original) The method of claim 1, further comprising
connecting the first pin set to a signal processing unit,
wherein the signal is processed by the signal processing unit.

4. (Original) The method of claim 3, wherein grounding the second pin set comprises connecting the second pin set to a grounding unit.

5. (Original) The method of claim 1, the first pin set is selected based on respective states of the first communication channel and the second communication channel.

6. (Canceled)

7. (Previously Presented) The method of claim 3, wherein the interface unit includes a first detection pin for detecting a connection with the first communication channel and a second detection pin for detecting a connection with the second communication channel, and

wherein the first detection pin and the second detection pin are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit.

8. (Previously Presented) The method of claim 7, further comprising detecting the connection with the first communication channel through the first detection pin.

9. (Previously Presented) The method of claim 1, wherein the first pin set comprises a first transmission pin set and a first reception pin set, and

wherein the second pin set comprises a second transmission pin set and a second reception pin set.

10. (Previously Presented) The method of claim 9, wherein the first transmission pin set and the second transmission pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit, and

wherein the first reception pin set and the second reception pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit.

11. (Currently Amended) An apparatus comprising:
an interface unit comprising a plurality of pin sets;

a signal processing unit for processing a signal;
a grounding unit for grounding at least one of the plurality of pin sets; and
at least one controller configured to:

determine whether an external device is connected through ~~in response to detecting a~~
~~cable which is supports a plurality of first communication channels; and a second~~
~~communication channel;~~

in response to determining that the external device is connected, select one pin set
from the plurality of pin sets based on a communication channel established between electronic
device and the external device;

ground remaining pin sets of the plurality of pin sets; and
process the signal for the selected one pin set,
wherein the at least one controller is further configured to:

when a first communication channel is established ~~pin set associated with a first~~
~~communication channel is selected,~~ transmit the signal to the an external device or receive the
signal from the external device through a the first pin set and the first communication channel,

when a second communication channel is established ~~pin set associated with a~~
~~second communication channel is selected,~~ transmit the signal to the external device or receive
the signal from the external device through a the second pin set and the second communication
channel, and

wherein the selected one pin set and the remaining pin sets are arrayed to be vertically
and horizontally symmetrical with respect to a center of the interface unit.

12. (Previously Presented) The apparatus of claim 11, wherein the at least one controller
is further configured to select the first pin set based on states of the first communication channel
and the second communication channel.

13. (Previously Presented) The apparatus of claim 11, wherein the interface unit includes
a first detection pin for detecting a connection with the first communication channel and a
second detection pin for detecting a connection with the second communication channel, and

wherein the first detection pin and the second detection pin are arrayed to be vertically
and horizontally symmetrical with respect to the center of the interface unit.

14. (Previously Presented) The apparatus of claim 13, wherein the at least one controller is further configured to:

detect the connection with the first communication channel through the first detection pin.

15. (Previously Presented) The apparatus of claim 14, wherein the at least one controller is further configured to detect that the first communication channel is connected to an external device by using the first detection pin.

16. (Previously Presented) The apparatus of claim 11, wherein the at least one controller comprises a connection unit configured to connect the first pin set to the signal processing unit, and to connect the second pin set to the grounding unit.

17. (Original) The apparatus of claim 16, wherein the connection unit comprises a switch device.

18. (Previously Presented) The apparatus of claim 17, wherein the at least one controller is further configured to apply a high signal for connecting the first pin set to the signal processing unit or a low signal for connecting the second pin set to the signal processing unit to the switch device.

19. (Previously Presented) The apparatus of claim 11, wherein the first pin set comprises a first transmission pin set and a first reception pin set,

wherein the second pin set comprises a second transmission pin set and a second reception pin set,

wherein the first transmission pin set and the second transmission pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit, and

wherein the first reception pin set and the second reception pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit.

20. (Currently Amended) A non-transitory computer-readable medium storing one or more instructions which when executed by an electronic device cause the electronic device to perform a method comprising the steps of:

determine whether an external device is connected through ~~in response to detecting a cable which supports a plurality of first communication channels; and a second communication channel;~~

in response to determining that the external device is connected, selecting one pin set from a plurality of pin sets that are part of an interface unit based on a communication channel established between electronic device and the external device;

grounding remaining pin sets of the plurality of pin sets; and

processing a signal for the selected one of the plurality of pin sets,

wherein the processing the signal comprising:

when a first communication channel is established ~~pin set associated with a first communication channel is selected,~~ transmit the signal to the an external device or receive the signal from the external device through a the first pin set and the first communication channel,

when a second communication channel is established ~~pin set associated with a second communication channel is selected,~~ transmit the signal to the external device or receive the signal from the external device through a the second pin set and the second communication channel, and

wherein the selected one of the plurality of pin sets and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.

REMARKS

Entry of this Amendment and reconsideration are respectfully requested in view of the amendments made to the claims and the remarks made herein.

1. Claims 1-5 and 7-20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Lanning (Publication Number US 2007/0226571 A1) in view of Rohrbach et al. (Patent Number US 8, 177,560 82) and Imamaki et al. (Publication Number US 2013/0244455 A1).

Claims 1-5 and 7-20 are pending, with claims 1, 11, and 20 being independent. Claim 6 has been cancelled without prejudice or disclaimer. Claims 1, 11, and 20 have been amended. No new subject matter has been added.

I. Claim Objections

Applicants have amended claim 11 to address the issue raised by the Examiner, as shown above. Based at least on this amendment, Applicants respectfully submit that this objection is moot, and withdrawal thereof is respectfully requested.

II. Rejections Under 35 U.S.C. §103

Claims 1-5 and 7-20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Lanning in view of Rohrbach and Imamaki. Applicants respectfully submit that the claims, as amended, are not rendered obvious by the prior art.

Claim 1, for example, has been amended to recite:

1. (Currently Amended) A method in an electronic device having an interface unit comprising a plurality of pin sets to which a plurality of communication channels are allocated, comprising:

determine whether an external device is connected through a cable which supports a plurality of communication channels;

in response to determining that the external device is connected, selecting one of the plurality of pin sets based on a communication channel established between electronic device and the external device;

*grounding remaining pin sets of the plurality of pin sets; and
processing a signal for the selected one of the plurality of pin sets,
wherein the processing the signal comprising:*

when a first communication channel is established, transmit the signal to the external device or receive the signal from the external device through a first pin set and the first communication channel,

when a second communication channel is established, transmit the signal to the external device or receive the signal from the external device through a second pin set and the second communication channel, and

wherein the one of the plurality of pin sets and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.

Support for the amendments may be found in at least page 18, lines 14-21 and page 21, lines 2-14 of the specification (emphasis added):

Subsequently, when the connection of the external device is detected in operation 711, *the controller 380 detects the respective states of the communication channels 210 and 220 in operation 713. The controller 380 may detect the respective states of the communication channels 210 and 220 through one of the detection pins 411 and 413.* The detection unit 510 may identify the first communication channel 210 and the second communication channel 220 through the active detection pin. Further, *the detection unit 510 may detect one of the first communication channel 210 and the second communication channel 220 through the active detection pin.*

Lastly, the controller 380 processes a signal for one of the communication pin sets 420, 430, 440, 451, and 453 and process/transmits the signal, in operation 717. That is, the controller 380 may process a signal for one of the communication channels 210 and 220. When the first communication pin set 420 is connected to the signal processing unit 520, the signal processing unit 520 may process a signal the first communication channel 210. *The signal processing unit 520 may*

transmit the signal to the first communication channel 210 or receive the signal from the first communication channel 210 through the first communication pin set 420. Additionally or alternatively, when the second communication pin set 430 is connected to the signal processing unit 520, the signal processing unit 520 may process a signal for the second communication channel 220. The signal processing unit 520 may transmit the signal to the second communication channel 220 or receive the signal from the second communication channel 220 through the second communication pin set 430.

The claimed invention includes a distinct advantage over the prior art in that the electronic devices embodying the claimed invention have a single interface structure for communication systems. And as such, the electronic devices can connect to each other. Accordingly, users of the electronic devices can easily connect the electronic devices through a single cable, and the use efficiency and the convenience of the users of the electronic devices can be improved.

In contrast, [0050-51] of Lanning discloses (emphasis added):

The interface 408 between the pod 112 and the analyzer 114 includes multiple channels that are connected or represented by the pins 410 and 412. ***The pins 410 are used, in one embodiment, to provide a pod ID to the analyzer 114.*** A pod ID enables the analyzer 114 to either program the pod 112 and the FPGA 113 appropriately as well as interpret the data that the analyzer 114 receives from the pod 112. The interface 408 is preferably an LVDS interface when the analyzer 114 requires LVDS signaling. As a result, the pod 112 may perform some signal translation if necessary. One of skill in the art can appreciate that other signaling schemes can be used at the interface 406 and/or the interface 408.

The pins 412 represent that channels over which data (including commands, programming, etc.) is communicated between the pod 112 and the analyzer 114. In some embodiments, the system 400 may not require use of all channels that exist at the interface 408. In this case, additional logic pods may be used on the extra channels. If any of the channels are unused, the FPGA 113 typically ties these signals to ground so they do not float.

This disclosure in Lanning is unrelated to the claimed features of “*in response to determining that the external device is connected, selecting one of the plurality of pin sets based on a communication channel established between electronic device and the external device;*”

grounding remaining pin sets of the plurality of pin sets; and processing a signal for the selected one of the plurality of pin sets, wherein the processing the signal comprising: when a first communication channel is established, transmit the signal to the external device or receive the signal from the external device through a first pin set and the first communication channel, when a second communication channel is established is established, transmit the signal to the external device or receive the signal from the external device through a second pin set and the second communication channel.”

Rohrbach and Imamaki do not cure the deficiencies of Lanning. And because Lanning, Rohrbach, and Imamaki, individually or in combination, do not disclose the limitations of the amended claim 1, even if Lanning can be combined with Rohrbach and Imamaki, no combination of Lanning with Rohrbach or Imamaki conceivable to one of ordinary skill in the art discloses or suggests the claimed subject matter of claim 1. Therefore, even if Lanning were to be have been combined with Rohrbach or Imamaki, such combination would fail to arrive at all the recited elements of the claims, thus the combination cannot render claim 1 obvious under 35 U.S.C. §103(a). For at least the above reasons, neither Lanning, nor any combination of Lanning, Rohrbach, Imamaki, and/or the ordinary skill in the art conceivable to one of ordinary skill in the art renders claim 1 obvious under 35 U.S.C. §103(a). *KSR International v. Teleflex*, 127 S.Ct. 1727, 82 USPQ2d 1385 (2007).

The remaining claims in this application are patentable over the cited references based at least upon their respective dependencies from independent claims.

In view of above, with regard to the rejection of the claims under 35 U.S.C. 103, Applicants submit that for the amendments made to the claims, the reason for the rejection is no longer applicable. Applicants respectfully request that the rejections be withdrawn.

If the Examiner believes that the amendments provided herein raise any issues, Applicants’ representative cordially invites the Examiner to contact the representative to resolve such issues.

Serial No: 15/082,408
Reply to Office Action of: November 27, 2018
Amendment Dated: February 22, 2019

Docket No: 4500-1-458

Applicants authorize charges to Deposit Account No. 502-470 for any underpayment, or credit any overages.

In view of the above, entry of this Amendment is requested and a Notice of Allowance be issued.

Respectfully submitted,

CHA & REITER, LLC

/SteveCha/

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Attorney for Applicant(s)
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Date: February 22, 2019

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 15/082,408		Filing Date 03/28/2016		☐ To be Mailed		
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO										
APPLICATION AS FILED - PART I										
		(Column 1)		(Column 2)						
FOR		NUMBER FILED		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), (l), 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(j))		minus 20 = *				x \$80 =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 = *				x \$420 =				
☐ 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										
		(Column 1)		(Column 2)		(Column 3)				
AMENDMENT	02/22/2019		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))		* 20	Minus	** 20	= 0			x \$100 =	0
	Independent (37 CFR 1.16(h))		* 3	Minus	*** 3	= 0			x \$460 =	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			CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))		*	Minus	**	=			x \$0 =	
	Independent (37 CFR 1.16(h))		*	Minus	***	=			x \$0 =	
	☐ 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.								LIE		
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".								/SHEILA D CHAPMAN/		
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/082,408	03/28/2016	Il-Hyung CHUNG	4500-1-458	5081
33942	7590	06/05/2019		
Cha & Reiter, LLC 17 Arcadian Avenue Suite 208 Paramus, NJ 07652			EXAMINER YU, HENRY W	
			ART UNIT	PAPER NUMBER
			2181	
			MAIL DATE	DELIVERY MODE
			06/05/2019	PAPER

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.

DETAILED ACTION

INFORMATION CONCERNING RESPONSES

Response to Amendment

1. This Office Action is in response to applicant's communication filed on February 22, 2019, in response to PTO Office Action mailed on November 27, 2018. The Applicant's remarks and amendments to the claims and/or the specification were considered with the results that follow.

2. In response to the last Office Action, claims 1, 11, and 20 have been amended. Claim 6 has been cancelled. As a result, claims 1-5 and 7-20 are now pending in this application.

Notice of Pre-AIA or AIA Status

3. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Priority

4. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119 (a)-(d).

Response to Arguments

5. Applicant's arguments filed on February 22, 2019, in response to PTO Office Action mailed on November 27, 2018, have been fully considered but are not persuasive.

Applicant argued that the prior arts of record do not disclose "*determine whether an external device is connected through a cable.*" However, upon further review of the

prior arts of record, Imamaki et al. (Publication Number US 2013/0244455 A1) discloses that when a connection is made, pin voltage goes from high to low [**step S602 and S604; FIG. 6; Paragraphs 0046-0047**].

Furthermore, the amended claims as interpreted by the Examiner do not differ from the claims that were rejected in the previous office action dated on November 27, 2018, where a cable is connected, pins of a certain channel are detected, unused pins are grounded, and signals are transmitted over the pins corresponding with the active channel (of which the prior arts of record discloses - see section entitled **REJECTIONS BASED ON PRIOR ART** in this office action).

OBJECTIONS TO THE SPECIFICATION

Claim Objections

6. **Claim 1** is objected to because of the following informalities:

Claim 1: On line 15, "*when a second communication channel is established is established*" should be replaced with – *when a second communication channel is established*–.

Appropriate correction is required.

REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 103

7. The following is a quotation of 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 negated by the manner in which the invention was made.

8. **Claims 1-5 and 7-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lanning (Publication Number US 2007/0226571 A1) in view of Rohrbach et al. (Patent Number US 8,177,560 B2) and Imamaki et al. (Publication Number US 2013/0244455 A1).

As per **claim 1**, Lanning discloses “a method in an electronic device having an interface unit comprising a plurality of pin sets to which a plurality of communication channels are allocated, comprising: determine where an external device is connected through a cable supports a plurality of communication channels **(the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).**”

Lanning discloses “grounding remaining pin sets of the plurality of pin sets **(unused channels are grounded so that they do not float; Paragraph 0051).**”

Lanning discloses “and processing a signal for the selected one of the plurality of pine sets **(as they pertain to active/used pins; Paragraphs 0050-0051).**”

However, Lanning does not disclose “in response to determining that the external device is connected, selecting one of the plurality of pin sets based on a communication channel established between electronic device and the external device,” or “wherein the processing the signal comprising: when a first communication channel is established transmit the signal to the external device or receive the signal from the external device through a first pin set and the first communication channel, when a second

communication channel is established, transmit the signal to the external device or receive the signal for the external device through a second pin set and the second communication channel.”

Imamaki et al. discloses “*in response to determining that the external device is connected, selecting one of the plurality of pin sets based on a communication channel established between electronic device and the external device (step S605 to S607/S611; FIG. 6; FIG. 7).*” Imamaki et al. also discloses “*determine where an external device is connected through a cable supports a plurality of communication channels (steps S602 and S604; FIG. 6; Paragraphs 0046-0047).*”

Imamaki et al. discloses “*wherein the processing the signal comprising: when a first communication channel is established transmit the signal to the external device or receive the signal from the external device through a first pin set and the first communication channel (selection in the switcher 104 where USB+ and USB- is selected; FIG. 3), when a second communication channel is established, transmit the signal to the external device or receive the signal for the external device through a second pin set and the second communication channel (selection in the switcher 104 where GND and MD are selected; FIG. 3).*”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Imamaki et al. in order to utilize common connectors among different types and functions of devices.

However, Lanning and Imamaki et al. do not disclose “*wherein the one of the plurality of pin sets and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.*”

Rohrbach et al. discloses “*wherein the one of the plurality of pin sets and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit (Column 5, lines 4-20).*”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Imamaki et al. with elements of Rohrbach et al. in order to minimize physical damage to the plug [Column 1, lines 30-67], which can be particularly problematic for asymmetrical plug shapes.

As per **claim 2**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*wherein the first communication channel and the second communication channel have an equal transmission rate (pin set 410 and 412 can be used for the same purpose and hence can be seen as being capable of the same transmission rate; Paragraphs 0050-0051).*”

As per **claim 3**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*connecting the first pin set to a signal processing unit, wherein the signal is processed by the signal processing unit (Paragraph 0050).*”

As per **claim 4**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the method*” (see rejection to **claim 1** above). Lanning discloses “*wherein*

*grounding the second pin set comprises connecting the second pin set to a grounding unit (**Paragraph 0051**)."*

As per **claim 5**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses "*the method*" (see rejection to **claim 1** above). Lanning discloses "*the first pin set is selected based on respective states of the first communication channel and the second communication channel (**depending on whether a particular channel is used or unused; Paragraph 0051**)."*

As per **claim 7**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses "*the method*" (see rejection to **claim 1** above). Lanning discloses "*wherein the interface unit includes a first detection pin for detecting a connection with the first communication channel and a second detection pin for detecting a connection with the second communication channel (**through a tap ID, where there are multiple taps; Paragraphs 0047-0048**)."*

Rohrbach et al. discloses "*and wherein the first detection pin and second detection pin are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (**Column 5, lines 4-20**)."*

As per **claims 8 and 14**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses "*the method*" (see rejection to **claim 1** above). Lanning discloses "*further comprising detecting the connection with the first communication channel through the first detection pin (**through a tap ID, which then determines the appropriate bus to process; Paragraphs 0047-0048 and 0051**)."*

As per **claim 9**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses "*the method*" (see rejection to **claim 1** above). Lanning discloses "*wherein the*

first pin set comprises a first transmission pin set and a first reception pin set, and wherein the second pin set comprises a second transmission pin set and a second reception pin set (the various buses 370 with a plurality of vias 360; FIG. 3C; Paragraph 0044).”

As per **claim 10**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “the method” (see rejection to **claim 1** above). Rohrbach et al. discloses “wherein the first transmission pin set and the second transmission pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (**Column 5, lines 4-20**).”

Rohrbach et al. discloses “wherein the first reception pin set and the second reception pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (**Column 5, lines 4-20**).”

As per **claim 11**, Lanning discloses “an apparatus comprising: an interface unit comprising a plurality of pin sets (**the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051**).”

Lanning discloses “a signal processing unit for processing a signal (**as they pertain to active/used pins; Paragraphs 0050-0051**).”

Lanning discloses “a grounding unit for grounding at least one of the plurality of pin sets (**unused channels are grounded so that they do not float; Paragraph 0051**).”

Lanning discloses “and at least one controller configured to: determine whether an external device is connected through a cable which supports a plurality of

communication channels, in response to determining that the external device is connected, select one pin set from the plurality of pin sets based on a communication channel established between electronic device and the external device (the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051)."

Lanning discloses "ground remaining pin sets of the plurality of pin sets (**unused channels are grounded so that they do not float; Paragraph 0051**)."

Lanning discloses "and process the signal for the first pin set (**as they pertain to active/used pins; Paragraphs 0050-0051**)."

However, Lanning does not disclose "wherein the at least one controller is further configure to: when a first communication channel is established, transmit the signal to the external device or receive the signal from the external device through a first pin set and the first communication channel, when a second communication channel is established, transmit the signal to the external device or receive the signal from the external device through a second pin set and the second communication channel."

Imamaki et al. discloses "wherein the at least one controller is further configure to: when a first communication channel is established, transmit the signal to the external device or receive the signal from the external device through a first pin set and the first communication channel (**selection in the switcher 104 where USB+ and USB- is selected; FIG. 3**), when a second communication channel is established, transmit the signal to the external device or receive the signal from the external device through a second pin set and the second communication channel (**selection in the switcher 104**

where GND and MD are selected; FIG. 3). Imamaki et al. also discloses “*and at least one controller configured to: determine whether an external device is connected through a cable which supports a plurality of communication channels (steps S602 and S604; FIG. 6; Paragraphs 0046-0047).*”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Imamaki et al. in order to utilize common connectors among different types and functions of devices.

However, Lanning and Imamaki et al. do not disclose “*wherein the selected one pin set and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.*”

Rohrbach et al. discloses “*wherein the selected one pin set and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit (Column 5, lines 4-20).*”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Imamaki et al. with elements of Rohrbach et al. in order to minimize physical damage to the plug [Column 1, lines 30-67], which can be particularly problematic for asymmetrical plug shapes.

As per **claim 12**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the at least one controller is further configured to select the first pin set based on states*

*of the first communication channel and the second communication channel (**depending on whether a particular channel is used or unused; Paragraph 0051**).*”

As per **claim 13**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the interface unit includes a first detection pin for detecting a connection with the first communication channel and a second detection pin for detecting a connection with the second communication channel (through a tap ID, where there are multiple taps; Paragraphs 0047-0048)*.”

Rohrbach et al. discloses “*wherein the first detection pin and the second detection pin are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (Column 5, lines 4-20)*.”

As per **claim 15**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the at least one controller is further configured to detect that the first communication channel is connected to an external device by using the first detection pin (whether a channel is used to provide a pod ID to an analyzer 114 (with the analyzer 114 being considered the external device); Paragraph 0050; FIG. 3A-D, FIG. 4)*.”

As per **claim 16**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses “*the apparatus*” (see rejection to **claim 11** above). Lanning discloses “*wherein the at least one controller comprises a connection unit configured to connect the first pin set to the signal processing unit (whether a channel is used to provide a pod ID to an analyzer 114 (with the analyzer 114 being considered the external device);*

Paragraph 0050; FIG. 3A-D, FIG. 4), and to connect the second pin set to the grounding unit (Paragraph 0051)."

As per **claim 17**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses "the apparatus" (see rejection to **claim 11** above). Lanning discloses "wherein the connection unit comprises a switch device (**through the FPGA; Paragraphs 0047 and 0051**)."

As per **claim 18**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses "the apparatus" (see rejection to **claim 11** above). Lanning discloses "wherein the at least one controller is further configured to apply a high signal for connecting the first pin set to the signal processing unit or a low signal for connecting the second pin set to the signal processing unit to the switch device (**a grounding signal can result in a low signal (signal '0' as opposed to a signal '1');** Paragraph 0051)."

As per **claim 19**, the combination of Lanning, Imamaki et al., and Rohrbach et al. discloses "the apparatus" (see rejection to **claim 11** above). Lanning discloses "wherein the first pin set comprises a first transmission pin set and a first reception pin set (**connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051**)."

Lanning discloses "wherein the second pin set comprises a second transmission pin set and a second reception pin set (**connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051**)."

Rohrbach et al. discloses “*wherein the first transmission pin set and the second transmission pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (Column 5, lines 4-20).*”

Rohrbach et al. discloses “*wherein the first reception pin set and the second reception pin set are arrayed to be vertically and horizontally symmetrical with respect to the center of the interface unit (Column 5, lines 4-20).*”

As per **claim 20**, Lanning discloses “*a non-transitory computer-readable medium storing one or more instructions which when executed by an electronic device cause the electronic device to perform a method comprising the steps of: determine whether an external device is connected through a cable which supports a plurality of communication channels, in response to determining that the external device is connected, selecting one pin set from a plurality of pin sets that are part of an interface unit based on a communication channel established between electronic device and the external device (the connector contains a series of pins 410 and 412 (FIG. 4), where one set of pins is used to provide a pod ID to an analyzer 114 (Paragraph 0050) and data transmission; Paragraph 0051).*”

Lanning discloses “*grounding remaining pin sets of the plurality of pin sets (unused channels are grounded so that they do not float; Paragraph 0051).*”

Lanning discloses “*and processing a signal for the selected one of the plurality of pin sets (as they pertain to active/used pins; Paragraphs 0050-0051).*”

However, Lanning does not disclose “*wherein the processing the signal comprising: when a first communication channel is established, transmit the signal to the external device or receive the signal from the external device through a first pin set*

and the first communication channel, when a second communication channel is established, transmit the signal to the external device or receive the signal for the external device through a second pin set and the second communication channel.”

Imamaki et al. discloses “*wherein the processing the signal comprising: when a first communication channel is established, transmit the signal to the external device or receive the signal from the external device through a first pin set and the first communication channel (selection in the switcher 104 where USB+ and USB- is selected; FIG. 3), when a second communication channel is established, transmit the signal to the external device or receive the signal for the external device through a second pin set and the second communication channel (selection in the switcher 104 where GND and MD are selected; FIG. 3).*” Imamaki et al. also discloses “*determine whether an external device is connected through a cable which supports a plurality of communication channels (steps S602 and S604; FIG. 6; Paragraphs 0046-0047).*”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Imamaki et al. in order to utilize common connectors among different types and functions of devices.

However, Lanning and Imamaki et al. do not disclose “*wherein the selected one of the plurality of pin sets and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit.*”

Rohrbach et al. discloses “*wherein the selected one of the plurality of pin sets and the remaining pin sets are arrayed to be vertically and horizontally symmetrical with respect to a center of the interface unit (Column 5, lines 4-20).*”

Before the effective filing date of the claimed invention it would have been obvious to a person of ordinary skill in the art to combine the elements of Lanning and Imamaki et al. with elements of Rohrbach et al. in order to minimize physical damage to the plug [**Column 1, lines 30-67**], which can be particularly problematic for asymmetrical plug shapes.

RELEVANT ART CITED BY THE EXAMINER

9. The following prior art made of record and relied upon is cited to establish the level of skill in the applicant's art and those arts considered reasonably pertinent to applicant's disclosure. See **MPEP 707.05(c)**.

10. The following references teach data transfer as they pertain to physical pin arrangements in a plug connector:

U.S. PATENT NUMBERS:

2013/0250180 A1 – [**Paragraph 0010**]

2014/0380103 A1 – [**Page 1, claim 1**]

5,745,795 – [**FIG. 3**]

CONCLUDING REMARKS

Conclusions

11. **THIS ACTION IS MADE FINAL.** 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 mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Henry Yu whose telephone number is (571)272-9779. The examiner can normally be reached on Monday - Friday.

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, IDRIS ALROBAYE can be reached on (571) 270-1023. 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.

/H.W.Y/
Examiner, Art Unit 2181
June 3, 2019

/Farley Abad/
Primary Examiner, Art Unit 2181

Notice of References Cited	Application/Control No. 15/082,408		Applicant(s)/Patent Under Reexamination CHUNG et al.	
	Examiner Henry Yu		Art Unit 2181	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-20130250180-A1	09-2013	WANG; Cheng-Si	H04N5/44	348/720
*	B	US-20140380103-A1	12-2014	PENG; XIAO-ZHAN	G06F13/00	714/43
*	C	US-5745795-A	04-1998	Pecone; Victor	G06F13/4022	710/1
	D					
	E					
	F					
	G					
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	I					
	J					
	K					
	L					
	M					

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.

Search Notes 	Application/Control No. 15/082,408	Applicant(s)/Patent Under Reexamination CHUNG et al.
	Examiner Henry Yu	Art Unit 2181

CPC - Searched*		
Symbol	Date	Examiner
G06F13/4221, G06F13/4068	02/13/2018	HY
G06F13/4221, G06F13/4068	08/03/2018	HY
G06F13/4221, G06F13/4068	11/21/2018	HY
G06F13/4221, G06F13/4068	05/31/2019	HY

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
710		02/13/2018	HY
710		08/03/2018	HY
710		11/21/2018	HY
710		05/31/2019	HY

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

/H.W.Y/ Examiner, Art Unit 2181	
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<i>Search Notes</i> 	Application/Control No. 15/082,408	Applicant(s)/Patent Under Reexamination CHUNG et al.
	Examiner Henry Yu	Art Unit 2181

Search Notes		
Search Notes	Date	Examiner
PLUS Search	01/18/2018	HY
EAST Seach (Inventor Search)	02/15/2018	HY
EAST Search	02/13/2018	HY
EAST Search	02/14/2018	HY
EAST Search	02/15/2018	HY
EAST Search (Update)	08/03/2018	HY
EAST Search (Update)	08/09/2018	HY
EAST Search (Update)	08/10/2018	HY
EAST Search (Update)	08/14/2018	HY
EAST Search (Update)	11/21/2018	HY
EAST Search (Update)	05/31/2019	HY
EAST Search (Update)	06/03/2019	HY

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/H.W.Y/ Examiner, Art Unit 2181	
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<i>Index of Claims</i> 	Application/Control No. 15/082,408	Applicant(s)/Patent Under Reexamination CHUNG et al.
	Examiner Henry Yu	Art Unit 2181

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	02/16/2018	08/14/2018	11/21/2018	06/03/2019					
	1	✓	✓	✓	✓					
	2	✓	✓	✓	✓					
	3	✓	✓	✓	✓					
	4	✓	✓	✓	✓					
	5	✓	✓	✓	✓					
	6	✓	✓	-	-					
	7	✓	✓	✓	✓					
	8	✓	✓	✓	✓					
	9	✓	✓	✓	✓					
	10	✓	✓	✓	✓					
	11	✓	✓	✓	✓					
	12	✓	✓	✓	✓					
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	14	✓	✓	✓	✓					
	15	✓	✓	✓	✓					
	16	✓	✓	✓	✓					
	17	✓	✓	✓	✓					
	18	✓	✓	✓	✓					
	19	✓	✓	✓	✓					
	20	✓	✓	✓	✓					

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	296	((("5574311") or ("5843798") or ("5764485") or ("4340266") or ("4834660") or ("4931723") or ("4934945") or ("4994732") or ("5222907") or ("5712858") or ("5736862") or ("5815057") or ("6139341") or ("4254446") or ("4263582") or ("4322120") or ("4333696") or ("4468072") or ("4531799") or ("4557540") or ("4611123") or ("4620304") or ("4763066") or ("4764848") or ("4766406") or ("4775917") or ("4784550") or ("4789011") or ("4799589") or ("4922492") or ("4946708") or ("5215140") or ("5243911") or ("5329693") or ("5331285") or ("5342992") or ("5353243") or ("5386189") or ("5391993") or ("5431244") or ("5460093") or ("5475215") or ("5483461") or ("5489798") or ("5551430") or ("5554985") or ("5613181") or ("5615344") or ("5625580") or ("5639562") or ("5655213") or ("5677663") or ("5689179") or ("5712504") or ("5712855") or ("5727963") or ("5734621") or ("5742256") or ("5743009") or ("5743457") or ("5758418") or ("5790830") or ("5801536") or ("5821825") or ("5831556") or ("5861663") or ("5905381") or ("5909124") or ("5923676") or ("5921817") or ("5929355") or ("5952843") or ("6000132") or ("RE36495") or ("6023568") or ("6051119") or ("6084267") or ("6105749") or ("6127204") or ("6132221") or ("6213786") or ("6223813") or ("6213786") or ("6223813") or ("4258566") or ("4265512") or ("4265013") or ("4272141") or ("4295060") or ("4307966") or ("4310753") or ("4314217") or ("4323631") or ("4348759") or ("4361372") or ("4380248") or ("4381211") or ("4383880") or ("4383760") or ("4384757")).PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2019/05/31 20:51
S2	10	(@ay<="2015" OR @rlad<="20150401") AND (G06F13/4221 OR G06F13/4068).cpc. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (plurality OR multiple)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S3	110	(@ay<="2015" OR @rlad<="20150401") AND (G06F13/4221 OR G06F13/4068).cpc. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51

S4	100	(@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (select\$3 OR choos\$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S5	16	"016744".ap.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S6	244	(@ay<="2015" OR @rlad<="20150401") AND "710".clas. AND pin SAME (channel OR lane OR link OR path) SAME ground\$3 SAME (device OR peripheral)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S7	4	((("20050120384") or ("8190786")).PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2019/05/31 20:51
S8	17	"203557".ap.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2019/05/31 20:51
S9	50	(@ay<="2015" OR @rlad<="20150401") AND pin WITH ground\$3 WITH unused SAME (channel OR lane OR link OR path)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S10	84	(@ay<="2015" OR @rlad<="20150401") AND pin SAME ground\$3 SAME unused SAME channel	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S11	3	("20040177207" "20070255885" "20140244890").PN.	US-PGPUB; USPAT	OR	OFF	2019/05/31 20:51
S12	90	((CHUNG NEAR "II-Hyung") OR (LEE NEAR Cheolho) OR (KIM NEAR "Dae-Woong") OR (KIM NEAR "Shin-Ho") OR (KIM NEAR Wonseob)).in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S13	7	((CHUNG NEAR "II-Hyung") OR (LEE NEAR Cheolho) OR (KIM NEAR "Dae-Woong") OR (KIM NEAR "Shin-Ho") OR (KIM NEAR Wonseob)).in. AND (pin).clm.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S14	2	((CHUNG NEAR "II-Hyung") OR (LEE NEAR Cheolho) OR (KIM NEAR "Dae-Woong") OR (KIM NEAR "Shin-Ho") OR (KIM NEAR	US-PGPUB; USPAT;	OR	ON	2019/05/31 20:51

		Wonseob)).in. AND (pin AND ground).clm.	USOCR; EPO; JPO; DERWENT			
S15	269	(@ay<="2015" OR @rlad<="20150401") AND pin SAME ground\$3 SAME channel SAME detect\$3 WITH connect\$3	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S16	51	(@ay<="2015" OR @rlad<="20150401") AND pin SAME ground\$3 SAME channel SAME reception SAME transmission	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S17	157	(@ay<="2015" OR @rlad<="20150401") AND pin SAME (channel OR lane OR link OR path) SAME (select\$3 OR choos\$3) SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S18	2	(@ay<="2015" OR @rlad<="20150401") AND (G06F13/4221 OR G06F13/4068).cpc. AND pin SAME (plug OR interface) SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S19	21	(@ay<="2015" OR @rlad<="20150401") AND ("710").clas. AND pin SAME plug SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S20	233	(@ay<="2015" OR @rlad<="20150401") AND (pin AND (plug OR interface) AND symmetrical).ti,ab.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S21	135	(@ay<="2015" OR @rlad<="20150401") AND pin SAME (channel OR lane OR link OR path) SAME (plug OR interface) SAME symmetrical	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S22	318	(@ay<="2015" OR @rlad<="20150401") AND (pin AND (plug OR interface) AND symmetric\$2).ti,ab.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/05/31 20:51
S23	2	("8177560").PN.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2019/05/31 20:51
S24	97	(@ay<="2015" OR @rlad<="20150401") AND pin SAME (select\$3 OR choos\$3) SAME channel SAME reception SAME transmission	US- PGPUB; USPAT;	OR	ON	2019/05/31 20:51

EAST Search History

			USOCR; EPO; JPO; DERWENT			
S25	141	(@ay<="2015" OR @rlad<="20150401") AND pin SAME (select\$3 OR choos\$3) SAME channel SAME (ascertain\$3 OR detect\$3) WITH connect\$3	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/06/03 13:44

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/082,408	03/28/2016	Il-Hyung CHUNG	4500-1-458	5081
33942	7590	12/20/2019		
Cha & Reiter, LLC 17 Arcadian Avenue Suite 208 Paramus, NJ 07652			EXAMINER YU, HENRY W	
			ART UNIT 2181	PAPER NUMBER
			MAIL DATE 12/20/2019	DELIVERY MODE PAPER

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.

<i>Notice of Abandonment</i>	Application No.	Applicant(s)
	15/082,408	CHUNG et al.
	Examiner	Art Unit
	Henry Yu	2181

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

This application is abandoned in view of:

1. ☒ Applicant's failure to timely file a proper reply to the Office letter mailed on 05 June 2019.
 - (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
 - (b) ☐ A proposed reply was received on _____, but it does not constitute a proper reply under 37 CFR 1.113 to the final rejection. (A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) if this is utility or plant application, a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. Note that RCEs are not permitted in design applications.)
 - (c) ☐ A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
 - (d) ☒ No reply has been received.
2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
 - (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
 - (b) ☐ The submitted fee of \$ _____ is insufficient. A balance of \$ _____ is due.
The issue fee required by 37CFR 1.18 is \$ _____. The publication fee, if required by 37 CFR 1.18(d), is \$ _____.
 - (c) ☐ The issue fee and publication fee, if applicable, has not been received.
3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
 - (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
 - (b) ☐ No corrected drawings have been received.
4. ☐ The letter of express abandonment which is signed by the attorney or agent of record or other party authorized under 37 CFR 1.33 (b). See 37 CFR 1.138(b).
5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34) upon the filing of a continuing application.
6. ☐ The decision by the Patent and Trademark Appeal Board rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.
7. ☒ The reason(s) below:

Examiner called the Attorney of Record, Mr. Steve Cha (Attorney Number 44,069), concerning the status of Application Number 15/082,408 (Attorney Docket Number 4500-1-458) on December 18, 2019, more than six months since the last action on the merits was mailed. Examiner was informed by Mr. Cha that a response has not been filed. Hence, in the view of the Office, the application has been abandoned.

/HENRY W YU/ Examiner, Art Unit 2181	/Farley Abad/ Primary Examiner, Art Unit 2181
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Petitions to revive under 37 CFR 1.137, or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.