請求項１乃至請求項６のいずれかに記載の移動通信端末。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】
本発明は、複数の項目を階層的に分類して構成されたメニューに従う使用者操作に基づいて使用者が指定する機能を判定し、その機能を実行する移動通信端末に関する。
【０００２】
【従来の技術】
移動通信端末は小型化・軽量化が要求されるため、表示器の表示領域の大きさやキーの数が制限される。
【０００３】
そこで、このような条件下において各種の機能の選択を使用者がより容易な操作により行うことを可能とするために移動通信端末では、各機能を分類して階層的なメニューを構成し、このメニューに従った使用者操作に基づいて指定される機能の判定を行うようにしている。
【０００４】
例えば、「音設定」↑「着信設定」↑「メール着信設定」↑「着信音量設定」なる順序で各階層のメニューから項目が使用者により選択されたことをもって、移動通信端末は着信音量を設定する機能が指定されたことを判定する。各階層のメニューにはそれぞれ複数の項目が含まれていて、使用者はそれらの複数の項目の中から所望の項目を選択する。
【０００５】
【特許文献１】
特開２０００－２６１５４４号公報
【０００６】
【発明が解決しようとする課題】
しかし、前記の通り移動通信端末の表示領域やキーの数は制限されていることから、１つの階層に含めることができる項目数も限られてしまう。その一方で近年は、移動通信端末の高機能化に伴って指定され得る機能が増大しており、メニューの階層数が増大する傾向にある。
【０００７】
このようなことから、上述のような形態で使用者が指定する機能の判定を行うようにしていても、使用者の操作は煩雑であるという不具合があった。
【０００８】
ところで、必ずしも使用者が移動通信端末に用意された全ての機能を平均的に使用するとは限らない。通常は、各機能の使用頻度に大きな差がある。すなわち、使用頻度の高い機能を指定するためには、その都度煩雑な操作を繰り返し行わなければならない。このような繰り返しの操作は非常に煩わしいものであり、使用者の利便性を損なっていた。
【０００９】
本発明はこのような事情を考慮してなされたものであり、その目的とするところは、使用頻度の高い機能を指定する際の使用者の操作を簡略化することが可能な移動通信端末を提供することにある。
【００１０】
【課題を解決するための手段】
以上の目的を達成するために本発明は第１に、機能の選択のための複数の項目を階層的に分類して構成されたメニューの階層毎に、含まれる項目の過去の選択状況に基づいて前記項目の優先順位を決定手段により決定し、この決定された優先順位が高い項目ほど少ない使用者操作に基づいて判定手段が選択するようにメニュー変更手段が前記メニューを前記階層毎に変更することとした。
【００１１】
このような手段を講じたことにより、メニューの各階層において、そこに含まれる項目の

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過去の選択状況に基づいてそれらの項目の優先順位が決定され、この優先順位が高い項目ほど少ない使用者操作に基づいて選択されるようにメニューが階層毎に変更される。従って、優先順位が高く設定されるような状況で過去に選択されている項目に関しては、使用者は少ない操作で選択することが可能となる。

【００１２】

また前述の目的を達成するために本発明は第２に、機能の選択のための複数の項目を階層的に分類して構成されたメニューの最下層の階層に含まれる項目の過去の選択状況に基づいてそれらの項目の優先順位を決定手段により決定し、この決定された優先順位が高い項目ほど少ない使用者操作に基づいて判定手段が選択するようにメニュー変更手段が前記メニューを変更することとした。

【００１３】

このような手段を講じたことにより、メニューの最下層の階層に含まれる項目の過去の選択状況に基づいてそれらの項目の優先順位が決定され、この優先順位が高い項目ほど少ない使用者操作に基づいて選択されるようにメニューが階層毎に変更される。従って、優先順位が高く設定されるような状況で過去に選択されている項目に関しては、使用者は少ない操作で選択することが可能となる。

【００１４】

【発明の実施の形態】

以下、図面を参照しながら本発明の実施形態について説明する。

【００１５】

図１は本発明の実施形態に係る移動通信端末のブロック図である。

【００１６】

この図に示すように本発明の実施形態の移動通信端末は、アンテナ１、無線部２、ＣＤＭＡ処理部３、圧縮伸長部４、ＰＣＭ処理部５、通話部６、ユーザインタフェース部７、記憶部８および主制御部９を有している。無線部２は、デュプレクサ（ＤＵＰ）２ａ、受信回路（ＲＸ）２ｂ、周波数シンセサイザ（ＳＹＮ）２ｃおよび送信回路（ＴＸ）２ｄを有する。通話部６は、レシーバアンプ６ａ、スピーカ６ｂ、マイクロホン６ｃおよび送話アンプ６ｄを有する。ユーザインタフェース部７は、表示部７ａおよび入力部７ｂを有する。

【００１７】

図示しない基地局から送信された無線信号は、アンテナ１で受信されたのち無線部２に入力される。無線部２では、上記無線信号はデュプレクサ２ａを介して受信回路２ｂに入力される。無線信号は、周波数シンセサイザ２ｃから出力された受信局部発振信号と受信回路２ｂにおいてミキシングされることで中間周波信号に周波数変換される。なお、上記周波数シンセサイザ２ｃから発生される受信局部発振信号の周波数は、主制御部９から出力される制御信号によって設定される。

【００１８】

上記中間周波信号は、ＣＤＭＡ処理部３に入力される。ＣＤＭＡ処理部３は、受信チャネルに割り当てられた拡散符号により上記中間周波信号を逆拡散処理する。続いてＣＤＭＡ処理部３は、例えばＱＰＳＫ（Ｑｕａｄｒａｔｕｒｅ Ｐｈａｓｅ Ｓｈｉｆｔ Ｋｅｙｉｎｇ）変調方式に対応する直交復調を行い、これによりデータレートに応じた所定のフォーマットの復調データまたはパケットデータに変換する。そしてＣＤＭＡ処理部３は、この変換された復調データを圧縮伸長部４に与え、パケットデータは主制御部９に与える。

【００１９】

圧縮伸長部４は、上記ＣＤＭＡ処理部３から出力された復調データに対し、主制御部９から通知される受信データレートに応じた伸長処理を施す。さらに圧縮伸長部４は、ビタビ復号などを用いた復号処理および誤り訂正復号処理を行って、ベースバンドの音声データを再生する。なお、上記の伸長処理はＱＣＥＬＰ方式またはＥＶＲＣ方式に準じた処理である。圧縮伸長部４は、音声データをＰＣＭ処理部５に与える。

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【００２０】
ＰＣＭ処理部５は、圧縮伸長部４から出力されたディジタルの音声データをＰＣＭ復号してアナログの音声信号を得る。この音声信号は、レシーバアンプ６ａで増幅されたのち、スピーカ６ｂより音声として出力される。
【００２１】
話者が発した音声は、マイクロホン６ｃにより音声信号に変換される。この音声信号は、送話アンプ６ｄに入力される。音声信号は、送話アンプ６ｄにより適正レベルまで増幅されたのち、ＰＣＭ処理部５へと与えられる。
【００２２】
ＰＣＭ処理部５は、上記音声信号に対してＰＣＭ符号化処理を施し、ディジタルの音声データを得る。ＰＣＭ処理部５は、この音声データを圧縮伸長部４に与える。
【００２３】
圧縮伸長部４は、音声データのエネルギー量を検出し、この検出結果に基づいてデータレートを決定する。そして圧縮伸長部４は、上記音声データを上記データレートに応じたフォーマットの信号にＱＣＥＬＰ方式により圧縮する。さらに圧縮伸長部４は、音声データに対して例えば畳み込み符号化による誤り訂正符号化処理を施したのちＣＤＭＡ処理部３へ出力する。
【００２４】
ＣＤＭＡ処理部３は、圧縮伸長部４から個々に与えられる各種伝送チャネルの送信データを多重化する。さらにＣＤＭＡ処理部３は、多重化後の送信データにより搬送波信号を変調する。この変調には、例えばＱＰＳＫが用いられる。ＣＤＭＡ処理部３は、変調された搬送波信号に対して、送信チャネルごとに割り当てられたＰＮ符号を用いてスペクトラム拡散処理を施して送信信号を得る。そしてＣＤＭＡ処理部３は、上記送信信号を無線部２の送信回路２ｄへと与える。
【００２５】
送信回路２ｄは、上記送信信号を、周波数シンセサイザ２ｃから発生される送信局部発振信号と合成することで無線周波信号に変換する。そして、送信回路２ｄは、主制御部９により通知される送信データレートに基づいて、上記無線周波信号の有効部分だけを高周波増幅した上で出力する。この送信回路２ｄから出力された無線周波信号は、デュプレクサ２ａを介してアンテナ１に供給され、このアンテナ１から接続中の基地局へ向けて送信される。
【００２６】
入力部７ｂには、各種のキーを含むキー群が設けられている。入力部７ｂは、これらのキーの押下による使用者指示を入力する。また表示部７ａには、ＬＣＤ（ｌｉｑｕｉｄ ｃｒｙｓｔａｌ ｄｉｓＰｌａｙ）およびＬＥＤ（ｌｉｇｈｔ ｅｍｉｔｔｉｎｇ ｄｉｏｄｅ）等が設けられている。表示部７ａは、これらＬＣＤおよびＬＥＤを用いて、通信相手の端末の電話番号および例えば着信状態などのような自端末の動作状態をはじめ、ＷＥＢサイトからのダウンロード情報、送受信メール、動画像、図示しないバッテリのＤｉｓｃｈａｒｇｅ状態等を表示する。
【００２７】
記憶部８は、例えばＲＯＭ、ＤＲＡＭ（ｄｙｎａｍｉｃ ＲＡＭ）、ＳＲＡＭ（ｓｔａｔｉｃ ＲＡＭ）、あるいはフラッシュメモリなどを適宜用いてなる。この記憶部８は、主制御部９用の動作プログラムを記憶する。また記憶部８は、各種の設定情報や各種の受信データ、あるいは本装置で作成された各種のデータなど、さまざまなデータを記憶する。また記憶部８は、メニュー操作における項目選択の履歴情報を記憶する。
【００２８】
主制御部９は、記憶部８に記憶されている動作プログラムに基づくソフトウェア処理により各部の制御処理を行うことで、移動通信端末としての動作を実現する。また主制御部９は、機能判定部９ａ、優先順位決定部９ｂ、メニュー変更部９ｃおよび優先順位変更部９ｄとして動作する。

【００２９】
ここで機能判定部９αは、使用者によるメニュー操作に基づいて使用者が指定する機能を判定する。優先順位決定部９ｂは、機能判定部９αが使用者によるメニュー操作を受け付けた際に、そのメニュー操作での項目選択の頻度情報を作成して記憶部８に記憶させておくとともに、この頻度情報に基づいて項目選択メニューに含まれる各項目の優先順位を決定する。メニュー変更部９ｃは、優先順位決定部９ｂにより決定された優先順位を考慮して項目選択メニューの構成を変更する。そして優先順位変更部９ｄは、上記の優先順位を使用者からの指示に応じて変更する。

【００３０】
（第１の実施形態）
次に以上のように構成された移動通信端末の第１実施形態における動作につき説明する。なお、音声通話機能などのような移動通信端末における一般的な機能を実現するための処理は従来と同様であるのでその説明は省略する。ここでは、使用者により指定される機能の判定に関する動作につき詳しく説明する。

【００３１】
まず、この移動通信端末が有する機能の使用者による指定を受け付ける場合、主制御部９は例えば図２に示すようなメニュー画面を表示部７αに表示させ、このメニュー画面に示される項目の選択を受け付けて行く。項目の選択の受け付けは、カーソルＣの移動指示に応じて候補項目を変更するとともに、決定指示がなされた際の候補項目を選択された項目として判定することで行う。あるいは、各項目に対応付けたキーが押下された場合に、そのキーに対応する項目を選択された項目として判定することで行う。具体的には、図２における「音設定」の項目は、カーソルの下方移動の指示が３回なされた上で決定指示がなされたことに応じて、あるいはテンキーのうちの「３」のキーが押下されたことに応じて選択が受け付けられる。なお、項目選択メニューは階層的に構成されていて、主制御部９は選択された項目に応じて順次下位の階層へと移行して行く。そして主制御部９は、最下層の階層にて選択される項目に応じた機能を指定された機能として判定する。以上の主制御部９での処理が、機能判定部９αとしての機能によりなされる処理に相当する。

【００３２】
さて、１階層の項目選択メニューからの項目の選択がなされる毎に主制御部９は、図３に示すような使用頻度情報記憶処理を実行する。なおこの図３に示す処理が、優先順位決定部９ｂとしての機能によりなされる処理に相当する。

【００３３】
主制御部９はステップＳＴ１において、現在の時刻を取得する。そして主制御部９はステップＳＴ２において、上記取得した時刻が属する時刻グループを今回頻度情報を更新する時刻グループ（以下、更新対象時刻グループと称する）として決定する。なお時刻グループは、例えば１時間単位などで予め定められている。

【００３４】
続いて主制御部９はステップＳＴ３において、現在在圏している基地局の基地局ＩＤ（以下、在圏基地局ＩＤと称する）を取得する。そして主制御部９はステップＳＴ４において、上記取得した在圏基地局ＩＤに対応するメニューリスト（以下、更新対象メニューリストと称する）が更新対象時刻グループに対応付けて既に作成されているか否かを確認する。もし、該当する更新対象メニューリストがまだ作成されていないことを確認したならば、主制御部９はステップＳＴ５において、更新対象時刻グループに対応付けて在圏基地局ＩＤに対応するメニューリストを新規作成し、これを今回の更新対象メニューリストとする。

【００３５】
一方、該当する更新対象メニューリストが作成済みであることをステップＳＴ４にて確認したならば、主制御部９はステップＳＴ６において、その更新対象メニューリストに今回項目の選択がなされた項目選択メニューのメニューＩＤ（以下、選択メニューＩＤと称する）が含まれているか否かを確認する。なおメニューＩＤは、階層的に構成された複数の

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項目選択メニューのそれぞれを一意に識別可能に予め定められている。

【００３６】

ここで選択メニューＩＤが含まれていないことを確認した場合、ならびにステップＳＴ５にてメニューリストを新規作成した場合、主制御部９は続いてステップＳＴ７において、更新対象メニューリストに選択メニューＩＤを登録するとともに、その選択メニューＩＤに対応付けて項目頻度テーブルを新規作成する。項目頻度テーブルは、項目選択メニューに含まれる各項目とその使用頻度を示す頻度情報とを対応付けて記憶するものである。

【００３７】

選択メニューＩＤが含まれていることをステップＳＴ６にて確認した場合、ならびにステップＳＴ７にて項目頻度テーブルを作成し終えた場合、主制御部９は続いてステップＳＴ８において、選択メニューＩＤに対応する項目頻度テーブルで今回選択された項目の頻度情報を更新する。そして主制御部９はこれをもって使用頻度情報記憶処理を終了する。

【００３８】

ところで、何らかのイベントが発生するのを待受けている状態から機能選択の開始を指示するキー（例えばファンクションキー）が押下された場合には最上層の階層のメニュー画面を、また最下層以外の階層の項目選択メニューにおいて項目の選択がなされた場合にはそれよりも１つ下位の階層のメニュー画面をそれぞれ表示する必要が生じる。そしてこのことに応じて主制御部９は図４に示すような項目選択メニュー表示処理を実行する。なおこの図４に示す処理が、優先順位決定部９ｂおよびメニュー変更部９ｃとしての機能によりなされる処理に相当する。

【００３９】

主制御部９はステップＳＴ１１において、現在の時刻を取得する。そして主制御部９はステップＳＴ１２において、上記取得した時刻が属する時刻グループを判定し、その時刻グループを今回メニューリストを参照するべき時刻グループ（以下、参照対象時刻グループと称する）として決定する。

【００４０】

次に主制御部９はステップＳＴ１３において、在圏基地局ＩＤを取得する。そして主制御部９はステップＳＴ１４およびステップＳＴ１５において、上記参照対象時刻グループに上記の在圏基地局ＩＤ用のメニューリスト（以下、参照対象メニューリストと称する）が含まれており、かつその参照対象メニューリストに今回表示するべきメニュー（以下、参照対象メニューと称する）のメニューＩＤが含まれているか否かを確認する。もし、この条件が成立することを確認したならば、主制御部９はステップＳＴ１６において、参照対象メニューの各項目について、参照対象メニューリストの参照対象メニューに対応した項目頻度テーブルの頻度情報から、使用頻度が高い項目ほど優先順位が高くなるように優先順位を決定する。すなわち、参照対象メニューに関して同一の地域にて過去に項目の選択が行われていて、その項目選択に関する頻度情報が項目頻度テーブルに記憶されているのならば、その情報に基づいて過去の使用頻度に応じて優先順位を決定するのである。

【００４１】

これに対して、ステップＳＴ１４およびステップＳＴ１５のいずれかで上記の条件が成立しないことを確認した場合、主制御部９はステップＳＴ１７において、参照対象メニューの各項目について、参照対象時刻グループの他のメニューリストに登録されている参照対象メニューの項目頻度テーブルの全ての頻度情報を平均化して、使用頻度が高い項目ほど優先順位が高くなるように優先順位を決定する。すなわち、参照対象メニューに関して同一の地域にて過去に項目の選択が行われていないのならば、参照対象メニューに関して他の地域にて過去になされた項目選択に関する頻度情報に基づいて過去の使用頻度に応じて優先順位を決定するのである。なお、複数の地域で選択された項目は使用頻度がそれぞれ異なるので、それらを地域毎の使用頻度を平均化することで項目毎の使用頻度を求めるのである。

【００４２】

ステップＳＴ１６またはステップＳＴ１７で優先順位を決定し終えたならば、続いて主制

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御部９はステップＳＴ１８において、上記の優先順位が高い項目ほど少ない操作で選択できるように項目を並べ替えた項目選択メニューを作成し、その項目選択メニューを表示部７αに表示させる。そしてこれをもって主制御部９は項目選択メニュー表示処理を終了する。

【００４８】

かくして、時間帯および地域毎でメニューの各階層の項目の使用頻度が学習され、使用頻度の高い項目ほど少ない操作で選択できるように項目を並べ替えた項目選択メニューが表示される。

【００４４】

以下に、この第１実施形態の移動通信端末にて表示される項目選択メニューの具体例を説明する。ここでは、使用者が、朝に職場に出社した際にメール着信音の音量を「２」に設定し、また夜に退社する際にメール着信音の音量を「４」に設定する操作を頻繁に行う場合を例示する。この場合、出社時間帯において職場がある地域にてメール着信音量を「４」に設定するためのメニュー操作と、退社時間帯において職場がある地域にてメール着信音量を「２」に設定するためのメニュー操作とが頻繁に行われることとなるため、そのメニュー操作に伴って選択される項目に関する使用頻度が高いことがそれぞれ学習される。

【００４５】

そしてこの結果、出社時間帯であってかつ職場がある地域においては、図５に示すように、表示部７αに待ち受け画面１１を表示させている状態からファンクションキー（Ｆキー）が１回押下されると、主制御部９は表示部７αに最上位メニュー１２を表示させる。この最上位メニュー１２には、デフォルト状態にて４番目の項目として「音設定」なる項目が含まれるが、主制御部９はこの項目が当該時間帯および地域にて最も頻繁に選択されていることから、この項目を１番目に示すように変更している。「音設定」の項目の選択キーとしてテンキーのうちの「３」のキーが割り付けられているが、主制御部９はこれについては変更しない。

【００４６】

メール着信音量の設定機能を使用するためには、使用者が「音設定」の項目を最上位メニュー１２から選択することとなる。このために使用者は、テンキーのうちの「３」のキーを押下するか、あるいは「音設定」の項目にカーソルＣを合わせてファンクションキーを押下する。そうすると主制御部９は、表示部７αに音設定メニュー１３を表示させる。この音設定メニュー１３には、デフォルト状態にて１番目の項目として「着信設定」なる項目が含まれるが、主制御部９はこの項目が当該時間帯および地域にて最も頻繁に選択されていることから、この項目をそのまま１番目に示すようにしている。「着信設定」の項目の選択キーとしてテンキーのうちの「０」のキーが割り付けられている。

【００４７】

メール着信音量の設定機能を使用するためには、使用者が「着信設定」の項目を音設定メニュー１３から選択することとなる。このために使用者は、テンキーのうちの「０」のキーを押下するか、あるいは「着信設定」の項目にカーソルＣを合わせてファンクションキーを押下する。そうすると主制御部９は、表示部７αに着信設定メニュー１４を表示させる。この着信設定メニュー１４には、デフォルト状態にて５番目の項目として「メール着信設定」なる項目が含まれるが、主制御部９はこの項目が当該時間帯および地域にて最も頻繁に選択されていることから、この項目を１番目に示すように変更している。「メール着信設定」の項目の選択キーとしてテンキーのうちの「４」のキーが割り付けられている。

【００４８】

メール着信音量の設定機能を使用するためには、使用者が「メール着信設定」の項目を着信設定メニュー１４から選択することとなる。このために使用者は、テンキーのうちの「４」のキーを押下するか、あるいは「メール着信設定」の項目にカーソルＣを合わせてファンクションキーを押下する。そうすると主制御部９は、表示部７αにメール着信設定メニュー１５を表示させる。このメール着信設定メニュー１５には、デフォルト状態にて３

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番目の項目として「着信音量設定」なる項目が含まれるが、主制御部９はこの項目が当該時間帯および地域にて最も頻繁に選択されていることから、この項目を１番目に示すように変更している。「着信音量設定」の項目の選択キーとしてテンキーのうちの「２」のキーが割り付けられている。

【００４９】

メール着信音量の設定機能を使用するためには、使用者が「着信音量設定」の項目をメール着信設定メニュー１５から選択することとなる。このために使用者は、テンキーのうちの「２」のキーを押下するか、あるいは「着信音量設定」の項目にカーソルＣを合わせてファンクションキーを押下する。そうすると主制御部９は、メール着信音量の設定機能を起動し、表示部７αに音量設定画面１６を表示させる。この音量設定画面１６は、デフォルト状態では現在設定されている音量を示す状態とされるのであるが、主制御部９は「音量２」が当該時間帯および地域においては最も頻繁に指定されていることから、「音量２」を指定する内容に音量設定画面１６を変更している。

【００５０】

使用者はメール着信音の音量を「２」に設定しようとしているのだから、音量設定画面１６を確認したならば、決定を指示するためにファンクションキーを押下することとなる。そうすると主制御部９は、メール着信音量の設定機能によりメール着信音の音量を「２」に設定する。この上で主制御部９は、表示部７αの表示をメール着信設定メニュー１７に戻す。ただしメール着信設定メニュー１７では、各項目はデフォルトの順番としている。さらに、メール着信設定メニュー１７を表示させている状態から終了キーが押下されたことに応じて、主制御部９は表示部７αの表示を待ち受け画面１１に戻す。

【００５１】

一方、退社時間帯であってかつ職場がある地域においては、図６に示すように、表示部７αに待ち受け画面２１を表示させている状態からファンクションキーが１回押下されると、主制御部９は表示部７αに最上位メニュー２２を表示させる。この最上位メニュー２２には、デフォルト状態にて４番目の項目として「音設定」なる項目が含まれるが、主制御部９はこの項目が当該時間帯および地域にて最も頻繁に選択されていることから、この項目を１番目に示すように変更している。

【００５２】

メール着信音量の設定機能を使用するために使用者が「音設定」の項目を最上位メニュー２２から選択したならば、これに応じて主制御部９は、表示部７αに音設定メニュー２３を表示させる。この音設定メニュー２３には、デフォルト状態にて１番目の項目として「着信設定」なる項目が含まれるが、主制御部９はこの項目が当該時間帯および地域にて最も頻繁に選択されていることから、この項目をそのまま１番目に示すようにしている。

【００５３】

メール着信音量の設定機能を使用するために使用者が「着信設定」の項目を音設定メニュー２３から選択したならば、これに応じて主制御部９は、表示部７αに着信設定メニュー２４を表示させる。この着信設定メニュー２４には、デフォルト状態にて５番目の項目として「メール着信設定」なる項目が含まれるが、主制御部９はこの項目が当該時間帯および地域にて最も頻繁に選択されていることから、この項目を１番目に示すように変更している。

【００５４】

メール着信音量の設定機能を使用するために使用者が「メール着信設定」の項目を着信設定メニュー２４から選択したならば、これに応じて主制御部９は、表示部７αにメール着信設定メニュー２５を表示させる。このメール着信設定メニュー２５には、デフォルト状態にて３番目の項目として「着信音量設定」なる項目が含まれるが、主制御部９はこの項目が当該時間帯および地域にて最も頻繁に選択されていることから、この項目を１番目に示すように変更している。

【００５５】

メール着信音量の設定機能を使用するために使用者が「着信音量設定」の項目をメール着

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信設定メニュー２５から選択したならば、これに応じて主制御部９は、メール着信音量の設定機能を起動し、表示部７αに音量設定画面２６を表示させる。この音量設定画面２６は、デフォルト状態では現在設定されている音量を示す状態とされるのであるが、主制御部９は「音量４」が当該時間帯および地域においては最も頻繁に指定されていることから、「音量４」を指定する内容に音量設定画面２６を変更している。

【００５６】

使用者はメール着信音の音量を「４」に設定しようとしているのだから、音量設定画面２６を確認したならば、決定を指示するためにファンクションキーを押下することとなる。そうすると主制御部９は、メール着信音量の設定機能によりメール着信音の音量を「４」に設定する。この上で主制御部９は、表示部７αの表示をメール着信設定メニュー２７に戻す。ただしメール着信設定メニュー２７では、各項目はデフォルトの順番としている。さらに、メール着信設定メニュー２７を表示させている状態から終了キーが押下されたことに応じて、主制御部９は表示部７αの表示を待ち受け画面２１に戻す。

【００５７】

さて、主制御部９は上述のように各項目選択メニューを表示する際、１番目の項目を候補項目とし、この候補項目に合わせてカーソルＣを表示させる。そして主制御部９は、このカーソルＣの移動指示に応じて候補項目を変更し、ファンクションキーが押下された際の候補項目を選択項目とする。このため、上述のように各階層のメニュー画面にて１番目に表示される項目は、そのメニュー画面の表示開始当初から候補項目とされるのであって、その項目の選択のために使用者はファンクションキーの押下のみ行えば良い。従って、最も頻繁に行うメニュー操作を繰り返し行うのであれば、使用者は各階層のメニュー画面毎にファンクションキーを押下するのみで良い。

【００５８】

また、各階層のメニュー画面にて１番目に表示されている項目とは異なる項目を選択する場合でも、各メニュー画面の項目は使用頻度に応じた優先順位で並べられるので、使用者は使用頻度の高い項目ほど少ないカーソルＣの移動指示で候補項目に指定することが可能である。従って、使用頻度の高い項目ほど少ない操作で選択することが可能なのである。

【００５９】

しかもこの第１実施形態では、時間帯および地域毎でそれぞれ個別に各項目の使用頻度を集計し、その時間帯および地域毎での使用頻度に基づいて優先順位を決定するから、上述の具体例のような日常的な繰り返しの操作を非常に効率良く行うことを可能とするように適正にメニュー画面を変更することが可能である。

【００６０】

なお、使用者により優先順位の変更が要求された場合、主制御部９は使用者からの指示に応じて記憶部８に記憶されている頻度情報を変更する。例えば、使用者が特定の項目についての頻度情報のクリアを指示したならば、主制御部９は該当する頻度情報を過去に選択がなされていないことを示す内容に更新する。このようにすることで、後のメニュー画面の表示の際に決定される優先順位が使用者の意志に応じて変更されることとなる。これにより、変更されたメニュー画面が使用者にとって操作し辛いものとなってしまった場合などに、使用者がメニュー画面の修正を図ることが可能となって、利便性が向上する。

【００６１】

（第２の実施形態）

続いて、本発明の実施形態の移動通信端末の第２実施形態における動作につき説明する。

【００６２】

さて、使用者がメニュー操作を開始したことに応じて、主制御部９はそのメニュー操作を受け付けるための処理を行うのと並行して、図７に示すような操作セット記録処理を実行する。なおこの図７に示す処理が、優先順位決定部９ｂとしての機能によりなされる処理に相当する。

【００６３】

主制御部９はステップＳＴ２１において、項目選択の確定やパラメータ入力の確定などの

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操作イベントが発生するのを待ち受ける。そして操作イベントが発生したことを確認したならば、主制御部９はステップＳＴ２２において、その操作の内容がメニュー操作の終了を指示するものであるか否かを確認する。もし終了を指示するものではないことを確認したならば、主制御部９はステップＳＴ２３において、今回なされた操作の内容を操作セットに追加し、この上でステップＳＴ２１に処理を戻す。操作セットとは、一連のメニュー操作において選択された機能を示す情報である。また、その選択された機能によりパラメータ設定が行われたのであれば、その設定されたパラメータも操作セットに含まれる。

【００６４】

一方、メニュー操作の終了を指示する操作がなされたことをステップＳＴ２２にて確認したならば、主制御部９はステップＳＴ２４において、現在の時刻を取得する。そして主制御部９はステップＳＴ２５において、上記取得した時刻が属する時刻グループを操作セットを登録する時刻グループ（以下、登録対象時刻グループと称する）として決定する。

【００６５】

続いて主制御部９はステップＳＴ２６において、在圏基地局ＩＤを取得する。そして主制御部９はステップＳＴ２７およびステップＳＴ２８において、上記取得した在圏基地局ＩＤに対応する操作セット頻度リスト（以下、登録対象操作セット頻度リストと称する）が登録対象時刻グループに対応付けて既に作成されており、かつその登録対象操作セット頻度リストに今回記録した操作セットが含まれているか否かを確認する。もし、既に存在する登録対象操作セット頻度リストに今回記録した操作セットが含まれていることを確認したならば、主制御部９はステップＳＴ２９において、登録対象操作セット頻度リストにて今回記録した操作セットに対応付けられている使用頻度情報を更新し、これをもって操作セット記録処理を終了する。

【００６６】

これに対して、登録対象時刻グループに対応する操作セット頻度リストが存在しないことをステップＳＴ２７にて確認したならば、主制御部９はステップＳＴ３０において、登録対象時刻グループに対応付けて登録対象操作セット頻度リストを新規作成する。

【００６７】

上記のように登録対象操作セット頻度リストを新規作成した場合、あるいは既に存在する登録対象操作セット頻度リストに今回記録した操作セットが含まれていないことをステップＳＴ２８にて確認した場合、主制御部９はステップＳＴ３１において、登録対象操作セット頻度リストに登録対象操作セットを使用頻度情報と対応付けて登録し、これをもって操作セット記録処理を終了する。

【００６８】

ところで、使用者の操作により操作セット選択メニューの表示が要求されたことに応じて、主制御部９は図８に示すような操作セット選択メニュー表示処理を実行する。

【００６９】

主制御部９はステップＳＴ４１において、現在の時刻を取得する。そして主制御部９はステップＳＴ４２において、上記取得した時刻が属する時刻グループを今回操作セット頻度リストを参照する時刻グループ（以下、参照対象時刻グループと称する）そして決定する。

【００７０】

続いて主制御部９はステップＳＴ４３において、在圏基地局ＩＤを取得する。そして主制御部９はステップＳＴ４４において、参照対象時刻グループに在圏基地局ＩＤ用の操作セット頻度リスト（以下、参照対象操作セット頻度リストと称する）があるか否かを確認する。もし、該当する参照対象操作セット頻度リストがあることを確認したならば主制御部９はステップＳＴ４５において、その参照対象操作セット頻度リストに登録された操作セットについて、その使用頻度が高い操作セットほど優先順位が高くなるように優先順位を決定する。しかし、該当する参照対象操作セット頻度リストがないことをステップＳＴ４４にて確認したならば主制御部９はステップＳＴ４６において、参照対象時刻グループの他の基地局ＩＤ用の操作セット頻度リストに登録されている全ての操作セットについて使

用頻度が高い操作セットほど優先順位が高くなるように優先順位を決定する。

【００７１】

ステップＳＴ４５またはステップＳＴ４６にて優先順位を決定したならば、続いて主制御部９はステップＳＴ４７において、上記の優先順位が高い操作セットほど少ない操作で選択できるように操作セットを並べた操作セット選択メニューを作成し、表示部７αに表示させる。そして主制御部９は、これをもって操作セット選択メニュー表示処理を終了する。

【００７２】

以上のように操作セット選択メニュー表示処理により表示部７αに表示させた操作セット選択メニューに基づいて操作セットが使用者により選択されたならば、主制御部９はその選択された操作セットに示されている機能が選択されたものとして判定する。そして主制御部９は、その選択された機能に関する処理を実行する。その選択された機能がパラメータの設定を伴う機能であるならば、上記選択された操作セットに設定するべきパラメータが含まれているから、そのパラメータの設定までを主制御部９が行う。

【００７３】

このように操作セットを実行した場合、主制御部９は図９に示すような使用頻度情報更新処理を実行する。

【００７４】

主制御部９はステップＳＴ５１において、現在の時刻を取得する。そして主制御部９はステップＳＴ５２において、上記取得した時刻が属する時刻グループを今回頻度情報を更新する時刻グループ（以下、更新対象時刻グループと称する）として決定する。

【００７５】

続いて主制御部９はステップＳＴ５３において、在圏基地局ＩＤを取得する。そして主制御部９はステップＳＴ５４において、更新対象時刻グループに在圏基地局ＩＤ用の操作セット頻度リスト（以下、更新対象操作セット頻度リストと称する）があり、その更新対象操作セット頻度リストに今回実行した操作セットが含まれているか否かを確認する。もし更新対象操作セット頻度リストに今回実行した操作セット（以下、更新対象操作セットと称する）が含まれているならば、主制御部９はステップＳＴ５６において、その操作セットに対応する頻度情報を更新し、これをもって使用頻度情報更新処理を終了する。

【００７６】

これに対して、更新対象操作セット頻度リストが存在しないことをステップＳＴ５４にて確認したならば、主制御部９はステップＳＴ５７において、更新対象時刻グループに更新対象操作セット頻度リストを新規作成する。

【００７７】

上記のように更新対象操作セット頻度リストを新規作成した場合、あるいは既に存在する更新対象操作セット頻度リストに更新対象操作セットが含まれていないことをステップＳＴ５５にて確認した場合、主制御部９はステップＳＴ５８において、更新対象操作セット頻度リストに更新対象操作セットを登録し、これをもって使用頻度情報更新処理を終了する。

【００７８】

以下に、この第２実施形態の移動通信端末にて表示される項目選択メニューの具体例を説明する。ここでは、使用者が、朝に職場に出社した際にメール着信音の音量を「２」に設定し、また夜に退社する際にメール着信音の音量を「４」に設定する操作を頻繁に行う場合を例示する。この場合、初期にはこれらの操作に関する操作セットは記録されていないが、例えば第１実施形態にて説明したような手順のメニュー操作により該当する機能が一旦実行されれば、そのことを示した操作セットが記録される。

【００７９】

そしてこの結果、出社時間帯であってかつ職場がある地域においては、図１０に示すように、表示部７αに待ち受け画面８１を表示させている状態からファンクションキーが１回押下されると、主制御部９は表示部７αに最上位メニュー８２を表示させる。この最上位

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メニュー８２には、１番目の項目として「操作セット選択」なる項目が含まれる。記録されている操作セットを実行させる場合に使用者は、「操作セット選択」の項目を最上位メニュー８２から選択することとなる。このために使用者は、テンキーのうちの「＊」のキーを押下するか、あるいは「操作セット選択」の項目にカーソルＣを合わせてファンクションキーを押下する。そうすると主制御部９は、表示部７αに操作セット選択メニュー８３を表示させる。この操作セット選択メニュー８３には、記録されている操作セットをそれぞれ示す項目が示され、ここでは過去での使用頻度に従い１番目に「メール着信音量２」なる項目が含まれている。

【００８０】

メール着信音量を「２」に設定するためには、使用者が「メール着信音量２」の項目を操作セット選択メニュー８３から選択することとなる。このために使用者は、テンキーのうちの「０」のキーを押下するか、あるいは「メール着信音量２」の項目にカーソルＣを合わせてファンクションキーを押下する。そうすると主制御部９は、メール着信音量の設定機能によりメール着信音の音量を「２」に設定する。この上で主制御部９は、表示部７αの表示を最上位メニュー８４に戻す。さらに、最上位メニュー８４を表示させている状態から終了キーが押下されたことに応じて、主制御部９は表示部７αの表示を待ち受け画面８１に戻す。

【００８１】

一方、退社時間帯であってかつ職場がある地域においては、図１１に示すように、表示部７αに待ち受け画面４１を表示させている状態からファンクションキーが１回押下されると、主制御部９は表示部７αに最上位メニュー４２を表示させる。この最上位メニュー４２には、１番目の項目として「操作セット選択」なる項目が含まれる。記録されている操作セットを実行させる場合に使用者は、「操作セット選択」の項目を最上位メニュー４２から選択することとなる。そうすると主制御部９は、表示部７αに操作セット選択メニュー４３を表示させる。この操作セット選択メニュー４３には、記録されている操作セットをそれぞれ示す項目が示され、ここでは過去での使用頻度に従い１番目に「メール着信音量４」なる項目が含まれている。

【００８２】

メール着信音量を「４」に設定するためには、使用者が「メール着信音量４」の項目を操作セット選択メニュー４３から選択することとなる。そうすると主制御部９は、メール着信音量の設定機能によりメール着信音の音量を「４」に設定する。この上で主制御部９は、表示部７αの表示を最上位メニュー４４に戻す。さらに、最上位メニュー４４を表示させている状態から終了キーが押下されたことに応じて、主制御部９は表示部７αの表示を待ち受け画面４１に戻す。

【００８３】

以上のようにこの第２実施形態によれば、使用者のメニュー操作により過去に選択された機能を操作セットとして学習され、この操作セットが操作セット選択メニューにより選択可能とされる。そして操作セットが使用者により選択された場合には、その選択された操作セットに対応する機能が実行される。従って、使用者は、過去に選択した機能を再度選択しようとする場合には、操作セット選択メニューから該当する操作セットを選択すれば良く、多数の階層に渡る複雑なメニュー操作を再度行う必要が無い。かつ操作セット選択メニューは、各操作セットが対応する機能の使用頻度に応じた優先順位で並べて構成されるので、使用者は使用頻度の高い機能に対応する操作セットほど少ない操作で選択することが可能である。

【００８４】

しかもこの第２実施形態では、時間帯および地域毎でそれぞれ個別に操作セットを管理し、その時間帯および地域毎での選択可能とする操作セットを変更するようにしているから、上述の具体例のような日常的な繰り返しの操作を非常に効率良く行うことを可能とするように適正に操作セットを使用者に対し提示することが可能である。

【００８５】

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なお、使用者により優先順位の変更が要求された場合、主制御部９は使用者からの指示に応じて記憶部８に記憶されている頻度情報を変更する。例えば、使用者が特定の項目についての頻度情報のクリアを指示したならば、主制御部９は該当する頻度情報を過去に選択がなされていないことを示す内容に更新する。このようにすることで、後に決定される操作セットの優先順位が使用者の意志に応じて変更されることとなる。これにより、操作セット選択メニューが使用者にとって操作し辛いものとなってしまった場合に、使用者がその操作セット選択メニューの修正を図ることが可能となって、利便性が向上する。

【００８６】

なお、本発明は前記各実施形態に限定されるものではない。例えば、時間帯および地域のいずれか一方のみに応じて優先順位を決定することとしても良いし、あるいは時間帯および地域のいずれも考慮せずに優先順位を決定することも可能である。

【００８７】

また、時間帯および地域の双方または一方に応じてメニュー内のそれぞれの選択に要する操作数を変化させる手法は、例えば特開２０００－２６１５４４号公報に開示されているもの等のような他の形態でのメニュー変更を行う技術に適用しても有効である。

【００８８】

また、優先順位は、最も新しく選択された項目や操作セットを最も高くするなどのように、その決定の条件は任意であって良い。

【００８９】

また、前記第２実施形態において操作セット選択メニューを配置する階層は、機能を特定するメニューよりも上位の階層であれば任意であって良い。

【００９０】

このほか、本発明の要旨を逸脱しない範囲で種々の変形実施が可能である。

【００９１】

【発明の効果】

本発明によれば、メニューの各階層にそこに含まれる項目の過去の選択状況に基づいて、あるいはメニューの最下層の階層に含まれる項目の過去の選択状況に基づいて、それらの項目の優先順位を決定し、この優先順位が高い項目ほど少ない使用者操作に基づいて選択されるようにメニューを変更することとしたので、優先順位が高く設定されるような状況で過去に選択されている項目に関しては、使用者は少ない操作で選択することが可能となり、この結果、使用頻度の高い機能を指定する際の使用者の操作を簡略化することが可能となる。

【図面の簡単な説明】

【図１】本発明の実施形態に係る移動通信端末のブロック図。

【図２】表示部７ａにて表示されるメニュー画面の一例を示す図。

【図３】使用頻度情報記憶処理のフローチャート。

【図４】項目選択メニュー表示処理のフローチャート。

【図５】第１実施形態での項目選択メニューの表示の具体例を示す図。

【図６】第１実施形態での項目選択メニューの表示の具体例を示す図。

【図７】操作セット記録処理のフローチャート。

【図８】操作セット選択メニュー表示処理のフローチャート。

【図９】使用頻度情報更新処理のフローチャート。

【図１０】第２実施形態での項目選択メニューの表示の具体例を示す図。

【図１１】第２実施形態での項目選択メニューの表示の具体例を示す図。

【符号の説明】

１　アンテナ

２　無線部

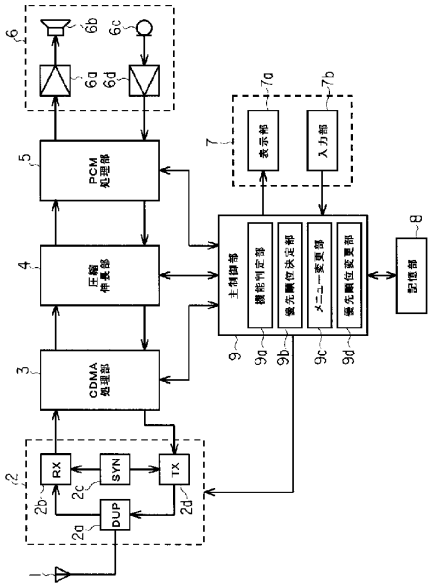
３　ＣＤＭＡ処理部

４　圧縮伸長部

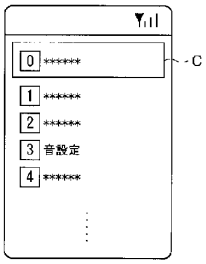
５　ＰＣＭ処理部

6　通話部
7　ユーザインタフェース部
8　記憶部
9　主制御部
9a　機能判定部
9b　優先順位決定部
9c　メニュー変更部
9d　優先順位変更部

【図１】

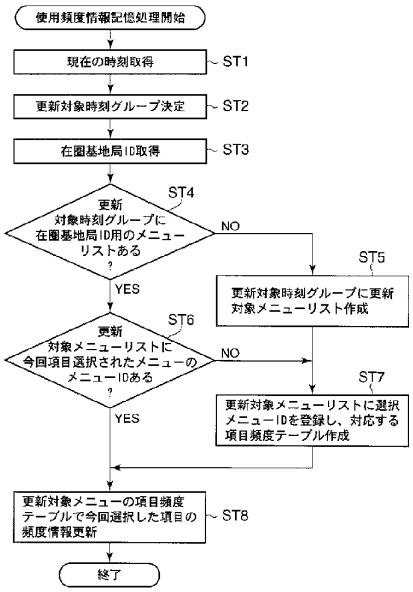


【図２】

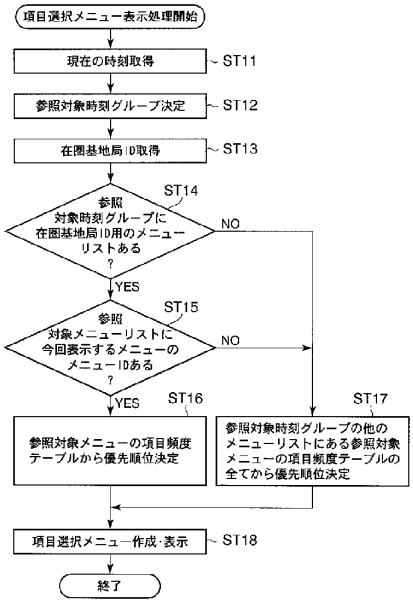


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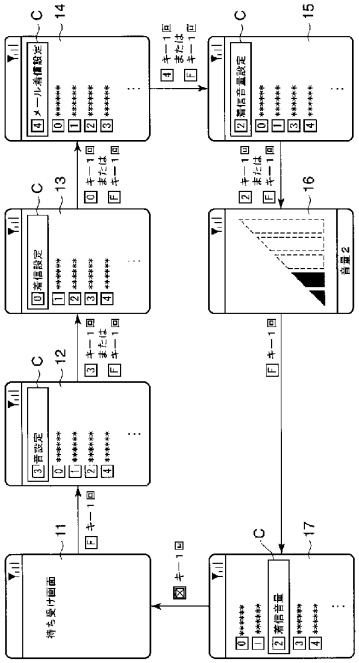
【図３】



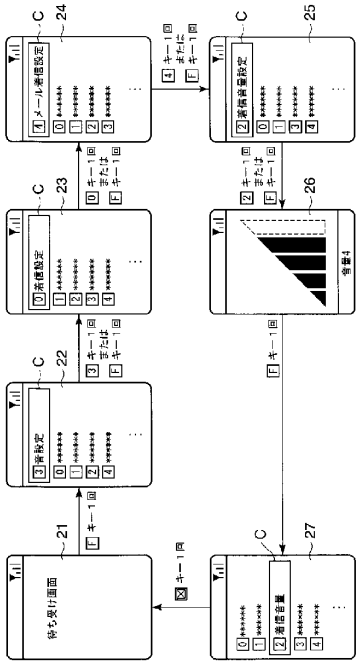
【図４】



【図５】

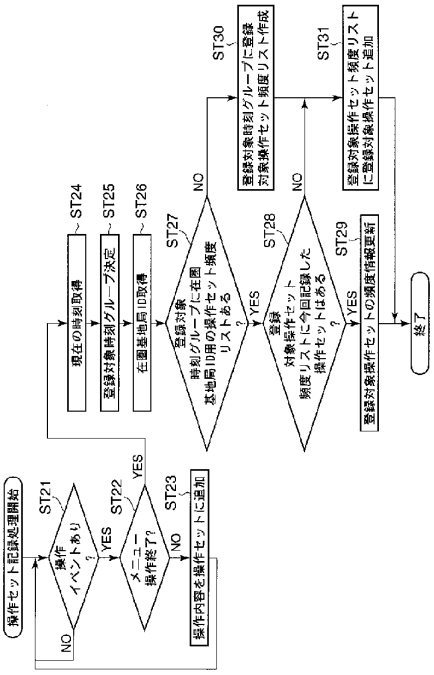


【図６】

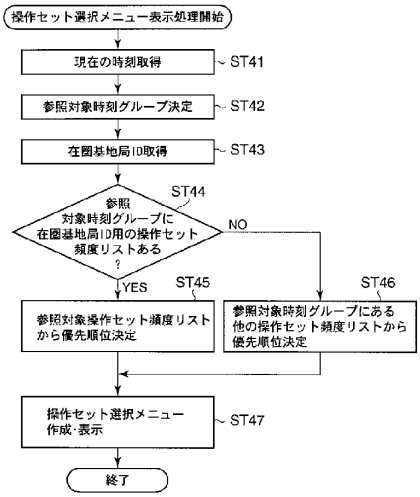


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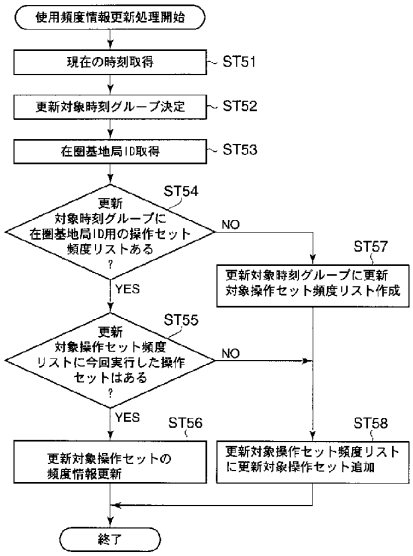
【図７】



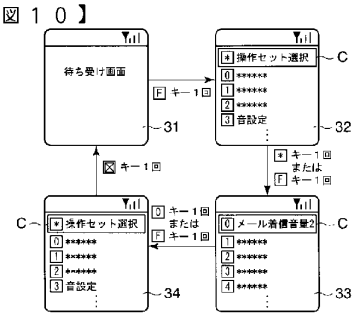
【図８】



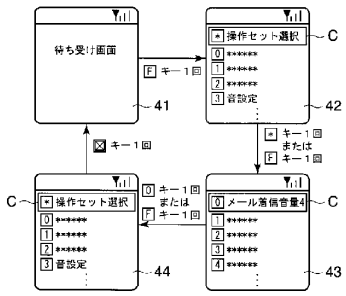
【図９】



【図１０】



【図１１】



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5K067 AA34 BB04 BB21 DD11 DD17 DD19 DD51 EE02 EE10 EE16
FF03 FF23 GG01 GG11 HH22 HH23 HH24 KK13 KK15

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HEALTH MONITORING APPARATUS

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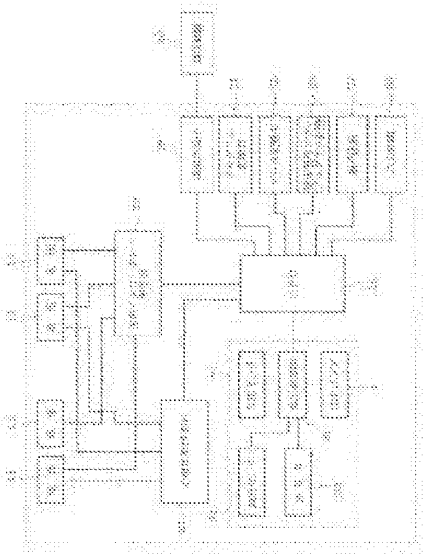
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Abstract of JP2006230679 (A)

PROBLEM TO BE SOLVED: To provide a health monitoring apparatus by which several types of biological data can be assessed in a comprehensive manner. ;SOLUTION: The health monitoring apparatus 1 is provided with a blood pressure measuring part 21, an electrocardiogram waveform measuring part 22, a biological impedance measuring part 23, a data storage part 25 which stores comments on the result of measurements of these measuring parts and a CPU 20 which outputs the result of measurements of the above measuring parts and the comments on a display screen. The comments stored in the data storage part 25 are previously set according to classification of results of measurements. ;COPYRIGHT: (C)2006,JPO&NCIPI



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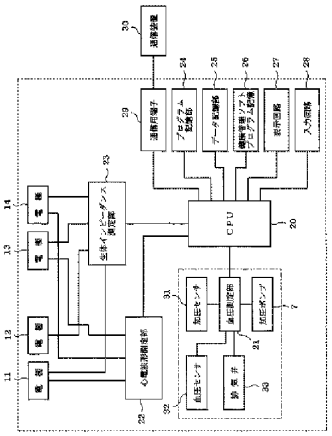
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(54)【発明の名称】健康管理装置

(57)【要約】
【課題】　複数種の生体データを総合的に評価することができる健康管理装置を提供する。
【解決手段】　本発明の健康管理装置１は、血圧測定部２１と、心電波形測定部２２と、生体インピーダンス測定部２３と、これら測定部の測定結果に対するコメントを記憶するデータ記憶部２５と、前記測定部の測定結果やそのコメントを表示画面に出力するＣＰＵ２０を備えている。データ記憶部２５に記憶されているコメントは、測定結果を分類し、その分類に従って予め設定されたものである。
【選択図】　図３



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【特許請求の範囲】
【請求項1】
血圧検出手段と、
心電波形検出手段と、
体脂肪検出手段と、
前記血圧検出手段、前記心電波形検出手段、前記体脂肪検出手段の少なくとも２個の検出結果に対する総合的な評価を出力する出力手段とを備えたことを特徴とする健康管理装置。
【請求項2】
血圧検出手段は、血流パターンを検出するように構成され、
出力手段は、血圧、心電波形、体脂肪の少なくとも一つの検出結果及び前記血流パターンに対する総合的な評価を出力することを特徴とする請求項１記載の健康管理装置。
【請求項3】
血圧検出手段が血圧値を検出する動作と、心電波形検出手段が心電波形を検出する動作とは並行して実行可能に構成されていることを特徴とする請求項１記載の健康管理装置。

【発明の詳細な説明】
【技術分野】
【0001】
本発明は、血圧、心電波形、体脂肪の測定手段と、前記測定手段の測定結果に基づいて健康に関するコメントを出力する出力手段を備えた健康管理装置に関する。
【背景技術】
【0002】
血圧や心電図の波形パターン、体脂肪量等の生体データは、種々の疾病の診断や治療効果の確認に用いられており、健康状態を示す指標となる。そこで、わざわざ病院に行かなくても血圧や心電波形、体脂肪を測定することができるように、家庭での使用が可能な種々の測定装置が提供されている。また、前記測定装置で測定された生体データを保存したり、前記生体データに対するコメントやアドバイスを出力したりする機能を備えた健康管理装置が提供されている（例えば特許文献１参照）。このような測定装置や健康管理装置を用いることにより、自己の健康状態を日常的に管理することができる。
【特許文献1】特願２００４－２８３５７０
【発明の開示】
【発明が解決しようとする課題】
【0003】
ところが、従来の健康管理装置は、複数種の生体データを保存、管理することができるものの、生体データ毎の独立したコメントやアドバイスを出力するようになっていた。このため、複数種の生体データに対するコメントやアドバイスの内容が、それぞれ異なる場合には、被験者が混乱してしまうという問題があった。
本発明は上記事情に鑑みてなされたものであり、その目的は、複数種の生体データを総合的に評価することができる健康管理装置を提供することである。
【課題を解決するための手段】
【0004】
本発明の健康管理装置は、血圧検出手段と、心電波形検出手段と、体脂肪検出手段と、前記血圧検出手段、前記心電波形検出手段、前記体脂肪検出手段の少なくとも２個の検出結果に対する総合的な評価を出力する出力手段とを備えたことを特徴とする。
【発明の効果】
【0005】
本発明の健康管理装置を用いることにより、使用者は、血圧や心電波形、体脂肪等、複数種の生体データに対する総合的な評価を取得することができる。このため、使用者は、自己の健康状態を正しく認識することができる。尚、生体データに対する総合的な評価と

は、生体データの解説や生体データから導き出される疾病の可能性、日常生活を送る上での注意点といった種々のコメントやアドバイスを示している。

【発明を実施するための最良の形態】

【0006】

以下、本発明を具体化した一実施例について図面を参照しながら説明する。

図１及び図２に示すように、本実施例に係る健康管理装置１は、扁平な矩形箱状の装置本体２と、前記装置本体２の上面の後部に回動可能に設けられた表示パネル３とを備えて構成されている。前記装置本体２の上面の中央部には矩形状の収納凹部４が設けられている。前記表示パネル３は収納凹部４の後縁に設けられたヒンジ（図示せず）によって支持されている。前記表示パネル３は収納凹部４に収納可能になっており、収納凹部４に収納された状態（収納状態）から後方に約１８０度の範囲で回動させることができる。図１及び図２は、前記表示パネル３を収納状態から約９０度回動させた起立状態を示しており、このとき前記表示パネル３の前面となる部分には液晶表示画面５（出力手段に相当）が取付けられている。後述するように、前記表示画面５はタッチパネルとしても機能するようになっている。

【0007】

また、装置本体２は左前部がやや突出した形状をなしており、その上面には被験者の手首部に装着されるカフ６（血圧測定部材に相当）が設けられている。前記カフ６は、装置本体２に内蔵された加圧ポンプ７（図３参照）から送出される空気を溜める空気袋８と、その両端に一体的に設けられたバンド部９ａ，９ｂとから構成されている。前記バンド部９ａ，９ｂには、手首部に巻回されたカフ６を固定するための面ファスナー１０ａ，１０ｂが設けられている。

【0008】

装置本体２の上面のうち収納凹部４の左部及び右部には、一対の電極１１，１２及び一対の電極１３，１４がそれぞれ設けられている。各電極１１～１４はそれぞれ半楕円形状に構成されており、対になる電極との組み合わせにより楕円形状となるように配置されている。前記電極１１～１４の上面は球面状に構成されており、被験者の手の平の中に電極１１～１４がぴったりと収まって手の平と電極１１～１４との間に安定的な接触状態が得られるようになっている。また、電極１１～１４と手の平との接触面積を小さくして耐ノイズ性を向上するために、電極１１～１４の表面には多数の小さな凸部１１ａ～１４ａが設けられている。

【0009】

後述するように、心電波形の測定時は４個の電極１１～１４のうちの３個（電極１１，１３，１４）が用いられる。このとき、左部の電極１１はプラス電極として機能し、右部の電極１３，１４はそれぞれＧＮＤ電極、マイナス電極として機能する。また、体脂肪を測定するときは、全ての電極１１～１４が用いられる。このとき、電極１１，１３は通電用電極として、電極１２，１４は計測用電極として機能する。即ち、本実施例では、４個の電極１１～１４のうちの３個の電極１１，１３，１４は心電波形用電極及び体脂肪測定用電極として機能する。

【0010】

装置本体２の上面部のうち収納凹部４の前部には、スタートボタン１５ａや「決定」ボタン１５ｂ、「選択」ボタン１５ｃ，１５ｃを備えた操作部１５が設けられている。

図３は、健康管理装置１の電気的構成を示すブロック図である。図３に示すように、健康管理装置１はＣＰＵ２０を中心に、血圧測定部２１（血圧測定手段）、心電波形測定部２２（心電波形測定手段）、生体インピーダンス測定部２３（体脂肪測定手段）、プログラム記憶部２４、データ記憶部２５、健康管理ソフトプログラム記憶部２６、表示回路２７、入力回路２８を備えて構成されている。表示回路２７には液晶表示画面５が接続されている。プログラム記憶部２４には、健康管理装置１の各部の動作を制御するプログラムが記憶されている。健康管理ソフトプログラム記憶部２６には、血圧測定部２１、心電波形測定部２２、生体インピーダンス測定部２３の測定結果に対する分析プログラムや評価

プログラム、コメント等が記憶されている。データ記憶部２５には、被験者の年齢や性別、体重、身長等の個人データや血圧測定部２１、心電波形測定部２２、生体インピーダンス測定部２３の測定値等が記憶されている。

【0011】

入力回路２８は、操作部１５が備える各種ボタンやタッチパネルの操作信号をＣＰＵ２０に与えるようになっている。これにて、ＣＰＵ２０は、被験者（使用者）による操作部１５やタッチパネルの操作、プログラム記憶部２４、健康管理ソフトプログラム記憶部２６に記憶されているプログラムに従って、血圧測定部２１、心電波形測定部２２、生体インピーダンス測定部２３の動作や表示回路２７を介した表示画面５の表示動作を制御する。

【0012】

更に、ＣＰＵ２０には通信用端子２９が接続されている。前記通信用端子２９には、インターネット等の通信網を介してＷｅｂサーバとの間でデータ通信を行うための通信装置３０が接続されるようになっている。

【0013】

前記血圧測定部２１には、加圧センサ３１、血圧センサ３２、排気弁３３、加圧ポンプ７が接続されている。血圧センサ３２は前記カフ６の空気袋８内に配置されている。血圧センサ３２が被験者の手首部の橈骨動脈と対向するように前記カフ６が被験者の手首に装着され、血圧測定を開始する旨の指示がなされると、ＣＰＵ２０は血圧測定部２１を介して加圧ポンプ７を駆動し、所定量の空気をカフ６の空気袋８に供給する。詳しい説明は省略するが、本実施例ではリバロッチ式の血圧測定方法が採用されており、ＣＰＵ２０は加圧センサ３１の検出結果に基づき最高血圧よりも高い圧力で手首部の橈骨動脈が空気袋８で圧迫されるように加圧ポンプ７の駆動を制御する。この後、排気弁３３が開放されて空気袋８内の空気が排気される過程におけるコロトコフ音の発生点及び消滅点の空気圧に基づき最高血圧値や最低血圧値、脈拍数が検出される。また、コロトコフ音の発生の仕方やコロトコフ音の大きさに基づき血流パターンが検出される。

【0014】

生体インピーダンス測定部２３には、４個の電極１１～１４（２個の通電用電極１１，１３及び２個の計測用電極１２，１４）が接続されている。詳しい説明及び図示は省略するが、前記生体インピーダンス測定部２３は、通電用電極１１，１３間に一定電流を供給する定電流供給回路、２個の計測用電極１２，１４間に発生する電圧を測定する発生電圧測定回路を備えている。左右両対の電極１１～１４に被験者の手の平が接触した状態で載せられ、測定開始の指示がなされると、電極１１，１３間に一定電流が供給され被験者の両手間に電流路が形成される。これにより被験者の腕部インピーダンスからなる生体インピーダンス、即ち電圧が発生し、電極１２，１４間の電圧が発生電圧測定回路によって測定される。測定された電圧値は、増幅回路にて増幅され、Ａ／Ｄ変換された後、ＣＰＵ２０に入力される。ＣＰＵ２０は、生体内に発生した電圧値及び電極間１１，１３に供給された電流値に基づき体内インピーダンス値を演算し、この体内インピーダンス値及び被験者の体重、年齢などの個人データから体脂肪量を演算する。

【0015】

心電波形測定部２２には、３個の電極１１，１３，１４（プラス電極１１、ＧＮＤ電極１３、マイナス電極１４）が接続されている。心電波形測定部２２には、電極１３，１４に右の手の平を接触させた状態で左の手の平を電極１１に接触させたときに発生する電極１１，１３間の電圧値及び電極１３，１４間の電圧値が入力される。心電波形測定部２２は、入力された電圧値を増幅回路にて増幅し、Ａ／Ｄ変換した後、ＣＰＵ２０に入力する。ＣＰＵ２０は、入力された電圧値に基づき、心電波形、Ｒ波とＲ波との間（以下、Ｒ－Ｒ間）における心拍数等を演算する。

【0016】

従って、本実施例では、ＣＰＵ２０は血圧検出手段、心電波形検出手段、体脂肪検出手段、出力手段として機能する。

次に、上記した健康管理装置１の使用方法やその動作について説明する。健康管理装置１の表示パネル３を回動させて起立状態にする。すると、電源が投入され、表示画面５にメニュー画面（図示せず）が表示される。メニュー画面には、生体データ（血圧、体脂肪、心電図）の測定動作実行メニュー、生体データの分析評価メニュー、被験者の個人データ（年齢や体重、身長、性別）入力メニュー等、複数のメニューが表示される。被験者は、選択ボタン１５ｃを操作して表示画面５上のカーソルを移動させ、決定ボタン１５ｂを押圧操作することにより、或いはメニュー画面をタッチ操作することにより所望のメニューを選択することができる。

【0017】

まず、生体データの測定動作実行メニューを選択し、各生体データを測定する場合の動作について説明する。ここでは、これら３種類の生体データを同時に測定する場合を例に挙げて説明するが、いずれか一つ、或いは２つの生体データを測定することも可能である。

【0018】

被験者は、初めに、左手ＬＨの手首の橈骨動脈と対向する部位に空気袋が位置するようにカフ６を左手首ＬＷに巻き、面ファスナー１０ａ，１０ｂで固定する。続いて、スタートボタン１５ａを押圧操作した後、左手ＬＨの手の平を左側の電極１１，１２の上面に、右手ＲＨの手の平を左側の電極１３，１４の上面に載せる。図４は、測定時の様子を示す健康管理装置１の斜視図である。この状態でスタートボタン１５ａが押圧操作された後、所定時間（例えば１０秒）経過すると、ＣＰＵ２０は血圧測定動作及び心電波形測定動作を血圧測定部２１及び心電波形測定部２２に実行させる。

【0019】

この結果、ＣＰＵ２０は、血圧測定部２１からの入力データに基づき最高血圧、最低血圧、脈拍数を演算すると共に血流パターンを判定する。また、ＣＰＵ２０は、心電波形測定部２２から入力された電極１１，１３間の電圧値及び電極１３，１４間の電圧値に基づき心電波形を演算する。心電波形測定動作が終了すると、ＣＰＵ２０は生体インピーダンス測定部２３を動作させる。即ち、電極１１，１３間に一定電流が供給され、電極１２，１４間に発生する電圧値がＣＰＵ２０に入力され、入力された電圧値に基づいてＣＰＵ２０は体脂肪量を演算する。測定動作が終了すると、ＣＰＵ２０は測定結果（最高血圧、最低血圧、脈拍数、血流パターン、心電波形、体脂肪量）を測定日時と共にデータ記憶部２５に記憶する。また、ＣＰＵ２０は測定結果を表示画面５に表示する。

【0020】

次に、生体データの分析評価メニューを選択した場合の動作について説明する。生体データの分析評価メニューを選択すると、血圧、体脂肪、心電図の各生体データの分析評価データ、及びこれら３種類の生体データの総合的な分析評価データのいずれかを表示画面５に表示させることができる。

【0021】

図５は、血圧の分析評価データ表示画面を示している。図５に示すように、血圧の分析評価データ表示画面の下段には、過去３回分の血圧データ（最高血圧、最低血圧、平均血圧、脈拍、抹消抵抗、心負担）、血圧データに関するレーダチャート、血流パターンを示す名称及び図形が、上段には血圧データに対するコメントが表示される。レーダチャートは、過去３回分の測定結果の平均値に基づいて作成されたものである。

【0022】

ＣＰＵ２０は、分析プログラムに従い血圧の測定結果を分析することにより、各種血圧データを演算したり血流パターンを判定したりする。また、ＣＰＵ２０は評価プログラムに従い、血圧データ及び血流パターンに対するコメントを出力する。尚、血圧データ及び血流パターンに対するコメントは予め健康管理ソフトプログラム記憶部２６に記憶されており、図９及び図１０にその一例を示す。図９における「高血圧」及び「低血圧」に相当する血圧値の範囲は、年齢及び性別に応じた範囲が設定されている。

【0023】

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図６は、体脂肪の分析評価データ表示画面を示している。図６に示すように、体脂肪の分析評価データ表示画面の下段には過去３回分の体バランスデータ（体脂肪率、ＢＭＩ（Body Mass Index）、基礎代謝、体水分量、筋肉量、体型判定、目標レベル、体重、身長）、体型判定結果を示す数値及びイラスト、体バランスデータのうちの６項目に関するレーダチャート、コメントが、上段には体バランスデータに対するコメントが表示される。このように、体型判定結果を示す数値と共にイラストを表示したことにより被験者の体型が一目でわかるようになっている。

【0024】

ＣＰＵ２０は、分析プログラムに従い体脂肪の測定結果や被験者の個人データを分析することにより各種の体バランスデータを演算する。また、ＣＰＵ２０は、体脂肪率及びＢＭＩに基づき体型判定を行う。図１１及び図１２は、体脂肪率及びＢＭＩによる肥満判定結果を示している。本実施例では、体脂肪率及びＢＭＩによる肥満判定結果から体型を「１」から「９」までの数字で表している。体型「５」は体重や体脂肪率等が標準値である体型を、体型「１」は痩せすぎの体型を、体型「９」は高度な肥満体型を示している。更に、ＣＰＵ２０は評価プログラムに従い、体バランスデータに対するコメントを出力する。体バランスデータに対するコメントは予め健康管理ソフトプログラム記憶部２６に記憶されており、図１３にその一例を示す。

【0025】

図７は、心電図の分析評価データ表示画面を示している。図７に示すように、心電図の分析評価データ表示画面には、過去５回分の心電図の波形及び心電図の波形に対するコメントが表示される。ＣＰＵ２０は、分析プログラムに従い心電図の波形を分析することにより、その波形パターンを分類する。そして、評価プログラムに従い、分析された波形パターンに対するコメントを出力する。波形パターンに対するコメントは予め健康管理ソフトプログラム記憶部２６に記憶されており、図１４にその一例を示す。

【0026】

一方、図８は、総合評価データ表示画面を示している。図８に示すように、総合評価データ表示画面には、最新の血圧データとそのレーダチャート、最新の体バランスデータとそのレーダチャート及び体型判定結果、最新の心電波形、並びに血圧データ、体バランスデータ、心電波形に対する総合的なコメントが表示される。即ち、ＣＰＵ２０は評価プログラムに従い血圧データ、体バランスデータ、心電波形を総合的に評価し、コメントを出力する。図１５は、体バランスデータ（体脂肪）、血圧データ（血圧値、血流パターン）、心電波形の判定結果とコメントとの関係を示す図である。図１５中、各判定結果を繋ぐ直線の傍に記載されている数字は、被験者の体バランスデータ、血圧データ、心電波形の判定結果が、当該直線の両側に示すものであるときに出力されるコメントの種類を示している。例えば、被験者の体バランスデータから痩せていると判定され（「やせ」）、且つ、「低血圧」と判定されたときは、種類１のコメントが出力される。図１６に、コメントの一例をその種類番号と共に示す。

【0027】

このように、本実施例では、血圧、体脂肪、心電波形の測定結果を総合的に評価し、コメントを出力可能に構成した。また、血圧、体脂肪、心電波形に対する総合的なコメントは、血圧データ、体バランスデータ、心電波形と共に総合評価データ表示画面に表示される。従って、被験者は自己の生体データを見ながらコメントを読み取ることができるため、自己の健康状態を正しく認識することができる。また、総合評価データ表示画面を設けたことにより、血圧データ、体バランスデータ、心電波形を同時に確認することができる。

【0028】

更に、本実施例では、各生体データのコメント表示画面を表示可能に構成した。このコメント表示画面には、各生体データの測定結果とこの測定結果に対するコメントが表示される。従って、被験者は、全体的な健康状態だけでなく、各部の健康状態も認識することができる。しかも、各生体データのコメント表示画面には複数回分の測定結果が表示され

るように構成したため、各生体データの変化に直ぐに気付くことができる。

【0029】

また、本実施例では血圧と心電波形とを並行して測定可能に構成した。このため、測定時間の短縮化を図ることができる。尚、発明者の実験によると、本実施例の健康管理装置１を用いて血圧、心電波形、体脂肪の全てを測定するために要する時間（測定開始から終了までの時間）は約１分となる。また、血圧及び心電波形はいずれも心臓の機能を診断するための指標であることから、測定タイミングをほぼ同じにしたことにより測定結果を精度良く解析・評価することができる。

【0030】

尚、各生体データの分析評価データ表示画面には、各生体データの被験者の名前及び性別並びに年齢が表示される。従って、使用者は、分析評価データ表示画面に表示された名前等を見て自分の生体データに対する表示画面であることを確認することができる。また、分析評価データ表示画面はタッチパネルになっており、表示画面の上部にある「血圧データ」、「体バランスデータ」、「心電図データ」及び「総合評価データ」と記載されたタグをタッチ操作することにより、メニュー画面に戻らなくても表示画面を切り換えることができる。

【0031】

更に、各生体データに対する分析評価データ表示画面の下段には「Ｗｅｂ登録」や「Ｗｅｂ相談」と表示されたタッチスイッチが設けられている。「Ｗｅｂ相談」に対応するタッチスイッチが操作されると、各生体データは通信網を介して外部機関のデータサーバ（図示せず）に送信される。この結果、外部機関に所属する医師や栄養士等の専門家により被験者の生体データが分析、評価された後、コメントやアドバイスが健康管理装置１に送信され、表示画面５に表示される。

【0032】

このような構成により、専門家による診断も入手することできる。尚、「Ｗｅｂ登録」は、上記した外部機関によるコメントを入手するサービスを受けるために個人データを登録する際に用いるタッチスイッチである。

【0033】

また、本発明は上記した実施例に限定されるものではなく、例えば次のような変形が可能である。

血圧測定手段、心電波形測定手段、体脂肪測定手段は、健康管理装置本体とは別に設けても良い。この場合、前記測定手段と健康管理装置とを接続ケーブル等を介して接続し、健康管理装置が測定結果を取り込むことができるように構成すると良い。

血圧の測定方式はリバロッチ式に限らず、オシロメトリック式を採用しても良い。またＬＥＤ等を用いた光による測定方法により血圧を測定することも可能である。

血圧の測定部位は手首の他、上腕部や手指でも良い。

【0034】

操作方法や測定結果、コメントを音声で知らせるように構成しても良い。

【図面の簡単な説明】

【0035】

【図1】本発明の一実施例を示す健康管理装置の平面図

【図2】健康管理装置の前面図

【図3】健康管理装置の電気的構成を示すブロック図

【図4】被験者による血圧、心電波形、体脂肪の測定時の様子を示す図１相当図

【図5】血圧の分析評価データ表示画面の一例を示す図

【図6】体脂肪の分析評価データ表示画面の一例を示す図

【図7】心電図の分析評価データ表示画面の一例を示す図

【図8】総合評価データ表示画面の一例を示す図

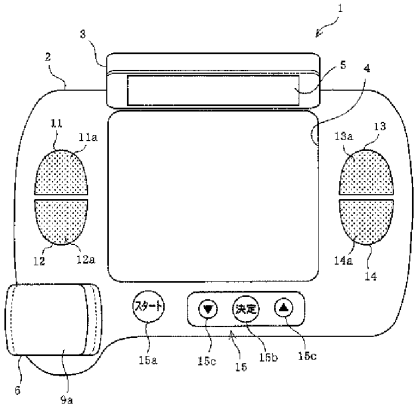
【図9】血圧値に対するコメントの内容を示す図

【図10】血流パターンに対するコメントの内容を示す図

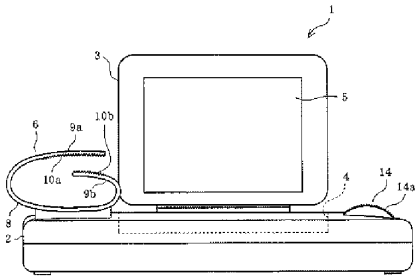
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【図11】体脂肪率に基づく肥満判定結果を示す図
【図12】ＢＭＩに基づく肥満判定結果を示す図
【図13】体バランスデータに対するコメントの内容を示す図
【図14】心電波形パターンに対するコメントの内容を示す図
【図15】体バランスデータ、血圧データ、心電波形の判定結果とコメントとの関係を示す図
【図16】生体データの総合的なコメントの内容を示す図
【符号の説明】
【0036】
図面中、１は健康管理装置、２は装置本体、３は液晶表示画面（出力手段）、２０はＣＰＵ（血圧検出手段、心電波形検出手段、体脂肪検出手段、出力手段）、２１は血圧測定部（血圧測定手段）、２２は心電波形測定部（心電波形検出手段）、２３は生体インピーダンス測定部（体脂肪検出手段）を示す。

【図1】

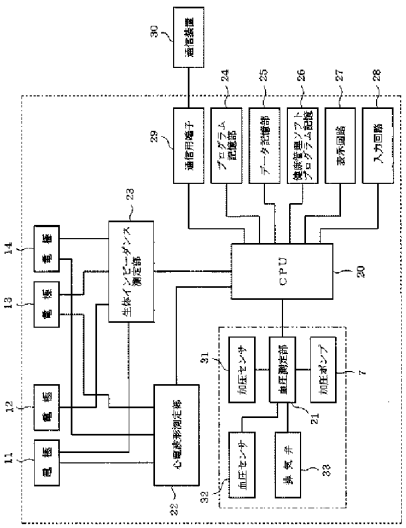


【図2】

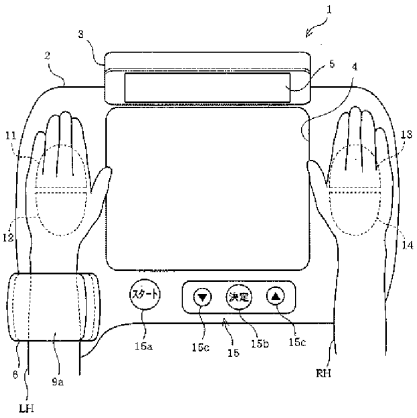


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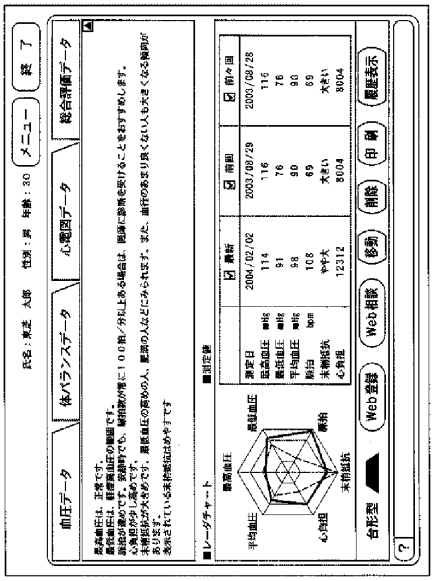
【図3】



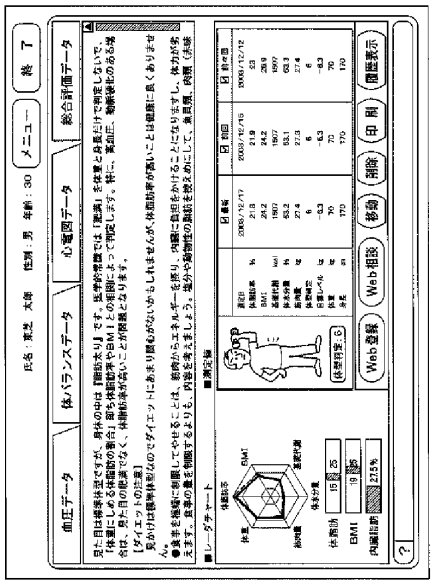
【図4】



【図5】

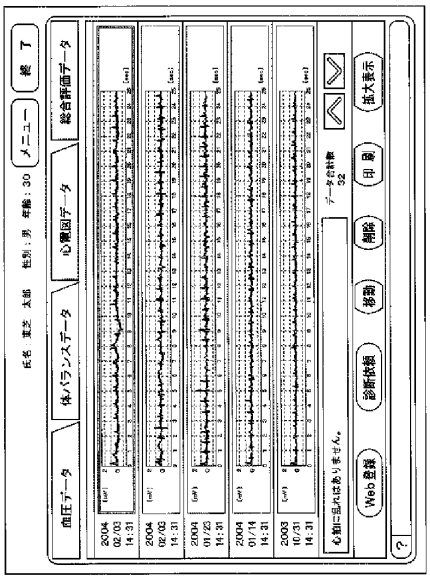


【図6】

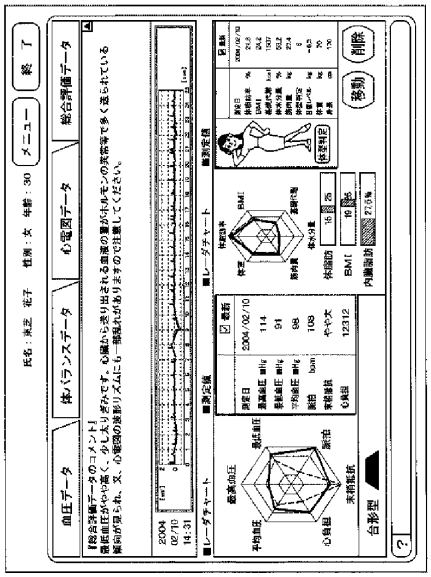


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【図7】



【図8】



【図9】

血圧分類	コメント
高血圧	塩分、カロリーの摂りすぎに注意。ヤツアイモやヒジキ、小豆などカリウムを含んだ食べ物を食べましょう。
低血圧	運動による脱力アップをおすすめします。体内の水分、塩分が減りすぎないように十分に注意を。

【図10】

血圧パターン	コメント
スクワン型	心臓から送り出す血液、動脈、末梢循環のバランスのとれた正常な血液の流れです。
台形型	高血圧、肥満、動脈、末梢循環不良などに見られる波形です。心臓から送り出される血液量が交感神経の興奮やホルモンの異常などにより大きい場合の傾向があります。
L型	低血圧、平均型とスクワン型の中間に位置するやや血行不良傾向波形です。体力低下、ストレス、疲労、運動不足、下痢、胃腸が弱いなどの場合が見られる傾向にあります。

【図11】

【体脂肪率判定基準】（単位：%）

性別/判定	やせ	正常	太りぎみ	肥満	高度肥満
男性	15未満	15以上～20未満	20以上～25未満	25以上～35未満	35以上
女性	20未満	20以上～30未満	30以上～35未満	35以上～40未満	40以上

【図12】

【ＢＭＩによる肥満判定】

（判定）	やせすぎ	やせぎみ	普通	太りぎみ	太りすぎ
ＢＭＩ	19未満	19以上～21未満	21以上～25未満	25以上～27未満	27以上

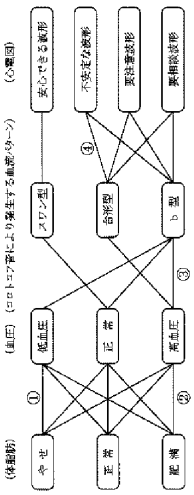
【図13】

体型判定	コ　メ　ン　ト
1	体脂肪率が高く、肥満体。急激な運動によるダイエットは、脚、腰に負担がかかります。食事は腹八分目を心掛けましょう。
5	体重、体脂肪とも標準ですが、筋肉は大敵です。中、高年になると基礎代謝が低下しますので中年太りに気をつけてください。
9	見た目はスリムで、体脂肪も少なく、スタミナ不足なので筋力アップトレーニングや脂肪分の多い食事を心掛けましょう。

【図14】

心電図の波形分類	コ　メ　ン　ト
安心できる波形	リズムに乱れはありません。
不安定な波形	a．乱れがあるようです。 b．リズムが少し乱れているようです。
要注意な波形	a．乱れがしばあるようです。気になる場合は医師に相談してください。 b．リズムが少し乱れています。気になる場合は医師に相談してください。 c．リズムが少し早いようです。気になる場合は医師に相談してください。 d．リズムが少し遅いようです。気になる場合は医師に相談してください。
要精密検査	a．乱れが全体の30％を超えているようです。医師に相談してください。 b．リズムがかなり乱れています。医師に相談してください。

【図15】



【図16】

	コ　メ　ン　ト
①	血圧が低めのようです。体脂肪も少なく、スタミナ不足ですので、運動による筋力アップをおすすめします。塩分の多い、脂肪分の多い食物は控えめにしましょう。
②	血圧が高く、体脂肪も高く、肥満体になっています。塩分、カロリーが控えめですこし、又、食事のリズムを崩した食べ過ぎをつつしまれ、ひじき、小豆等のリズムを含んだ食べ物を食べましょう。
③	血圧が高めのようです。血行はやや不良傾向です。心臓病も少し心配されるようです。食べ過ぎ、飲み過ぎ、塩分の多い食物は控えめにしましょう。又、血圧は毎日測定して記録しておくことも大切です。
④	血圧が高く、肥満の傾向です。心臓からも送り出される血液の量がホルモンの関係等で多くまられている傾向が見られ、リズムも少し乱れているようですので注意しましょう。

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Ｆターム(参考) 4C027 AA02 AA06 BB05 CC00 GG15 KK03
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NURSING SUPPORT SYSTEM

Inventor(s): KOIZUMI YUICHI ± (KOIZUMI YUICHI)

Applicant(s): CARECOM CO LTD ± (CARECOM:KK)

Classification: **- international:** ***A61B5/00; A61G12/00; G06Q50/22; G06Q50/24***

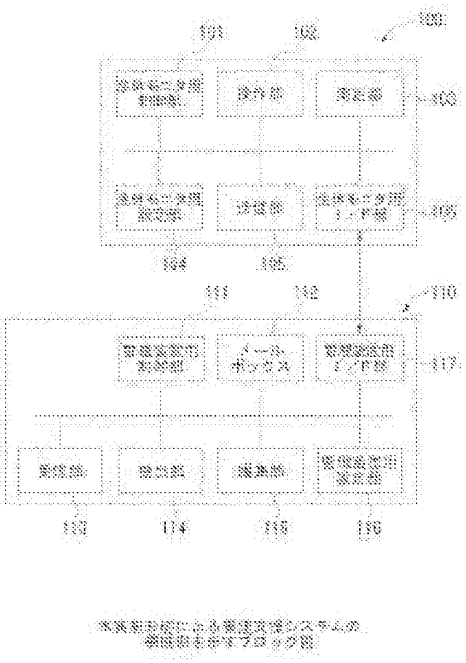
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Application number: JP20070021451 20070131 Global Dossier

Priority number(s): JP20070021451 20070131

Abstract of JP2008183339 (A)

PROBLEM TO BE SOLVED: To provide a nursing support system which enables a medical staff to easily transmit an e-mail including biological data under measurement from a biomonitor. ;SOLUTION: When the medical staff performs a transmitting operation using the biomonitor 100, a transmitting part 105 attaches the biological data acquired at the point of time to the e-mail. Then, the transmitting part 105 transmits the e-mail using an e-mail address acquired from a setting part 104 for the biomonitor as a destination. In addition, when the e-mail transmitted from the biomonitor 100 is received by a management device 110, an extraction part 114 extracts the biological data of a desired measured person by measured person information included in the e-mail address of the received e-mail. Thus, the medical staff can transmit the e-mail including the biological data without setting destinations of e-mails one by one. ;COPYRIGHT: (C)2008,JPO&INPIT



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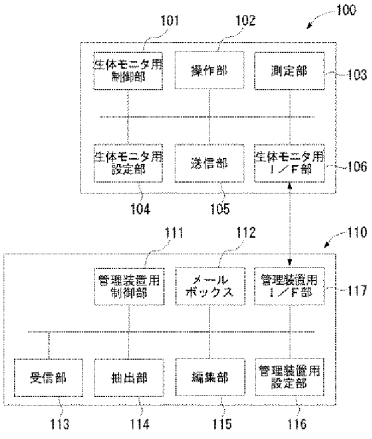
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4C341 LL30

(54)【発明の名称】看護支援システム

(57)【要約】
【課題】　生体モニタにおいて、測定中の生体データを含んだ電子メールを医療従事者が容易に送信できるようにした看護支援システムを提供することを目的とする。
【解決手段】　生体モニタ１００にて、医療従事者が送信操作を行うと、送信部１０５は、その時点で取得されている生体データを電子メールに添付する。そして、送信部１０５は、生体モニタ用設定部１０４から取得したメールアドレスを宛先にして電子メールを送信する。また、管理装置１１０にて、生体モニタ１００から送信された電子メールを受信すると、抽出部１１４は、受信した電子メールのメールアドレスに含まれる被測定者情報により、所望の被測定者の生体データを抽出する。これにより、医療従事者は、電子メールの宛先をいちいち設定することなく、生体データを含んだ電子メールを送信できる。
【選択図】　図１



本実施形態による看護支援システムの構成例を示すブロック図

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【特許請求の範囲】
【請求項1】
被測定者を測定し生体データを出力する測定部と、
前記被測定者を示す被測定者情報とメール受信サーバのドメイン名を示すドメイン情報とを測定開始前に登録し前記被測定者情報と前記ドメイン情報とからメールアドレスを生成する生体モニタ側設定部と、前記測定部により測定された生体データを電子メールに添付し、前記生体モニタ側設定部により生成されたメールアドレスを宛先として送信する送信部とを備えた生体モニタと、
前記ドメイン名が登録された管理装置用設定部と、前記管理装置用設定部にて登録されたドメイン名を示すドメイン情報を持つ電子メールを受信する受信部と、前記受信部にて受信した電子メールを保存するメールボックスと、前記メールボックスに保存された電子メールのメールアドレスに含まれる前記被測定者情報を解析して所望の被測定者の生体データを抽出する抽出部とを備えた管理装置と、
を有する看護支援システム。

【発明の詳細な説明】
【技術分野】
【0001】
本発明は、病院などで使用される生体モニタに表示されている情報を取得する看護支援システムに関する。
【背景技術】
【0002】
一般に病院では、看護行為を効率的に進めるために看護支援システムが用いられている。従来の看護支援システムでは、生体モニタ（例えば、バイタルセンサや心電図計など）で測定した生体データを記憶して管理している。
【0003】
さらに近年では、生体モニタから電子メールで送信された生体データを医師や看護師などの医療従事者が使用する情報端末装置が受信し、受信した生体データを情報端末装置の表示部に表示する生体データの登録・表示システムが開示されている（例えば、特許文献１を参照）。特許文献１に記載の生体データの登録・表示システムでは、生体データモニタ情報を登録する者は、情報端末装置のアドレスを入力する。各生体モニタは、メールサーバを介して生体データをメールにより情報端末装置のアドレスに送信する。
【特許文献1】特開２００５－９５４６９号公報
【0004】
しかしながら、特許文献１に記載の生体モニタ情報の登録・表示システムでは、生体データを情報端末装置へメール送信するには、生体データを登録する度にアドレスを設定する必要があるので、生体データを登録する者は、登録作業が面倒になってしまうという問題があった。
【発明の開示】
【発明が解決しようとする課題】
【0005】
本発明は、このような問題を解決するために成されたものであり、生体モニタにおいて、測定中の生体データを含んだ電子メールを医療従事者が容易に送信できるようにした看護支援システムを提供することを目的とする。
【課題を解決するための手段】
【0006】
上述した課題を解決するために、本発明の看護支援システムでは、生体モニタにて、医療従事者が送信操作を行うと、送信部は、その時点で取得されている生体データを電子メ

ールに添付する。そして、送信部は、生体モニタ用設定部から取得したメールアドレスを宛先にして電子メールを送信するようにしている。また、管理装置にて、生体モニタから送信された電子メールを受信すると、抽出部は、受信した電子メールのメールアドレスに含まれる被測定者情報により、所望の被測定者の生体データを抽出するようにしている。

【発明の効果】

【0007】

上記のように構成した本発明によれば、生体データを送信するためのメールアドレスに含まれるドメイン名を持つメールサーバである管理装置に、すべての生体データが集められるとともに、メールアドレスに含まれる被測定者情報により生体データが区別される。これにより、医療従事者は、電子メールの宛先をいちいち設定することなく、生体データを含んだ電子メールを送信できる。

【発明を実施するための最良の形態】

【0008】

以下、本発明の一実施形態を図面に基づいて説明する。本実施形態による看護支援システムの構成例を示すブロック図を図１に示す。同図に示すように、本実施形態による看護支援システムは、生体モニタ１００、管理装置１１０を備えて構成されている。

【0009】

また、生体モニタ１００は、生体モニタ用制御部１０１と、操作部１０２と、測定部１０３と、生体モニタ用設定部１０４と、送信部１０５と、生体モニタ用インターフェース（Ｉ／Ｆ）部１０６とを備えている。また、管理装置１１０は、管理装置用制御部１１１と、メールボックス１１２と、受信部１１３と、抽出部１１４と、編集部１１５と、管理装置用設定部１１６と、管理装置用インターフェース（Ｉ／Ｆ）部１１７とを備えている。

【0010】

図１において、生体モニタ１００は、病室内や診察室内の患者の近辺に設置されており、ネットワークを介して管理装置１１０に接続されている。また、管理装置１１０は、医療従事者の居室や各種サーバが設置されているサーバ室などに設置されている。管理装置１１０には、複数の生体モニタ１００が接続されている。ここで、管理装置１１０は、メール受信サーバの機能を有している。

【0011】

生体モニタ用制御部１０１は、生体モニタ１００の各構成要素を後述するように制御する。操作部１０２は、医療従事者により生体モニタ１００を操作するためのものである。ここで、操作部１０２は、タッチパネルなどにより構成されており、図２に示す測定画面２００上に設けられている。測定画面２００には、記録ボタン２０４が設けられているが、この他にも、測定開始ボタン、測定終了ボタン（いずれも図示しない）が設けられている。また、測定開始ボタンを押下したと生体モニタ用制御部１０１が判断した場合には、生体モニタ用制御部１０１は、測定部１０３を動作させることで測定を開始する。また、測定終了ボタンを押下したと生体モニタ用制御部１０１が判断した場合には、生体モニタ用制御部１０１は、測定部１０３の動作を終了し、測定を終了させる。また、記録ボタン２０４を押下したと生体モニタ用制御部１０１が判断した場合には、制御部１０１は、送信部１０５を動作させる。

【0012】

測定部１０３は、被測定者の生体データを測定するためのものである。生体モニタ１００は、測定部１０３を動作させることで測定を行うことができる。また、測定部１０３は、記憶メモリを有しており、測定した生体データを記憶することができる。生体モニタ用設定部１０４は、被測定者情報とメール受信サーバのドメイン情報とを登録するものである。生体モニタ用設定部１０４では、初期設定時にメール受信サーバのドメイン名を示すドメイン情報を登録し、測定前に患者ＩＤ（特許請求の範囲の被測定者情報に該当する）を登録する。生体モニタ用設定部１０４は、登録された登録内容を使用してメールアドレスを生成する。

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【0013】
ここで、メールアドレスの形式は、「１２３＠ｘｙｚ．ｃｏｍ」となっており、「＠」記号の前が患者を識別するための患者ＩＤであり、「＠」記号の後が管理装置１１０を示すためのドメイン情報である。
【0014】
送信部１０５は、電子メールを作成し送信するものである。医療従事者が記録ボタン２０４を押下すると、送信部１０５は、電子メールを新規作成し、測定部１０３に記憶された生体データを取得する。続いて、送信部１０５は、取得した生体データを電子メールに添付して、生体モニタ用設定部１０４で生成したメールアドレスを宛先にして電子メールを送信する。送信した電子メールには、生体モニタ１００のシステム時計から打刻した記録日時情報が含まれている。
【0015】
測定画面２００は、図２に示すように、測定を監視するための画面である。測定画面２００は、被測定者ＩＤ表示欄２０１、測定日時表示欄２０２、生体データ表示欄２０３、記録ボタン２０４を含んでいる。被測定者ＩＤ表示欄２０１には、測定前に予め生体モニタ用設定部１０４に登録した患者ＩＤが表示される。測定日時表示欄は、現時点の測定日時が表示される。生体データ表示欄２０３は、測定部１０３で測定された生体データが表示される。ここで、生体データ表示欄２０３のデータは、波形図が表示されているが、これに限定されない。例えば、測定値を表示させても良い。記録ボタン２０４を押下すると、生体モニタ用制御部１０１は、送信部１０５を動作させることで、前述したように送信部１０５は、生体データを含んだ電子メールを管理装置１１０へ送信する。
【0016】
生体モニタ用Ｉ／Ｆ部１０６は、ネットワークと接続し、送信部１０５で送信された電子メールを通信するものである。ここで、電子メールを通信する方法としては、一般的にＳＭＴＰ（Ｓｉｍｐｌｅ　Ｍａｉｌ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ）通信が用いられる。
【0017】
管理装置用制御部１１１は、管理装置１１０の各構成要素を後述するように制御する。メールボックス１１２は、受信部１１３にて受信した電子メールを保存するものである。ここで、メールボックス１１２は、各生体モニタ１００から送信された電子メールをメールの宛先毎に保存する。受信部１１３は、生体モニタ１００から送信された電子メールを受信し、メールボックス１１２に蓄積するものである。受信部１１３は、電子メールを受信すると、後述する管理装置用設定部１１６に登録されている患者情報を参照し、メールアドレスに含まれる患者ＩＤが患者情報に登録されているか否かを判定する。メールアドレスに含まれる患者ＩＤが管理装置用設定部１１６の患者情報に登録されている場合には、受信部１１３は、宛先不明を示すフラグとして“０”（否）を立てて被測定者毎にメールボックス１１２に保存する。メールアドレスに含まれる患者ＩＤが管理装置用設定部１１６の患者情報に登録されていない場合には、受信部１１３は、宛先不明を示すフラグとして“１”（正）を立ててメールボックス１１２に保存する。メールボックス１１２内の電子メールは、図３に示す閲覧画面３００のように患者ＩＤ毎に保存される。
【0018】
ここで、受信部１１３で受信したすべての電子メールには、宛先不明を示すフラグが含まれている。宛先不明を示すフラグとして“０”（否）が立っている電子メールは、メールアドレスに含まれる患者ＩＤを持つ患者情報が管理装置用設定部１１６に登録されているということである。一方、宛先不明を示すフラグとして“１”（正）が立っている電子メールは、メールアドレスに含まれる患者ＩＤを持つ患者情報が管理装置用設定部１１６に登録されていないということである。これらの宛先不明を示すフラグは、後述の抽出部１１４の処理で使用される。
【0019】
閲覧画面３００は、図３に示すように、メールボックス１１２に蓄積された電子メール

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を閲覧するための画面である。閲覧画面３００は、被測定者フォルダ３０１、被測定者ＩＤ表示欄３０２、測定日時表示欄３０３、生体データ表示欄３０４、ＵＮＫＮＯＷＮフォルダ３１０を含んでいる。被測定者フォルダ３０１には、患者情報に登録されている患者ＩＤに該当する（すなわち、宛先不明を示すフラグとして“０”が立っている）電子メールに添付されているデータが患者ＩＤ毎に表示される。メールアドレスに含まれる患者ＩＤが被測定者ＩＤ表示欄３０２に表示される。生体モニタ１００から送信された電子メールに含まれる記録日時情報が測定日時表示欄３０３に表示される。生体モニタ１００から送信された電子メールに添付されている生体データが生体データ表示欄３０４に表示される。ＵＮＫＮＯＷＮフォルダ３１０には、患者情報に登録されていない（すなわち、宛先不明を示すフラグとして“１”が立っている）患者ＩＤと生体モニタ１００から送信された電子メールに含まれる記録日時情報とが患者ＩＤ毎に表示される。

【0020】

抽出部１１４は、メールボックス１１２に保存された電子メールのメールアドレスに含まれる患者ＩＤを解析して所望の被測定者の生体データを抽出するものである。医療従事者が図示しない参照ボタンを押下すると、管理装置用制御部１１１は、抽出部１１４を動作させる。抽出部１１４が動作を開始すると、抽出部１１４は、図示しない入力画面を表示する。入力画面は、患者ＩＤ入力欄と出力ボタンとを含んでいる。医療従事者は、患者ＩＤを患者ＩＤ入力欄に入力し、出力ボタンを押下する。出力ボタンが押下されると、抽出部１１４は、患者ＩＤ入力欄に入力された患者ＩＤを取得し、患者ＩＤに該当する生体データをメールボックス１１２から抽出し、閲覧画面３００の被測定者フォルダ３０１に抽出した生体データを表示する。また、患者ＩＤを持つ患者情報が管理装置用設定部１１６に登録されていない生体データも、閲覧画面３００のＵＮＫＮＯＷＮフォルダ３１０に表示する。

【0021】

編集部１１５は、メールボックス１１２に保存された電子メールに含まれる被測定者情報を編集するものである。医療従事者がＵＮＫＮＯＷＮフォルダ３１０に表示された患者ＩＤをクリックすると、管理装置用制御部１１１は、編集部１１５を動作させる。編集部１１５が動作を開始すると、編集部１１５は、図示しない入力画面を表示する。入力画面は、患者ＩＤ入力欄と保存ボタンとを含んでいる。医療従事者は、患者ＩＤ入力欄に新たな患者ＩＤを入力し、保存ボタンを押下する。保存ボタンが押下されると、編集部１１５は、患者ＩＤ入力欄に入力された患者ＩＤを取得し、入力された患者ＩＤをキーにして管理装置用設定部１１６に登録された患者情報を検索する。検索後、編集部１１５は、患者ＩＤを持つ患者情報が管理装置用設定部１１６に登録されているか否かの判定を行う。入力された患者ＩＤを持つ患者情報が管理装置用設定部１１６に登録されていると編集部１１５にて判断した場合には、編集部１１５は、該当する電子メールに宛先不明を示すフラグとして“０”を立てて保存し、編集処理を終了する。一方、入力された患者ＩＤを持つ患者情報が管理装置用設定部１１６に登録されていないと編集部１１５にて判断した場合には、編集部１１５は、宛先不明を示すフラグとして“１”を立てたまま編集処理を終了する。

【0022】

管理装置用設定部１１６は、メール受信サーバのドメイン名を示すドメイン情報と、入院または通院している患者の患者情報とを登録するものである。患者情報には、患者ＩＤと、患者氏名と、受診科目とが互いに紐付けられて登録されている。また、管理装置用設定部１１６に登録されたドメイン情報は、生体モニタ１００から送信された電子メールを受信する際に使用される。管理装置用設定部１１６に登録されたドメイン情報と生体モニタ１００から送信された電子メールのメールアドレスのドメイン情報とが一致していれば、生体モニタ１００から送信された電子メールは、ドメイン情報が一致した管理装置１１０のメールボックス１１２に保存される。

【0023】

管理装置用Ｉ／Ｆ部１１７は、ネットワークと接続し自宛先に送られてきた電子メール

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を通信するものである。

【0024】

次に、本実施形態による看護支援システムの動作を説明する。本実施形態による看護支援システムの動作を示すフローチャートを図４並びに図５に示す。同図に示すように、看護支援システムの動作は、生体モニタ１００での動作と、管理装置１１０での動作とに分かれる。生体モニタ１００にて、生体モニタ用制御部１０１は、初期設定済みであるか否か（すなわち、生体モニタ用設定部１０４にメール受信サーバのドメイン情報が登録済みであるか否か）の判定を行う（ステップ４０１）。初期設定済みであると生体モニタ用制御部１０１にて判断した場合には、（ステップ４０１にてＹＥＳ）、ステップ４０３へ移行する。一方、初期設定が未設定であると生体モニタ用制御部１０１にて判断した場合には（ステップ４０１にてＮＯ）、生体モニタ用制御部１０１は、生体モニタ用設定部１０４にメール受信サーバのドメイン情報を設定し、初期設定を行う（ステップ４０２）。このように、初期設定でメール受信サーバのドメイン情報を設定しておくことにより、生体モニタの測定開始前に被測定者情報を入力するだけで、生体モニタ１００は、指定した管理装置にメールを送信することができる。

【0025】

初期設定済みであるか、初期設定が終了するか、何れかの処理が行われると、生体モニタ１００は測定可能となる。医療従事者は、測定開始前に被測定者情報である患者ＩＤを操作部１０２で入力して、生体モニタ用設定部１０４に被測定者情報を登録する。生体モニタ用制御部１０１は、被測定者情報が登録されたか否かを判断する（ステップ４０３）。被測定者情報が登録されていないと生体モニタ用制御部１０１にて判断した場合には（ステップ４０３にてＮＯ）、生体モニタ用制御部１０１は、ステップ４０３に戻り、被測定者情報が登録されるまで処理を継続する。一方、被測定者情報が登録されたと生体モニタ用制御部１０１にて判断した場合には（ステップ４０３にてＹＥＳ）、生体モニタ用設定部１０４は、登録された被測定者情報とメール受信サーバのドメイン情報とから、管理装置へ送信するためのメールアドレスを生成する。

【0026】

生体モニタ用設定部１０４がメールアドレスを生成すると、生体モニタ用制御部１０１は、開始操作が行われたか否か（すなわち、操作部１０２の操作開始ボタンが押下されたか否か）の判定を行う（ステップ４０４）。開始操作が行われていないと生体モニタ用制御部１０１にて判断した場合には（ステップ４０４にてＮＯ）、生体モニタ用制御部１０１は、ステップ４０４の処理に戻り、開始操作が行われるまで処理を継続する。一方、開始操作が行われた生体モニタ用制御部１０１にて判断した場合には（ステップ４０４にてＹＥＳ）、生体モニタ用制御部１０１は、測定部１０３を動作させることで測定を開始する（ステップ４０５）。測定部１０３で測定した生体データは、生体モニタ１００の測定画面２００として出力される。測定部１０３による測定は、終了操作が行われる（すなわち、操作部１０２の測定終了ボタンが押下される）まで継続される。

【0027】

測定中、生体モニタ用制御部１０１は、送信操作が行われたか否か（すなわち、測定画面２００の記録ボタン２０４が押下されたか否か）の判定を行う（ステップ４０６）。送信操作が行われていないと生体モニタ用制御部１０１にて判断した場合には、（ステップ４０６にてＮＯ）、ステップ４０９へ移行する。一方、送信操作が行われたと生体モニタ用制御部１０１にて判断した場合には（ステップ４０６にてＹＥＳ）、生体モニタ用制御部１０１は、送信部１０５を動作させる。送信部１０５が動作を開始すると、送信部１０５は、取得された生体データを測定部１０３から取得する。また、送信部１０５は、データ送信用の電子メールを新規に作成し、生体モニタ設定部１０４で生成したメールアドレスを取得する（ステップ４０７）。

【0028】

送信部１０５は、取得したメールアドレスを電子メールの宛先とし、生体データと生体モニタ１００の記録日時情報とをメール本文に含ませ、電子メールを送信し（ステップ４

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０８）、ステップ４０９へ移行する。送信した電子メールは、生体モニタ用Ｉ／Ｆ部１０７を介してネットワーク上の管理装置１１０へ送信される。なお、ステップ４０７～４０８の動作が行われている間も測定部１０２は測定を行っている。

【0029】

ステップ４０９では、生体モニタ用制御部１０１は、終了操作が行われたか否か（すなわち、測定終了ボタンが押下されたか否か）の判定を行う。終了操作が行われたと生体モニタ用制御部１０１にて判断した場合には、（ステップ４０９にてＹＥＳ）、測定部１０３の動作を終了させて測定を終了する。一方、終了操作が行われていないと生体モニタ用制御部１０１にて判断した場合には、（ステップ４０９にてＮＯ）、生体モニタ用制御部１０１は、ステップ４０５に戻る。このようにして、記録ボタン２０４が押下される度に、生体モニタ１００は、測定中の生体データを含んだ電子メールを送信することができる。また、生体モニタ１００は、測定前に被測定者情報を登録するので、生体モニタ情報を送信する度にアドレスを設定する必要がない。そのため、医療従事者は、電子メールの宛先をいちいち設定することなく、生体データを含んだ電子メールを送信できる。

【0030】

生体モニタ１００から送信された電子メールは、管理装置１１０で受信される。管理装置１１０では、電子メール受信時に受信部１１３が実行するメール受信処理と、医療従事者の操作によって抽出部１１４が実行する受信済電子メールの参照処理と、医療従事者の操作によって編集部１１５が実行する編集処理とが行われる。メール受信処理において、管理装置用制御部１１１は、図４に示すように、電子メールの受信チェックを行い、電子メールを受信したか否かを判断する（ステップ４１１）。具体的には、受信部１１３は、管理装置用設定部１１６に登録されたドメイン情報に該当する電子メールを検索し、ドメイン情報が存在する場合には、該当する電子メールを受信する。電子メールを受信していないと管理装置用制御部１１１が判断した場合には（ステップ４１１にてＮＯ）、ステップ４１１の処理に戻り、管理装置用制御部１１１は受信待機状態となる。一方、電子メールを受信したと管理装置用制御部１１１が判断した場合には（ステップ４１１にてＹＥＳ）、受信部１１３は、電子メールに含まれるメールアドレスから患者ＩＤを取得する（ステップ４１２）。続いて受信部１１３は、取得した患者ＩＤをキーにして管理装置用設定部１１６に登録された患者情報を検索する（ステップ４１３）。検索後、受信部１１３は、患者ＩＤを持つ患者情報が管理装置用設定部１１６に登録されているか否かの判定を行う（ステップ４１４）。

【0031】

患者ＩＤを持つ患者情報が管理装置用設定部１１６に登録されていると受信部１１３にて判断した場合には、（ステップ４１４にてＹＥＳ）、受信部１１３は、電子メールに宛先不明を示すフラグとして“０”（否）を立てて、メールボックス１１２に電子メールを保存し（ステップ４１５）、ステップ４１１の処理に戻る。一方、患者ＩＤを持つ患者情報が管理装置用設定部１１６に登録されていないと受信部１１３にて判断した場合には、（ステップ４１４にてＮＯ）、受信部１１３は、電子メールに宛先不明を示すフラグとして“１”（正）を立てて、メールボックス１１２に電子メールを保存し（ステップ４１６）、ステップ４１１の処理に戻る。このように、宛先不明を示すフラグとして“０”または“１”をすべての電子メールに立てることにより、受信部１１３は、宛先不明の電子メールも管理することができる。

【0032】

管理装置１１０は、図５（ａ）に示すように、所望の生体データを参照する参照処理を行う。受信済電子メールの参照処理おいて、医療従事者が図示しない参照ボタンを押下することにより、管理装置用制御部１１１は、参照操作が行われたか否かの判定を行う（ステップ５０１）。参照操作が行われていないと管理装置用制御部１１１にて判断した場合には、（ステップ５０１にてＮＯ）、ステップ５０１の処理に戻り、管理装置用制御部１１１は操作待機状態となる。一方、参照操作が行われたと管理装置用制御部１１１にて判断した場合には、（ステップ５０１にてＹＥＳ）、管理装置用制御部１１１は、抽出部１

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１４を動作させる。抽出部１１４が動作を開始すると、抽出部１１４は、図示しない入力画面を表示する。入力画面は、患者ＩＤ入力欄と出力ボタンとを含んでいる。医療従事者は、患者ＩＤを患者ＩＤ入力欄に入力し、出力ボタンを押下する。

【0033】

出力ボタンが押下されると、抽出部１１４は、患者ＩＤ入力欄に入力された患者ＩＤを取得する（ステップ５０２）。抽出部１１４は、ステップ５０２で取得した患者ＩＤに該当する生体データをメールボックス１１２から抽出し、図３に示す閲覧画面３００の被測定者フォルダ３０１に抽出した生体データを表示する（ステップ５０３）。そして、電子メールの宛先が不明である（すなわち、宛先不明を示すフラグとして“１”が立っている）生体データを抽出し、閲覧画面３００のＵＮＫＮＯＷＮフォルダ３１０に表示する（ステップ５０４）。

【0034】

生体データを出力後、管理装置用制御部１１１は、終了操作が行われたか否かの判定を行う（ステップ５０５）。終了操作が行われたと管理装置用制御部１１１にて判断した場合には、（ステップ５０５にてＹＥＳ）、管理装置用制御部１１１は、参照処理を終了する。一方、終了操作が行われていないと管理装置用制御部１１１にて判断した場合には、（ステップ５０５にてＮＯ）、ステップ５０１の処理に戻る。

【0035】

管理装置１１０は、宛先不明の生体データについて被測定者情報を修正することで、図５（ｂ）に示すように、編集処理を行う。編集処理において、医療従事者が閲覧画面３００のＵＮＫＮＯＷＮフォルダ３１０に表示された患者ＩＤをクリックすることにより、管理装置用制御部１１１は、編集操作が行われたか否かの判定を行う（ステップ５１１）。編集操作が行われていないと管理装置用制御部１１１にて判断した場合には、（ステップ５１１にてＮＯ）、ステップ５１１の処理に戻り、管理装置用制御部１１１は操作待機状態となる。一方、編集操作が行われたと管理装置用制御部１１１にて判断した場合には、（ステップ５１１にてＹＥＳ）、管理装置用制御部１１１は、編集部１１５を動作させることで、該当するデータの患者ＩＤ入力欄（図示しない）を含む図示しない入力画面を表示する。また、入力画面は、図示しない保存ボタンを含む。医療従事者は、患者ＩＤ入力欄に新たな患者ＩＤを入力し、保存ボタンを押下する。

【0036】

保存ボタンが押下されると、編集部１１５は、患者ＩＤ入力欄に入力された患者ＩＤを取得する（ステップ５１２）。編集部１１５は、入力された患者ＩＤをキーにして管理装置用設定部１１６に登録された患者情報を検索する（ステップ５１３）。検索後、編集部１１５は、患者ＩＤを持つ患者情報が管理装置用設定部１１６に登録されているか否かの判定を行う（ステップ５１４）。

【0037】

入力された患者ＩＤを持つ患者情報が管理装置用設定部１１６に登録されていると編集部１１５にて判断した場合には、（ステップ５１４にてＹＥＳ）、編集部１１５は、該当する電子メールに宛先不明を示すフラグとして“０”を立てて保存し（ステップ５１５）、編集処理を終了する。一方、入力された患者ＩＤを持つ患者情報が管理装置用設定部１１６に登録されていないと編集部１１５にて判断した場合には、（ステップ５１４にてＮＯ）、編集部１１５は、宛先不明を示すフラグとして“１”を立てたまま編集処理を終了する。

【0038】

ステップ５１５の処理により、宛先不明を示すフラグが“０”になった電子メールは、次回以降の抽出ではＵＮＫＮＯＷＮフォルダ３１０に表示されず、該当する被測定者フォルダ３０１に表示される。このように、測定後の生体データの被測定者情報を修正できることから、医療従事者は、実際の被測定者と異なった情報を登録した場合でも測定を再実施せずに済み、正しい被測定者情報に修正した生体データを被測定者の看護記録として取り纏めることができる。

【0039】
以上詳しく説明したように、本実施形態の看護支援システムでは、生体モニタ１００にて、医療従事者が送信操作を行うと、送信部１０５は、その時点で取得されている生体データを電子メールに添付する。そして、送信部１０５は、生体モニタ用設定部１０４から取得したメールアドレスを宛先にして電子メールを送信するようにしている。また、管理装置１１０にて、生体モニタ１００から送信された電子メールを受信すると、抽出部１１４は、受信した電子メールのメールアドレスに含まれる被測定者情報により、所望の被測定者の生体データを抽出するようにしている。
【0040】
本実施形態によれば、生体データを送信するためのメールアドレスに含まれるドメイン名を持つメールサーバである管理装置１１０に、すべての生体モニタ１００からの生体データが集められるとともに、メールアドレスに含まれる被測定者情報により集められた生体データが区別される。これにより、医療従事者は、電子メールの宛先をいちいち設定することなく、生体データを含んだ電子メールを管理装置１１０に送信することができる。
【0041】
また、管理装置１１０の抽出部１１４は、医療従事者が指定する被測定者の生体データを抽出することができる。これにより、宛先に含まれる患者ＩＤ毎に生体データが表示されるため、医療従事者は、被測定者毎の生体データを容易に管理することができる。また、抽出部１１４は、受信部１１３が登録無しと判断した生体データも併せて抽出することができる。
【0042】
また、管理装置１１０の編集部１１５は、受信部１１３にて登録無しと判断された生体データについて、患者ＩＤを編集可能としている。これにより、医療従事者は、実際の被測定者と異なった情報を登録した場合でも測定を再実施せずに済み、生体データを該当する被測定者の看護記録として取り纏めることができる。
【0043】
なお、前述した実施形態では、送信部１０５は、波形図の生体データを添付してメールを送信しているが、これに限定されない。例えば、測定値を直接メール本文に含ませても良い。これにより、医療従事者は、様々な出力パターンを持った生体モニタでも、測定されたデータを管理装置へ送信することができる。
【0044】
また、前述した実施形態では、患者情報は、管理装置用設定部１１６に登録されているが、これに限定されない。例えば、ネットワーク上のサーバや端末に登録しても良い。これにより、患者情報を一括で管理でき、患者情報すべてを持ち出して管理装置用設定部１１６へ登録する必要がないため、患者情報の取得を最低限に抑えることができる。
【0045】
また、前述した実施形態では、編集部１１５は、宛先不明の生体データを正しい患者ＩＤに修正すると、宛先不明を示すフラグとして“０”を立てているが、これに限定されない。例えば、宛先不明を示すフラグとは別に、修正が行われた生体データであることを編集部１１５が判断できるようなフラグ（“１”（修正済み）、“０”（未修正））を立てても良い。これにより、医療従事者は、患者ＩＤを修正した生体データを把握することができる。
【0046】
また、前述した実施形態では、医療従事者が記録ボタン２０４を押下することにより、生体モニタ１００は、測定した生体データを添付した電子メールを管理装置１１０へ送信しているが、これに限定されない。例えば、生体モニタ用設定部１０４に予め生体データの上限値及び下限値を設定し、測定値が設定した上限値を上回った場合、または、設定した下限値を下回った場合に、その前後の生体データを添付した電子メールを管理装置１１０へ送信するようにしても良い。
【0047】

具体的には、測定値が設定した上限値を上回った、または、設定した下限値を下回ったと測定部１０３が判断した場合には、生体モニタ用制御部１０１は、送信部１０５を動作させる。送信部１０５が動作を開始すると、送信部１０５は、電子メールを新規作成し、測定部１０３に記憶された生体データを取得する。続いて、送信部１０５は、取得した生体データを電子メールに添付して、生体モニタ用設定部１０４で生成したメールアドレスを宛先にして電子メールを送信する。これにより、設定した範囲を超えて急変等を検出した時点の生体データが自動的に取得されるので、医療従事者は、急変等を検出した時点の生体データを被測定者の看護記録として容易に取り纏めることができる。また、このような場合において、生体データの上限値または、下限値のみを設定するようにしても良い。

【0048】

また、前述した実施形態では、測定画面２００には、患者ＩＤと生体モニタ１００の記録日時情報とが表示されているがこれに限定されない。例えば、これらに加えて生体モニタ１００を識別するための装置識別情報を表示するようにしても良い。

【0049】

具体的には、送信部１０５が電子メールを管理装置１１０へ送信する際、送信部１０５は、生体モニタ１００を識別するための装置識別情報、例えば、装置番号を電子メールに添付して送信する。ここで、装置番号は、生体モニタ１００固有の番号であり、他の生体モニタ１００と重複しない番号で構成されている。また、装置番号は、生体モニタ用設定部１０４または生体モニタ１００の設定ファイル（図示しない）に登録されている。管理装置１１０にて電子メールを受信した後、図４のステップ５０３において、閲覧画面３００の被測定者フォルダ３０１に抽出した生体データを表示する際に、抽出部１１４は、抽出した生体データに該当する装置番号を併せて表示する。また、図４のステップ５０４において、閲覧画面３００のＵＮＫＮＯＷＮフォルダ３１０に宛先不明を示すフラグとして“１”が立っている生体データを表示する際にも、抽出部１１４は、生体データに該当する装置番号を併せて表示する。

【0050】

この変形例の閲覧画面６００は、図６に示すように、被測定者フォルダ６０１およびＵＮＫＮＯＷＮフォルダ６１０を含む。被測定者フォルダ６０１は、被測定者ＩＤ表示欄６０２、測定日時表示欄６０３、生体データ表示欄６０４に加え、装置番号を表示する装置番号表示欄６０５を含む。また、ＵＮＫＮＯＷＮフォルダ６１０には、患者情報に登録されていない患者ＩＤと記録日時情報と装置番号とが患者ＩＤ毎に表示される。

【0051】

被測定者フォルダ６０１内の被測定者ＩＤ表示欄６０２には、「ＩＤ：１２３」が表示される。測定日時表示欄６０３には、「６／６　１２：３４」が表示される。装置番号表示欄６０５には、「８５１」が表示される。一方、ＵＮＫＮＯＷＮフォルダ６１０内には、患者ＩＤとして「ＩＤ：１２４」が表示される。また、「ＩＤ：１２４」にて測定した測定日時として「７／１０　１０：２０」が表示される。また、「ＩＤ：１２４」にて測定した装置番号として「８５１」が表示される。被測定者フォルダ６０１とＵＮＫＮＯＷＮフォルダ６１０との両者を見ると、患者ＩＤと測定日時とは異なるが、装置番号が同じである。また、両者の患者ＩＤは、「１２３」と「１２４」と番号が近い。このことから、正しい患者ＩＤである１２３と入力すべきところを１２４と誤って入力してしまったと医療従事者は推測することができる。このように、医療従事者は、被測定者フォルダ６０１に表示されているデータと、ＵＮＫＮＯＷＮフォルダ６１０に表示されているデータとを比較して、生体データの正しい送信元を推測することができる。

【図面の簡単な説明】

【0052】

【図1】本実施形態による看護支援システムの構成例を示すブロック図である。

【図2】生体モニタの測定画面例を示す表示図である。

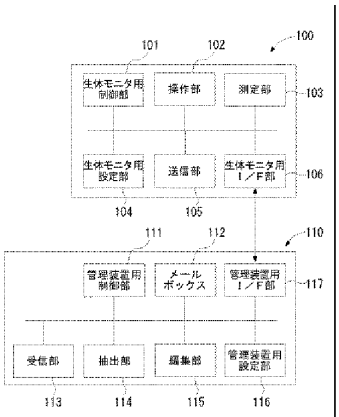
【図3】管理装置の閲覧画面例を示す表示図である。

【図4】本実施形態による看護支援システムの動作を示すフローチャート（その１）であ

る。
【図5】本実施形態による看護支援システムの動作を示すフローチャート（その２）である。
【図6】管理装置の閲覧画面例の変形例を示す表示図である。
【符号の説明】
【0053】
１００　生体モニタ
１０１　生体モニタ用制御部
１０２　操作部
１０３　測定部
１０４　生体モニタ用設定部
１０５　送信部
１０６　生体モニタ用インターフェース（Ｉ／Ｆ）部
１１０　管理装置
１１１　管理装置用制御部
１１２　メールボックス
１１３　受信部
１１４　抽出部
１１５　編集部
１１６　管理装置用設定部
１１７　管理装置用インターフェース（Ｉ／Ｆ）部
２００　測定画面
２０１　被測定者ＩＤ表示欄
２０２　測定日時表示欄
２０３　生体データ表示欄
２０４　記録ボタン
３００　閲覧画面
３０１　被測定者フォルダ
３０２　被測定者ＩＤ表示欄
３０３　測定日時表示欄
３０４　生体データ表示欄
３１０　ＵＮＫＮＯＷＮフォルダ
６００　変形例の実施形態の閲覧画面
６０１　被測定者フォルダ
６０２　被測定者ＩＤ表示欄
６０３　測定日時表示欄
６０４　生体データ表示欄
６０５　装置番号表示欄
６１０　ＵＮＫＮＯＷＮフォルダ

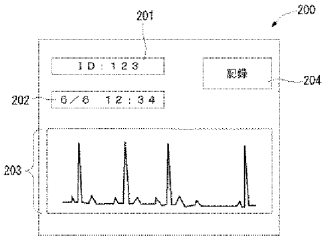
AliveCor Exhibit 1002
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【図1】



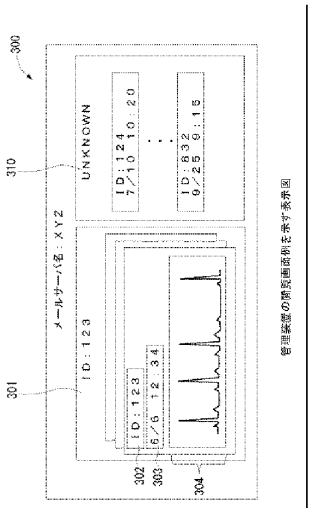
本実施形態による看護支援システムの構成例を示すブロック図

【図2】



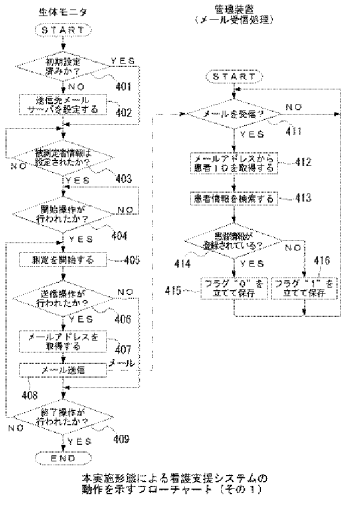
生体モニタの測定画面例を示す表示図

【図3】



管理装置の閲覧画面例を示す表示図

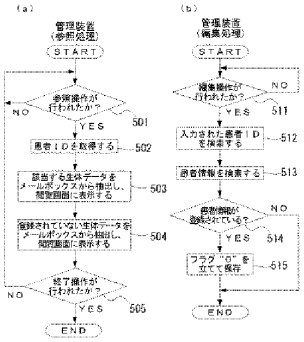
【図4】



本実施形態による看護支援システムの動作を示すフローチャート（その１）

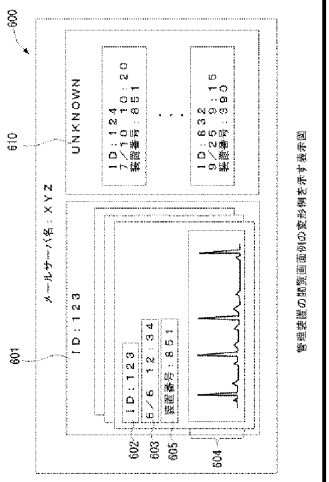
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【図5】



本実施形態による看護支援システムの動作を示すフローチャート（その２）

【図6】



管理装置の閲覧画面例の変形例を示す表示図

Espacenet

Bibliographic data: JP2011192126 (A) — 2011-09-29

APPARATUS AND METHOD FOR DISPLAY CONTROL

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Applicant(s): DENSO IT LAB INC ± (DENSO IT LABORATORY INC)

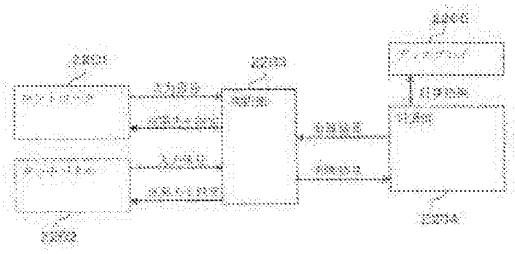
Classification: **- international:** ***G06F3/041; G06F3/048***
- cooperative:

Application number: JP20100058887 20100316 Global Dossier

Priority number(s): JP20100058887 20100316

Abstract of JP2011192126 (A)

PROBLEM TO BE SOLVED: To provide a display control apparatus or the like, capable of performing operation of storage and returning by operating a list of items that has a soft body area of a sense of soft body without losing a display area on a picture due to placement (occupation) of buttons or learning how to use a new button, such as pressing the button for "putting on bookmarks" or "storing a current place". ;SOLUTION: The display control apparatus includes: a receiver 2202 for receiving scroll operation by a user with respect to an item displayed to a display 2205; a determiner 2203 for determining whether the scroll operation received is prescribed operation; and a display controller 2204 for designating an item scroll operated and displaying an item designated as a designated item in a prescribed display form. ;COPYRIGHT: (C)2011,JPO&INPIT



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G06F	3/048	(2006.01)	G06F	3/048	656D	5B087
G06F	3/041	(2006.01)	G06F	3/041	330B	5E501

審査請求 未請求　請求項の数 28　ＯＬ　（全 39 頁）

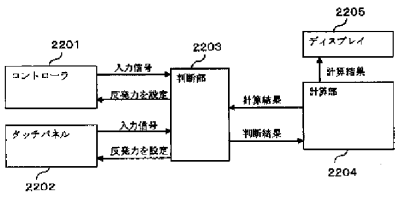
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Ｆターム(参考)　5B087 AA09 BC02 BC06 DD12 DE06
5E501 AA01 BA05 CB04 CB05 CB07 EA07 EA13 FA15 FA23 FA27 FB02 FB25 FB32

(54)【発明の名称】表示制御装置及び表示制御方法

(57)【要約】
【課題】画面上の表示エリアをボタンの配置（占有）で失うことなく、ブックマークするや今の場所を記憶させる、のようなボタンを押すなどの新しいボタンの使い方を覚えることなく、軟体的質感の軟体領域を有するアイテムリストの操作で、記憶と戻るという操作を行うことができる表示制御装置などを提供する。
【解決手段】ディスプレイ２２０５に表示されるアイテムに対するユーザのスクロール操作を受け付ける受付手段２２０２と、受け付けられたスクロール操作が所定の操作であるか否かを判断する判断手段２２０３と、スクロール操作が所定の操作である場合に、スクロール操作されたアイテムを指定アイテムとして指定し、指定アイテムとして指定されたアイテムの表示を所定の表示形式で表示させる表示制御手段２２０４とを備える。
【選択図】図２２



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【特許請求の範囲】
【請求項１】
それぞれが所定のフレームで構成される複数のアイテムによって構成されるアイテム列中の一部の複数のアイテムが静止時にはディスプレイ上に所定の間隔で配置され、前記所定の間隔がユーザのアイテムに対する前記ディスプレイ上でのスクロール操作により変化するよう表示態様を制御する表示制御装置であって、
前記ディスプレイに表示されるアイテムに対する前記ユーザの前記ディスプレイ上でのスクロール操作を受け付ける受付手段と、
受け付けられた前記スクロール操作が所定の操作であるか否かを判断する判断手段と、
前記スクロール操作が前記所定の操作である場合に、前記スクロール操作されたアイテムを指定アイテムとして指定し、前記指定アイテムとして指定された前記アイテムの表示を所定の表示形式で表示させる表示制御手段とを、
備える表示制御装置。
【請求項２】
前記所定の操作は、前記複数のアイテムが配列された方向と略平行に移動させ、前記方向と略垂直に移動させる操作、又は前記複数のアイテムが配列された方向と略平行に移動させ、前記方向と逆の方向に移動させる操作、又は前記複数のアイテムが配列された方向と略平行に移動させ、突然、移動を停止させる操作のいずれか１つである請求項１に記載の表示制御装置。
【請求項３】
前記所定の操作は、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の間隔が一定の値を超える操作、又は前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量が一定の値を超える操作である請求項１に記載の表示制御装置。
【請求項４】
前記所定の操作は、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量に依存する関数により表される力が一定の値を超える操作、前記力により計算されるアイテム間の距離が一定の値を超える操作、又は前記力により計算されるアイテム間の相対速度が一定の値を超える操作のいずれかである請求項１に記載の表示制御装置。
【請求項５】
前記所定の表示形式は、前記スクロール操作されたアイテムが傾き、隣接するアイテム上の一部に重なるような表示の形式である請求項１から４のいずれか１つに記載の表示制御装置。
【請求項６】
前記表示制御手段は、前記所定の表示形式で表示されたアイテムの前記指定アイテムとしての指定を解除するための操作を前記受付手段が受け付けた場合、前記指定アイテムの指定を解除し、前記所定の表示形式を前記指定アイテムとして指定される前の表示形式に戻す請求項１から５のいずれか１つに記載の表示制御装置。
【請求項７】
前記表示制御手段は、前記指定アイテムが指定された後に前記アイテムリストが前記ユーザによりスクロールされ、前記ディスプレイ上の所定の位置を前記指定アイテムが通過した場合、前記スクロールを停止させ、前記指定アイテムを前記所定の位置で表示させる請求項１から６のいずれか１つに記載の表示制御装置。
【請求項８】
前記表示制御手段は、
前記指定アイテムに近づける向きにアイテムがスクロール操作され、前記スクロール操作されたアイテムが前記指定アイテムにあらかじめ決められた距離近づくと、前記スクロール操作されたアイテムを前記指定アイテム上の一部に積み重ねて表示し、
前記積み重ねられたアイテム周辺の所定の表示エリアを始点とし、前記積み重ねられた

アイテムから遠ざかる向きにスクロール操作がされた場合、前記スクロール操作されたアイテムをスクロールされた方向に向けて前記所定の間隔で配置し、
前記積み重ねられたアイテム周辺の他の所定の表示エリアを始点として前記積み重ねられたアイテムから遠ざける向きにスクロール操作がされ、前記スクロール操作があらかじめ決められた操作である場合に、前記積み重ねられたアイテムのうち、前記他の所定の表示エリアにおける始点からスクロールされた方向にあるアイテムそれぞれをスクロールされた方向に向けて前記所定の間隔で配置する請求項１から７のいずれか１つに記載の表示制御装置。
【請求項９】
前記あらかじめ決められた操作は、前記複数のアイテムが配列された方向と略平行に移動させ、前記方向に移動させてから一定時間内に前記方向と逆の方向に移動させる操作、又は前記複数のアイテムが配列された方向と略平行に移動させ、前記方向に移動させてから一定時間内に移動を停止させる操作である請求項８に記載の表示制御装置。
【請求項１０】
前記あらかじめ決められた操作は、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の距離が一定の値を超える操作、又は前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量が一定の値を超える操作である請求項８に記載の表示制御装置。
【請求項１１】
前記あらかじめ決められた操作は、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量に依存する関数により表される力が一定の値を超える操作、前記力により計算されるアイテム間の距離が一定の値を超える操作、又は前記力により計算されるアイテム間の相対速度が一定の値を超える操作のいずれかである請求項８に記載の表示制御装置。
【請求項１２】
前記表示制御手段は、前記指定アイテム上にアイテムが積み重ねられ、所定の時間内に前記受付手段を介した操作がない場合、前記積み重ねられたアイテムそれぞれを積み重ねられる前の前記所定の間隔で配置させる請求項８から１１のいずれか１つに記載の表示制御装置。
【請求項１３】
前記ユーザからのスクロール操作を受け付ける前記受付手段がコントローラ装置の場合、
前記コントローラ装置に対して前記ユーザによって加えられる力は、前記指定アイテム上にアイテムを積み重ねる操作を行う場合のほうが、前記積み重ねられたアイテムそれぞれを前記所定の間隔で配置させる操作を行う場合よりも大きい請求項８から１２のいずれか１つに記載の表示制御装置。
【請求項１４】
前記ユーザからのスクロール操作を受け付ける前記受付手段がコントローラ装置の場合、
前記コントローラ装置に対して前記ユーザによって加えられる力は、前記関数により表される力である請求項１１に記載の表示制御装置。
【請求項１５】
それぞれが所定のフレームで構成される複数のアイテムによって構成されるアイテム列中の一部の複数のアイテムが静止時にはディスプレイ上に所定の間隔で配置され、前記所定の間隔がユーザのアイテムに対する前記ディスプレイ上でのスクロール操作により変化するよう表示態様を制御する表示制御装置による表示制御方法であって、
前記ディスプレイに表示されるアイテムに対する前記ユーザの前記ディスプレイ上でのスクロール操作を受け付けるステップと、
受け付けられた前記スクロール操作が所定の操作であるか否かを判断するステップと、
前記スクロール操作が前記所定の操作である場合に、前記スクロール操作されたアイテ

AliveCor Exhibit 1002
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ムを指定アイテムとして指定し、前記指定アイテムとして指定された前記アイテムの表示を所定の表示形式で表示させるステップとを、
有する表示制御方法。
【請求項１６】
前記所定の操作は、前記複数のアイテムが配列された方向と略平行に移動させ、前記方向と略垂直に移動させる操作、又は前記複数のアイテムが配列された方向と略平行に移動させ、前記方向と逆の方向に移動させる操作、又は前記複数のアイテムが配列された方向と略平行に移動させ、突然、移動を停止させる操作のいずれか１つである請求項１５に記載の表示制御方法。
【請求項１７】
前記所定の操作は、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の間隔が一定の値を超える操作、又は前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量が一定の値を超える操作である請求項１５に記載の表示制御方法。
【請求項１８】
前記所定の操作は、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量に依存する関数により表される力が一定の値を超える操作、前記力により計算されるアイテム間の距離が一定の値を超える操作、又は前記力により計算されるアイテム間の相対速度が一定の値を超える操作のいずれかである請求項１５に記載の表示制御方法。
【請求項１９】
前記所定の表示形式は、前記スクロール操作されたアイテムが傾き、隣接するアイテム上の一部に重なるような表示の形式である請求項１５から１８のいずれか１つに記載の表示制御方法。
【請求項２０】
前記所定の表示形式で表示されたアイテムの前記指定アイテムとしての指定を解除するための操作を受け付けた場合、前記指定アイテムの指定を解除し、前記所定の表示形式を前記指定アイテムとして指定される前の表示形式に戻すステップを更に有する請求項１５から１９のいずれか１つに記載の表示制御方法。
【請求項２１】
前記指定アイテムが指定された後に前記アイテムリストが前記ユーザによりスクロールされ、前記ディスプレイ上の所定の位置を前記指定アイテムが通過した場合、前記スクロールを停止させ、前記指定アイテムを前記所定の位置で表示させるステップを更に有する請求項１５から２０のいずれか１つに記載の表示制御方法。
【請求項２２】
前記指定アイテムに近づける向きにアイテムがスクロール操作され、前記スクロール操作されたアイテムが前記指定アイテムにあらかじめ決められた距離近づくと、前記スクロール操作されたアイテムを前記指定アイテム上の一部に積み重ねて表示し、
前記積み重ねられたアイテム周辺の所定の表示エリアを始点とし、前記積み重ねられたアイテムから遠ざかる向きにスクロール操作がされた場合、前記スクロール操作されたアイテムをスクロールされた方向に向けて前記所定の間隔で配置し、
前記積み重ねられたアイテム周辺の他の所定の表示エリアを始点として前記積み重ねられたアイテムから遠ざける向きにスクロール操作がされ、前記スクロール操作があらかじめ決められた操作である場合に、前記積み重ねられたアイテムのうち、前記他の所定の表示エリアにおける始点からスクロールされた方向にあるアイテムそれぞれをスクロールされた方向に向けて前記所定の間隔で配置するステップを更に有する請求項１５から２１のいずれか１つに記載の表示制御方法。
【請求項２３】
前記あらかじめ決められた操作は、前記複数のアイテムが配列された方向と略平行に移動させ、前記方向に移動させてから一定時間内に前記方向と逆の方向に移動させる操作、

又は前記複数のアイテムが配列された方向と略平行に移動させ、前記方向に移動させてから一定時間内に移動を停止させる操作である請求項２２に記載の表示制御方法。
【請求項２４】
前記あらかじめ決められた操作は、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の距離が一定の値を超える操作、又は前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量が一定の値を超える操作である請求項２２に記載の表示制御方法。
【請求項２５】
前記あらかじめ決められた操作は、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量に依存する関数により表される力が一定の値を超える操作、前記力により計算されるアイテム間の距離が一定の値を超える操作、又は前記力により計算されるアイテム間の相対速度が一定の値を超える操作のいずれかである請求項２２に記載の表示制御方法。
【請求項２６】
前記指定アイテム上にアイテムが積み重ねられ、所定の時間内に前記受付手段を介した操作がない場合、前記積み重ねられたアイテムそれぞれを積み重ねられる前の前記所定の間隔で配置させるステップを更に有する請求項２２から２５のいずれか１つに記載の表示制御方法。
【請求項２７】
コントローラ装置を介して前記ユーザからのスクロール操作を受け付ける場合、
前記コントローラ装置に対して前記ユーザによって加えられる力は、前記指定アイテム上にアイテムを積み重ねる操作を行う場合のほうが、前記積み重ねられたアイテムそれぞれを前記所定の間隔で配置させる操作を行う場合よりも大きい請求項２２から２６のいずれか１つに記載の表示制御方法。
【請求項２８】
コントローラ装置を介して前記ユーザからのスクロール操作を受け付ける場合、
前記コントローラ装置に対して前記ユーザによって加えられる力は、前記関数により表される力である請求項２５に記載の表示制御方法。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、ディスプレイ上に表示されるアイテムの表示を制御する表示制御装置及び表示制御方法に関する。
【背景技術】
【０００２】
ユーザが、リスト（以下、アイテム列やアイテムリストとも言う）上に配置された複数のアイテムを、コントローラや指やマウスのドラッグ操作などによりスクロールさせて検索する技術がある（下記の特許文献１、図３０を参照）。ユーザが、アイテムリスト上に配置されているアイテムのどれがよいかを漠然と模索する場合、ユーザはアイテムリスト上のアイテムをスクロールさせながら、くまなくキョロキョロ見渡す必要がある。
【０００３】
従来のアイテムリストでは、アイテムを何個かスクロールさせると、元の位置に戻るためにはそれと同じ数だけ逆方向にスクロールさせる必要があった。そのため、ユーザは、自分が何個スクロールさせたか覚えておかなければいけなかった。仮に、「記憶」ボタンと「戻る」ボタンを設置させた場合には、後で戻りたいお気に入りの箇所で「記憶」ボタンを押して先へ進み、「記憶」ボタンを押した箇所へ戻りたい場合は「戻る」ボタンを押すことにより戻ることができる。
【先行技術文献】
【特許文献】
【０００４】

【特許文献１】特開平５－６１６３１号公報（要約）
【発明の概要】
【発明が解決しようとする課題】
【０００５】
しかし、スクロールするたびに「記憶」ボタンと「戻る」ボタンを押すという操作を行わなければならなく、ユーザにとって負担となる。元の位置に戻ることに対して負担のある作業が付随するとなると、新しいものを探すためにわざわざスクロールという行為をすることが面倒であるとユーザは感じてしまう恐れがある。また、「記憶」、「戻る」ボタンを設置すると、ボタンの領域分だけ画面上の表示エリアが占有されてしまう。さらに何のボタンなのか（どのような機能のボタンであるのか）覚えなければならず、アプリケーション全体の中でユーザが覚えなければいけない操作方法が増えることとなり、簡単なユーザインタフェースの提供という点で望ましくない。
【０００６】
本発明は、上記の問題点に鑑み、上記ボタンを設置することなく、特定のアイテムを指定してブックマークさせ、そこに戻ったり先に進んだりという操作を物理的現象のような動きと交えて行うことができる表示制御装置及び表示制御方法を提供することを目的とする。
【０００７】
すなわち、アイテムリスト上のアイテム間の間隔を一定の値ではなく、ユーザの指やマウスなどによる入力の動きに応じて変化させる。つまり、アイテムリストを指で寄せると折り込まれ、指を離すとその反動で伸びて戻る。アイテムリストを構成するアイテム間の間隔が一定（剛体）ではなく、変化する（軟体）という感覚をユーザに与える。このアイテム間の間隔が伸びたり縮んだりするアニメーションを体感することで、指を強く動かして、軟体であるアイテムリストのフレームに力を加えるとその形が変わるのでは？と直感的にユーザは予測できる。
【０００８】
そして、それを裏付けるように、アイテム間に大きな収縮が起きた時点で、アイテムが折り込まれているという現象を発生させる。このアイテムリストを折り込むことによってユーザは任意のアイテムを指定できる。さらに、折り込まれたアイテムリストの上に、他のアイテムを積み重ねることができ、手を離すと積み重なりがほどけるという、質感、塑性力の演出によって、アイテムを指定してブックマークさせ、先に進んだりそこに戻ったりという直感的で容易な操作を達成させることができる。
【課題を解決するための手段】
【０００９】
上記目的を達成するために、本発明によれば、それぞれが所定のフレームで構成される複数のアイテムによって構成されるアイテム列中の一部の複数のアイテムが静止時にはディスプレイ上に所定の間隔で配置され、前記所定の間隔がユーザのアイテムに対する前記ディスプレイ上でのスクロール操作により変化するよう表示態様を制御する表示制御装置であって、前記ディスプレイに表示されるアイテムに対する前記ユーザの前記ディスプレイ上でのスクロール操作を受け付ける受付手段と、受け付けられた前記スクロール操作が所定の操作であるか否かを判断する判断手段と、前記スクロール操作が前記所定の操作である場合に、前記スクロール操作されたアイテムを指定アイテムとして指定し、前記指定アイテムとして指定された前記アイテムの表示を所定の表示形式で表示させる表示制御手段とを、備える表示制御装置が提供される。この構成により、特定のアイテムを指定してブックマークさせ、そこに戻ったり先に進んだりという操作を物理的現象のような動きと交えて行うことができる。なお、指定アイテムは、後述する折り込まれたアイテムに相当する。
【００１０】
また、本発明の表示制御装置において、前記所定の操作が、前記複数のアイテムが配列された方向と略平行に移動させ、前記方向と略垂直に移動させる操作、又は前記複数のア

イテムが配列された方向と略平行に移動させ、前記方向と逆の方向に移動させる操作、又は前記複数のアイテムが配列された方向と略平行に移動させ、突然、移動を止める操作のいずれか１つであることは、本発明の好ましい態様である。

【００１１】

また、本発明の表示制御装置において、前記所定の操作が、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の間隔が一定の値を超える操作、又は前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量が一定の値を超える操作であることは、本発明の好ましい態様である。

【００１２】

また、本発明の表示制御装置において、前記所定の操作が、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量に依存する関数により表される力が一定の値を超える操作、前記力により計算されるアイテム間の距離が一定の値を超える操作、又は前記力により計算されるアイテム間の相対速度が一定の値を超える操作のいずれかであることは、本発明の好ましい態様である。

【００１３】

また、本発明の表示制御装置において、前記所定の表示形式が、前記スクロール操作されたアイテムが傾き、隣接するアイテム上の一部に重なるような表示の形式であることは、本発明の好ましい態様である。

【００１４】

また、本発明の表示制御装置において、前記表示制御手段が、前記所定の表示形式で表示されたアイテムの前記指定アイテムとしての指定を解除するための操作を前記受付手段が受け付けた場合、前記指定アイテムの指定を解除し、前記所定の表示形式を前記指定アイテムとして指定される前の表示形式に戻すことは、本発明の好ましい態様である。

【００１５】

また、本発明の表示制御装置において、前記表示制御手段が、前記指定アイテムが指定された後に前記アイテムリストが前記ユーザによりスクロールされ、前記ディスプレイ上の所定の位置を前記指定アイテムが通過した場合、前記スクロールを停止させ、前記指定アイテムを前記所定の位置で表示させることは、本発明の好ましい態様である。なお、所定の位置は後述する停止線に相当する。

【００１６】

また、本発明の表示制御装置において、前記表示制御手段が、前記指定アイテムに近づける向きにアイテムがスクロール操作され、前記スクロール操作されたアイテムが前記指定アイテムにあらかじめ決められた距離近づくと、前記スクロール操作されたアイテムを前記指定アイテム上の一部に積み重ねて表示し、前記積み重ねられたアイテム周辺の所定の表示エリアを始点とし、前記積み重ねられたアイテムから遠ざかる向きにスクロール操作がされた場合、前記スクロール操作されたアイテムをスクロールされた方向に向けて前記所定の間隔で配置し、前記積み重ねられたアイテム周辺の他の所定の表示エリアを始点として前記積み重ねられたアイテムから遠ざける向きにスクロール操作がされ、前記スクロール操作があらかじめ決められた操作である場合に、前記積み重ねられたアイテムのうち、前記他の所定の表示エリアにおける始点からスクロールされた方向にあるアイテムそれぞれをスクロールされた方向に向けて前記所定の間隔で配置することは、本発明の好ましい態様である。なお、所定の表示エリアは後述する通常領域に相当し、他の所定の表示エリアは後述する近接領域に相当する。

【００１７】

また、本発明の表示制御装置において、前記あらかじめ決められた操作が、前記複数のアイテムが配列された方向と略平行に移動させ、前記方向に移動させてから一定時間内に前記方向と逆の方向に移動させる操作、又は前記複数のアイテムが配列された方向と略平行に移動させ、前記方向に移動させてから一定時間内に移動を停止させる操作であることは、本発明の好ましい態様である。

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【００１８】
また、本発明の表示制御装置において、前記あらかじめ決められた操作が、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の距離が一定の値を超える操作、又は前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量が一定の値を超える操作であることは、本発明の好ましい態様である。
【００１９】
また、本発明の表示制御装置において、前記あらかじめ決められた操作が、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量に依存する関数により表される力が一定の値を超える操作、前記力により計算されるアイテム間の距離が一定の値を超える操作、又は前記力により計算されるアイテム間の相対速度が一定の値を超える操作のいずれかであることは、本発明の好ましい態様である。
【００２０】
また、本発明の表示制御装置において、前記表示制御手段が、前記指定アイテム上にアイテムが積み重ねられ、所定の時間内に前記受付手段を介した操作がない場合、前記積み重ねられたアイテムそれぞれを積み重ねられる前の前記所定の間隔で配置させることは、本発明の好ましい態様である。
【００２１】
また、本発明の表示制御装置において、前記ユーザからのスクロール操作を受け付ける前記受付手段がコントローラ装置の場合、前記コントローラ装置に対して前記ユーザによって加えられる力が、前記指定アイテム上にアイテムを積み重ねる操作を行う場合のほうが、前記積み重ねられたアイテムそれぞれを前記所定の間隔で配置させる操作を行う場合よりも大きいことは、好ましい態様である。
【００２２】
また、本発明の表示制御装置において、前記ユーザからのスクロール操作を受け付ける前記受付手段がコントローラ装置の場合、前記コントローラ装置に対して前記ユーザによって加えられる力が、前記関数により表される力であることは、本発明の好ましい態様である。
【００２３】
また、本発明によれば、それぞれが所定のフレームで構成される複数のアイテムによって構成されるアイテム列中の一部の複数のアイテムが静止時にはディスプレイ上に所定の間隔で配置され、前記所定の間隔がユーザのアイテムに対する前記ディスプレイ上でのスクロール操作により変化するよう表示態様を制御する表示制御装置による表示制御方法であって、前記ディスプレイに表示されるアイテムに対する前記ユーザの前記ディスプレイ上でのスクロール操作を受け付けるステップと、受け付けられた前記スクロール操作が所定の操作であるか否かを判断するステップと、前記スクロール操作が前記所定の操作である場合に、前記スクロール操作されたアイテムを指定アイテムとして指定し、前記指定アイテムとして指定された前記アイテムの表示を所定の表示形式で表示させるステップとを、有する表示制御方法が提供される。この構成により、特定のアイテムを指定してブックマークさせ、そこに戻ったり先に進んだりという操作を物理的現象のような動きと交えて行うことができる。なお、指定アイテムは、後述する折り込まれたアイテムに相当する。
【００２４】
また、本発明の表示制御方法において、前記所定の操作が、前記複数のアイテムが配列された方向と略平行に移動させ、前記方向と略垂直に移動させる操作、又は前記複数のアイテムが配列された方向と略平行に移動させ、前記方向と逆の方向に移動させる操作、又は前記複数のアイテムが配列された方向と略平行に移動させ、突然、移動を停止させる操作のいずれか１つであることは、本発明の好ましい態様である。
【００２５】
また、本発明の表示制御方法において、前記所定の操作が、前記スクロール操作された

アイテムと、そのアイテムに隣接するアイテムとの間の間隔が一定の値を超える操作、又は前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量が一定の値を超える操作であることは、本発明の好ましい態様である。

【００２６】

また、本発明の表示制御方法において、前記所定の操作が、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量に依存する関数により表される力が一定の値を超える操作、前記力により計算されるアイテム間の距離が一定の値を超える操作、又は前記力により計算されるアイテム間の相対速度が一定の値を超える操作のいずれかであることは、本発明の好ましい態様である。

【００２７】

また、本発明の表示制御方法において、前記所定の表示形式が、前記スクロール操作されたアイテムが傾き、隣接するアイテム上の一部に重なるような表示の形式であることは、本発明の好ましい態様である。

【００２８】

また、本発明の表示制御方法において、前記所定の表示形式で表示されたアイテムの前記指定アイテムとしての指定を解除するための操作を受け付けた場合、前記指定アイテムの指定を解除し、前記所定の表示形式を前記指定アイテムとして指定される前の表示形式に戻すステップを更に有することは、本発明の好ましい態様である。

【００２９】

また、本発明の表示制御方法において、前記指定アイテムが指定された後に前記アイテムリストが前記ユーザによりスクロールされ、前記ディスプレイ上の所定の位置を前記指定アイテムが通過した場合、前記スクロールを停止させ、前記指定アイテムを前記所定の位置で表示させるステップを更に有することは、本発明の好ましい態様である。

【００３０】

また、本発明の表示制御方法において、前記指定アイテムに近づける向きにアイテムがスクロール操作され、前記スクロール操作されたアイテムが前記指定アイテムにあらかじめ決められた距離近づくと、前記スクロール操作されたアイテムを前記指定アイテム上の一部に積み重ねて表示し、前記積み重ねられたアイテム周辺の所定の表示エリアを始点とし、前記積み重ねられたアイテムから遠ざかる向きにスクロール操作がされた場合、前記スクロール操作されたアイテムをスクロールされた方向に向けて前記所定の間隔で配置し、前記積み重ねられたアイテム周辺の他の所定の表示エリアを始点として前記積み重ねられたアイテムから遠ざける向きにスクロール操作がされ、前記スクロール操作があらかじめ決められた操作である場合に、前記積み重ねられたアイテムのうち、前記他の所定の表示エリアにおける始点からスクロールされた方向にあるアイテムそれぞれをスクロールされた方向に向けて前記所定の間隔で配置するステップを更に有することは、本発明の好ましい態様である。

【００３１】

また、本発明の表示制御方法において、前記あらかじめ決められた操作が、前記複数のアイテムが配列された方向と略平行に移動させ、前記方向に移動させてから一定時間内に前記方向と逆の方向に移動させる操作、又は前記複数のアイテムが配列された方向と略平行に移動させ、前記方向に移動させてから一定時間内に移動を停止させる操作であることは、本発明の好ましい態様である。

【００３２】

また、本発明の表示制御方法において、前記あらかじめ決められた操作が、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の距離が一定の値を超える操作、又は前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量が一定の値を超える操作であることは、本発明の好ましい態様である。

【００３３】

また、本発明の表示制御方法において、前記あらかじめ決められた操作が、前記スクロール操作されたアイテムと、そのアイテムに隣接するアイテムとの間の前記所定の間隔からの変化量に依存する関数により表される力が一定の値を超える操作、前記力により計算されるアイテム間の距離が一定の値を超える操作、又は前記力により計算されるアイテム間の相対速度が一定の値を超える操作のいずれかであることは、本発明の好ましい態様である。

【００３４】

また、本発明の表示制御方法において、前記指定アイテム上にアイテムが積み重ねられ、所定の時間内に前記受付手段を介した操作がない場合、前記積み重ねられたアイテムそれぞれを積み重ねられる前の前記所定の間隔で配置させるステップを更に有することは、本発明の好ましい態様である。

【００３５】

また、本発明の表示制御方法において、コントローラ装置を介して前記ユーザからのスクロール操作を受け付ける場合、前記コントローラ装置に対して前記ユーザによって加えられる力が、前記指定アイテム上にアイテムを積み重ねる操作を行う場合のほうが、前記積み重ねられたアイテムそれぞれを前記所定の間隔で配置させる操作を行う場合よりも大きいことは、本発明の好ましい態様である。

【００３６】

また、本発明の表示制御方法において、コントローラ装置を介して前記ユーザからのスクロール操作を受け付ける場合、前記コントローラ装置に対して前記ユーザによって加えられる力が、前記関数により表される力であることは、本発明の好ましい態様である。

【発明の効果】

【００３７】

本発明の表示制御装置及び表示制御方法は、上記構成を有し、画面上の表示エリアをボタンの配置（占有）で失うことなく「ブックマークする」「今の場所を記憶させる」のようなボタンを押すなどの新しいボタンの使い方を覚えることなく、軟体的質感の軟体領域を有するアイテムリストの操作で「記憶」と「戻る」という操作を行うことができる。一度覚えたら忘れにくい操作であるため、表示制御装置及び表示制御方法は、より気軽で手軽な気持ちでユーザに操作させることができ、ユーザがマニュアルを読み返さなくても新しいアイテムの検索などをユーザにスクロールさせながら行わせることができる。

【図面の簡単な説明】

【００３８】

【図１ａ】本発明の第１の実施の形態におけるアイテムリストの一例を示す図である。

【図１ｂ】本発明の第１の実施の形態におけるアイテムリストがドラッグされた状態を示す図である。

【図２】本発明の第１の実施の形態のアイテムリストにおけるばねモデルの適用範囲を示す図である。

【図３ａ】本発明の第１の実態の形態におけるアイテムリストのばねモデルのパラメータの定義を説明するための図である。

【図３ｂ】本発明の第１の実態の形態におけるばねモデルの計算プログラムコードの一例を示す図である。

【図３ｃ】本発明の第１の実施の形態におけるアイテムが折り込まれた場合のばねモデルの計算プログラムコードの一例を示す図である。

【図４】本発明の第１の実態の形態におけるばねモデルのアイテムが移動する様子を示す図である。

【図５ａ】本発明の第１の実施の形態におけるアイテムをドラッグ操作で折り込ませる様子の一部を示す図である。

【図５ｂ】本発明の第１の実施の形態におけるアイテムをドラッグ操作で折り込ませる様子の一部を示す図である。

【図５ｃ】本発明の第１の実施の形態におけるアイテムをドラッグ操作で折り込ませる様

子の一部を示す図である。
【図６ａ】本発明の第１の実施の形態におけるアイテムを上方向ドラッグ操作で折り込ませる様子の一部を示す図である。
【図６ｂ】本発明の第１の実施の形態におけるアイテムを上方向ドラッグ操作で折り込ませる様子の一部を示す図である。
【図７ａ】本発明の第１の実施の形態におけるアイテムをドラッグ操作で折り込ませる様子を示す図である。
【図７ｂ】本発明の第１の実施の形態におけるアイテムをドラッグ操作で折り込ませる様子を示す他の図である。
【図８ａ】本発明の第１の実施の形態におけるアイテムが逆方向に折り込まれた様子を示す図である。
【図８ｂ】本発明の第１の実施の形態におけるアイテムにしおりのアイコンを描画させた様子を示す図である。
【図９ａ】本発明の第１の実施の形態における折り込まれたアイテムの右隣のアイテムを右へドラッグしている様子を示す図である。
【図９ｂ】本発明の第１の実施の形態における折り込まれたアイテムの左隣のアイテムを左へドラッグしている様子を示す図である。
【図９ｃ】本発明の第１の実施の形態における折り込まれたアイテムを左から右上にドラッグしている様子を示す図である。
【図９ｄ】本発明の第１の実施の形態における折り込まれたアイテムを左右にドラッグしている様子を示す図である。
【図９ｅ】本発明の第１の実施の形態における折り込まれたアイテムがほどけ、元の平坦なアイテムリストに戻った様子を示す図である。
【図１０ａ】本発明の第１の実施の形態における折り込まれたアイテムの右側の領域を始点とする指のドラッグによる操作の定義について説明するための図である。
【図１０ｂ】本発明の第１の実施の形態における画面の枠内に設定された停止線を示す図である。
【図１０ｃ】本発明の第１の実施の形態におけるアイテムリストを右に弾いた様子を示す図である。
【図１０ｄ】本発明の第１の実施の形態における折り込まれたアイテムが停止線でスクロールを停止した様子を示す図である。
【図１０ｅ】本発明の第１の実施の形態におけるアイテムリストを左に弾いた様子を示す図である。
【図１０ｆ】本発明の第１の実施の形態における折り込まれたアイテムが停止線でスクロールを停止した様子を示す図である。
【図１１ａ】本発明の第２の実施の形態における折り込まれたアイテムを示す図である。
【図１１ｂ】本発明の第２の実施の形態における折り込まれたアイテムに右からアイテムを積み重ねていく様子を示す図である。
【図１１ｃ】本発明の第２の実施の形態における折り込まれたアイテムと積み重なったアイテム群を左にドラッグする様子を示す図である。
【図１１ｄ】本発明の第２の実施の形態における折り込まれたアイテムに積み重なったアイテム群の右側のアイテムを始点として右側にドラッグしようとしている図である。
【図１１ｅ】本発明の第２の実施の形態における積み重なったアイテム群が崩れていく様子を示す図である。
【図１１ｆ】本発明の第２の実施の形態における折り込まれたアイテムが停止線で止まった様子を示す図である。
【図１１ｇ】本発明の第２の実施の形態におけるアイテムの積み重なりが一定時間放置されることにより自動的に崩れていく様子を示す図である。
【図１１ｈ】本発明の第２の実施の形態におけるアイテムの積み重なりが崩れて、折り込まれたアイテムだけが残った様子を示す図である。

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【図１２】本発明の第２の実施の形態における折り込まれたアイテムの右側の近接領域と通常領域での操作を説明するための図である。
【図１３ａ】本発明の第２の実施の形態における近接領域を始点にした様子を示す図である。
【図１３ｂ】本発明の第２の実施の形態におけるアイテムリストをゆっくり左へドラッグしている様子を示す図である。
【図１３ｃ】本発明の第２の実施の形態におけるアイテムリストをゆっくり右へドラッグしている様子を示す図である。
【図１４ａ】本発明の第２の実施の形態における近接領域のアイテムの積み重なりを始点に左に弾こうとする様子を示す図である。
【図１４ｂ】本発明の第２の実施の形態におけるアイテムを左に弾いた様子を示す図である。
【図１４ｃ】本発明の第２の実施の形態における積み重なったアイテムが平坦に戻った様子を示す図である。
【図１４ｄ】本発明の第２の実施の形態における積み重なったアイテムが平坦に戻った様子を示す図である。
【図１５ａ】本発明の第２の実施の形態における近接領域のアイテムの積み重なりを始点に右に弾こうとする様子を示す図である。
【図１５ｂ】本発明の第２の実施の形態におけるアイテムを右に弾いた様子を示す図である。
【図１５ｃ】本発明の第２の実施の形態における積み重なったアイテムが平坦に戻った様子を示す図である。
【図１５ｄ】本発明の第２の実施の形態における折り込まれたアイテムが停止線で止まった様子を示す図である。
【図１６ａ】本発明の第２の実施の形態における折り込まれたアイテムを示す図である。
【図１６ｂ】本発明の第２の実施の形態における折り込まれたアイテムに左からアイテムを積み重ねていく様子を示す図である。
【図１６ｃ】本発明の第２の実施の形態における折り込まれたアイテムと積み重なったアイテム群を右にドラッグする様子を示す図である。
【図１６ｄ】本発明の第２の実施の形態における折り込まれたアイテムに積み重なったアイテムの左側のアイテムを始点として左側にドラッグしようとしている様子を示す図である。
【図１６ｅ】本発明の第２の実施の形態における積み重なったアイテムが崩れていく様子を示す図である。
【図１６ｆ】本発明の第２の実施の形態における折り込まれたアイテムが停止線で止まった様子を示す図である。
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【図１６ｈ】本発明の第２の実施の形態におけるアイテムの積み重なりが崩れて、折り込まれたアイテムだけが残った様子を示す図である。
【図１７】本発明の第２の実施の形態における折り込まれたアイテムの左側の近接領域と通常領域での操作を説明するための図である。
【図１８ａ】本発明の第２の実施の形態における近接領域を始点にした様子を示す図である。
【図１８ｂ】本発明の第２の実施の形態におけるアイテムリストがゆっくりと左へドラッグしている様子を示す図である。
【図１８ｃ】本発明の第２の実施の形態におけるアイテムリストがゆっくりと右へドラッグしている様子を示す図である。
【図１９ａ】本発明の第２の実施の形態における近接領域のアイテムの積み重なりを始点に右に弾こうとする様子を示す図である。

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【図１９ｂ】本発明の第２の実施の形態におけるアイテムを右に弾いた様子を示す図である。
【図１９ｃ】本発明の第２の実施の形態における積み重なったアイテムが平坦に戻った様子を示す図である。
【図１９ｄ】本発明の第２の実施の形態における積み重なったアイテムが平坦に戻った様子を示す図である。
【図２０ａ】本発明の第２の実施の形態における近接領域のアイテムの積み重なりを始点に左に弾こうとする様子を示す図である。
【図２０ｂ】本発明の第２の実施の形態におけるアイテムを左に弾いた様子を示す図である。
【図２０ｃ】本発明の第２の実施の形態における積み重なったアイテムが平坦に戻った様子を示す図である。
【図２０ｄ】本発明の第２の実施の形態における折り込まれたアイテムが停止線で止まった様子を示す図である。
【図２１ａ】本発明の第１、第２の実施の形態におけるイベントの分岐の処理フローの一例について説明するためのフローチャートである。
【図２１ｂ】本発明の第１、第２の実施の形態におけるアイテムスクロールが行われる際の分岐処理の処理フローの一例について説明するためのフローチャートである。
【図２２】本発明の第２の実施の形態に係る表示制御装置の構成の一例を示す図である。
【図２３ａ】本発明の第２の実施の形態における２つ目のアイテムの折り込みを入れようとしている様子を示す図である。
【図２３ｂ】本発明の第２の実施の形態における２つのアイテムが折り込まれた様子を示す図である。
【図２３ｃ】本発明の第２の実施の形態における２つのアイテムが平坦なアイテムの領域を間に持って折り込まれた様子を示す図である。
【図２４ａ】本発明の第２の実施の形態におけるアイテムが奥行きの軸に折り込まれた場合を示す図である。
【図２４ｂ】本発明の第２の実施の形態におけるアイテムが奥行きの軸に折り込まれた場合の積み重なりの様子を示す図である。
【図２４ｃ】本発明の第２の実施の形態におけるアイテムが奥行きの軸に折り込まれた場合の反対側における積み重なりの様子を示す図である。
【図２４ｄ】本発明の第２の実施の形態におけるアイテムが奥行きの軸に折り込まれた場合の各領域の定義を説明するための図である。
【図２５ａ】本発明の第２の実施の形態における２次元の平坦なアイテムリストを示す図である。
【図２５ｂ】本発明の第２の実施の形態におけるアイテムが折り込まれた２次元のアイテムリストを示す図である。
【図２５ｃ】本発明の第２の実施の形態におけるアイテムが折り込まれ積み重なった２次元のアイテムリストを示す図である。
【図２５ｄ】本発明の第２の実施の形態におけるアイテムが折り込まれ積み重なった２次元のアイテムリストを示す図である。
【図２５ｅ】本発明の第２の実施の形態における２次元の平坦なアイテムリストを示す図である。
【図２５ｆ】本発明の第２の実施の形態における折り込まれたアイテムの上下に積み重なった２次元のアイテムリストを示す図である。
【図２５ｇ】本発明の第２の実施の形態における折り込まれたアイテムの上に積み重なった２次元のアイテムリストを示す図である。
【図２６ａ】本発明の第２の実施の形態におけるスティック型ハプティックコントローラを示す図である。
【図２６ｂ】本発明の第２の実施の形態におけるドラッグボタン型ハプティックコントロ

ーラを示す図である。
【図２６ｃ】本発明の第２の実施の形態におけるスティック型ハプティックコントローラの移動角度と反発力を示す図である。
【図２６ｄ】本発明の第２の実施の形態におけるドラッグボタン型ハプティックコントローラの移動距離と反発力を示す図である。
【図２７ａ】本発明の第２の実施の形態における平坦なアイテムリストを示す図である。
【図２７ｂ】本発明の第２の実施の形態におけるスティック型ハプティックコントローラの角度θと反発力Ｆの関係を示す図である。
【図２７ｃ】本発明の第２の実施の形態におけるドラッグボタン型ハプティックコントローラの距離ｄＸと反発力Ｆの関係を示す図である。
【図２８ａ】本発明の第２の実施の形態におけるアイテムが折り込まれた様子を示す図である。
【図２８ｂ】本発明の第２の実施の形態におけるスティック型ハプティックコントローラの角度θと反発力Ｆの関係を示す図である。
【図２８ｃ】本発明の第２の実施の形態におけるドラッグボタン型ハプティックコントローラの距離ｄＸと反発力Ｆの関係を示す図である。
【図２９ａ】本発明の第２の実施の形態におけるアイテムを折り込もうとしている様子を示す図である。
【図２９ｂ】本発明の第２の実施の形態におけるスティック型ハプティックコントローラの角度θと反発力Ｆの関係を示す図である。
【図２９ｃ】本発明の第２の実施の形態におけるドラッグボタン型ハプティックコントローラの距離ｄＸと反発力Ｆの関係を示す図である。
【図３０】従来におけるコントローラや指やマウスのドラッグ操作でアイテムをスクロールさせる技術の例を示す図である。
【発明を実施するための形態】
【００３９】
＜第１の実施の形態＞
以下、本発明の第１の実施の形態について述べる。図１ａ、図１ｂはアイテムリスト（上述のアイテム列に相当）１０上に配置された複数のアイテムのスクロールの様子を示している。図１ａは画面の中心（中心線上）にあるアイテム１１が選択されている状態を示している。図１ｂはタッチパネルなどにより指でドラッグを行い、選択されたアイテム１１が右に移った状態を示している。従来の技術であれば、これらアイテムを配置したアイテムリストのフレーム間隔、すなわちアイテム間の間隔は、ユーザがどのように指やマウスでジェスチャー入力しても、剛体のように固定されたもの（アイテム間の配置間隔が一定のもの）である。
【００４０】
これに対し、本発明の提案するアイテムリストはアイテム間の連結部分（図２に示すエッジ２１）に伸縮性を持たせたものとする。とりわけ、ここでは、ばねモデルを使ったものについて述べる。一般的なばねモデルの計算方法の一例（SOFTWARE-PRACTICE AND EXPERIENCE, VOL.21(1 1), 1129-1164(November 1991) Graph Drawing by Force-directed Placement）がある。
【００４１】
図２はアイテムリストにどのようにばねモデルを適用しているのかを説明するための図である。図２に示すように、アイテム１つ１つの部分に、ばねモデルの点の部分であるノード２０があり、ノード２０間にはアイテム間の連結ばね部分であるエッジ２１があるとする。ユーザからの入力によりばねの部分が伸縮する。
【００４２】
実際には、アイテムリストが有するアイテムの数は１０００個にも１００００個にもなり得るため、すべてのアイテム間にばねをつけるのは計算量が膨大となり現実的ではない。ユーザがアイテムを直接操作できる領域は画面枠内のみであることから、画面の枠の内

及び画面の枠の外の若干個数分のみを軟体領域（アイテム間が伸縮する領域）とし、その部分にのみアイテム間の伸縮を許可し、画面の中心から離れた画面上に表示されない部分は剛体領域（アイテム間が伸縮せずに一定の間隔の領域）とし、スクロールはしてもアイテム間の間隔（距離）は変わらないようにする。これにより計算量は減る。これは、物理現象で説明すると、ばねによる伸縮運動が摩擦によりすぐに失われてしまい遠くまで及ばない、画面の枠内からばねをいくら揺らしても、画面の枠から遠く離れたばねまでは伸縮運動を伝えることができないことと同様にして扱える。

【００４３】

ここで、ばねモデルを使って本発明を実現させた場合の数値の定義について図３ａから図３ｃを用いて説明する。図３ａに示すように、あるアイテム１（Item１）に対しそのアイテム１の１次元の軸上の位置をItem１　Ｘとし、アイテム１の位置の微小移動量、すなわちある時間での速度をItem１　ｄＸとする。隣接するアイテム間の距離は、隣接するアイテム同士の中心から中心までの距離としdeltaと定義する。アイテムは複数あるので、それぞれのアイテムごとにこれらの変数が定義される。

【００４４】

図３ｂは、プログラムの一例としてばねモデルの計算プログラムコードと変数の定義を示している。このプログラムは、全体を繰り返し行う「forループ」で囲まれ、繰り返し回数「iteration」の数だけ計算を行う。これは、一回だけの計算結果があまりに変化のないものだった場合など、何回分かばね計算した結果をまとめて得たいときに繰り返し計算をさせる。

【００４５】

プログラムそのものは大きく２つ（第１部と第２部）に分けられる。第１部がメインのばねによる計算部分で、第２部が第１部によって得られた新しいアイテムの速度、位置の値を更新する部分である。軟体領域にあるすべてのアイテムに付いているばねに関し、ばねの両側に付いているアイテムの移動距離を計算し、そのばねがどれだけ伸縮したかをdeltaとして計算する。deltaを下記の数式（１）に示す。ここでは、あるアイテムｎに対し、右側に隣接するあるアイテムｎ＋１との距離deltaを求めている。それに対するばねから発する力を「Force（delta）」として下記の数式（２）で定義する。これにより新たな位置や速度を求める。Ｌは力がかかってないときのばねの長さである。ここでは、すべてのばねが同一の長さＬとなる。なお、ｋはばね係数である。

【００４６】

delta＝Item（ｎ）　Ｘ－Item（ｎ＋１）　Ｘ・・・（１）

Force（delta）＝－ｋ×（Ｌ－delta）・・・（２）

【００４７】

摩擦がないばねモデルであるとアイテム同士が伸縮を繰り返し、いつまでたっても止まらなくなってしまうため、ばね運動に摩擦による抵抗の効果を与える。プログラムの第２部の速度の更新部分で速度ｄＸをdMaxかｄＸの小さいほうで切り取っている理由は摩擦を表現しているためである。はじめdMaxは大きいので影響はないが、減衰させる関数「dMax＝Decrease(dMax)」によりdMaxをだんだん小さくしていくため、ｄＸは最後には０（ゼロ）に落ち着く。減衰させる関数は入力値に対して、その入力値よりもさらに小さくした値を返す関数であり、適宜、安定させる関数を選択する。

【００４８】

これらのプログラムは、ユーザが指やマウスを用いてドラッグや弾く操作を行い、軟体領域を有するアイテムリストに対して何らかの入力があると呼び出され（起動され）、新しいアイテムの位置と速度が更新されていく。図３ｃについては後で述べる。

【００４９】

図４には、単純なばねモデルをアイテムリストに適用し、タッチパネルなどを介して指でアイテムを動かした場合のアイテムリストの動的変化の時系列が示されている。図４の（ａ）はアイテムリストに触れていない状態を示す。図４の（ｂ）は画面の中心（画面の中心線上）にあるアイテムを指で左側にドラッグした瞬間を示す。図４（ｃ）では、ある

程度指を左にドラッグさせた後、指をパネルに触れたまま、指の動きを止めた様子を示す。図４（ｄ）、（ｅ）では、その後、指を離すと、ばねによりアイテムが左右に揺れだす様子を示す。

【００５０】

ここまでは普通のばねモデルの説明であり、アイテムリストのあるアイテムでブックマークするといった操作とは直接関係ない。以降では、上述の指の動きによってユーザが軟体領域を有するアイテムリストを折り込むことで、如何にして任意のアイテムを指定できるかのアルゴリズムについて述べる。アイテムを指定するための折り込みのイベントが発生するトリガーはいくつか考えられるが、本発明では３つ提案する。

【００５１】

１つ目の提案は、擬似的なばねモデルのようなアニメーション機能を備え、ジェスチャー認識で折り込むものである。図５ａ、図５ｂには、アイテムのドラッグ操作によりアイテムリストがスクロール（アイテムが配列される方向にスクロール）され、アイテムリストの隣接するアイテム同士の距離が個別に変わり、あるアイテムをドラッグさせると、アイテムのドラッグする方向側の隣接アイテム同士の距離は縮まり、アイテムのドラッグする逆方向側の隣接アイテム同士の距離は広がる様子が示されている。

【００５２】

具体的な折り込みのイベントを発生させる方法としては、図６ａ、図６ｂに示すように、アイテムが並んでいる方向（アイテムが配列されている方向）とほぼ平行に移動してからその方向とほぼ垂直方向に移動するドラッグ操作で折り込みのイベントを発生させる方法がある。また、図５ｃに示すように、アイテムが並んでいる方向とほぼ平行に移動してからすぐにその方向と平行かつ逆の方向に動かすドラッグ操作で折り込みのイベントを発生させる方法もある。

【００５３】

２つ目の提案も同様に、図７ａのａ～ｅ、図７ｂのｆ～ｊのような擬似的なばねモデルのアニメーション機能を備え、かつ、イベントのトリガーはパラメータの値によるものである。図７ａのｂには、アイテムのドラッグ操作により、アイテムリストがスクロールし、アイテムリストの隣接するアイテム同士の距離が個別に変わり、あるアイテムをドラッグさせると、アイテムのドラッグする方向側の隣接アイテム同士の距離は縮まり、アイテムのドラッグする逆方向側の隣接アイテム同士の距離は広がる様子が示されている。

【００５４】

折り込みのイベントを発生させる方法としては、図７ａのｃに示すように、あるアイテムをドラッグ操作により、ドラッグさせたアイテムと、それに隣接するアイテムとの距離（アイテム間の間隔であって、上述する所定の間隔に相当）がある一定の値を超えた、あるいは、ドラッグさせたアイテムと、それに隣接するアイテムとの距離の初期値からの変化量がある一定の値を超えたとき、折り込みのイベントを発生させる。図７ａのｄでは、アイテムが折り込まれた後、ばねモデルにより、アイテムが図４のｄ、ｅで示したように左右に揺れるべきであるが、本発明では異なる。本発明の特長としては、折り込まれたアイテムは、選択されたアイテムであり、それが画面内で左右に揺れると、ユーザが酔ってしまうという問題があるため、ばねモデルによる動きは、常に選択されたアイテムを画面に固定した形で、すなわち選択されたアイテムに相当するノードの部分の位置が固定されたまま、左右のノードが揺れるように計算される。図７ａのｄ、ｅでは、図４のｄ、ｅと異なり、折り込まれたアイテムが画面内（ばねの固定位置）で固定されたまま、左右のアイテムが揺れて、次第に揺れがおさまる様子を示す。図７ｂのｆ～ｊに関しても同様であり、後述する。

【００５５】

３つ目の提案は、図７ａのａ～ｅに示すばねモデルなどの力の方程式を使ったものであり、アイテムのスクロールにより、アイテムリストの隣接するアイテム同士の距離が個別に変わり、隣接するアイテム同士の距離の初期値からの変化量に依存する関数で表される力の方程式が定義される。その力が上述の隣接するアイテムに働き、それによりアイテム

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の位置や速度が計算され、ユーザがある特定のアイテムをドラッグさせることにより、ドラッグされたアイテムと隣接するアイテムとの間の距離が一定の値より変化した（一定の値を超えた）、あるいはドラッグされたアイテムと隣接するアイテムとの間に働く力が一定の値より変化した（一定の値を超えた）、あるいはドラッグされたアイテムとそれに隣接するアイテムとの速度（相対速度）が一定の値より変化した（一定の値を超えた）という条件により折り込みのイベントが発生する。

【００５６】

これら３つに共通する折り込みの演出について説明する。図５ａから図５ｃでは、アイテムリストが軟体領域を有することから、アイテム間の伸縮性を利用する。図５ａで示すように、まず選択されている画面中心のアイテムに対し、指などのストロークにより右側にアイテムを移動させる。図５ｂに示すように、選択されたアイテムが右に移動したため左側のアイテムが右側に寄ってくる。そこで、図５ｃに示すように、左側にすばやく移動させると、右側に寄ってきた左側のアイテムと強く衝突することになり、アイテム間のばねが強く圧縮され、選択されていたアイテムが傾いてアイテムリスト上に折れ込んだ状態、すなわち、スクロール操作されたアイテムが傾き、隣接するアイテム上の一部に重なるような表示（上述する所定の表示形式の一例）となる。

【００５７】

この現象を、左右にドラッグさせるジェスチャー認識による判定（上述した１つ目の提案）で、アイテム間の距離やその距離の変化量の値からの判定（上述した２つ目の提案）で、力の方程式を定義し、アイテム間の距離やその距離の変化量、速度、力の値からの判定（上述した３つ目の提案）で、必要に応じて、それらをまぜて、アイテムの折れ込みイベントを発生させるようにできる。

【００５８】

ばねモデルの動きを再現するための数学的手法についてプログラムの一例を図３ｂに示した。アイテムが折り込まれるまでは図３ｂで示されるようなコードになる。あるアイテムｎに関して、隣接するアイテムｎ＋１との距離はdelta、速度はItemn ｄＸ、隣接するアイテムｎ＋１からの力はForceで定義され、その力の値からも折り込みイベントの判定を行う（上述した３つ目の提案）。

【００５９】

上述した１つ目の提案のジェスチャー認識では、左右に揺らすというものの他に、図６ａ、図６ｂで示したような指のストロークによって、アイテムリストに平行な方向に、ある程度ドラッグしてアイテムリストの方向と垂直な方向へ方向転換してドラッグすることで、アイテムが折れ曲がってアイテムリストの中で配置されるというのも考えられる。この場合のジェスチャー認識において最も簡単なものとしては、ストロークの方向を上、右上、右、右下、下、左下、左、左上の８つの方向に分けておき、正解のテンプレートを「左」→「左上」→「上」とし、正解テンプレートと順番が同じであれば折り込ませる。もっと正確に行うには、微小ベクトルで表し、距離と方向のテンプレートマッチングから点数を出してある閾値より大きい場合、折り込ませるとする。

【００６０】

いずれにせよ、アイテムの折り込みという特殊なイベントを起こさせるためには、普通のアイテムをスクロールさせるのとは異なる特殊な指の動きをする必要がある。実際には指のストロークのジェスチャー認識（上述した１つ目の提案）は、上述した２つ目の提案や３つ目の提案のアイテム間の距離、速度、力の条件との両方を併用して、精度の高い認識でアイテムの折り込みイベントを発生させることも可能である。

【００６１】

図７ａのａ～ｅ、図７ｂのｆ～ｊは、図５ａから図５ｃで述べたようなばねを強く圧縮する方法でアイテムの折り込みを行った場合のアイテムリストの状況を詳細に時系列に示している。まず、図７ａのａ～ｅまでについて述べる。図７ａのａはアイテムリストに触れていない状態を示す。ユーザがたまたま画面の真ん中にある、動かすアイテムを指で触れてドラッグしようとしている。図７ａのｂは動かすアイテムを指で左側に移動させたと

きの状態を示す。ユーザの指によって無理やり右側にアイテムが移動させられたので、動くアイテムの右側のアイテム群のばねが圧縮されている。それと同時に、動くアイテムの左側のアイテム群は右側にドラッグされている動くアイテムに引っ張られて同様に右側に移動している。

【００６２】

図７ａのｃでは、タッチパネル上で、ドラッグしていた指を突然止めることで、アイテムの移動を突然停止させた状態を示す。これにより、触れていたアイテムが選択され、折り込まれる。図７ａのｄ、ｅでは、ばねモデルの計算により、折り込まれたアイテムが画面内で固定されたまま、その左右のアイテムが、左右に揺れ動き、やがてすべてが止まる様子を示す。

【００６３】

図７ｂのｆ～ｊについて述べる。図７ｂのｆでは、アイテムリストに触れてない状態を示す。図７ｂのｇでは、指でアイテムを右に移動させた場合を示す。図７ｂのｈでは、突然、指を反対方向の左に移動させて、アイテムを逆方向に移動させる。これにより、このアイテムが折り込まれたアイテムとなる。図７ｂのｉ、ｊでは、ばねモデルの計算により、折り込まれたアイテムが画面内で固定されたまま、その左右のアイテムが、左右に揺れ動き、やがてすべてが止まる様子を示す。折り込みによって指定されたアイテムは、図８ａに示すように逆向きに折り込まれたり、図８ｂに示すように指定されたアイテムにしおりのようなアイコンを描画させたりすることもできる。

【００６４】

逆に、折り込んだアイテムを元に戻すという操作とそのためのイベント発生の条件について述べる。図９ａから図９ｅには折り込まれたアイテムを元に戻すための操作が示めされている。図９ａでは、折り込まれたアイテムの右隣のアイテムを右側に、ある一定以上の速度でドラッグする、あるいはばねモデルなどを適用した場合にある一定の力を与えてドラッグすることで、折り込まれたアイテムがあたかも強く引っ張られるという質感を演出しながら、図９ｅに示すような元の折り込まれてない状態に戻すことができる。

【００６５】

また、図９ａと同様な考え方で、図９ｂに示すように、折り込まれたアイテムの左隣のアイテムを左側に、ある一定以上の速度でドラッグする、あるいはばねモデルなどを適用した場合にある一定の力を与えてドラッグすることで折り込みをほどくことができる。また、図６ａと同様な考え方で、図９ｃに示すように、折り込まれたアイテム上を始点として、アイテムリストの軸とほぼ垂直な方向に指を動かすことで折り込みを解除させることができる。

【００６６】

また、図９ｄに示すように、折り込まれたアイテム上を始点として、アイテムリストの軸にほぼ平行に左右に一定の速度で移動させることで、あたかも折り込みを振り払う演出で、元の状態に戻すことができる。図９ｅには折り込みが解除された状態が示されている。折り込み解除のためのイベント発生の値は、折り込みのイベント発生のための値より緩く設定することも考えられる。

【００６７】

以上により、特定のアイテムを折り込ませることで「指定したアイテム」にしたり、折り込みを元に戻すことで「指定を解除」したりすることがどのようにできるかを説明した。これは、上述のある特定のアイテムを「記憶」ボタンを押してブックマークさせておくということに相当する。

【００６８】

次に、折り込みによって指定されたアイテムに対してどのように上述の「戻る」の操作を行うかについて図１０ａから図１０ｆを用いて説明する。図１０ａには折り込みによって指定されたアイテムが示されている。図１０ｂには画面内に指定された停止線が示されている。図１０ｃは、アイテムリスト上で折り込まれたアイテムより右に離れた位置から折り込まれたアイテムの方向、つまり右方向へアイテムリストをスクロールしている状態

を示している。図１０ｄは、ユーザのコントローラや指がアイテムリストから離れた状態、つまりリリースされた状態で、アイテムリストが慣性力のみで移動しているときに、折り込まれたアイテムが停止線に差し掛かると、そこでスクロールが止まる様子を示している。

【００６９】

図１０ｅは、図１０ｃと同様に、アイテムリスト上で折り込まれたアイテムより左に離れた位置から折り込まれたアイテムの方向、つまり左方向へアイテムリストをスクロールしている状態を示している。図１０ｆは、ユーザのコントローラや指がアイテムリストから離れた状態、つまりリリースされた状態で、アイテムリストが慣性力のみで移動しているときに、折り込まれたアイテムが停止線に差し掛かると、そこでスクロールが止まる様子を示している。

【００７０】

以上のように、折り込みによりアイテムを指定しておけば、アイテムリスト上で遠くのアイテムに移動しても、折り込まれたアイテムのほうにアイテムリストをスクロールすれば、指定したアイテムが画面内に移動して、画面内の指定された任意の停止位置でスクロールが強制的に停止させられ、アイテムを戻ってこさせることができる。いわば「記憶させる」、「戻る」の操作ボタンを作ることなく、アイテムをスクロールの指の軌道の延長上の動きでアイテムを指定して記憶させ、離れてもそこに戻させることができる。

【００７１】

＜第２の実施の形態＞

上述した第１の実施の形態では、折り込むことでアイテムを指定できても、そこから遠くへスクロールさせてしまうと画面から折り込んだアイテムを見失い、折り込まれたアイテムがどのようなものだったのか同一画面で現在見ているアイテムと見比べにくい。これに対する対策として、アイテムが折り込まれると、スクロールされる他の複数のアイテムが折り込まれたアイテムに向かって近接し圧縮して並んでいく、すなわち折り込まれたアイテムの上に積み重ねられていくようにする。また、重なったアイテムを画面上で振り払うなどすると、重なりがほどけて元の間隔のアイテムリストに戻るようにもする。以下でこれらの機能について説明する。これらの操作や機能もアイテムリストが軟体領域を有するがゆえに可能となる。

【００７２】

ここでは、図１１ａから図１１ｈ、図１２、図１３ａから図１３ｃ、図１４ａから図１４ｄ、図１５ａから図１５ｄに示すような、折り込まれたアイテムの右側に複数のアイテムが積み重ねられた場合と、図１６ａから図１６ｈ、図１７、図１８ａから図１８ｃ、図１９ａから図１９ｄ、図２０ａから図２０ｄに示すような、折り込まれたアイテムの左側に複数のアイテムが積み重ねられた場合とに分けて説明するが一般性は失わない。

【００７３】

まず、折り込まれたアイテムの右側に、他の複数のアイテムを積み重ねていく場合について説明する。図１１ａは、折り込まれたアイテムと、通常の状態での隣接するアイテム間の距離（通常の隣接アイテム間の距離であって、上述する所定の間隔に相当）とを示している。図１１ｂは、折り込まれたアイテムに向かってアイテムをドラッグ（スクロール）して、ドラッグされたアイテムが折り込まれたアイテムにあらかじめ決められた距離近づくと、折り込まれたアイテムにアイテムが積み重なっていく様子を示している。積み重なったアイテム同士は隣接するアイテム間の距離が近接して配置される。なお、折り込まれたアイテムとドラッグするアイテムとの間に他のアイテムが存在する場合も積み重ねは可能であり、その場合、他のアイテムが折り込まれたアイテムにあらかじめ決められた距離近づくと、折り込まれたアイテムに他のアイテムが積み重なっていく。

【００７４】

図１１ｃは、ドラッグしているアイテムが折り込まれたアイテムに積み重なった後も、さらに左側にドラッグされている様子を示している。その場合は、図１１ｃに示すように、これ以上積み重ねができないので、アイテムリスト全体が左へスクロールするような設

定などが適宜できる。

【００７５】

図１１ｄは、通常の隣接するアイテム間の距離で配置されているアイテムを、折り込まれたアイテムから逆の離れる方向にドラッグさせた場合について示している。図１１ｅは、アイテムが右側にドラッグされることで、それに続いて積み重なっていたアイテムもほどけるように移動して、通常の隣接するアイテム間の距離に戻って並ぶ様子を示している。なお、ここでは、１つのアイテムをドラッグすることで積み重なっているアイテムそれぞれがほどかれて通常の隣接するアイテム間の距離で配置されることを示しているが、積み重ねをほどく際、アイテムごとに積み重ねをほどくためのドラッグ作業を行うようにしてもよい。図１１ｆは、図１１ｅの操作で、仮にユーザが右側に指をはじくなどをしてアイテムリスト全体が右に慣性力でスクロールすることがあったとしても、事前に決められた停止線で折り込まれたアイテムが停止する様子を示している。

【００７６】

図１１ｇは、図１１ｃの状態でアイテムが積み重なり、そのままある一定の時間操作せずに放置するとアイテムが自然に崩れ始める様子を示しており、最終的には初期の図１１ａと同様の状態に戻る様子が図１１ｈに示されている。これは、ユーザがアイテムをスクロールしていってみたが、興味のありそうなものがないと思ったとき、一切の操作をしなくても自動的に指定しておいたアイテムに戻ることができるというものである。

【００７７】

図１１ａから図１１ｈで述べた操作は、図１２では操作［Ａ］、［Ｂ］として表されている。つまり、隣接するアイテム間の距離が通常のものとなっているアイテムリストの領域である「通常領域」内を始点として指やコントローラでドラッグした場合である。その一方、折り込まれたアイテムに積み重なっているアイテム群の領域、つまり隣接するアイテム間の距離が近接している領域である「近接領域」を始点としてアイテムをドラッグさせた場合の操作については図１２の［Ｃ］、［Ｄ］に示され、図１３ａから図１３ｃ、図１４ａから図１４ｄ、図１５ａから図１５ｄを用いて説明する。

【００７８】

図１２に示したアイテムが積み重なっている「近接領域」のアイテムをドラッグする場合、ゆっくりと積み重なったアイテムを動かした場合と、積み重なりを指ではねてアイテムをほどいた場合の２通りが考えられる。図１３ａから図１３ｃは、図１２の「近接領域」を始点として、例えばある一定の速度より遅く左右にドラッグさせた場合について示している。図１３ａは「近接領域」に指を置いた状態を示している。図１３ｂは、図１２の［Ｃ］の操作であり、図１３ａの状態から左側へある一定の速度より遅くドラッグさせることにより、アイテムリスト全体が指に付随して左方向にスクロールされる様子を示している。

【００７９】

図１３ｃは、図１２の［Ｄ］の操作であり、図１３ａの状態から逆に右側方向へある一定の速度より遅くドラッグさせることにより、アイテムリスト全体が指に付随して右方向にスクロールされる様子を示している。

【００８０】

図１４ａから図１４ｄ、図１５ａから図１５ｄでは、例えばある一定の速度以上の速い速度で移動させた場合、つまり積み重なったアイテム群をはねた場合について述べる。図１４ａは、図１２の［Ｃ］の操作であり、「近接領域」に指を置いた状態を示している。図１４ｂは、図１４ａの状態からある一定の速度以上の速度で左側にドラッグし、図１４ａの指の始点より左側に並んでいたアイテム（隣接するアイテム間の距離が近接されて配置されていたアイテム）が左側に移動し、最終的に図１４ｃに示すように、アイテムが通常の隣接するアイテム間の距離に戻ったアイテムリストになるという状態を示している。図１４ｄは、図１４ｃと全く同じだが、折り込まれたアイテムがそのまま折り込まれたままにしておくような設定も適宜できる。

【００８１】

図１５ａは、図１２の［Ｄ］の操作であり、「近接領域」に指を置いた状態を示している。図１５ｂは、図１５ａの状態からある一定の速度以上の速度で右側にドラッグし、図１５ａの指の始点から右側に並んでいたアイテム（隣接するアイテム間の距離が近接されて配置されていたアイテム）が右側に移動する様子を示している。そして、最終的に図１５ｃに示すように、アイテムが通常の隣接するアイテム間の距離に戻ったアイテムリストになる。慣性力などでアイテムリストがさらにスクロールされている場合は、図１５ｄに示すように停止線で折り込まれたアイテムが引っかかりスクロールが停止する。

【００８２】

上述の図１３ａから図１３ｃのようなゆっくりとドラッグして積み重なり全体をスクロールさせる場合と、図１４ａから図１４ｄ、図１５ａから図１５ｄに示すような速くドラッグして積み重なりをはねてアイテムをほどく場合との判別の条件を以下に説明する。

【００８３】

ジェスチャー認識による判別であって、アイテムリストとほぼ平行にドラッグして、その後平行であるが上述のドラッグの方向と逆の方向に一定時間内にドラッグした場合（上述の１つ目の提案）や、値による判別であって、ドラッグさせたアイテムとそれに隣接するアイテムとの距離がある一定の値を超えた、あるいはドラッグさせたアイテムとそれに隣接するアイテムとの距離の変化量がある一定の値を超えた場合（上述の２つ目の提案）や、力の方程式を使い、そのドラッグによりドラッグされたアイテムと隣接するアイテム間の距離が一定の値より変化した、あるいはドラッグされたアイテムと隣接するアイテム間に働く力が一定の値より変化した、あるいはドラッグされたアイテムと隣接するアイテムの速度が一定の値より変化した場合（上述の３つ目の提案）に、強いドラッグ（速いドラッグ）と判断される。

【００８４】

そのように判断されると、図１４ａから図１４ｄ、図１５ａから図１５ｄで定義した、ドラッグした始点にあるアイテムから最後にドラッグした方向に、連続して重なったアイテム群の全部若しくは一部がドラッグによりはねられ、最後にドラッグした方向に移動し、それらアイテムが元の通常の隣接するアイテム間の距離をもったアイテムリストに戻る。

【００８５】

逆に、上述の強いドラッグでない場合、すなわち弱いドラッグ（ゆっくりのドラッグ）として判断されると、図１３ａから図１３ｃで示したように、積み重なったアイテム群が積み重なったままドラッグされた方向にスクロールするだけである。

【００８６】

図１６ａから図１６ｈ、図１７、図１８ａから図１８ｃ、図１９ａから図１９ｄでは、折り込まれたアイテムの左側にアイテムが積み重なった場合について述べる。この場合も、上述の折り込まれたアイテムの右側に積み重なった場合と方向が逆なだけで、全く同様に考えられる。

【００８７】

図１６ａは折り込まれたアイテムの様子を示している。折り込まれたアイテムの右側にアイテムが積み重なっているが、これらがあっても無くてもここでの説明は一般性を失わない。図１６ｂは、折り込まれたアイテムに向かってアイテムをドラッグして、折り込まれたアイテムにアイテムが積み重なっていく様子を示している。積み重なったアイテム同士は隣接するアイテム間の距離が近接して配置される。図１６ｃは、ドラッグしているアイテムが折り込まれたアイテムに積み重なった後も、さらに右側にドラッグされている様子を示している。その場合は、図１６ｃに示すように、アイテムリスト全体が右へスクロールするような設定など適宜できる。

【００８８】

図１６ｄは、逆に通常の隣接するアイテム間の距離で配置されているアイテムを、折り込まれたアイテムから離れる方向にドラッグさせた場合について示している。図１６ｅは、アイテムが左側にドラッグされることで、それに続いて積み重なっていたアイテムもほ

どけるように移動して、通常の隣接するアイテム間の距離に戻って並ぶ様子を示している。図１６ｆは、図１６ｄの操作で、仮にユーザが左側に指をはじくなどをしてアイテムリスト全体が左側に慣性力でスクロールすることがあったとしても、事前に決められた停止線で折り込まれたアイテムが停止する様子を示している。

【００８９】

図１６ｇは、図１６ｃの状態で、アイテムが積み重なり、そのままある一定の時間操作せずに放置するとアイテムが自然に崩れ始める状態を示し、図１６ｈは、折り込まれたアイテムが初期の図１６ａの状態に戻った様子を示している。図１６ａから図１６ｈで述べた操作は、図１７では操作［Ａ］、［Ｂ］として表される。つまり、隣接するアイテム間の距離が通常のものとなっているアイテムリストの領域である「通常領域」内を始点として、指やコントローラでドラッグした場合である。

【００９０】

その一方、折り込まれたアイテムに積み重なっているアイテム群の領域、つまり隣接するアイテム間の距離が近接している領域である「近接領域」を始点として、アイテムをドラッグさせた場合の操作は、図１７の［Ｃ］、［Ｄ］に示され、図１８ａから図１８ｃ、図１９ａから図１９ｄ、図２０ａから図２０ｄを用いて説明する。

【００９１】

図１８ａから図１８ｃ、図１９ａから図１９ｄ、図２０ａから図２０ｄは、それぞれ、図１３ａから図１３ｃ、図１４ａから図１４ｄ、図１５ａから図１５ｄと同様である。したがって、弱いドラッグの場合は、図１３ａから図１３ｃ、図１８ａから図１８ｃに示すもの処理となり、強いドラッグの場合は、図１４ａから図１４ｄ、図１５ａから図１５ｄ、図１９ａから図１９ｄ、図２０ａから図２０ｄに示す処理となる。

【００９２】

図１８ａから図１８ｃは、図１７の「近接領域」を始点として、例えばある一定の速度より遅く左右にドラッグさせた場合を示している。図１８ａは「近接領域」に指を置いた状態を示している。図１８ｂは、図１７の［Ｃ］の操作であり、図１８ａの状態から左側へある一定の速度より遅くドラッグさせ、アイテムリスト全体が指に付随して左方向にスクロールされる様子を示している。図１８ｃは、図１７の［Ｄ］の操作であり、図１８ａの状態から逆に右側方向へある一定の速度より遅くドラッグさせ、アイテムリスト全体が指に付随して右方向にスクロールされる様子を示している。

【００９３】

図１９ａから図１９ｄ、図２０ａから図２０ｄでは、例えばある一定の速度以上の速い速度で移動させた場合について述べる。図１９ａは、図１７の［Ｃ］の操作であり、「近接領域」に指を置いた状態を示している。図１９ｂは、図１９ａの状態から、ある一定の速度以上の速度で右側にドラッグさせ、図１９ａでの指の始点から右側に並んでいたアイテム（隣接するアイテム間の距離が近接されて配置されていたアイテム）が右側に移動し、最終的に図１９ｃに示すような、アイテムが通常の隣接するアイテム間の距離に戻ったアイテムリストになるという状態を示している。

【００９４】

図２０ａは、図１７の［Ｄ］の操作であり、「近接領域」に指を置いた状態を示している。図２０ｂは、図２０ａの状態から、ある一定の速度以上の速度で左側にドラッグさせ、図２０ａでの指の始点から左側に並んでいたアイテム（隣接するアイテム間の距離が近接されて配置されていたアイテム）が左側に移動する様子を示している。そして、最終的に図２０ｃに示すように、アイテムが通常の隣接するアイテム間の距離に戻ったアイテムリストになる。慣性力などでアイテムリストがさらにスクロールしている場合は、図２０ｄに示すように、停止線で折り込まれたアイテムが引っかかりスクロールが停止する。

【００９５】

ここで、図３ａから図３ｃに戻り、折り込まれたアイテムに積み重なる場合のばねモデルの拡張について説明する。折り込まれたアイテムに連続して積み重なったアイテム群は、１つの大きな剛体、大きなノードとして扱うことができる。あるいは、積み重なった個

別のアイテムに関して、別の力を定義する関数を適用させることができる。

【００９６】

折り込まれた後の計算の一例を図３ｃに示す。折り込まれた場合、折り込まれたアイテム及びそのアイテムに積み重なったアイテムには、フラグb Foldedがtrueとなって個別にそのアイテムが積み重なったことを示す。あるアイテムが積み重なるべきか、あるいは通常の平坦なアイテムリストとして配置されるべきかの判断は、隣接する積み重なったアイテムとの距離がある定数distanceよりも小さいと積み重なると判断され、b Foldedをtrueと設定する。

【００９７】

b Foldedがtrueなものに関しては、短いばねの長さと別の力との関数が適用される。その関数を式（３）に示す。

【００９８】

Force_folded（delta）＝－kf×（Lf－delta）・・・（３）

【００９９】

積み重なったアイテム同士のばね定数はｋｆ、短いばねの長さはＬｆと定義される。あるいは式（３）を適用せず、b Foldedがtrue、つまり積み重なっているものに関してはアイテム間の距離を近接したアイテム同士のある定数として、積み重なったアイテム群を１つのノードとして扱う。

【０１００】

以上述べたイベントの分岐の処理フローの一例について図２１ａを用いて説明する。ユーザにより、指やコントローラなどであるアイテムがドラッグ（スクロール）されたとする（ステップＳ２１０１）。そして、ドラッグされたアイテムが図１２や図１７で定義された「通常領域」のアイテムか否かを判断する（ステップＳ２１０２）。ドラッグされたアイテムが「通常領域」のアイテムの場合、そのドラッグにより、上述した３つの提案で定義されたアイテムを折り込む条件を満たすか否かが判断され（ステップＳ２１０３）、条件を満たす場合、そのアイテムを新規の折り込みのアイテムとする（ステップＳ２１０４）。条件を満たしていない場合は、そのアイテムのスクロールが行われる（ステップＳ２１０５）。

【０１０１】

一方、ステップＳ２１０２で「通常領域」のアイテムではないと判断された場合、ドラッグされたアイテムが図１２や図１７で定義された「近接領域」でのアイテム、すなわち積み重なったアイテムか否かを判断し（ステップＳ２１０６）、「近接領域」でのアイテムである場合、積み重なったアイテムのドラッグの仕方が積み重なりの山を崩す条件を満たすか否かを判断され（ステップＳ２１０７）、条件を満たす場合、例えばある一定の速度を超えたものの場合、図１４ａから図１４ｄ、図１５ａから図１５ｄ、図１９ａから図１９ｄ、図２０ａから図２０ｄで示したように、そのアイテムからドラッグした方向へ連続して積み重なっているアイテム群を積み重なりからほどく処理が行われ（ステップＳ２１０８）、アイテムのスクロールが行われる（ステップＳ２１０５）。条件を満たしていない場合、図１３ａから図１３ｃや図１８ａから図１８ｃで示したように、アイテムリスト全体がスクロールするようなアイテムのスクロールが行われる（ステップＳ２１０５）。

【０１０２】

また、一方、ステップＳ２１０６で「近接領域」のアイテムではないと判断された場合、すなわち、ドラッグされたアイテムが図７ａのａ～ｅで定義された折り込まれたアイテムの場合、折り込まれたアイテムをドラッグする動きが、上述した３つの提案の折り込みを解除する図９で示したようなものであるか否かが判断され（ステップＳ２１０９）、折り込み解除の条件を満たす場合、折り込みの解除がなされる（ステップＳ２１１０）。条件を満たさない場合、アイテムのスクロールが行われる（ステップＳ２１０５）。

【０１０３】

上述したアイテムスクロールが行われる際の分岐処理のフローの一例について図２１ｂ

を用いて説明する。まず、アイテムがスクロールされる際、ユーザが指やコントローラによる指示をアイテムリストから離した（リリースされた）かどうか、かつ折り込まれた指定されたアイテムが画面内に定義された停止線を横切ろうとしているか否かを調べる（ステップＳ２１１１）。横切ろうとしている場合は、図１０ａから図１０ｆ、図１１ｆ、図１５ｃ、図１６ｆ、図１９ｄ、図２０ｅで示したように、アイテムリストのスクロールを停止させる（ステップＳ２１１２）。上述の条件を満たしていない場合は処理を続ける。

【０１０４】

そして、アイテムがドラッグ（スクロール）されている方向に折り込まれたアイテムがあるか否かを調べる（ステップＳ２１１３）。ある場合は、図１１ｂ、図１６ｂで示したように、ドラッグするアイテムの延長上にあるアイテムを折り込まれたアイテムに積み重なるようにする（ステップＳ２１１４）。次に、アイテムがドラッグ（スクロール）されている方向と逆の方向に積み重なったアイテムがあるか否かを調べる（ステップＳ２１１５）。ある場合は、図１１ｅ、図１６ｅで示したように、ドラッグするアイテムの逆方向の延長上にあるアイテムを積み重なりからほどく（ステップＳ２１１６）。

【０１０５】

図２２には表示制御装置としての全体の構造の一例を示す。表示制御装置は、コントローラ２２０１（上述する受付手段に相当）、タッチパネル２２０２（上述する受付手段に相当）、判断部２２０３（上述する判断手段に相当）、計算部２２０４（上述する表示制御手段に相当）、ディスプレイ２２０５を備える。なお、表示制御装置は、ディスプレイ２２０５を構成要素とせず、外部の表示手段（不図示）に接続可能なインタフェースを有するものであってもよい。

【０１０６】

コントローラ２２０１やタッチパネル２２０２は、ユーザからの入力を受け付けるものであり、コントローラ２２０１やタッチパネル２２０２を介したユーザからの操作による入力信号が判断部２２０３に送られる。なお、表示制御装置は、コントローラ２２０１とタッチパネル２２０２の両方を備えるものでもよく、またどちらか一方のみを備えるものでもよい。判断部２２０３は、図２１ａ、図２１ｂに示すような入力されたユーザの指の動きから適切な判断を行う。判断を行った判断結果が計算部２２０４に送信される。

【０１０７】

計算部２２０４は、アイテム同士の物理法則、ばねモデルなどを使い、個々のアイテムの位置や速度を計算（決定）し、計算結果をディスプレイ２２０５に表示させる。計算部２２０４で計算された計算結果は判断部２２０３にも送られ、アイテムの動向、物理感を再現するためにコントローラ２２０１に対して反発力を判断部２２０３によって生成させる。タッチパネル２２０２に対しても、振動するハプティックタッチパネルの場合、反発力を表現するため、判断部２２０３はパネルを振動させる信号を適宜送る。ユーザは、それを感じてディスプレイ２２０５を見ながら、より直感的にコントローラ２２０１でアイテムを操作できる。

【０１０８】

本発明では、折り込まれるアイテムの数は１つに限定されない。図２３ａから図２３ｃに示すように、複数の折り込みを入れることも可能である。例えば、図２３ａに示すように１つの折り込みがされており、さらに図２３ｂや図２３ｃで示すように、２つ目の折り込みを続けて入れることも可能である。図２３ｂでは折り込まれたアイテムが２つある。その場合でも、「通常領域」が２つあるだけで図１２に示す態様と変わらない。

【０１０９】

図２３ｃは、折り込まれた２つのアイテム間に若干の距離がある場合である。この場合、「近接領域」の間に「通常領域」が挟まれている。このような場合、例えば右側の「近接領域」を始点として指を左にはねて、右の「近接領域」に重なっているアイテムを崩しても、左側の「近接領域」に重なっているアイテムは崩れないようにすることで、ユーザは１つ１つの独立した積み重なりの山を個別に崩すことができる。

【０１１０】

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本発明では、折り込まれたアイテムに積み重なるアイテムの定義は、隣接するアイテム間の距離が小さくなり近接して並ぶこととする。したがって、その表現、演出方法は、図１１に示すようなアイテムリストの軸に沿ったものに限定されない。すなわち、折り込まれるアイテムは、図２４ａから図２４ｄに示すように、アイテムリストの奥（奥行き）に向かった軸に沿って並ばせることも可能である。

【０１１１】

図２４ａは、アイテムリストの奥に向かった軸に沿ってアイテムが折り込まれた様子を示している。図２４ｂは、アイテムリストの奥に向かった軸に沿ってアイテムが積み重なる様子を示している。図２４ｃは、アイテムリストの奥に向かった軸に沿って、折り込まれたアイテムの反対側からアイテムが積み重なる様子を示している。図２４ｄは、このような場合の「近接領域」、「通常領域」を示している。ユーザは、アイテムリストの奥に向かった軸に沿って指をドラッグする必要がある。

【０１１２】

本発明では、アイテムリストを１次元から２次元へ拡張することも可能である。その状態を図２５ａから図２５ｇに示す。図２５ａは、ユーザが操作する前の２次元アイテムリストを示している。図２５ｂは、ある任意の方向にアイテムが指によってドラッグされ、折り込まれた状態を示している。アイテムリストが２次元であり、ドラッグされた方向が斜めであったことから、縦、横の２つの列のアイテムの折り込み（折り込まれたアイテム群）が生成される。図２５ｃと図２５ｄは、折り込まれたアイテム群の上に、さらにアイテムが積み重ねられていく様子を示している。この重なりによって、２次元アイテムリストでの「通常領域」と「近接領域」が定義される。

【０１１３】

図２５ｅは、しばらく入力（ユーザによるドラッグなど）をしないで放置すると、積み重なったアイテムがほどけて元の平坦な状態に戻る様子を示している。図２５ｆは、図２５ｄの折り込まれたアイテム群の反対側にアイテムを積み重ねていく様子を示している。図２５ｇは、入力しないで放置すると、積み重なったアイテムがほどけて元の平坦な状態に戻る様子を示している。

【０１１４】

本発明のアイテムリストにおけるアイテムの折り込みの操作は、通常のコントローラやタッチパネルでの指の操作だけでなく、ハプティック機能を備えたコントローラやタッチパネルでも可能である。ハプティックとは、ユーザが加える力に対する反発力や反動力をコントローラなどに加えることで、ユーザがコントローラを通して反発力や反動力を感じることができるものである。本発明では、アイテムが折り込まれた際のアイテムリストが持つ不均衡となった質感などを与えることができる。

【０１１５】

ここでは２種類のコントローラを例に挙げ、１つのコントローラを図２６ａに示し、もう１つのコントローラを図２６ｂに示す。図２６ａに示すコントローラは、ユーザが力を加えることで図２６ｃに示すようにある角度θ傾けることができ、図２６ｂに示すコントローラは、図２６ｄに示すようなある移動距離ｄＸをドラッグすることができる。

【０１１６】

図２７ａに示すようにアイテムリストが平坦、つまり、すべてのアイテムが通常の隣接するアイテム間の距離を持っている場合では、図２６ａ、図２６ｂに示すそれぞれのコントローラは、移動分に対し左右に同一の反発力を持つ。一方、図２８ａに示すように、アイテムリストに折り込まれたアイテムがある場合、コントローラの移動分に応じて左右の反発力の均衡が崩れる。直感に沿った反発力を説明すると、図２８ａにおいて、さらなるアイテムを、折り込まれたアイテムの上に重ねていく操作をするには反発力がかかり、逆に、積み重なったアイテムの山をほどいていくほうには反発力がかからない感覚をユーザに与える。

【０１１７】

図２８ｂ、図２８ｃでは、正の移動距離の方向を、図２８ａのアイテムリストのアイテ

ムの左への移動と定義しているため、図２８ｂではθ＞０の方向ほど、図２８ｃではｄＸ＞０ほどアイテムを左にもっていき山積みに載せるので重い操作の負担が必要となる。

【０１１８】

図２９ａ、図２９ｂでは、図７ａのａ～ｅで示した軟体領域を有するアイテムリストの特定のアイテムに力を入れて折り込まれるという操作の中で、ドラッグしているアイテムにかかった理論上の力をそのままコントローラに与えることにより、力を加えたからアイテムが折り込まれ、指定されたアイテムにすることができたとユーザに感じさせることができる。

【０１１９】

図２９ａは、あるアイテムを右から左へとドラッグさせることでそのアイテムにかかる力を増やそうとしている様子を示している。図２９ｂ、図２９ｃは、図２９ａの状況下でのばねモデルなどの計算から算出されるドラッグしているアイテムに加わる力を、コントローラにθ若しくはｄＸの関数として与える様子を示している。アイテムリストのうねりに反発する左側にドラッグさせようとすると、右勾配の反発力となって大きな反発力がユーザには感じられる。

【産業上の利用可能性】

【０１２０】

本発明に係る表示制御装置及び表示制御方法は、画面上の表示エリアをボタンの配置（占有）で失うことなく「ブックマークする」「今の場所を記憶させる」のようなボタンを押すなどの新しいボタンの使い方を覚えることなく、軟体的質感の軟体領域を有するアイテムリストの操作で「記憶」と「戻る」という操作を行うことができるため、ディスプレイ上に表示されるアイテムの表示を制御する表示制御装置及び表示制御方法などに有用である。

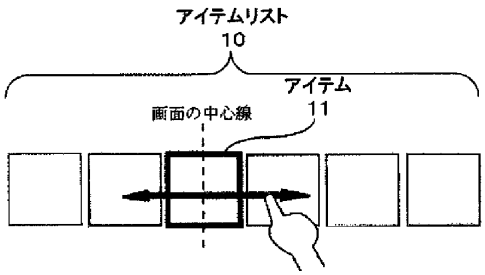
【符号の説明】

【０１２１】

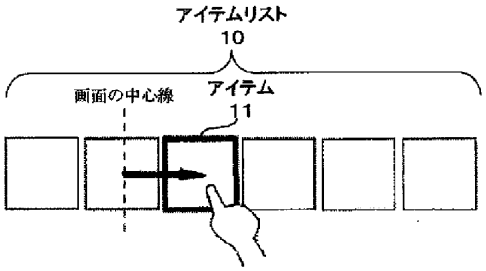
１０　アイテムリスト
１１　アイテム
２０　ノード
２１　エッジ
１００　折り込みによって指定されたアイテム
２２０１　コントローラ（受付手段）
２２０２　タッチパネル（受付手段）
２２０３　判断部（判断手段）
２２０４　計算部（表示制御手段）
２２０５　ディスプレイ

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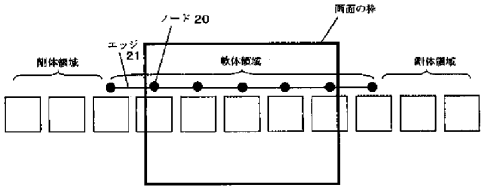
【図１ａ】



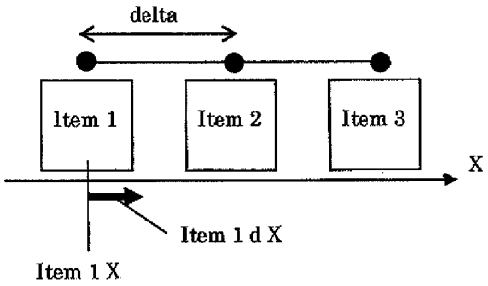
【図１ｂ】



【図２】



【図３ａ】



【図３ｂ】

Item n X: アイテムｎの座標	Force (d): バネの変位量ｄに対する
Item n dX: アイテムｎの移動量	反発力
dMax: アイテム移動量の上限	Decrease(): 減衰関数
iteration: 繰り返し回数	iteration: 繰り返し回数

```
for iteration do begin
  //Calculate displacement
    for Item n in TotalItem do begin
        delta=Item n X- Item n+1 X;
        Item n dX=Item n+1 dX+(delta/ |delta |)* Force(delta)
    end

  //Update position
  for Item n in TotalItem do begin
      Item n X=Item n X+0.1*Item n dX/ | Item n dX | *min( Item n dX, dMax)
  end
  dMax = Decrease(dMax)
end
```

ばねによるアイテムの位置、速度計算
繰り返し
新しい速度と位置の更新

【図３ｃ】

Item n bFolded: アイテムｎが積み重なっているか	
distance: 積み重なると判断されるアイテム間の距離	
Force_folded: 積み重なったアイテム同士の力	

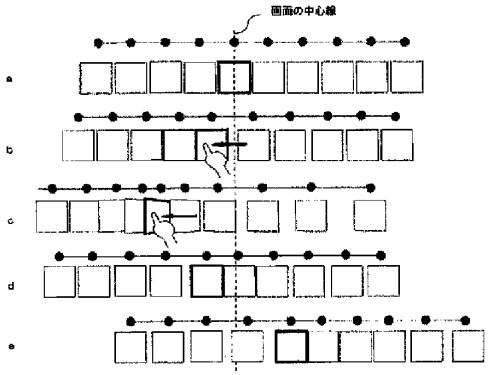
```
//Calculate displacement
//Item f is a folded Item.
bitem f bFolded=true;
    //Calculate displacement
    for Item n in TotalItem do begin
        delta=Item n X- Item n+1 X;
        if((Item n   bFolded) &&(delta< distance))
          Item n+1 bFolded=true;

        if(Item n+1   bFolded)
          Item n dX=(Item n+1 dX+(delta/ |delta |)* Force_folded(delta)
        else
          Item n dX=Item n+1 dX+(delta/ |delta |)* Force(delta)

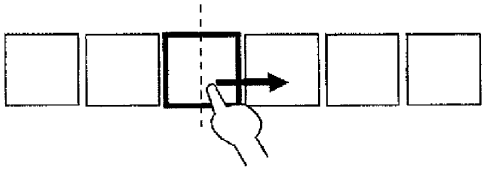
        endif
    end
```

ばねによるアイテムの位置、速度計算

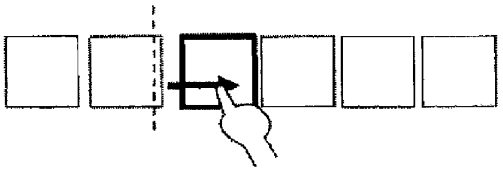
【図４】



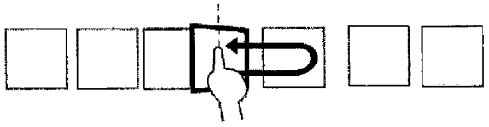
【図５ａ】



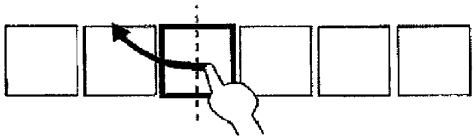
【図５ｂ】



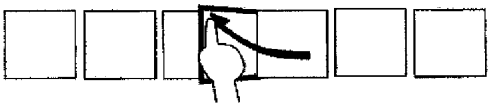
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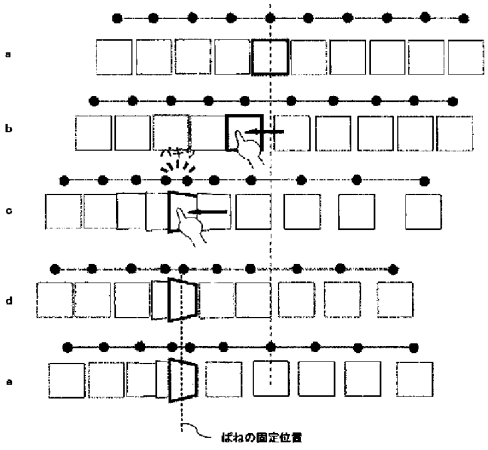
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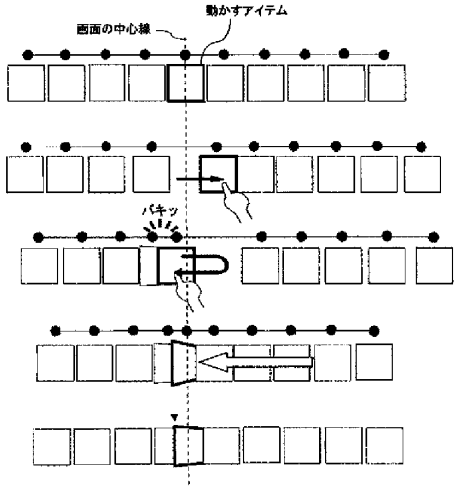
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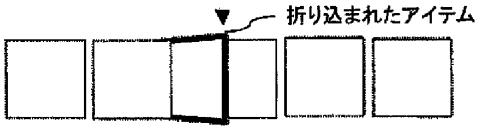
【図７ａ】



【図７ｂ】

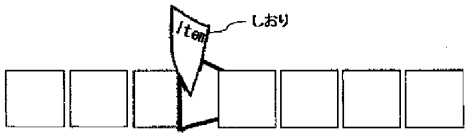


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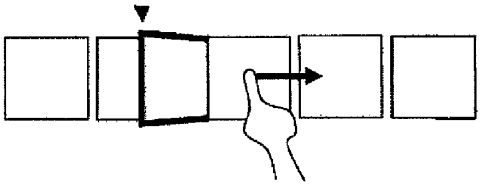


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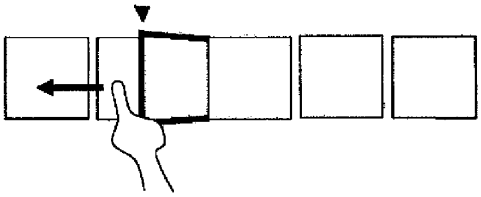
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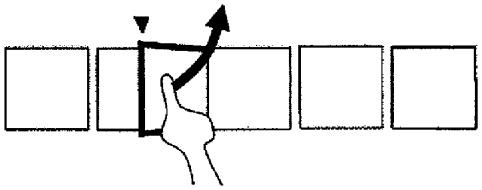
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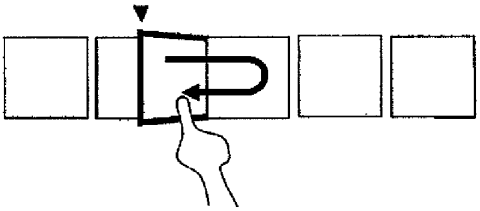
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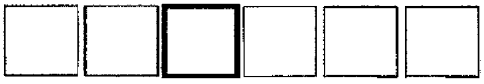
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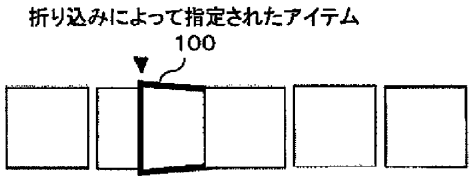
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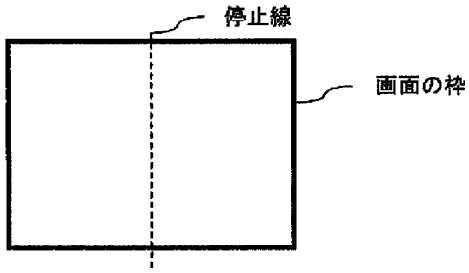
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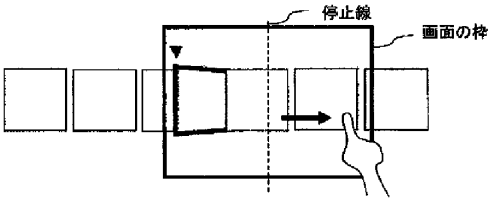
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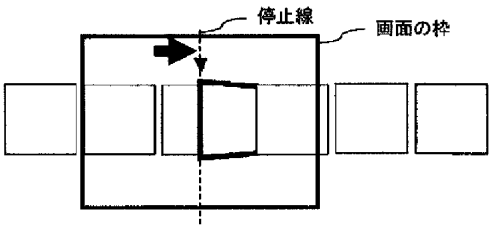
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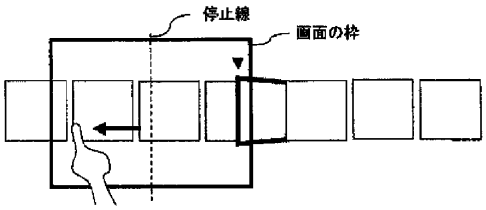
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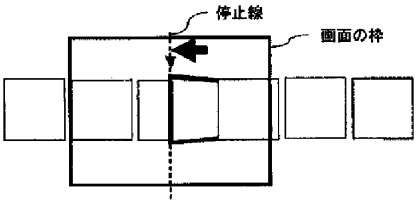
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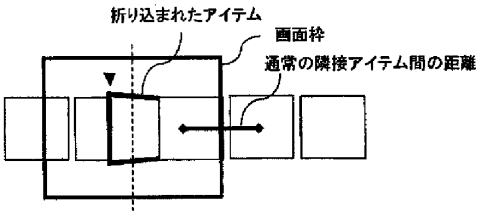
【図１０ｅ】



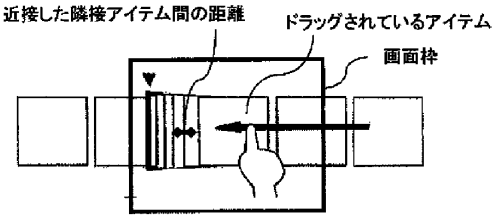
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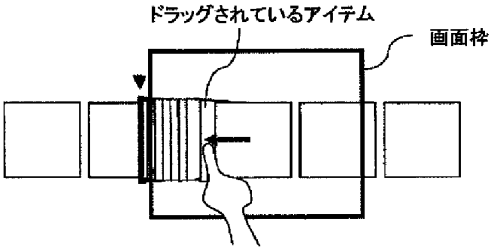
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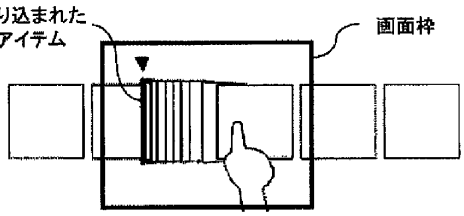
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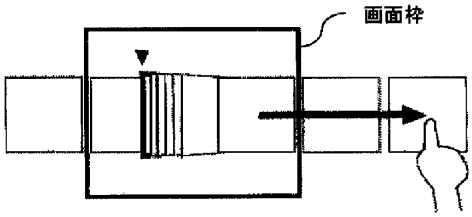
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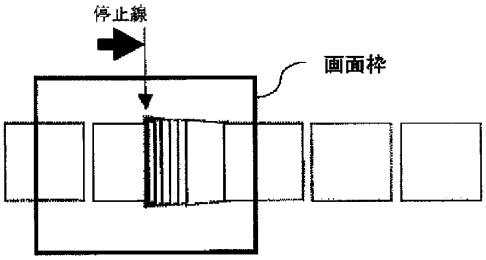
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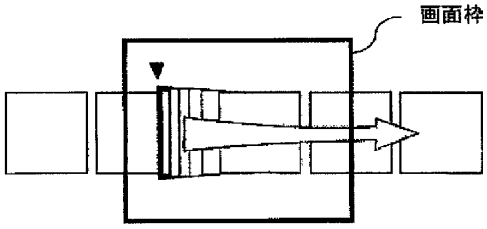
【図１１ｅ】



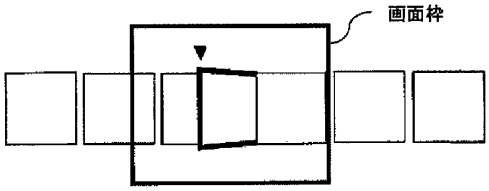
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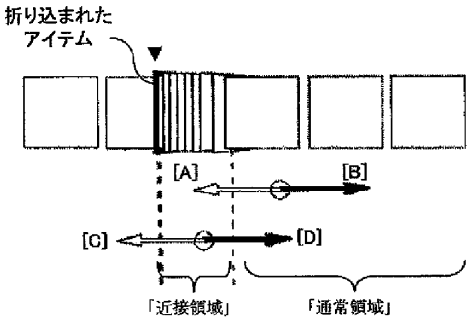
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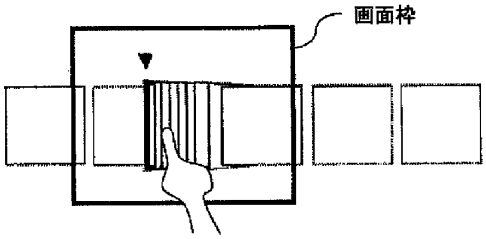
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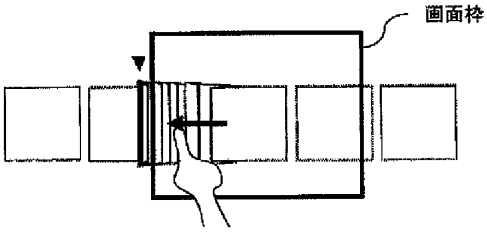
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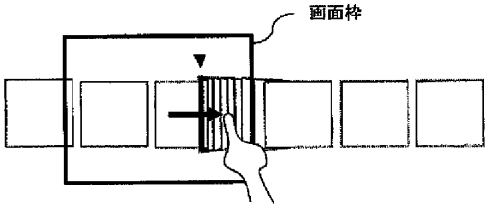
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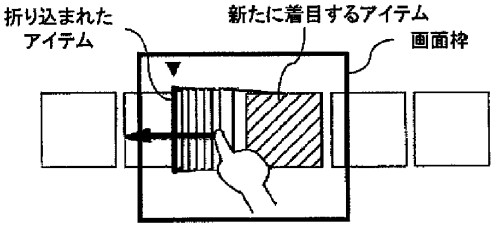
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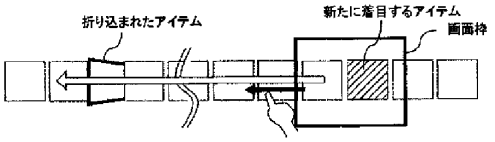
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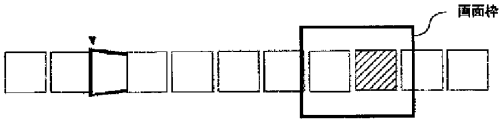
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【図１４ｂ】

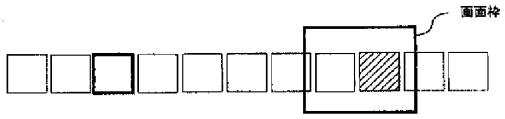


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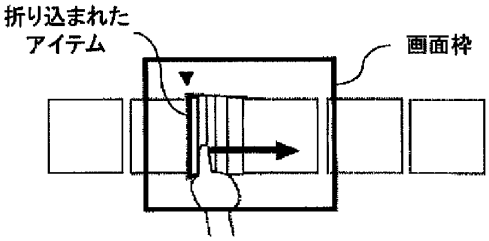


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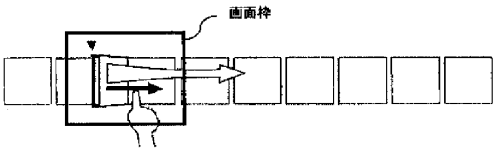
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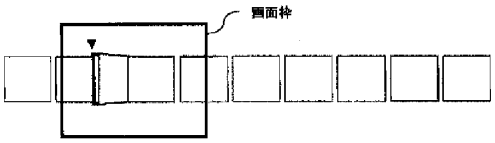
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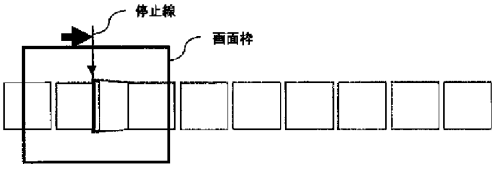
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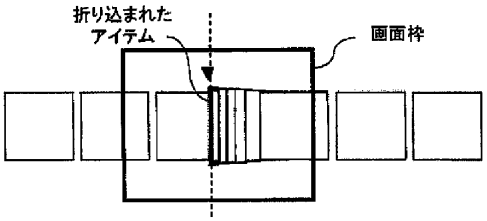
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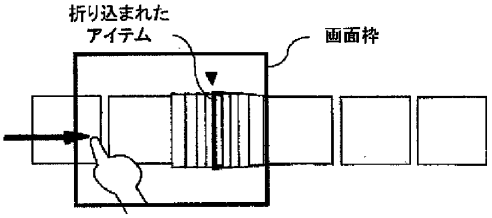
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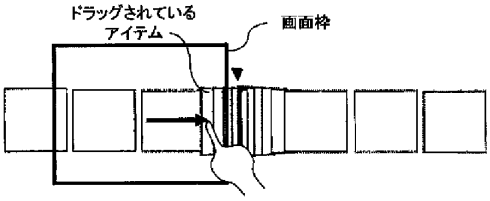
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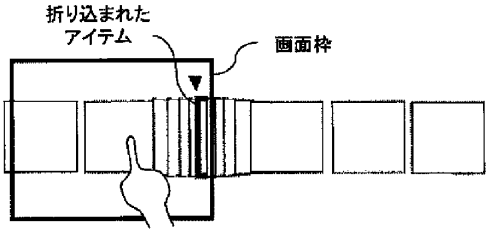
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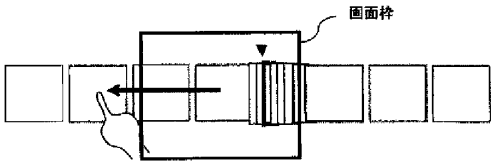
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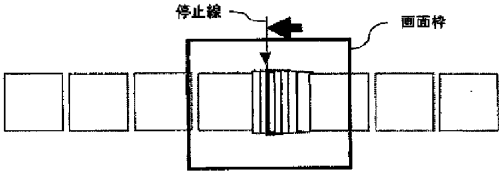
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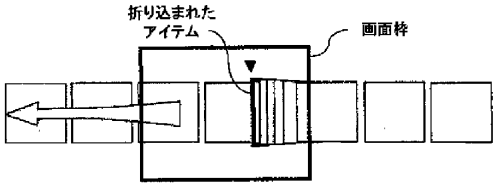
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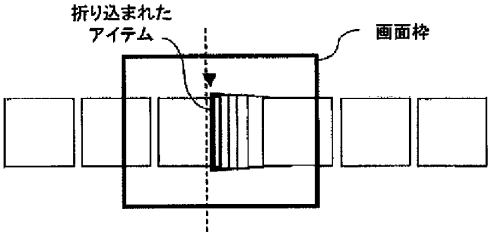
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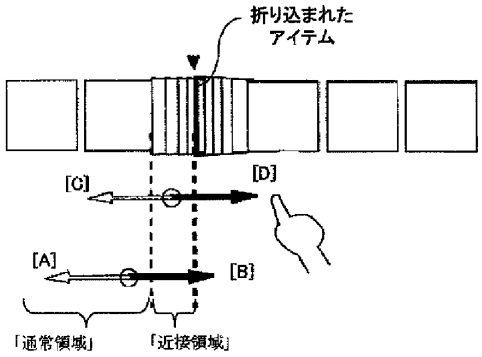
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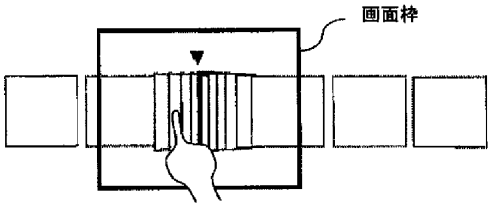
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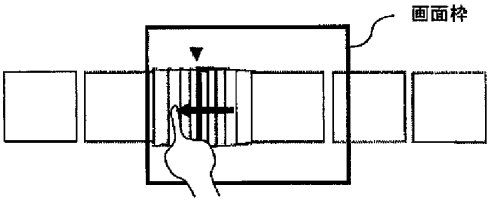
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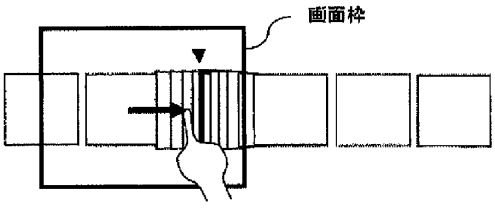
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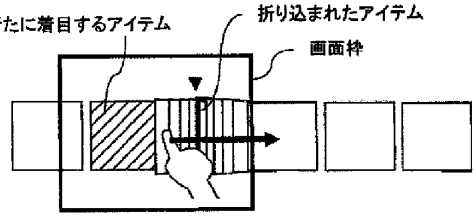
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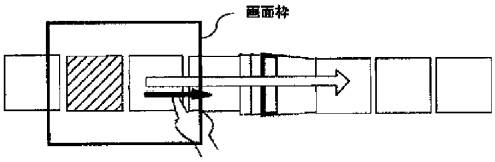
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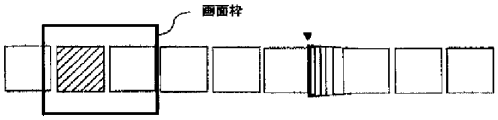
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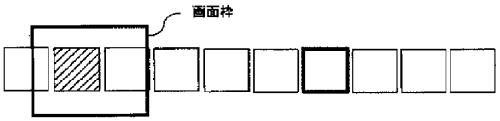
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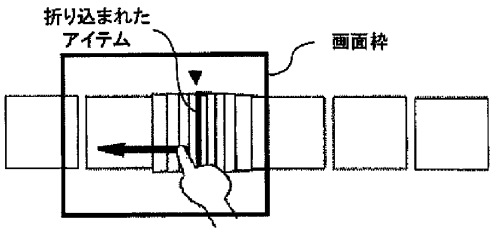
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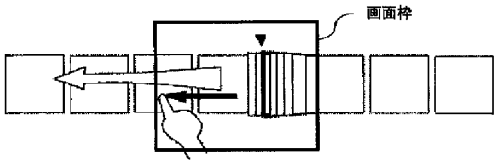
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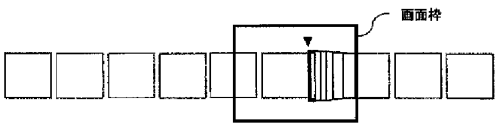
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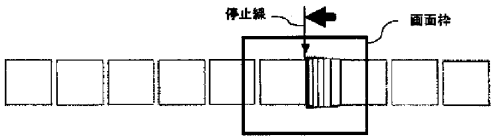
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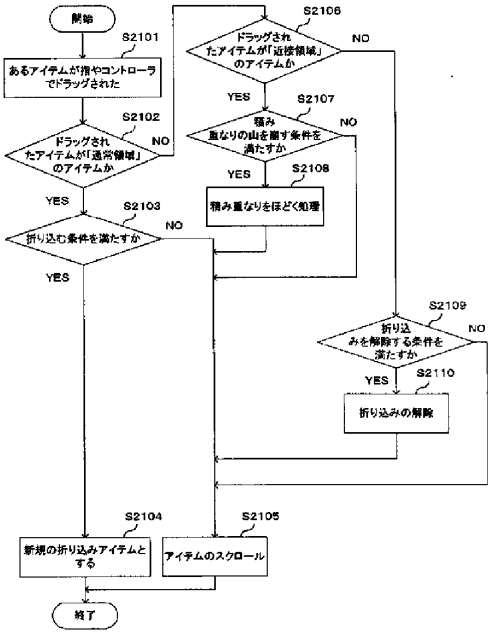
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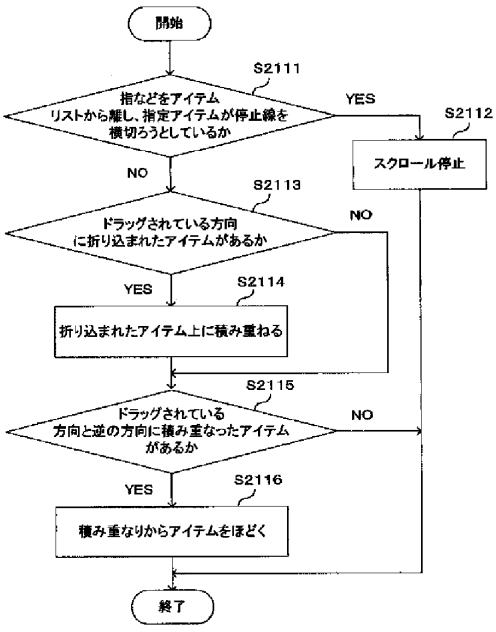
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【図２１ａ】

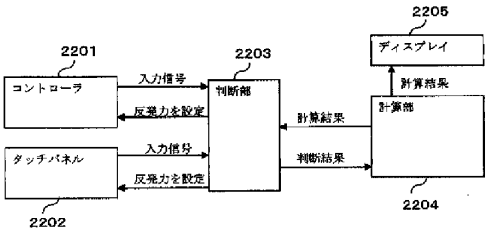


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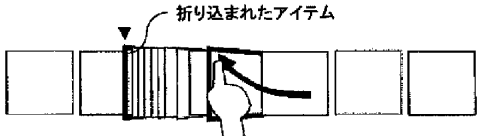


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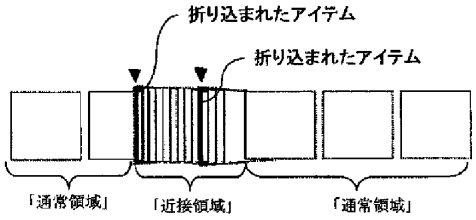
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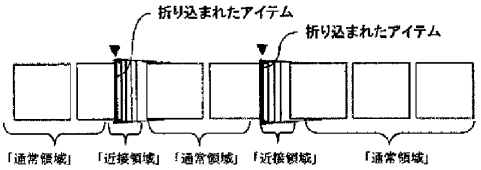
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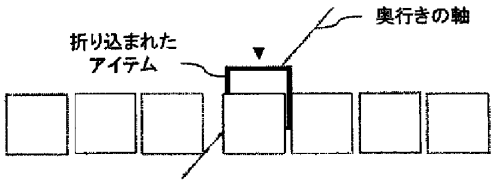
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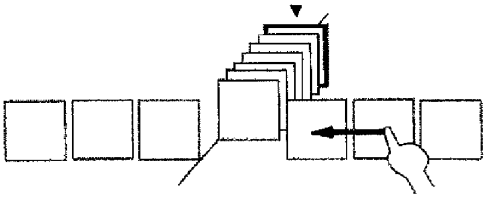
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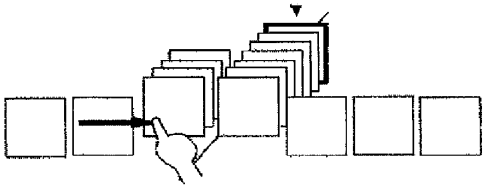
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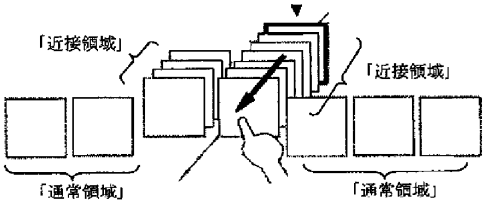
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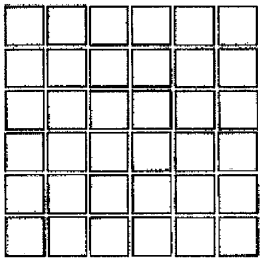
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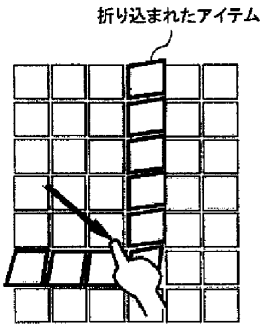
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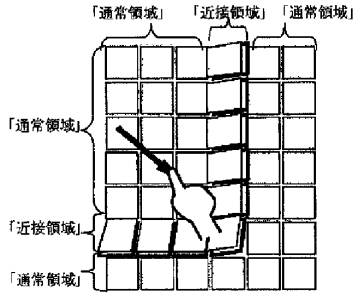


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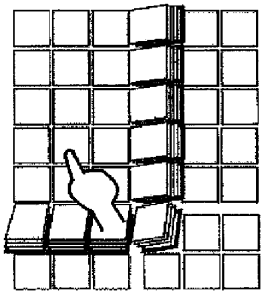


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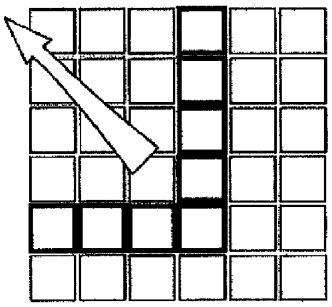
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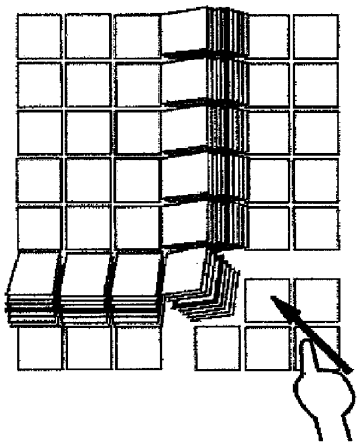
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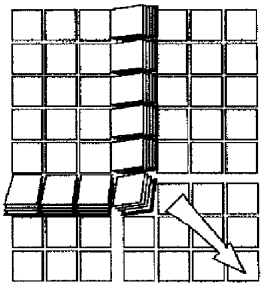
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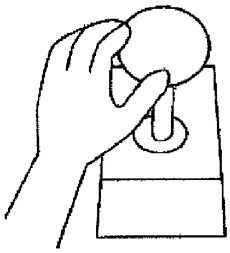
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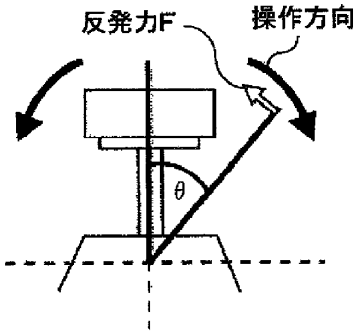
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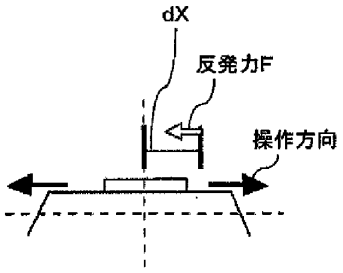
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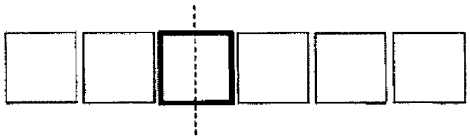
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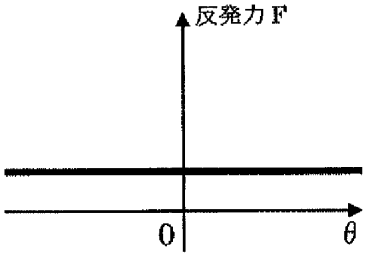
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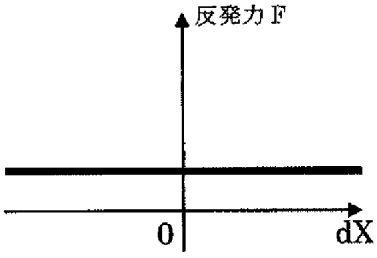
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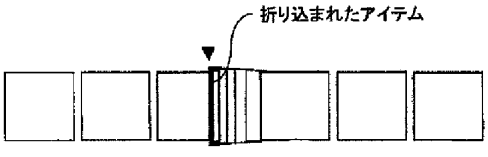
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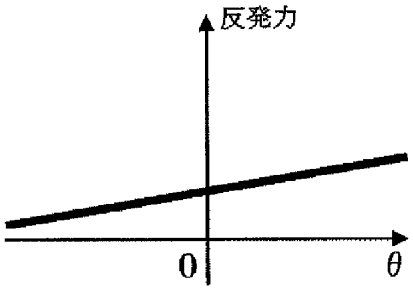


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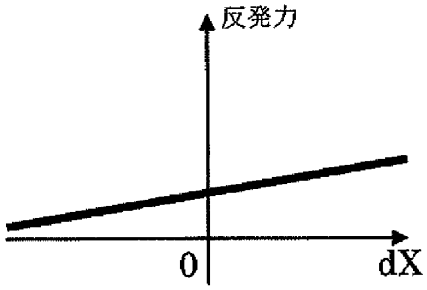


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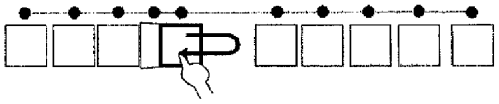
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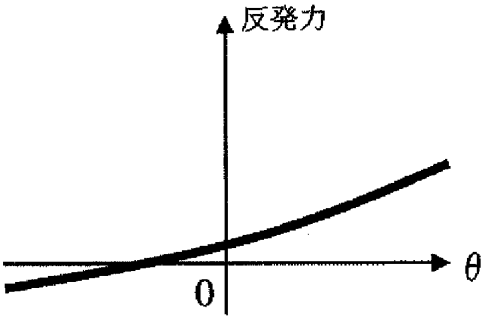
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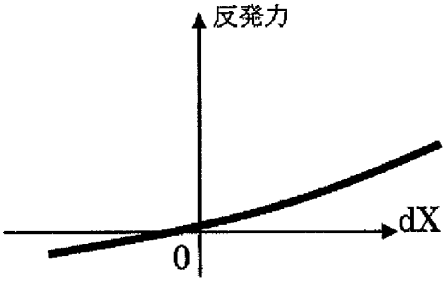
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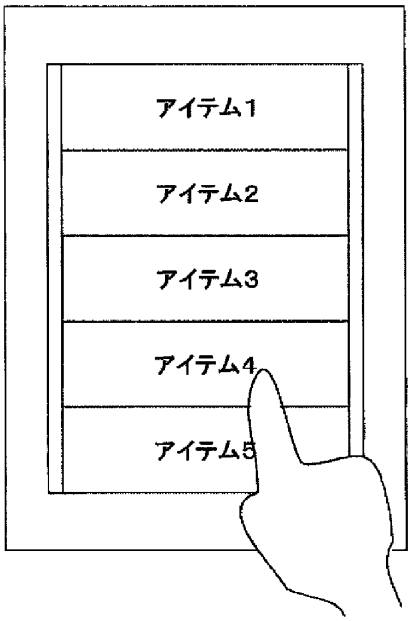
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[Continued on next page]

(54) Title: MOBILE DEVICE WITH USER INTERFACE

(57) Abstract: There is provided a bar form factor mobile display device comprising front and back major faces, the front major face arranged to present a normal power first display screen and the back major face arranged to present a low power second display screen, wherein the device includes a computer.

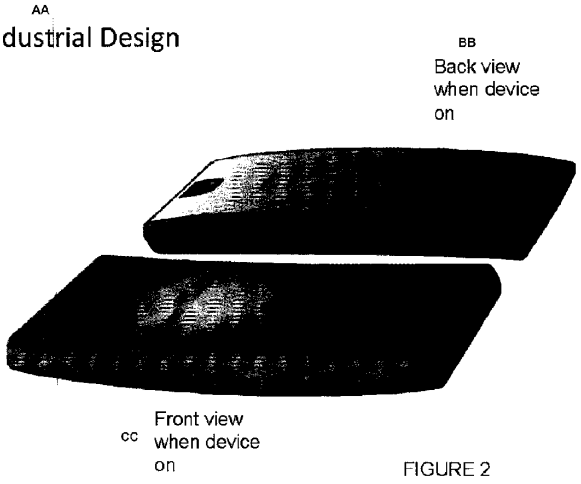


FIGURE 2

WO 2012/078079 A2

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MOBILE DEVICE WITH USER INTERFACE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The field of the invention relates to mobile display devices comprising a first display screen and a second display screen, to user interface aspects of such devices, to methods of operating such devices, and to computer program products operable to run on such devices.

2. Technical Background

Bar form factor display devices, eg. slate devices such as the iPhone™ and the iPad™, are known. However, these devices comprise only a single display screen. A bar form factor device may be a slate device.

3. Discussion of Related Art

In US2008002115A1, as shown in prior art **Figure 66**, there is disclosed a display stack-up **300** which is provided for a mobile electronic device **100** having an internal and external display, for example a clamshell style mobile phone. The display stack-up comprises a backlight unit **114** and an external display device **110** having bi-stable optical states. The external display device **110** is placed in contact with, and is optically coupled to, the backlight unit **114**. The display stack-up further comprises an internal display device **106** which is placed in contact with, and is optically coupled to, the external display device **110**.

The terms "internal display" and "external display" employed in US2008002115A1 arise because the device disclosed therein contains a hinged part such that one display is permanently visible to a user (the "external display"), while the other display may or may not be visible to a user (the "internal display"). Prior art **Figure 67** is disclosed in US2008002115A1. In US2008002115A1 it is disclosed that the mobile electronic device **100** includes a first housing member **102** and a second housing member **104**.

The first housing member **102** and the second housing member **104** may be made up of materials like metal, plastic, glass and/or hybrids thereof. The first housing member **102** and the second housing member **104** are hingedly connected with one another and are configurable in the open and closed positions. In other words, the first housing member **102** and the second housing member **104** are connected to each other with a hinge such that the angle between the two is approximately 180° or less, when configured in an open position, and the minimum angle is approximately 0° or slightly greater, when configured in the closed position. The first housing member **102** further comprises an external display aperture **101** and an internal display aperture **103** through which the external display device **110** and internal display device **106** are viewable, respectively. The display itself comprises three primary devices which are encased by the first housing member **102**. In the cross sectional view of prior art **FIG. 67**, the three devices are shown in a "stack-up" configuration having the internal display device **106**, the external display device **110,** and a backlight device **108**.

Prior art **Figure 68** taken from US2008002115A1 shows the hinged mobile phone disclosed therein in the closed configuration. In the closed configuration the inner display surface is protected from scratching which may occur eg. when the device is inside a woman's handbag and it comes into contact with various items such as keys, make up casing and metal elements on the surface of a money holder. The closed configuration is more compact than the open configuration of prior art **Figure 67**; the compactness is useful when the device is being transported, eg. in a woman's handbag, because its greatest lateral extent is reduced with respect to the open configuration. The interface components are kept inside the hinged phone, which offers more surface area when the device is open than when the device is closed. Interface components such as keypad keys and an internal display are protected when the device is closed, and when closed it is less long or wide, making the device easier to carry around. When a hinged phone is in the closed configuration, the second display can be used for display purposes because the first display may not be visible in the closed configuration.

The device of prior art **Figures 67** and **68** is not a bar form factor device because it consists of two parts connected by a hinge.

SUMMARY OF THE INVENTION

According to a first aspect of the invention, there is provided a bar form factor mobile display device comprising front and back major faces, the front major face arranged to present a normal power first display screen and the back major face arranged to present a low power second display screen, wherein the device includes a computer.

The bar form factor mobile display device may be one wherein the second display screen is a Grayscale panel.

The bar form factor mobile display device may be one wherein the second display screen is a bi-stable display screen.

The bar form factor mobile display device may be one wherein the bi-stable display screen is a bi-stable active matrix and high-resolution display screen.

The bar form factor mobile display device may be one wherein the bi-stable display screen is an E-ink bi-stable display screen.

The bar form factor mobile display device may be one wherein the second display screen is an Electronic Paper Display.

The bar form factor mobile display device may be one wherein the device includes sensors and wherein the device is operable to process input from the sensors when the ~~first display screen is off.~~

The device may be operable to process input from sensors in the device when the first display screen is off, in response to a specific event.

The device may be one wherein the specific event is a notification being displayed on the second display screen.

The device may be one wherein one or more sensors are operable to sense which screen a user is interacting with.

The device may include pressure sensors on opposed sides of the device operable to receive pressure input from a user.

The device may include volume buttons on the device operable to receive input from a user.

The device may include an accelerometer sensor and a gyroscope sensor.

The device may be one wherein the first display screen is a touch screen.

The device may be one wherein the first display is operable to receive multi touch input.

The device may be one wherein the second display screen is a touch screen.

The device may be one wherein the second display is operable to receive multi touch input.

The device may be one wherein the computer is programmed with an Android operating system.

The device may be one wherein the device operates as a one screen device in the Android operating system.

The device may be one wherein the first display screen output is generated by a first application and the second display screen output is generated by a second application different to the first application.

The device may be one wherein the first display is operable to display a home screen pane corresponding to the second display screen.

The device may be one wherein the second application is operable to communicate with specified applications.

The device may be one wherein only specified applications are allowed to communicate with the second application.

The device may be one wherein the second display is operable to display a plurality of widgets, wherein at least two of the widgets have different update frequencies.

The device may be one wherein the update of at least two widgets are synchronized, wherein synchronization provides for energy saving in device power usage.

The device may be one wherein the update of all widgets are synchronized, wherein synchronization provides for energy saving in device power usage.

The device may be one wherein the update is a screen update of the second screen.

The device may be further operable to operate in a mode in which the screen update of widgets on the second screen is not synchronized.

The device may be further operable to perform a full screen refresh of the second screen.

The device may be one wherein the second display is operable to be configured.

The device may be one wherein the second display configuration is operable to be changed via the first display.

The device may be one wherein a device screen page for initiating the changing of the configuration of the second display is at the same level in the menu hierarchy as other home panes on the device.

The device may be one wherein the device screen page for initiating the changing of the second display configuration is accessible by swiping through other screens.

The device may be one wherein the device screen page for initiating the changing of the second display configuration is accessible by a screen wide two finger swipe.

The device may be one wherein a two finger swipe in a first direction brings up the the screen page for initiating the changing of the second display configuration, and a two finger swipe in the opposite direction to the first direction brings up a previously displayed home page.

The device may be one wherein the first display is operable to display a plurality of home panes, wherein a shortcut icon is displayed on each home pane.

The device may be one wherein when the shortcut icon is selected by a user, the icon is expanded to provide a shortcut to each home pane.

The device may be one wherein the expanded icon which provides a short cut to each home page is operable to provide a preview of a home screen in response to a finger touch on the corresponding home screen short cut.

The device may be one wherein the device is operable to display a home screen in response to the release of a finger from the corresponding home screen short cut.

The device may be one wherein the second display displays only wallpaper when a user is interacting with the first display.

The device may be one wherein the wallpaper is Android live wallpaper.

The device may be one wherein the second display configuration screen displayed on the first display includes a replica of the second display screen.

The device may be one wherein a part of the second display screen is not operable to display widgets.

The device may be one wherein the replica excludes parts of the second display screen which are not operable to display widgets.

The device may be one wherein the second display configuration screen is configurable to display a portion of an options menu.

The device may be one wherein when the portion of an options menu is displayed, the portion of the options menu includes an on/off switch for widgets.

The device may be one wherein the portion of the options menu is operable to be folded in response to a user tapping on the screen outside the displayed portion of the options menu.

The device may be one wherein the displayed portion of the options menu provides a selectable option which provides options for adding widgets, configuring the second screen wallpaper and for altering the second screen settings.

The device may be one wherein widgets are operable to be displayed or not displayed on the second screen in response to the setting of the on/off switch for widgets.

The device may be one wherein instead of having more panes, settings and/or profiles ~~there are simply two modes: to not show or to show widgets on the second screen~~.

The device may be one wherein if widgets are turned off, they are shown as faded on the configuration screen, and they are not visible on the second screen.

The device may be one wherein the on/off switch for widgets is further operable at some other place in the first screen user interface.

The device may be one wherein the on/off switch for widgets is further operable when turning on or off a device silent mode.

The device may be one wherein the on/off switch for widgets is further operable as a device setting.

The device may be one wherein the second screen displays an alarm clock indicator in response to an alarm clock having been set on the device, and the second screen is not configurable not to display the alarm clock indicator in response to an alarm clock having been set on the device.

The device may be one wherein the second screen displays a critical battery indicator in response to the battery reaching a predefined level, and the second screen is not configurable not to display the critical battery indicator in response to the battery reaching a predefined level.

The device may be one wherein the second display is operable to display a plurality of widgets, wherein the second display is divided into a grid comprising grid elements, wherein each widget is presented using grid elements.

The device may be one wherein grid elements have a lower areal density than pixels of the second display.

The device may be one wherein the grid is a m x n grid, where $2 \leq m \leq 20$, and $2 \leq n \leq 20$.

The device may be one wherein the grid is a 4x8 grid.

The device may be one wherein each widgets has a grid element size p x q in the range of $1 \leq p \leq 20$, and $1 \leq q \leq 20$, and $p \leq m$ and $q \leq n$.

The device may be one wherein widgets can have the size of: 1x1, 1x2, 1x4, 2x2, 2x4, 3x4 or 4x4 of the grid's elements.

The device may be one wherein the second display configuration is operable to be changed via a second display configuration screen on the first display, and the configuration screen is operable to add or edit widgets for the second display.

The device may be one wherein adding or editing widgets for the second display is initiable by long pressing on a portion of the configuration screen without displayed content.

The device may be one wherein adding or editing widgets for the second display is initiable by selecting a selectable menu item.

The device may be one wherein after initiation of adding or editing widgets for the second display, a widget editing menu is provided, wherein the widget editing menu is expandable or collapsible.

The device may be one wherein an icon is provided for switching between the expanded and the collapsed widget editing menu.

The device may be one wherein a user can only switch between the expanded and the collapsed widget editing menu after a user selects a menu item.

The device may be one wherein when a menu item is tapped it is expanded, if not already expanded, and a first available layout alternative for the widget is displayed.

The device may be one wherein ~~the device is operable to receive a user finger swipe,~~ wherein a swipe left or right provides further layout alternatives for the widget.

The device may be one wherein the device is operable to receive a user finger input, wherein a finger tap on a directional arrow provides further layout alternatives for the widget.

The device may be one wherein if a header is pressed on an expanded item, the item is folded.

The device may be one wherein to select a widget and place it on the second screen, the user taps it.

The device may be one wherein if a user taps a new item in the menu list that is not a currently expanded item, the currently expanded item is closed and the new item is expanded.

The device may be one wherein when the user selects to add a widget, and there is not enough space on the second screen for the additional widget, the user is taken to a different screen on which a faded layout preview is displayed and an amount of missing space is indicated.

The device may be one wherein a dialog is presented to inform a user that there is not enough space.

The device may be one wherein a shortcut is presented to go to an edit screen to free up the needed space by either changing the layout of a widget or removing a widget.

The device may be one wherein the second screen is configured automatically to provide enough space for the selected widgets.

The device may be one wherein when the user selects to add a widget, and there is not enough space on the second screen for the additional widget, an option is presented to free up space for the additional widget.

The device may be one wherein when the user selects to add a widget, a grid is presented representing the space on the second screen, and the device is operable to move the widget on the grid and to place the widget on the grid.

The device may be one wherein the widget layout is operable to be edited.

The device may be one wherein the widget layout is operable to be edited by tapping arrows on the screen.

The device may be one wherein when a user is not dragging an object, a done button appears on the screen.

The device may be one wherein if there already are widgets placed on the second screen they are shown faded, to indicate that that space is occupied; any such widget is selectable by tapping on it; the user is able to move such a widget around and change its layout.

The device may be one wherein tapping an empty grid element takes the user to the add widget screen and he can from there add another widget.

The device may be one wherein when an already selected widget is tapped in edit mode, the settings for that widget are opened.

The device may be one wherein a settings icon is provided on top of the widget to indicate that its settings are accessible.

The device may be one wherein all the widget's settings are saved as soon as the user makes them and pressing the Android back-key, in hardware or in software, takes the user back to the widget layout editing screen.

The device may be one wherein the second display is operable to display a plurality of widgets, wherein the widgets are associated with a selectable privacy level, and wherein a layout of the widgets is related to the selectable privacy level.

The device may be one wherein the selectable privacy level is a user selectable privacy level for information shown on the second screen.

The device may be one wherein available layouts of the widgets comprise layout modes of widgets, wherein different layout modes comprise different amounts of information.

The device may be one wherein available layouts of the widgets comprise layout modes of widgets, wherein different layout modes provide the same information arranged differently.

The device may be one wherein a first selectable privacy level provides that private information is provided in detail on the second screen.

The device may be one wherein private information details include full name of caller on missed calls, and name of sender and part of message for new text-based messages.

The device may be one wherein a second selectable privacy level provides that limited private information is provided on the second screen.

The device may be one wherein limited private information includes the number of missed calls and the number of unread messages, but the names of senders and *message content are not displayed.*

The device may be one wherein a third selectable privacy level provides that only wallpaper is shown on the second screen.

The device may be one wherein when a device is unlocked by a user, the user is offered the option to deselect the first selectable privacy level.

~~*The device may be one wherein the second screen wallpaper is selectable from* a menu~~ which is accessible from the home screen pane.

The device may be one wherein if the menu is not displayed on the home screen pane, the menu is operable to be displayed in response to a pressing of a menu key.

The device may be one wherein the menu includes an icon operable to provide selectable wallpaper.

The device may be one wherein selection of the icon operable to provide selectable wallpaper provides a New photo option.

The device may be one wherein the New photo option is selectable to take the user to a camera application for taking and adjusting and cropping the new photo and then selecting the new photo as wallpaper.

The device may be one wherein selection of the icon operable to provide selectable wallpaper provides a wallpaper gallery option.

The device may be one wherein the wallpaper gallery option is selectable to take the user to the Wallpaper gallery to select a wallpaper.

The device may be one wherein selection of the icon operable to provide selectable wallpaper provides a gallery option.

The device may be one wherein the wallpaper gallery option is selectable to take the user to a native gallery application where the user can select, crop and adjust an image.

The device may be one wherein the second screen is configurable to adjust the brightness of the wallpaper and the brightness of widgets.

The device may be one wherein the brightness of the wallpaper and the brightness of widgets are independently adjustable.

The device may be one wherein the brightness of the wallpaper and the brightness of widgets are adjustable in relation to each other.

The device may be one wherein the New photo option provides a wallpaper consisting of a pattern derived from a device camera image.

The device may be one wherein the pattern consists of a tiling of a camera image.

The device may be one wherein when a user is interacting with the first screen, the second screen displays only wallpaper.

The device may be one wherein when a user is interacting with the first screen, the second screen displays no private information.

The device may be one wherein when a user is operating a device function, an image corresponding to that device function is shown on the second screen.

The device may be one wherein when the device function is a camera function, the second screen displays an image of a camera.

The device may be one wherein when the device function is a phone function, the second screen displays an image of a phone.

The device may be one wherein when the device function is a music playing function, the second screen displays a music-related image.

The device may be one wherein the device is operable to provide a deactivated first screen and an activated second screen in response to a user manipulation of the device.

The device may be one wherein a user manipulation includes turning the device around and placing it on a flat surface with the front screen facing down.

The device may be one wherein a user manipulation includes ~~squeezing the sides of~~ the device.

The device may be one wherein a user manipulation includes pressing a side button of the device.

The device may be one wherein a user manipulation includes a device rotation.

The device may be one wherein the device is operable to provide a deactivated first screen and an activated second screen in response to a timeout limit of the device.

The device may be one wherein the device is operable to answer a call in response to a user manipulation including a device rotation.

The device may be one wherein the device is operable to cycle between different privacy levels for display of widgets on the second screen in response to a double tap on the device or on the second screen.

The device may be one wherein if a first selectable privacy level is selected which provides that private information is provided in detail on the second screen, the double tapping cycles between the first, a second privacy level and a third privacy level, wherein the second privacy level provides that limited private information is provided on the second screen, and the third privacy level provides that only wallpaper is shown on the second screen.

The device may be one wherein if a first selectable privacy level is selected which provides that private information is provided in detail on the second screen, the double tapping toggles between a second privacy level and a third privacy level, wherein the second privacy level provides that limited private information is provided on the second screen, and the third privacy level provides that only wallpaper is shown on the second screen.

The device may be one wherein the device provides a selectable option to provide notifications on the second screen.

The device may be one wherein notification includes providing one or more of a received email, a received SMS, a received MMS, a received Facebook message.

The device may be one wherein a notification is displayed for a predefined time, and then the screen returns to a previous state.

The device may be one wherein when a notification is displayed on the second screen, the notification replaces second screen content.

The device may be one wherein when a notification is displayed the device is operable to expand the displayed content of the notification in response to a double tap of a user on the device.

The device may be one wherein when a notification is displayed the device is operable to receive a PIN code via the first screen in response to a double tap of a user on the device, wherein the device is further operable to expand the displayed content of the notification in response to a correct PIN code.

The device may be one wherein following expansion of the notification on the second screen, a message corresponding to the notification is displayed on the first screen in response to the device being turned over.

The device may be one wherein following the display on the first screen of the message, the device is operable for the user to instantly interact with the message.

The device may be one wherein when a notification is displayed the device is operable to dismiss the notification and return the second screen to a previous state.

The device may be one wherein the device is operable to dismiss the notification and return the second screen to a previous state in response to the device being lifted up ~~and returned to its previous position.~~

The device may be one wherein the device is operable to dismiss the notification and return the second screen to a previous state in response to the device being lifted up on one side and then being let go to return it to its previous position.

The device may be one wherein when no notification is displayed on the second screen, the device is operable to display on the second screen the most recently displayed notification in response to three taps on the device.

The device may be one wherein following display of the most recently displayed notification on the second screen, a message corresponding to the notification is displayed on the first screen in response to the device being turned over.

The device may be one wherein the device provides a selectable option to provide output on the second screen.

The device may be one wherein an incoming voice call to the device is announced on the entire second screen.

The device may be one wherein the front screen is turned on in response to an incoming voice call.

The device may be one wherein no interaction in relation to an incoming call is allowed until the device has been turned over from the second screen to the first screen.

The device may be one wherein interaction with the front screen is supported in response to the device being turned over wherein the first screen faces upwards.

The device may be one wherein the interaction with the front screen is supported irrespective of if the front screen was locked or unlocked before the incoming voice call to the device.

The device may be one wherein user is presented with a screen where the user can swipe to answer a call.

The device may be one wherein the device is operable to answer the call in response to a user swipe down the screen, and the device is operable to decline the call in response to a user swipe up the screen.

The device may be one wherein the user is presented with the options "mute", "decline" and "send SMS" in response to the user pressing a software Menu button or a hardware Menu button after notification on the second screen of an incoming call.

The device may be one wherein the device requires input of a PIN code in response to selection of either of the options "decline" or "send SMS".

The device may be one wherein the device displays an overlay of the screen for a predefined time in response to selection of the option "decline".

The device may be one wherein the device is operable to send a message to the declined caller in response to selection of the option "decline".

The device may be one wherein the device is operable to clear an overlaid part of the screen in response to a user tap on a non-overlaid part of the screen.

The device may be one wherein the device is operable to receive a mute instruction in response to an incoming voice call to the device being announced on the second screen.

The device may be one wherein the mute instruction comprises the device being lifted up and returned to its previous position.

The device may be one wherein the mute instruction comprises the device being lifted up at one side and let go to return it to its previous position.

The device may be one wherein the device is operable to display a full graphics overlay on the second screen in response to an application running on the device, or to an event occurring at the device.

The device may be one wherein the graphics overlay comprises a phone symbol and the event is an active voice call.

The device may be one wherein no information is shown on the second display in addition to the phone symbol.

The device may be one wherein the graphics overlay comprises a camera skin and the application is a camera application.

The device may be one wherein the camera skin is user selectable.

The device may be one wherein the graphics overlay comprises a music-related skin and the application is a media player.

The device may be one wherein the skin is user selectable or predetermined, depending on the media played.

The device may be one wherein the event occurring at the device is a low power level, and the graphics overlay indicates a low power level.

The device may be one wherein the second screen is operable to display a wallpaper, and wherein an application which provides the wallpaper for display is operable to change the displayed wallpaper without user intervention.

The device may be one wherein the application which provides the wallpaper for display changes the displayed wallpaper in response to activating events.

The device may be one wherein an activating event is one or more of: device location, time, calendar events, weather, weather in combination with location.

The device may be one wherein the wallpaper is changed at a low rate.

The device may be one wherein the wallpaper is changed very slowly.

The device may be one wherein the first screen is a touch screen, and the first screen is operable to be unlocked by a touch gesture in which a finger starts at either the top or bottom of the screen and moves towards the centre of the screen.

The device may be one wherein the finger must pass a predefined distance up or down the screen in order to complete the unlock.

The device may be one wherein the distance is half way down the screen.

The device may be one wherein the finger must achieve a threshold speed in order to complete the unlock.

The device may be one wherein the finger starts at the top of the screen.

The device may be one wherein there is an inactive area between a top capacitive area and the screen edge to separate unlock gesture from status menu gesture.

The device may be one wherein the first screen is a touch screen, and the first screen is operable to be locked by a touch gesture in which a finger starts at either the top or bottom of the screen and moves towards the centre of the screen.

The device may be one wherein the direction of the finger for the lock gesture is the opposite to the direction of the finger for a corresponding unlock gesture.

The device may be one wherein the finger must pass a predefined distance up or down the screen in order to complete the lock.

The device may be one wherein the distance for the lock is half way down the screen.

The device may be one wherein the finger must achieve a threshold speed in order to complete the lock.

The device may be one wherein for the lock the finger starts at the bottom of the screen.

The device may be one wherein the device is a slate device.

The device may be one wherein the device is a bar or candybar device.

The device may be one wherein the device is a slab-shaped form.

The device may be one wherein the first display screen is a liquid crystal display screen.

The device may be one wherein the device is portable.

The device may be one wherein the device is a mobile phone, a portable digital assistant, a laptop, a digital audio player (eg. ipod), or a tablet computer (eg. ipad).

The device may be one wherein the device includes a virtual keyboard.

The device may be one wherein the device includes a concave front face and a convex rear face.

According to a second aspect of the invention, there is provided a method of operating the device, comprising the step of the device receiving user input.

According to a third aspect of the invention, there is provided a method of operating the device, comprising the step of the device changing what is displayed on the device.

According to a fourth aspect of the invention, there is provided a computer program product operable when running on the device to enable the device to receive a user input to the device.

According to a fifth aspect of the invention, there is provided a computer program product operable when running on the device to change what is displayed on the device.

5

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows an example of a mobile device industrial design.

Figure 2 *shows an example of a mobile device industrial design.*

Figure 3 shows the front face, back face and side view of an example device in the same Figure. The device is shown in the off state or in a low power state.

Figure 4 relates to Accessing the EPD pane (the "6th pane").

Figure 5 relates to Accessing the EPD pane (the "6th pane").

Figure 6 relates to Accessing the EPD pane (the "6th pane").

Figure 7 relates to the EPD configuration screen.

Figure 8 relates to the EPD configuration screen.

Figure 9 *relates to the function Enable/Disable EPD widget switch.*

Figure 10 relates to EPD grid and system controlled elements.

Figure 11 relates to Widget Layouts.

Figure 12 relates to EPD screen examples.

Figure 13 relate to the Available widgets list.

Figure 14 relate to the Available widgets list.

Figure 15 relate to the EPD pane edit mode.

Figure 16 relate to the EPD pane edit mode.

Figure 17 *relates to widget settings.*

Figure 18 relate to setting wallpaper.

Figure 19 relate to setting wallpaper.

Figure 20 relates to EPD screen modes.

Figure 21 relates to interaction on the EPD screen.

Figure 22 relates to interaction on the EPD screen.

Figure 23 relates to interaction on the EPD screen.

Figure 24 relates to incoming event notification.

Figure 25 *relates to incoming event notification.*

Figure 26 relates to incoming event notification.

Figure 27 relates to an incoming call.

Figure 28 relates to an incoming call.

Figure 29 relates to an incoming call.

Figure 30 relates to back screen use cases.

Figure 31 shows a screen example relating to Accessing the EPD pane (the "6th pane").

Figures 32 and 33 each shows a screen example relating to the EPD configuration screen.

Figures 34 and 35 each shows a screen example relating to the function Enable/Disable EPD widget switch.

Figure 36 shows a screen example relating to EPD grid and system controlled elements.

Figures 37 to 39 show screen examples relating to Widget Layouts.

Figures 40 to 42 show screen examples relating to EPD screen examples.

Figures 43 to 46 show screen examples relating to the Available widgets list.

***Figures 47 to 51** show screen examples relating to the EPD pane edit mode.*

Figures 52 to 54 show screen examples relating to widget settings.

Figures 55 to 57 show screen examples relating to EPD screen modes.

Figures 58 to 60 show screen examples relating to incoming event notification.

Figures 61 to 64 show screen examples relating to an incoming call.

Figure 65 illustrates gestures suitable for locking or unlocking a touch screen mobile communications device. (eg. a phone).

Figure 66 is from the prior art publication US2008002115A1. In this Figure there is *disclosed a display stack-up **300** which is provided for a mobile electronic device **100*** having an internal and external display, for example a clamshell style mobile phone.

Figure 67 is from the prior art publication US2008002115A1. In this Figure it is disclosed that the mobile electronic device **100** includes a first housing member **102** and a second housing member **104**. The first housing member **102** and the second housing member **104** may be made up of materials like metal, plastic, glass and/or hybrids thereof. The first housing member **102** and the second housing member **104** are hingedly connected with one another and are configurable in the open and closed *positions.*

Figure 68 is from the prior art publication US2008002115A1. This Figure shows the hinged mobile phone disclosed therein in the closed configuration.

DETAILED DESCRIPTION

Dual Screen Phone

In an example, there is provided a dual screen bar form factor phone with a bi-stable display. An advantage of a dual screen bar form factor phone is that one screen is always visible, whichever way up the device is placed on a table. By displaying an incoming message on both screens, this ensures that incoming messages are always visible when the device is lying on a table. The first display screen may use electrowetting technology. The second display screen may use electrowetting technology eg. Liquavista.

The device appearance may be context-related eg. in relation to position such as one determined using a global positioning system (GPS) receiver, or in relation to weather, or in relation to temperature, or in relation to time of day. Context related (eg. position-related) device appearance may include location-based advertising. Context related (eg. position-related) device appearance may include results of a location-based search.

Notification and customization are important tasks in mobile computing. For notification it is known to use sound, vibration or LCD/AMOLED (liquid crystal display/ Active-matrix organic light-emitting diode) displays. All those ways provide notification for a limited time and cannot work in always-on mode due to high power consumption. There are cases with segmented bi-stable displays used for notifications, but they don't give right flexibility with notification messages or/and options.

There are many ways for customization of the device – pictures and themes for user *interface (UI) on main screen, sounds and different accessories like phone cases can* be used to change the look of the device. The look of the device can be changed by changing what is displayed on the bi-stable screen, such as to give the appearance of a different phone case for example. For example, the phone skin can be changed. The phone skin may be one or more of wallpaper, photos, movies, user-customized content.

In an example, there is provided a bi-stable active matrix and high-resolution display on the back panel of the device. This improvement gives the following advantages in *relation to prior art cases:*

- Phone customization – user is able to display any pattern, picture or application interface to differentiate their phone from others
- Notifications – any application or service is able to display the notification on the back screen. Notification time is not limited, because a bi-stable display is used.
- Notifications – any application or service is able to display the notification on the front screen. The notification such as a message may be provided on the front screen and on the back screen.
- The information remains on the screen even when the phone itself is switched off. This is important even for manufacturing – a manufacturer can place all needed information directly on the bi-stable screen: eg. serial number, certification logos, country of origin and so on.

An example of a device which may implement the invention is shown in **Figure 3. Figure 3** shows the front face and back face of an example device which may implement the invention in the same Figure. The device is shown in the off state or in a low power state. In the off state or in a low power state, the front face is not illuminated: it is shown as dark. However, in the off-state or in a low power state, the bi-stable display on the back face continues to display content, which can be viewed as a result of external illumination eg. ambient illumination. In an example of **Figure 3**, the front face has an AMOLED display, and the back face has an E-ink bi-stable display.

~~A bi-stable display may use interferometric modulation technology~~ eg. Qualcomm Mirasol.

An example is shown in **Figure 1. Figure 1** shows in the same Figure the front face and the back face of an example device which may implement the invention. The device is shown in the on state. In the on state, the front face is illuminated and can

display an image or other content. In the on-state, the bi-stable display on the back face also can display an image or other content. In an example of **Figure 1**, the front face has an AMOLED display, and the back face has an E-ink bi-stable display. **Figure 1** *shows a side view of an example.*

An example of a device which may implement the invention is shown in **Figure 2. Figure 3** shows in the same Figure the front face and the back face of an example device which may implement the invention. The device is shown in the on state. In the on state, the front face is illuminated and can display an image or other content. In the on-state, the bi-stable display on the back face also can display an image or other content. In an example of **Figure 2**, the front face has an AMOLED display, and the back face has an E-ink bi-stable display.

An example of the front display is: 4" WVGA (800 x 480 Or 854 x 480)
Technology: AMOLED or sIPS / FFS
Nissha Capacitive touch screen
Glass: Gorilla Glass (Corning)

An example of the back screen is: Electronic Paper Display under glass on back side (E-INK).

Properties of the back face may include:

- E-INK Back screen
- Sharp Greyscale panel
- Perceived as part of case
- Low power consumption

~~Properties of the back screen~~ may include:

1. Image
   - Resolution: 700~900 x 480 (possible target: similar to front display)
   - Colors: 16 Grey scale (E-ink) or 65K (LG)
   - *Contrast: 10:1 ~ 20:1*, Reflective ratio: 40%+

- Refresh ratio: 150 ms ~ 400 ms
- Ability to refresh any area starting from 1 pixel
- Color scheme conforms to case color

2. Power Consumption

- Approximately 1000 full screen updates using 300 mAh of charge
- To minimize power consumption, update rate should be minimized to the order of twice per minute
- Does not consume / require power when in bi-stable state

The back screen output may provide:

- Interactions,
- Control,
- Use cases,
- Personalization,
- Widgets, (widgets may be understood with reference to Appendix 4)
- Privacy

An example of interactions is text messages from a blog site. An example of control is varying the frequency of back screen updates eg. from once per minute to once per 5 minutes. An example of use cases is receipt of a major emergency notification by an emergency services worker. An example of personalization is putting a photo of a favourite landmark on the back screen. An example of privacy is removing names of companies or individuals from any received incoming message displayed on the back screen.

A bar form factor display device may be one wherein the back display screen output provides a social network screen.

Preinstalled Widgets may include: Clock, Social aggregator, Communications Log, "Favorites" Bucket, News, Weather, Yota Connection, Battery, Contacts Favorites, Latitude & Longitude, and Player.

The Back Screen may provide:

- Context related Themes (Weather, Location, Environment)
- Widgets, Notifications
- Personalization
- Post cards
- Operator Push (Congratulations, Customer info)

The back display of the device may display news provided by a news service. The back display of the device may display social messages provided by a social messaging service. The back display of the device may display output providing social aggregator output or social network output. The social aggregator output or social network output may be a Facebook page. The back display of the device may display a Google search page. The back display of the device may display an indication of mobile phone signal strength. The back display of the device may display an indication of battery charge state. The back display of the device may display calendar information.

The back display of the device may be the only operational display of the device when the device operates in a low power notification mode. When the device operates in a low power notification mode the back display of the device may be updated in response to an incoming news story provided by a news service. When the device operates in a low power notification mode the back display of the device may be updated in response to an incoming social message provided by a social messaging service. The device may be programmed such that when the device operates in a low power notification mode, the back display of the device displays content updates of one or more categories, for example, news, social messages, an emergency notification, financial news, earthquake, tsunami or weather. The categories may be preselected, such as by a user or by a network services provider.

Further aspects of the mobile device

The mobile device may be portable. The mobile device may be a mobile phone, a portable digital assistant, a laptop, a digital audio player or a tablet computer. Known digital audio players include the ipod and mp3 players. Known tablet computers

include the ipad. The device may include a virtual keyboard. The device may have a touch screen. The device may have two screens each of which is a touch screen. A screen may be bi-stable; a bi-stable screen may be a touch screen. A screen that is not a bi-stable screen may be a touch screen. The device may include a second bi-stable screen. The device may include a second bi-stable screen which is a touch screen. The device may include a second bi-stable screen which is not a touch screen.

A screen may occupy greater than 50% of the area of the major face of the device on which it is located. A screen may occupy greater than 60% of the area of the major face of the device on which it is located. A screen may occupy greater than 70% of the area of the major face of the device on which it is located. A screen may occupy greater than 80% of the area of the major face of the device on which it is located. A screen may occupy greater than 90% of the area of the major face of the device on which it is located. A screen may occupy greater than 95% of the area of the major face of the device on which it is located.

The device may comprise a single backlight module situated between its two major faces. The backlight module may illuminate one display on one major face. The backlight module may illuminate two displays each of which is situated on a different major face of the device to the other display.

The device may comprise two backlight modules, each of which may illuminate a display situated on a major face of the device. Each backlight module may illuminate a respective display on a respective major face of the device. The two backlight modules may be situated between two displays of the device, where each display is situated on a different major face of the device to the other display.

~~The device may have flat (i.e. non-curved) front and back major faces.~~ ~~The device~~ may have one major face that is curved with the other major face being flat (i.e. non-curved).

The device may comprise a normal power display (eg. LCD, AMOLED), which drains battery power too much for the normal power display to operate in a mode in

which it can display content at all times, and a low power display which is better suited, or ideally suited, to operate in a mode in which it can display content at all times (eg. a bistable display, or a greyscale panel).

Curved bar form factor display device (eg. phone)

The bar form factor display device (eg. a phone) may have a unique and organic shape – essential for rapid product differentiation in a crowded space. Examples are shown in **Figures 1** and **2**. The bar form factor display device may have a concave front face and a convex rear face. The magnitude of the curvature of the faces may be the same or similar. The concave front may match the path of a finger as the user's wrist rotates. Hence it's very natural to use. Having a curved surface as the vibrating distributed mode loudspeaker (DML) speaker is also better since if the front display with the speaker exciters was instead a flat surface, then it would sound unpleasant if that flat surface is placed down against a tabletop. Curving the surface prevents this happening. Preferred curvature of front and back is cylindrical, but spherical or aspherical are possible. The convex back can have a bistable display. Since the normal resting position is front face down, the back screen with bi-stable display is normally displayed when bar form factor display device is in the resting position. This resting position is mechanically stable. If bar form factor display device is placed back down (ie convex face down), the bar form factor display device could spin, which is unstable. Hence a user will likely place bar form factor display device front face (i.e. concave face) down, with the bi-stable screen showing.

If the bar form factor display device is in a pocket, the front face (concave face) can face inwards, since this better matches leg curvature. This can be the better configuration (as opposed to front face up) for antenna reception.

In manufacturing, the curved shape may be laminated to glass.

The mobile phone may be connected to a 4G mobile phone network. The mobile phone may be connected to a 3G mobile phone network. The mobile phone may be connected to a 2G mobile phone network. The mobile device may be connected to a

4G mobile phone network. The mobile device may be connected to a 3G mobile phone network. The mobile device may be connected to a 2G mobile phone network.

The mobile device (eg. mobile phone) may be a bar form factor device. The device case may be a single block. The device may have a touch screen. The device operating system may be Google Android. The device may have a bistable screen. The device may have a touch screen and a further bistable screen. The bistable screen may be one which can be refreshed wholly or partially, such as for a limited screen area or the whole screen area, starting with any pixel in that screen area. A glass substrate of the device may be curved in conformity with device surface curvature.

The bar form factor display device may comprise a plurality of display screens. Bar form factors include slab, slate, block, bar and candybar. Bar form factor display devices, eg. slate devices such as the iPhone™ and the iPad™, are known. However, these devices comprise only a single display screen. A bar form factor device may be a slate device.

The mobile device (eg. mobile phone) may be used to define a limited set of users who may connect to the device to enable instant and automatic sharing of a WiFi network with the limited set of users.

The mobile device (eg. mobile phone) may provide a wireless connection to a personal computer, to enable that computer to connect to the internet.

The mobile device (eg. mobile phone) may provide a wireless connection to two personal computers, to enable file sharing or resource sharing (eg. sharing of application software) between those two personal computers via a trusted intermediary: the mobile device.

The mobile device (eg. mobile phone) may provide for file synchronization for files that are shared using automatic sharing of a WiFi network via the mobile device.

The mobile device may be a personal computer, a video game console, a smartphone, a digital audio player, a mobile phone or a tablet computer, for example. The mobile device may include an integral GPS antenna.

The mobile device (eg. mobile phone) may provide instant and automatic sharing of a wireless network in response to a single action by a user, the single action comprising a physical contact gesture by the user with the mobile device, or a voice activation command, when the device is already turned on and connected to a mobile phone network. Sharing may be with a device of another user, or with a plurality of other user devices.

USER INTERFACE INTERACTION DESIGN: *Controlling and customizing the* back display eg. the electronic paper display (EPD)

Although this example is given for an EPD, the skilled person will understand that any low power display technology may be used in the place of an EPD on the back side of the mobile display device.

Figures 4 to **6** relate to Accessing the EPD pane (the "6th pane").

Figure 4A shows the standard home screen on the front screen. To directly access the EPD pane (6th pane) the user can swipe to the right with two fingers across the screen. Once at the 6th pane the user could perform a two finger swipe again (in either direction (left/right)) to instantly return to the previous panel, as shown in **Figure 4B**.

Figure 5 shows that the EPD pane is located at position zero in relation to the other five Android home panes. Besides the two finger swipe, it can be accessed by swiping through the other screens.

Figure 6 shows an alternative shortcut pane navigation. For the screen on the left hand side of **Figure 6**, at the very bottom right corner a shortcut icon is found. Pressing on this icon will enable the user to quickly jump to another pane, such as is shown in the right hand side of **Figure 6**. In the right hand side of **Figure 6**, the user has initiated

the "quick jump" function and is presented with a preview of the "6th pane". The user can then drag upwards to reach any of the other five panes (see **Fig. 5**). In the right hand side of **Figure 6**, as the user drags upwards, the preview image changes. Releasing the finger will "launch" the currently highlighted pane. A pane snapshot preview is indicated at the top of the right hand side of the screen in **Figure 6**. An example of the right hand side of **Fig. 6** is shown in **Fig. 31**.

Figures 7 to **8** relate to the EPD configuration screen. (Examples are shown in **Figs. 32** and **33**).

Figure 7 shows the EPD configuration screen. It displays a replica of the actual EPD with the top part removed. If you look closely at **Fig. 7**, you can see that the items at the top of the right hand EPD screen "15:55" and the battery charge state indicator are not present in the left hand EPD configuration screen on the device front display. The top part is removed to give the user a less downscaled mirror of the EPD (the user is not able to place widgets on the top part anyway). When the user enters this screen the top part of the options menu is displayed containing the EPD widgets on/off switch. (This switch will be described further in the section relating to "Enable/Disable EPD widget switch": see **Fig. 9** and its associated description). When the user taps elsewhere on the screen, the menu is folded. (Having the top part of the menu automatically displayed is an optional feature. Removing it would simply take the user directly to screen 0402.) In **Figure 7**, the small screen shows how the back of the phone would look if the user turned off the front screen. While the user is interacting with the front screen the only thing showing is always only the wallpaper.

Figure 8A shows the Configuration screen with the menu folded.

~~Pressing the [Menu]-key brings the menu back up looking like **Figure 8B**.~~

Figure 9 relates to the function Enable/Disable EPD widget switch. (Widgets may be understood with reference to Appendix 4).

Figure 9 left hand side shows the EPD configuration screen with widgets disabled. The currently added widgets are displayed but faded to indicate that they are not currently visible on the back of the phone (an example is shown in **Fig. 34**). This feature is controlled by the previously mentioned EPD widgets switch in the options menu, shown in the bottom left of **Figure 9**. The purpose of having an on/off switch for EPD widgets is to give the user an easy way of being and feeling in control of the content on the back of the phone. Instead of having more panes, settings and/or profiles, there are simply two modes: to not show or to show widgets on the back.

Controlling EPD widgets on/off could also be done from other parts of the user interface (UI). For example when setting the phone to silent mode there is also an option to enable/disable EPD widgets.

In the right hand side of **Figure 9**, EPD widgets are now activated and to add a widget the user can longpress the background or press the [menu]-key and then the add widget item in the menu. An example is shown in **Fig. 35**.

Figure 10 relates to EPD grid and system controlled elements. In **Fig. 10A**, the EPD display is divided into a 4x8 grid and widgets can have the size of: 1x1, 1x2, 1x4, 2x2, 2x4, 3x4 or 4x4. An example is shown in **Fig. 36**.

In **Fig. 10B** there are only two different types of information that are not controlled by the user. Those are:
Alarm indicator (**Fig. 10B** top left of screen) and Critical Battery level (**Fig. 10B** top right of screen).
- The alarm indicator is only displayed if the user has set an alarm.
- The Critical Battery level indicator is only displayed if the battery has reached a ~~critical level (eg. according to Android parameters).~~

Figure 11 relates to Widget Layouts. In terms of privacy it is completely up to the end user to decide what he puts on the EPD. To make it flexible for the user widgets will have different layouts; these can both contain a variable amount of information or display the same information in different ways. In (a), this layout takes up more space

but provides the user with more information. In (b), this layout displays the same information as the (a) one but takes up smaller space. In **Fig. 11**, (a) and (b) illustrate that different widget layouts do not necessarily have to contain different amounts of information. In (c), this layout takes up smaller space and is also more suitable for a user demanding higher privacy as it does not show any names of senders. Further examples are shown in **Figs. 37, 38** and **39**.

Figure 12 relates to EPD screen examples. In **Figure 12** there are shown some different examples of what the EPD could look like depending on what widgets the user has added. Notice that screen "c" has added a widget that shows actual messages received via facebook/SMS etc. as well as showing a localization based widget, hence the "c" screen would be the one with a very high public level (low privacy). Further examples are shown in **Figs. 40, 41** and **42**.

Figures 13 and **14** relate to the Available widgets list. In the left hand side of **Figure 13** (screenID 0901), the user has longpressed the background or selected "add new widget" from the menu and is presented with a list with all the available widgets. The button in the header switches the list between expanded and collapsed. This enables the user to both get a quick overview of the available widgets and go more in-depth to view the visual previews. The first time the user enter this screen, the list may be expanded to screen ID [0903].

In **Figure 13**, in the right hand screen (screen ID 0902), when an item is tapped it is expanded and the user can browse through different widget layout alternatives by swiping left or right or tapping the arrows. If the header is pressed on the expanded item, it is folded. To select a widget, and place it, the user taps it. If a user taps another item the currently expanded one is closed and the new item is expanded. If there is not ~~enough room on the EPD for the current layout: see screen ID [0904]~~ in **Fig. 14.**

In **Figure 14** in the left hand screen, when the user has pressed the "expand all" button, all items are expanded. Pressing the button now takes the user back to screen ID [0901]. An option to consider is simply removing the expanded/folded switch and choosing one of these modes [0901]+[0902] or [0903]. This is something that highly

depends on number of available EPD widgets, for a list with few items this solution [0903] might be preferable and vice versa.

In **Figure 14** right hand screen, this screen shows what is displayed if there is not enough space on the EPD for the current layout. The layout preview is faded and the amount of missing space is marked eg. with a different colour. A dialog is also displayed to inform the user why the current layout is unavailable. He is also presented with a shortcut to the solution which is to go to the edit mode (screen [1001]) where he can free up the needed space by either changing the layout of another widget or removing it. An option could be to automatically add this layout directly in the edit mode when the user has freed up enough space or to simply do this automatically.

Examples relating to **Figs. 13** and **14** are shown in **Figs. 43** to **46**.

Figures 15 and **16** relate to the EPD pane edit mode. In the left hand side of **Fig. 15**, when the user has selected a widget he is presented with a grid and can move the widget around and place it. He can also in this mode change the layout of the widget by tapping the arrows on the sides. When the user is not dragging an object a done button appears at the bottom of the screen. In this mode the user can also tap another widget to move it around or change its layout. Tapping an empty grid takes the user to [0901] and he can from there add another widget. Other widgets are faded to indicate that that space in the grid is occupied. All changes made in the edit mode are saved instantly when the user has done them. One thing to take into consideration is the option to remove the done button and just leave this functionality to the hardware [back]-key. This might be confusing to new users but better for users familiar with the Android paradigm. In **Figure 15** right hand side, when the user is dragging a widget the done button is replaced by a trashbin (see centre of bottom of screen). To remove a ~~widget the user can drag the widget to the trashbin~~.

In **Figure 16** left hand side, the user has released the widget at a new position and the done button is presented again. Pressing the hardware [back]-button in this mode is the same as pressing done. It takes the user to the EPD pane in "normal" mode with the (new) widget(s) in place. In **Figure 16** right hand side, when the user has pressed

"done" the new widget is placed. Longpressing a widget takes the user back to the edit mode with that widget currently selected.

Examples relating to ***Figs. 15*** *and* ***16*** *are shown in* ***Figs. 47*** *to* ***51***.

Figure 17 relates to widget settings. In **Figure 17** left hand side, the user has tapped the weather widget in the edit mode and can now switch layout on the widget or move it around. Tapping the widget when it already is selected in edit mode opens its settings. There might be a need to communicate this more clearly by for instance placing a settings icon on top of the selected widget in edit mode. The purpose of having settings accessible
through the edit mode is that this opens up for interacting with the widget by tapping on it in the "normal" mode. In **Figure 17** right hand side, when a widget is tapped in edit mode the settings for that widget are opened. All settings are saved as soon as the user makes them and pressing the hw [back]-key takes the user back to [1101].

Regarding configuring the EPD, this configuration solution differs a lot from the Android standard widget handling. This makes the EPD pane configuration stand out from configuration of the other Android widget panes. A general solution for all *widget panes including the EPD pane is desirable. This is something that may be* included for all widget panes. Even though this is currently a solution for only the EPD pane we still think that it is reasonable to include it here. Even though it stands out from the other panes there are some things to consider:
- The whole EPD pane and its widgets already stand out from the rest of the Android panes in functionality. Differentiating the EPD pane to some degree might not be a bad thing.
- The EPD pane is run as a separate application and the Android status bar is removed. ~~*This also already differentiates it from the other panes.*~~

Examples relating to **Fig. 17** are shown in **Figs. 52** to **54**.

Figures 18 and **19** relate to setting wallpaper. In **Figure 18A**, to set the wallpaper the user presses the [menu]-key to bring up the menu and then presses the EPD wallpaper

option, as shown in **Figure 18B**. In **Figure 19**, when the wallpaper item has been selected in the options menu, this standard dialog that lets the user select the source of the wallpaper is opened. If the user takes a new photo or selects a photo from the gallery he is taken to a screen where he can crop and adjust the image. In **Figure 19**, the user can select "New photo", then Go to: camera app, Take photo, crop and adjust image. In **Figure 19**, the user can select "EPD wallpapers" then Go to: EPD wallpaper gallery and Select image. In **Figure 19**, the user can select "Gallery" then Go to: native gallery app, Select, crop and adjust image.

USER INTERFACE INTERACTION DESIGN: Interacting with the back screen eg. the EPD screen

Figure 20 relates to EPD screen modes. In **Fig. 20** there are shown three modes that can be displayed on the EPD (apart from notifications). This is a summary of their content. How the user interacts with them is described below with respect to subsequent **Figures 21** to **23**. In (a), like the name implies, the wallpaper-only mode displays only the wallpaper. In (b), the peek view is a mode that displays only the wallpaper, a clock and a small notifications widget. The peek view is an intermediary state and is not customizable by the user. In (c), the EPD widget mode displays the wallpaper and the currently selected widgets. This mode is by default enabled but can be disabled by the EPD widgets on/off switch described above with respect to **Fig. 9**, or from other parts of the UI. When the user activates the PIN lock he is also prompted whether he would like to disable this mode or not.

Examples relating to **Fig. 20** are shown in **Figs. 55** to **57**.

Figures 21 to **23** relate to interaction on the EPD screen. On the left hand side of **Fig. 21**, while the user is interacting with the front (touch) screen the EPD screen is kept clean (and private) - no EPD widgets are displayed. The only exceptions are some explicit applications that may control/utilize the EPD screen such as: Camera application, Music player, in-call (see **Fig. 30** and related description). The left hand side of **Fig. 21** shows the Front Screen On, Back Screen Off mode. This can be changed to the Front Screen Off, Back Screen On mode, as shown in **Figure 21**. The

device can be turned over so the back screen is visible with the device facing front screen on to a table or other flat surface, for example. Alternatively, side buttons can be squeezed to lock or turn off the front screen. A device timeout may be approximately one minute. The right hand side of **Fig. 21** shows the Front Screen Off, Back Screen On mode. Once the user "turns off" the front (touch) screen, the EPD is enabled. Note: the behaviour of the default layout and interaction on the EPD screen is affected by settings performed by the user on the EPD configuration panel. For more information regarding the interaction (settings) on the EPD configuration panel, see **Figs. 7** and **8** and their accompanying description. For more information regarding supported interaction on the EPD screen, see **Figs. 22** to **26** and their accompanying description.

Figure 22 shows an example of interaction on the EPD screen. In **Fig. 22** left hand side, the user has turned the device front side down and since the EPD widgets are disabled (OFF) the wallpaper only mode is enabled as default. In **Fig. 22** right hand side, the user has triggered the peek view mode and is presented with a clock and mini notification. The user may toggle between the wallpaper only and Peek view screens by double tapping the EPD screen. In **Figure 22,** the scenario is that the user has turned off the front (touch) screen and turned the device front side down (ie backside upwards). The EPD widgets have been disabled (through the EPD pane settings). This scenario shows how the user easily can toggle between the wallpaper-only mode and the peek view mode.

Figure 23 shows an example of interaction on the EPD screen. In **Fig. 23**, left hand side, the user has turned the device front side down and is by default presented with the EPD widgets (since the EPD widgets are set to enabled (ON)). In **Fig. 23**, middle, the user has reached the wallpaper-only mode - all widgets have been turned off (but ~~are still reachable). In **Fig. 23**, right hand side, the user has triggered the peek view~~ mode and is presented with a clock and a mini notification. In **Fig. 23**, the user may cycle between the EPD widget mode, the wallpaper-only mode, and the Peek view mode screens by double tapping the EPD screen. In **Fig. 23**, the scenario is that the user has turned off the front (touch) screen and turned the device front side down. The EPD widgets have been enabled (through the EPD pane settings). This scenario shows

how the user easily can cycle between the three EPD states without having to enter the Android experience (EPD pane).

Figures 24 to **26** relate to incoming event notification. The scenario of **Figs. 24** to **26** shows how the user is able to interact with incoming messages. It also shows how notifications could coexist/interact with the front (touch) screen.

In **Fig. 24** left hand side, the user has switched off the front (touch) screen and the EPD screen is activated. The user is either presented with the EPD widgets enabled or disabled depending on current EPD pane settings. In **Fig. 24** right hand side, when a new event (eg. message: E-mail, SMS/MMS, facebook) occurs a notification indicator is displayed eg. for approx. 2 minutes and then returns the screen to its previous state. While on the screen, the notification takes over the EPD screen real-estate. The next step is shown on the left hand side of **Fig. 25**.

Continuing on the left hand side of **Fig. 25**, the user may progress by double tapping the EPD. If a PIN code is required, the device must be unlocked, eg. by turning the device around or turning the device over to execute an unlock process. The user may enter the PIN code through the unlock screen (on the front/touch screen). After entering the PIN code, if the user would flip the device to the "Touch screen" in this state – the user would be transported directly to the current message/event (native application) and be able to instantly act on the event (read/answer/consume).

If no PIN code is required, the user may read the message. The user is presented with a large portion of the actual message. If the user turns the device over to the front screen, then the user would be transported directly to the current message/event (native application) and be able to instantly act on the event (read/answer/consume).

Figure 26 shows two possibilities for dismissing an event notification. In **Fig. 26A**, in (a) the user grabs the phone; in (b) the user lifts up the phone; in (c) the user gently lets it go to return it to its initial position - now the event notification has been removed from the screen and the EPD screen is returned to its previous state. In **Fig. 26B**, in (a) the user grabs the phone; in (b) the user lifts up the side; in (c) the user

gently lets it go to return it to its initial position - now the event has been removed from the EPD screen.

Examples relating to **Figs. 24** *to* **26** *are shown in* **Figs. 58** *to* **60**. **Figs. 58** and **60** are examples of screens corresponding to new events. **Fig. 59** is an example of a displayed screen if an unlock code is required.

Figures 27 to **29** relate to an incoming call. The scenario of **Figs. 27** to **29** shows how the user is able to interact with incoming calls if the PIN lock is enabled or if it is disabled. It also shows how an incoming call coexists/interacts with the front (touch) screen.

In **Fig. 27**, left hand side, the user has switched off the front (touch) screen and the EPD screen is activated. The user is either presented with the EPD widgets enabled or disabled depending on previous state. In **Fig. 27**, right hand side, when the user receives an incoming call (eg. skype or other voice service) the event takes over the entire EPD screen real-estate. No interaction is supported during an incoming call event. The front (touch) screen is turned on simultaneously and shows the [1903] screen. Interaction on the front screen is not supported until the device has been turned around or turned over.

In **Fig. 28**, left hand side, the front screen shows the incoming call dialogue. The user swipes up to answer, or swipes down to decline and go to the homescreen. In this scenario the front screen is unlocked; if it were locked while receiving the call this screen would show in just the same way. Pressing the [menu]-button would allow the user to "Mute", "Decline & Send SMS". "Decline & Send SMS" would require the user to unlock the phone if PIN code is enabled before reaching the "Send message" screen. If an answer is performed, we move to the EPD screen: while in-call the EPD shows an "in call" icon.

If a Decline is performed, we move to the right hand side of **Fig. 28**. If the user activates the "Decline" command the area will slide into the above layout - allowing the user to "Send a message" to the caller. The "overlay" area would stay visible for

approximately 5 seconds and then disappear. The user could also tap on the underlying screen (in this case "Home screen") and thereby dismiss the overlay. The overlay is also automatically removed after a short period of time.

If the device is PIN locked, then the user would be provided with the unlock screen instead.

Figure 29 shows two possibilities for muting an incoming call. In **Fig. 29A**, in (a) the user grabs the phone; in (b) the user lifts up the phone; in (c) the user gently lets it go to return it to its initial position - now the call has been muted. In **Fig. 26B**, in (a) the user grabs the phone; in (b) the user lifts up the side; in (c) the user gently lets it go to *return it to its initial position - now the call has been muted.*

Examples relating to **Figs. 27** to **29** are shown in **Figs. 61** to **64**.

USER INTERFACE INTERACTION DESIGN: Back screen use cases

Figure 30 relates to back screen use cases.

Figure 30A *relates to an outgoing call. During an incoming call* a simple telephone icon is displayed on top of the wallpaper on the EPD. Not so much to show others, most parts of the phone would probably be blocked by the hand anyway. An example of a scenario when this would be useful would be if the user forgets to hang up a call, then both the front and the back of the phone will alert him that he is actually still having an active call.

Figure 30B relates to a camera function. From the front screen the user can easily *choose one from a few camera skins that will cover the back screen while using the* camera application. The skins could, like in this example, be stylized images of vintage cameras, much like the hipstamatic interface. The style of the skin could also be applied to the front screen UI to give the user a comprehensive and appealing experience.

Figure 30C relates to a media player. In this scenario the user is using the media player listening to music. Displayed on the back screen is a skin and also information about the current track blended together. Apart from a cassette, a media player back screen skin could also for example be an image of the currently playing albums cover. Much like the camera these skins should be optional and easily customizable. The skins should also only be visible when the user has the actual application open. In this case this skin would not show if the user had the media player only running in the background playing music.

Gestures Lock

There is provided a device, such as a communications device, such as a mobile communications device. Examples of mobile communications devices include mobile phones, smart phones, tablet computers, and laptop computers with a mobile communications capability.

Main idea here is new gestures to unlock and lock the screen of touch screen mobile communications device (eg. a phone). In short terms – it's a replacement for switching the screen on your iPhone on with button on upper side of the device and a replacement for the unlock gesture at your iPhone at the same time.

Implementation details:

When mobile communications device (eg. a phone) is in standby mode (display is off) touch screen remains on:

- User swipes screen from bottom to upper area to switch mobile communications device (eg. a phone) to operational mode (eg. to unlock)
- (optional) we can add power on animation – as long user swipes the finger actual display image appears under the finger.

When mobile communications device (eg. a phone) is in operational mode:

- User swipes screen from upper part to the bottom area to switch mobile communications device (eg. a phone) to standby mode (eg. to lock)
- (optional) to avoid interference with OS control elements we can add additional touch area above the main display

An example is shown in **Fig. 65. Fig. 65A** illustrates a pan gesture suitable for locking a device screen. In an example, panning top-down locks the screen. When a cut off point of 50% down the screen is reached, the screen is locked. A swipe gesture does not need to be as long as the pan gesture if the swipe speed is enough to take the screen over the lock border. There may be a non-active area between the top capacitive area and the screen edge to separate lock gesture from status menu gesture.

Fig. 65B illustrates a pan gesture suitable for unlocking a device screen. In an example, panning bottom-up unlocks the screen. When a cut off point of 50% up the screen is reached, the screen is unlocked. A swipe gesture does not need to be as long as the pan gesture if the swipe speed is enough to take the screen over the lock border.

Key Technical Aspects of the Device, UI and Interaction

This section describes key technical aspects of the device, UI and interaction, which are assessed on feasibility and issues. Here we go into specific topics. This section is divided into topics. Each topic will be lead by a story, state the scope of assessment and followed by the assessments.

Device

The device is intended as an always connected device with next generation technology.

Technical specifications:

~~Qualcomm Snapdragon (MSM8260)~~

- o Dual-core 1.2 GHz
- o Adreno 220

NXT/NISSHA – Main screen solution

- o WVGA+ (480 x 800-854)
- o Bending wave multi touch input

- o High resolution multi touch haptic feedback
- o Flat loudspeaker surface

EPD – Electronic Ink display on back of the device

Sensors

- o Accelerometer + Gyro
- o Analogue pressure on sides (Squeeze)
- o Light meter
- o Proximity
- o Thermometer
- o Camera
- o 1-3 Capacitive buttons in the front, below front screen
- o Volume buttons on the side.

Operating System

- o Android 3.0 / (post-Gingerbread)

Concept

This is a Dual screen device with an EPD surface covering almost entire back side of the device, differentiating it from other devices. There are currently some gestures involved in making the dual screen experience unique.

Scope

The user may be able to interact with the back screen. Gestures are feasible and can be accurately detected. Determine what screen the user is viewing. Sensors are needed and their physical placement should be suitable.

Interaction is an important issue for the back screen. Some interaction is allowed. This is motivated both from a power consumption point of view and user experience and expectation, e.g. acquire information without having to turn on the main screen, quick gesture to switch between the amounts of information displayed etc.

Gestures should be simple and easy to detect. Gestures should not be used to initiate interaction, which would require constantly running sensors and central processing unit (CPU). The sensors should be turned off when the phone is locked and idling, and the CPU not constantly processing the signal to detect an incoming gesture.

With the information available currently, we discourage gestures like "tapping on the device", mainly due to power consumption (motivated further under the 'Power consumption' topic below), but also accurate gesture recognition under the different positions of the phone. We expect the tap to be sensed differently if the phone is on different surfaces or in the user's hand or if tapped with your thumb of the same hand or with the other hand.

A vital aspect of dual screens is to determine what the user is looking at, especially if the user can interact with both screens. User input might become ambiguous and disrupt the user experience. Utilizing sensors may solve the issue to some extent or completely, depending on their placement, specifications and reliability.

Currently, the best functioning initial interaction seems to be the pressure sensors or the volume buttons. The issue to solve here is other interactions designated to these sensors. The applied pressure on squeeze sensors, if reliable enough, may be used to solve the ambiguity issue above. Pressure sensors are known from eg. US2011/0038114A1.

From a power consumption point of view, it is highly justified to momentarily use even several sensors for detecting gestures that might save the user from turning on the main screen. However, these gestures should be reserved to user reaction only. For example, if the phone is laying upside-down on a table and there is an incoming call, we can turn on several sensors to determine user response, like dismissing the call if user lifts one side of the phone and let go again. The light, proximity, accelerometer and gyro sensors might be used in some combination to accurately identify this gesture. (This particular example required a table).

Another gesture in the concept has been to be able to turn the device from the EPD, displaying a message preview, to the main screen, which instantly shows the full message with option to reply etc. It is tricky to make this work, but may be possible using the gyro in most situations. Lock screen interaction should also be considered in this interaction.

For touch gestures on the main screen, e.g. 2-finger swipe to access EPD configuration screen, we see no apparent complications or feasibility issues as long as they are performed from Yota Home or other Yota controlled applications, as they can be designed for possible incoming gestures.

Global gestures are assessed to be unfeasible in implementing and maintaining as they would require significant work and modification to Android and/or touch drivers. These might also become an annoyance to the user or block proper usage of applications. Complicated gestures, especially if not well designed for the specific application running, might also become a performance or response issue.

EPD (Back screen)

The device will have an EPD surface covering almost entire back side of the device. EPD display is meant to be always on. It is said to have better refresh/update rate than previous generations. It will be rendered in portrait mode only. EPD display will only accommodate specialized widgets or application, i.e. no third party allowed. Electronic ink displays typically have very low power consumption.

Scope

Keep the EPD interface within the limits of the hardware. The screen may be protected from third parties while still allowing application context. Main screen UI may be communicated with for daily usage and configuration.

Assessment

With low refresh rates, we should not use any animations, but "living wallpaper" with slow animations (eg. over a day) may be feasible. Partial updates on EPD displays leave shadows and artifacts; full refreshes are usually needed every now and then, but can be tactically minimized if design and interaction permits.

EPD process could run under Yota Home, but it is recommended to have it as a separate activity or service and allow communication with selected applications (e.g. Home, Lock Screen, Phone etc.) through some (undisclosed) application programming interface (API) for context changing and configuration. Having separate activity or service for EPD would also allow it to successfully sleep while the other applications are on top or always run in the background. Currently, a service seems most logical implementation and should avoid eventual window stack and Android issues with dual screen. (See also 'Android' assessment about dual screen below).

Current UI design of the EPD display includes some user interaction even when the device is locked. Interaction should be possible through customization of the Android lock screen activity or "key guard" while the device is locked. (Customizing the lock screen also enables style unification across the most basic parts of the UI and help creating the brand).

Yota Home can be used to configure the EPD and communicate the user preferences to the EPD service. EPD service can also be enabled to communicate back to Yota Home for use cases such as going directly to message, if previewed on EPD. Other chosen application may also be allowed to communicate to EPD service for special use cases, e.g. Camera application telling EPD to draw a picture of a camera on the back surface.

Initiating interaction with the EPD UI should be via hard keys or similar. Reacting on events could use more complicated gestures. These are motivated in 'Concept' above and 'Power consumption' assessment below.

Dynamic profiles

Yota imagines various phone settings changing and events happening automatically with change in context, for example, hidden widgets appearing at certain times or themes changing with the weather.

Scope

Consider intelligent profiles, automatically and dynamically changing to suit the user's environment. Context (location, time and other sensors or user input) may affect the style and layout of the UI, including for example widgets (and information) on front and back screen. Text style may be changed for readability, depending on the background.

Assessment

Depending on the scope of automatization, artificial intelligence may be used to determine correct context. More feasible / less work is to define some simple contexts, which, together with some user input and various sensors, can switch between some predetermined "profiles".

Profile changes should not be so frequent or such that they require special sensors running most of the time. Although, for slow or infrequent changes, sensor may well be used to poll the status, e.g. once every day check the temperature at a specific time to guess the season or the GPS every hour to see if the user changes location or even in combination for best guess. See also 'Power consumption' assessment on sensor usage below.

Changing the UI style depending on the properties of the background imagery ~~currently chosen by the user is complicated and costly, especially for Live Wallpapers.~~ Even static wallpapers are complicated as they may include very bright and very dark regions, and with added parallax this also becomes unfeasible. It is recommended to use background for any text used on the main screen. The EPD escapes some of these issues. Here, the static backgrounds can either be chosen carefully or assessed runtime to choose best brightness of text. There are still issues with local variances in

brightness for custom wallpapers and changes in EPD-"Living Wallpapers" and it is recommended to use text background here too for any fine text.

TAT Home

TAT Home is a complete Android home screen solution built on TAT Cascades. TAT Home supports Live Wallpapers, Live Folders and Android widgets. Moreover it allows specialized TAT Widgets controlled and rendered via TAT technology. TAT Home is extremely customizable, both visually and functionality-wise.

Scope

Assess TAT Home as Yota Home.

Assessment

TAT Home is very versatile and customizable in most areas. It incorporates scheme for Yota specialized widgets, both if Yota wishes to utilize TAT graphics engine to the full extent or via Android widgets. TAT Home can be partially or fully customized in functionality, layout and style for desktop, application list/view, widget handling, overview etc.

TAT Home can communicate with the EPD service to setup the layout and controls through a special configuration screen and also actively and continuously control its context. TAT Home also has a silent update scheme through Android market already in place and tested.

Android

The device will run a version of Google Android OS (possibly 3.0 – post Gingerbread). All the features of Yota customization should be cost efficient and need to be compatible, easily maintainable and quick to merge with Android updates.

Scope

Assess Android compliance of concept and design. Assess the feasibility of changing styles to Android applications.

Assessment

Google has an extensive test suite for Android devices for eligibility for Google market. These need to pass in order to have access to the market. The critical changes relevant to Yota would be Android style changes and lock screen modifications needed for the concept and design.

Another critical issue is the dual screen support on Android. Although, if the EPD runs as a service, and is the only one allowed direct access to the back screen, the device could technically be seen as single screen device; EPD service application programming interface (API) would be the only way to access the "screen". Implementing this way will save a lot of cost in implementation and avoid Android dual screen issues.

Android themes and styles are described in markup language (XML) and should be low cost to modify and presumably same to maintain for the foreseeable future.

These styles are hierarchical and can be overridden fully or partially by an application for its visualization. Changing native base styles could have unintended visual effects on third party applications (that assume a specific default style, e.g. background colour), especially if they inherit and mix with their own styles. Changing styles for specific applications, such as Phone application, status bar etc., should avoid third party style issues in all or most cases. This is where we recommend any needed style changes be done.

Installing additional system wide fonts is fairly easy, and can be assigned to standard Android applications through the same XML as above.

Icons should be easy to replace from a technical point of view, especially if they keep the original form factor, but the amount of icons might present some graphics work. A quick digging in Android source revealed about 140 icons and images related to the status bar. Of the icons, normally about 10-20 different are shown to an average user. However, some of these icons do have several states or animations, e.g. different battery levels or WiFi signal strength, where each of these are separate icons. Each state is of course only a minor modification to basically the same icon base.

Market applications are also recommended to produce the icon sets in three resolutions to fit the different supported screen densities, but this should not be an immediate concern of Yota as the screen resolution is fixed. Also, per Google's guidelines, these can be scaled versions of the original medium sized set.

Power consumption

Being an always on and connected device and a social center with lots of innovative features the battery time could become an issue.

Scope

Assess power consumption when designing the UI and interaction. Share ideas on how to best save power. The sensors may be used, if needed for UI and interaction.

Assessment

The biggest culprit in power consumption today for the average user is by far the liquid crystal display (LCD) and its back light, followed by what is drawn on the screen and various networking devices. While the dual screen concept may reduce the main screen power consumption, TAT technology can minimize the amount of pixels needed redrawing by keeping track of changes to the UI elements and only updating the "dirty rectangles" (reference may be had to Appendix 3).

EPD is always on and, depending on its power efficiency, should be updated as little as possible. But, using it, instead of forcing user to turn on the main LCD screen, where possible, might help save more power in the long run. Rendering EPD with TAT technology could provide additional power saving through the "dirty rectangles" feature. Although, if the EPD is its own application or service, it would require a separate TAT graphics engine running. This may depend on the exact usage of the EPD.

Features that require sensors to be constantly running should be avoided, e.g. tap as initial gesture to interact with the device would require the accelerometer (or another sensor(s)) to be always on. Unless this sensor is extremely power efficient, the battery drainage over a day could be substantial. CPU would also be required for sensor signal processing and gesture recognition (the more advanced the gesture, the more CPU power is required), not to mention the effects of possible false positives. Current assessment is that hard keys be used for initiating interaction.

Going into details, it is our understanding that current generation gyro+accelerometer sensors use about 20 times less power than the backlight of a LCD screen. If this (plus CPU usage) can be worked into the battery budget, above scenario could be feasible.

On the other hand, solutions using EPD and turning on some sensors for a short duration for an incoming notification or events that the user can react on without having to turn on the main screen could help save a lot of power. This is a strong motivation for the EPD interface having some interaction.

A general rule is to use more power to shorten the processing time than to use less power for longer periods. This applies to all hardware; including sensors etc. and ~~becomes very significant with network devices and communication~~. To conserve power, one should use the fastest connection possible (e.g. WiFi) than use slower but lower power consuming connection (2G/3G) over a longer period of time. Grouping downloads, updates and other network access together, instead of random accesses, is also an example.

Performance

Performance is prioritized over features and effects. UI should keep stable frame rate as far as possible.

Scope

Find the best applications for and utilizations of Dual-core. Investigate frame rate locking; we may stabilize the frame rate to some specific number. Provide guide in best usage of TAT Cascades (e.g. asynchronous data services).

Assessment

Android specifications for dual-core support must forego any thorough technical assessment for utilization of dual-core processors. Generally, it is possible to delegate asynchronous tasks to different cores for simultaneous processing, even though it might be tricky. The operating system might handle this or an application with a sub-task might be allowed to run it on the core of its choosing. TAT Home itself does not use this feature, but network services or decoders providing data or images to TAT Home could then run on a separate core to avoid blocking the UI and keeping it responsive. Wait and see how to use the dual core until after Android Gingerbread support is known.

It is impossible to guarantee a specific frame rate over any specific number under all circumstances, but a lot of measures can be taken to deliver a stable and smooth UI experience. Choosing correct rendering methods, integration method, application schemes etc. for your specific UI are vital.

TAT Cascades is heavily optimized for fast rendering, but care must be taken when developing services for it. For example, it is vital that a service providing data to be quick at its task, so it does not stall the UI. Sometimes a service will need to process heavy and time consuming tasks. In these situations, considering an asynchronous scheme might be a better idea. Typical situation are image decoding and accessing

network data. Further reading on different optimization areas and full documentation and examples are available from TAT developer site accessible to customers developing with TAT products after a signed TEA.

Using OpenGL acceleration in most cases boosts the performance considerably. TAT also has a performance test tool that is run on devices to find their base characteristics, e.g. memory bandwidth, GPU features and performance etc. Through this, we can quickly find a lot of pros and cons of a device and are able to avoid the bottlenecks.

The cost in power consumption is very hard to assess without tests on the target with the intended UI. Following the general rule in 'Power consumption' above, it is better to render as quickly as possible, even if using a high amount of power, and then idle until next frame than to constantly use lesser amount of power all the time. The former case might be easier to achieve with graphics acceleration and using frame rate capping, whereas the latter could easily turn out to be the case for software rendering, depending on the specific UI and effects, but of course needs to be tested. Furthermore, it is plausible even that real-world tests show less instantaneous power consumption when using hardware acceleration than rendering in software. These things are often not of concern, unless we are pushing to the limit, as the power consumption of CPU and graphics processing unit (GPU) are much lower than the back light of the LCD, which would of course be on if we are rendering to the main screen.

Updates

Scope

~~The update process will work. Investigate silent updates.~~

Silent update

Android Marketplace accommodates silent updates (apart from currently suffering first time update issue with preinstalled applications). Applications on Android market can

be viewed from and downloaded by anyone. Measures can be taken to prevent installation on unintended devices. TAT Home already utilized this mechanism.

A custom solution may be deployed for all or part of the update process as well, but initial work and maintenance will increase significantly.

EPD being a separate activity or service would require its own update process. Whether it is through firmware, custom solution or Android market, may depend on its integration on Android. If the EPD is part of Yota Home, they would naturally share the update scheme.

Note

It is to be understood that the above-referenced arrangements are only illustrative of the application for the principles of the present invention. Numerous modifications and alternative arrangements can be devised without departing from the spirit and scope of the present invention. While the present invention has been shown in the drawings and fully described above with particularity and detail in connection with what is presently deemed to be the most practical and preferred example(s) of the invention, it will be apparent to those of ordinary skill in the art that numerous modifications can be made without departing from the principles and concepts of the invention as set forth herein.

CONCEPTS

This document includes multiple concepts. Some concepts are summarized below.

1. A mobile device with two screens: one main display and one EPD display

- Joker is a 'Dual-Side' device – i.e. a slate format mobile telephone with a LCD touchscreen on one side and a touchscreen bi-stable EPD surface covering almost the entire read side of the device.
- The device should allow interaction with sensors when the main screen is turned off. For example to acquire information on the EPD screen.
    - This can be achieved via using extremely power efficient sensors.
    - *This can also be achieved through turning on the sensors and thus* allowing interaction, when a specific event occurs, such as a notification being displayed on the EPD screen. This would allow the interaction with sensors to be "reactive" and hence power efficient instead of gestures initiating interaction with the device (the latter requires the device to be regularly looking for gesture input, draining power).
- Sensors would be deployed to sense which screen the user is interacting with. *It is important to determine which screen the user is interacting with since* there could be two options (one associated with the EPD, the other with the main screen) that the user might be selecting and the device needs to be able to discriminate between them.
- The device has pressure sensors on two opposing sides detecting pressure from the user.

2. EPD screen display a separate application from the main screen's application

- The EPD screen is shown as a home screen pane and runs in the Android system as a separate activity or service (i.e. 'application').
- The device would be seen as a one screen device from an Android compatibility sense.

- The EPD screen would only be allowed to communicate with specified applications.
- Only specified applications would be allowed to communicate with the EPD screen.

3. Combined refresh of widgets to save power

- Widgets displayed on the EPD screen could have different update frequencies to reflect the type of widget.
- For example
  - Weather widget updates every 30 minutes
  - Clock widget updates every 1 minute
  - Twitter widget updates on demand
  - Friends nearby widget updates every 5 minutes
- Combining each update to a specific time, where as many widgets are updated at the same time as possible saves energy. This could for instance be used to combine the updates in full minutes – e.g. all widgets only ever update once every 5 minutes.
- New events received between updates would not be displayed until the update time (e.g. once every 5 minutes). Neither would the widgets poll this information.
- In an alternative arrangement the information would be pushed to the device and displayed on the EPD screen as soon as they arrived. This would significantly alter the battery performance.
- It is understood that full refreshes of the EPD screen sometimes would be necessary to clear out artifacts and shadows possibly occurring when only partially updating the screen.

4. The back screen is a "virtual home screen"

- The bistable display (EPD) on the device's rear side is accessed for setup (see section 7 below) and adjustments through a virtual home screen via the main display on the main display of the device.

- The EPD pane is located at for example position 0 in relation to the other home screens on the device.
- The EPD pane can be accessed through swiping through the other screens to *position 0*.
- The EPD pane can also be directly accessed via a screen wide two finger swipe. Swiping one direction will bring up the EPD pane and swiping the other direction will take the user back to the previous home screen pane.

5. Shortcut navigation between home screen panes

- On each home screen pane a shortcut icon is found. When the user touches the icon it is expanded with a shortcut for each home screen pane. When moving the finger over the icons a home screen preview is shown. Releasing the finger on an icon will bring the corresponding home screen pane to be shown in the display.

6. EPD display appearance when interacting with main screen

- The EPD display will show wallpaper only when the user is interacting with the main front display. The wallpaper, i.e. image used as a background, may be Android 'live wallpaper'. See also section 12 below.

7. The EPD configuration screen

- The EPD configuration screen, which is shown on the main display, includes a replica of the actual EPD with the top part removed. The top part is removed to give the user a less downscaled mirror of the EPD.
- The user cannot place widgets on the top part of the EPD screen.
- When the user enters this configuration screen it is optional to have the top part of the options menu shown. When displayed it contains the EPD widgets on/off switch. When the user taps elsewhere on the screen the menu is folded.
- When touching the menu a lower pane is revealed with options for "add widget", "EPD wallpaper" and "EPD settings".

8. On/off switch for widgets

- The user can select to turn on or off all widgets on the EPD back screen by touching the on/off switch on the configuration screen.
- Instead of having more panes, settings and/or profiles there are simply two modes: to not show or to show widgets on the back screen.
- If the widgets are turned off, they will be shown faded on the EPD configuration screen. When turned off they will not be visible on the EPD back screen.
- Controlling the widgets on/off switch can also be done through other parts of the UI. For instance, the widgets could be turned off when turning on "silent mode" on the phone. There could also be a setting to turn on/off the widgets.

9. Layout of the EPD screen

- The alarm clock indicator is shown if the user has set an alarm. The user cannot control the alarm clock indicator.
- The critical battery level indicator is only displayed if the battery has reached a predefined level. The user cannot control the critical battery level indicator.
- The EPD display is divided into a 4x8 grid where the widgets can be placed.
- Widgets can have the size of: 1x1, 1x2, 1x4, 2x2, 2x4, 3x4 or 4x4 of the grid's squares.

10. Adding and editing widgets on the EPD screen

- The user can long press the background on the EPD configuration screen or alternatively select "add widget" from the menu.
- The user is then taken to a widget-editing menu. The menu can be expanded or collapsed and the user can switch between these modes by touching an icon. The alternative is to have the menu items always expanded or always collapsed, until the user selects a menu item.
- When a menu item is tapped it is expanded, if not already expanded, and a first available layout alternative for the widget is displayed. The user can swipe left or right or tap the directional arrows to see further available layout alternatives for the widget.
- If the header is pressed on the expanded item, the item is folded.
- To select a widget and place it on the EPD screen the user taps it.

- If a user taps another item in the menu list, the currently expanded item is closed and the new item is expanded.

- If, when the user selects to add a widget, there is not enough space on the EPD screen, the user is taken to a different screen. The layout preview is faded and the amount of missing space is marked with a different color.
    - The user is presented with a dialog to inform the user that there is not enough space.
    - The user is further presented with a shortcut to go to the edit screen where he can free up the needed space by either changing the layout of another widget or removing it.
    - An alternative layout of the notification screen of lacking space is to do the clearing up of screen space automatically or to present the option to free up space already in the add widget mode.

- When the user has selected a widget he is presented with a grid representing the space on the EPD screen. The user can move the widget around and place it.
- The user can also in this editing mode change the layout of the widget by tapping the arrows on the sides of the screen.
- When the user is not dragging an object, a done button appears at the bottom of the screen.
- If there already are widgets placed on the EPD screen they are shown faded, to indicate that that space is occupied. The user is able to move that other widget around and change its layout. The user selects that widget by tapping on it.
- Tapping an empty grid takes the user to the add widget screen and he can from there add another widget. The Done button to be shown on the screen is ~~therefore optional.~~

- When an already selected widget is tapped in edit mode, the settings for that widget is opened. One option is to have a settings icon on top of the widget to communicate that the settings menu is accessible.

- All settings are saved as soon as the user makes them and pressing the Android back-key (hardware or software) takes the user back to the widget layout editing screen.

11. EPD screen widget layout and privacy

- The widgets shown on the EPD screen have different layouts. These layouts can be related to the privacy level that the user decides to use for the information shown on the back screen.
- The different layout modes selectable by the user can contain a variable amount of information or display the same information in different ways but for instance use different size of the screen.
- There are different levels of privacy for the information shown.
    - EPD widget mode. Private information will be displayed with details. For instance full name is shown on caller and missed calls. Name of sender and part of message can be shown for a new message (SMS, MMS, Facebook Twitter etc.) or email. Wallpaper can be shown in the background.
    - Peek view. A private mode where only the number of missed calls and unread messages are shown. The names and content of the messages and calls are not shown. Generic information such as the clock could also be shown. This mode is not customizable by the user.
    - Wallpaper only. A further mode provides that no information except the wallpaper is shown.
- When the user activates the key lock, he is prompted with the option to turn off the EPD widget mode. This can also be done through other parts of the UI.

12. EPD screen wallpaper

- To set the wallpaper background on the EPD screen the user selects the "EPD wallpaper" icon on the EPD pane which is accessible from the home screen. If the menu is hidden the user can press the menu key.
- When the "EPD wallpaper" icon has been selected the user is taken to a screen where he is presented with three options; New photo, EPD Wallpapers and Gallery.

- Selecting New photo takes the user to the camera application for taking and adjusting and cropping the new photo and then select as wallpaper.
- Selecting EPD Wallpapers takes the user to the EPD Wallpaper gallery to select a wallpaper.
- Selecting Gallery takes the user to the native gallery application where the user can select, crop and adjust an image.

- The wallpaper could also be set from other parts of the UI when selecting the wallpaper item in the options menu. The user is then presented with a dialog asking which wallpaper he would like to set (home screen/lock screen/EPD).
- Depending on the selected wallpaper, the EPD screen could sometimes need to adjust the brightness of the text and widgets on the screen for best view.

13. EPD screen wallpaper photo as texture

- The EPD wallpaper could also be constructed of the pattern as captured by the device's camera.
- The pattern of the photo would then be duplicated to the wallpaper as a pattern and not as a photo.

14. Interaction with the EPD screen

- When the user is interacting with the main screen, the EPD screen is only showing the wallpaper. No private information is shown.
  - Some specific applications could override this main setting. Examples could be, if the user uses the camera an image of a camera could be displayed on the EPD screen or other applications such as in-call or music player.
- The EPD screen can be activated and the front screen deactivated by the user.
  - If the device is turned around and placed on a flat surface (e.g. table) the front screen (facing the table top and hence not visible) is turned off and the EPD screen is activated.
  - If the user squeezes the sides/side buttons on the device, the front screen is turned off and the EPD screen is activated.

- If a timeout limit is reached (e.g. 1 minute) the front screen is turned off and the EPD screen is activated.
- More generally, rotation of the device can be used as the control input – e.g. to initiate some action or process, like answering a call (see section 17 below) or to control in some manner the EPD or the main screen.

15. EPD privacy setting interaction

- The user can switch between the different privacy modes/display of available information on the EPD screen by double tapping the device or EPD.
- If the user has enabled the widget mode in the EPD settings screen the double tapping will alter the EPD screen between the modes Wallpaper only/Peek view/EPD widget mode in a predefined direction.
- If the user has enabled the widget mode in the EPD settings screen the double tapping will alter the EPD screen between the modes Wallpaper only/Peek view.

16. EPD interaction with notifications

- If the user has activated the EPD screen and a new event occurs (message: E-mail, SMS/MMS, Facebook) the user is presented with a notification.
- The notification is displayed for a predefined time. The screen then returns to the previous state.
- While on the screen, the notification takes over the EPD screen real-estate.

- If the user taps the device twice when the notification is shown the message is expanded and shown on the EPD screen. Longer messages will be abbreviated.
  - If the user has activated a PIN code for this action the tapping does not expand the notification. The user is then notified that he needs to turn the device and enter the code to see the message on the main screen.
- When the user has expanded the notification to show the message on the EPD screen he can turn the device around to see the message on the main screen. The user is then taken to the right place in the UI to see the message or event.

The user is also able to instantly interact with the message or event (e.g. respond, accept/decline). This turning/flipping action also unlocks the main screen if it has been locked.

- The user can also dismiss a notification being shown on the EPD screen and return the screen to the previous state.
    - The user can grab the phone and lift it up and gently return it to its previous position. This will dismiss the notification.
    - The user can also grab the phone and lift up one side of the device and let it go to return to its previous position. This will dismiss the notification.

- The user can as an alternative also show and expand the last shown notification when the notification is no longer shown by tapping the device three times. The message or event is then shown on the EPD screen.
- The user can then interact with the notification as above, turning the device to interact on the main screen.

17. EPD interaction when call is received

- If the user has activated the EPD screen and an incoming voice call (phone, Skype or other voice service) is received the event takes over the entire EPD screen real estate.
- The front screen is turned on at the same time as the EPD screen event is shown. No other interaction then in relation to the call is allowed.
- Interaction (touch) with the front screen is not supported until the device has been turned around and the front screen is facing up.

- When the user has turned the device around he can interact with the front screen. The same interaction is possible irrespective if the screen was locked or unlocked before the call.
- The user is presented with a screen where the user can swipe to answer the call. The user swipes up to decline the call and down to answer the call.
- If the user presses the Menu button (HW or SW) the user is presented with the options "mute", "decline" and "send SMS".

- The options Decline and send SMS would require the user to enter the PIN code if the device has that option enabled before being able to proceed.

- If the user declines the call he is presented with an overlay of the screen for a predefined time. The user can select to send a message to the declined caller. Tapping on the non-overlaid part of the screen will dismiss the overlay.

- The user can also mute the call when the notification is shown on the EPD screen.
  - The user can grab the phone and lift it up and gently return it to its previous position. This call is muted.
  - The user can also grab the phone and lift up one side of the device and let it go to return to its previous position. This call is muted.

18. Full EPD screen usage

- Some applications or events on the device will overtake the EPD screen and do a full graphics overlay.
  - When a call is received and when the user is in an active voice call the EPD screen shows a phone symbol. No other information is being shown on the EPD screen.
  - When the user activates the camera application on the device the EPD screen displays a camera skin. The user can select the desired camera skin to be displayed.
  - When the user uses the media player on the device a music-related skin is displayed on the EPD screen. This skin is user selectable or could be automated depending on the media played.
  - When the device power level is low.

19. Living/live wallpaper

- The wallpaper of the EPD screen could in one mode change itself depending on the surrounding factors and other activating events.
- Activating events could be
  - Location

- Time
- Upcoming events in calendar
- Weather (+location)

- The refresh rate should be low (eg. once per day), so as not to annoy the user with new information too often or unnecessarily drain the battery.
- The wallpaper can change very slowly so that eg. the change is only really noticeable after an hour, or after a few hours.
-

APPENDIX 1: PRIMER ON LTE

3GPP Long Term Evolution, usually referred to as LTE, is a standard for wireless communication of high-speed data for mobile phones and data terminals. It is based on the GSM/EDGE and UMTS/HSPA network technologies, increasing the capacity and speed using new modulation techniques. The standard is developed by the 3GPP (3rd Generation Partnership Project).

The world's first publicly available LTE service was launched by TeliaSonera in the Scandinavian capitals Stockholm and Oslo on 14 December 2009. LTE is the natural upgrade path for carriers with GSM/UMTS networks, but even CDMA holdouts such as Verizon in North America and KDDI in Japan have announced that they will migrate to LTE in the future. LTE is therefore anticipated to become the first truly global mobile phone standard.

Although commonly referred to as a type of 4G wireless service, LTE release 8 currently in use does not satisfy the requirements set forth by the ITU-R organization. Future releases of LTE (referred to as LTE Advanced) are expected to satisfy the requirements to be considered 4G.

LTE is a standard for wireless data communications technology and an evolution of the GSM/UMTS standards. The goal of LTE is to increase the capacity and speed of wireless data networks using new DSP (Digital Signal Processing) techniques and modulations that were developed in the beginning of the new millennium. Its wireless

interface is incompatible with 2G and 3G networks, and so it must be operated on a separate wireless spectrum.

LTE was first proposed by NTT DoCoMo of Japan in 2004. The standard was finalized in December 2008, and the first publicly available LTE service was launched by TeliaSonera in the Scandinavian capitals Stockholm and Oslo on December 14, 2009 as a data connection with a USB modem. In 2011, LTE services were launched by major North American carriers as well, with the Samsung Galaxy Indulge offered by MetroPCS starting on February 10, 2011 being the first commercially available LTE phone and HTC ThunderBolt offered by Verizon starting on March 17 being the second LTE phone to be sold commercially. Initially, CDMA operators planned to upgrade to a rival standard called the UMB, but all the major CDMA operators (such as Verizon, Sprint and MetroPCS in the United States, Bell and Telus in Canada, au by KDDI in Japan, SK Telecom in South Korea and China Telecom/China Unicom in China) have announced that they intend to migrate to LTE after all. The evolution of LTE is LTE Advanced, which was standardized in March 2011. Services are expected to commence in 2013.

The LTE specification provides down-link peak rates of 300 Mbit/s, uplink peak rates of 75 Mbit/s and QoS provisions permitting round-trip times of less than 10 ms. LTE has the ability to manage fast-moving mobiles, and support for multi-cast and broadcast streams. LTE supports scalable carrier bandwidths, from 1.4 MHz to 20 MHz and supports both frequency division duplexing (FDD) and time-division duplexing (TDD). The architecture of the network is simplified to a flat IP-based network architecture called the Evolved Packet Core (EPC), designed to replace the GPRS Core Network and support seamless handovers for both voice and data to cell towers with older network technology such as GSM, UMTS and CDMA2000. The simpler architecture results in lower operating costs (for example, each E-UTRAN cell will support up to four times the data and voice capacity when compared to HSPA).

APPENDIX 2: PRIMER ON LTE ADVANCED

LTE Advanced is a preliminary mobile communication standard, formally submitted as a candidate 4G system to ITU-T in late 2009, was approved into ITU, International Telecommunications Union, IMT-Advanced and expected to be finalized by 3GPP in early 2011. It is standardized by the 3rd Generation Partnership Project (3GPP) as a major enhancement of the 3GPP Long Term Evolution (LTE) standard.

The LTE format was first proposed by NTT DoCoMo of Japan and has been adopted as the international standards. LTE standardization has come to a mature state by now where changes in the specification are limited to corrections and bug fixes. The first commercial services were launched in Scandinavia in December 2009 followed by the United States and Japan in 2010. More first release LTE networks are expected to be deployed globally during 2010 as a natural evolution of several 2G and 3G systems, including Global system for mobile communications (GSM) and Universal Mobile Telecommunications System (UMTS) (3GPP as well as 3GPP2).

Being described as a 3.9G (beyond 3G but pre-4G) technology the first release LTE does not meet the IMT Advanced requirements for 4G also called IMT Advanced as defined by the International Telecommunication Union such as peak data rates up to 1 Gbit/s. The ITU has invited the submission of candidate Radio Interface Technologies (RITs) following their requirements as mentioned in a circular letter. The work by 3GPP to define a 4G candidate radio interface technology started in Release 9 with the study phase for LTE-Advanced. The requirements for LTE-Advanced are defined in 3GPP Technical Report (TR) 36.913, "Requirements for Further Advancements for E-UTRA (LTE-Advanced)." These requirements are based on the ITU requirements for 4G and on 3GPP operators' own requirements for advancing LTE. Major technical considerations include the following:

- Continual improvement to the LTE radio technology and architecture
- Scenarios and performance requirements for interworking with legacy radio access technologies

- Backward compatibility of LTE-Advanced with LTE. An LTE terminal should be able to work in an LTE-Advanced network and vice versa. Any exceptions will be considered by 3GPP.
- Account taken of recent World Radiocommunication Conference (WRC-07) decisions regarding new IMT spectrum as well as existing frequency bands to ensure that LTE-Advanced geographically accommodates available spectrum for channel allocations above 20 MHz. Also, requirements must recognize those parts of the world in which wideband channels are not available.

Likewise, 802.16m, 'WiMAX 2', has been approved by ITU into the IMT Advanced family. WiMAX 2 is designed to be backward compatible with WiMAX 1/1.5 devices. Most vendors now support ease of conversion of earlier 'pre-4G', pre-advanced versions and some support software defined upgrades of core base station equipment from 3G.

The mobile communication industry and standardization organizations have therefore started to work on 4G access technologies such as LTE Advanced. At a workshop in April 2008 in China 3GPP agreed the plans for future work on Long Term Evolution (LTE). A first set of 3GPP requirements on LTE Advanced has been approved in June 2008. Besides the peak data rate 1 Gbit/s that fully supports the 4G requirements as defined by the ITU-R, it also targets faster switching between power states and improved performance at the cell edge. Detailed proposals are being studied within the working groups.

APPENDIX 3: DIRTY RECTANGLES

Dirty Rectangles are used extensively in computer/video game programming for fast, *flicker-free double-buffer graphic updating. The following will give you the gist of it:*

Ideally, the bounding rectangles of the items on screen which need to be drawn are accumulated in a list. Intersecting rectangles are unioned, the union stored in the list, and the two original rectangles thrown away (other optimizations are possible.)

When it comes time to draw, we can use the list of dirty rectangles to limit what actually gets blitted (copied.) We blit the background thru the rectangles, and then *draw whatever needs to get drawn - whatever intersects any dirty rectangle.*

We save that list for the next pass because we will union that entire list with the new list of things to be drawn so that we erase everything properly. We also use that combined list to blit thru onto the screen. We then throw away the combined list, and save the most recent Dirty Rectangle list for the next pass.

Obviously, Dirty Rectangles are useful for any graphical system where many small *objects change over time. This is true for game sprites as well as user interfaces. It is* inefficient for, say, full-screen animation.

Saving the list of Dirty Rectangles between frames and doesn't work because you miss painting the old positions of sprites that had not moved last frame. It's better to record which rectangles need to be redrawn as objects move.

APPENDIX 4: WIDGETS

In computing, a widget is a component of a user interface that operates in a particular way.

Desktop widgets (commonly just called widgets) may be interactive virtual tools that provide single-purpose services such as showing the user the latest news, the current weather, the time, a calendar, a dictionary, a map program, a calculator, desktop notes, photo viewers, or even a language translator, among other things. Examples of widget engines include:

- Dashboard widgets of Apple Macintosh
- Microsoft gadgets in Windows Vista and in the Windows Live system
- Plasmoids are widgets in Plasma, the workspace for the KDE desktop environment.
- Portlets in Google Desktop
- Yahoo! Widgets
- gdesklets, adesklets, and Screenlets in Linux
- Opera widgets on all platforms (desktop, mobile TVs, gaming consoles) using the Opera browser's rendering engine.
- Homescreen widgets in Maemo

Originally, desk accessories were developed to provide a small degree of multitasking, but when real multitasking operating systems became available, these were replaced by normal applications.

Most mobile widgets are like desktop widgets, but for a mobile phone. Mobile widgets can maximize screen space use and may be especially useful in placing live data-rich applications on the device idle-screen/home-screen/"phone-top". Several Java ME-based mobile widget engines exist, but the lack of standards-based APIs for Java to control the mobile device home-screen makes it harder for these engines to expose widgets on the phone-top.

CLAIMS

1. Bar form factor mobile display device comprising front and back major faces, the front major face arranged to present a normal power first display screen and the back major face arranged to present a low power second display screen, wherein the device includes a computer.

2. Bar form factor mobile display device of Claim 1, wherein the second display screen is a Grayscale panel.

3. Bar form factor mobile display device of Claim 1, wherein the second display screen is a bi-stable display screen.

4. Bar form factor mobile display device of Claim 3, wherein the bi-stable display screen is a bi-stable active matrix and high-resolution display screen.

5. Bar form factor mobile display device of any of Claims 3 to 4, wherein the bi-stable display screen is an E-ink bi-stable display screen.

6. Bar form factor mobile display device of any of Claims 3 to 4, wherein the second display screen is Electronic Paper Display.

7. Bar form factor mobile display device of any previous Claim, wherein the device includes sensors and wherein the device is operable to process input from the sensors when the first display screen is off.

8. Device of Claim 7, wherein the device is operable to process input from sensors in the device when the first display screen is off, in response to a specific event.

9. Device of Claim 8, wherein the specific event is a notification being displayed on the second display screen.

10. Device of any of Claims 7 to 9, wherein one or more sensors are operable to sense which screen a user is interacting with.

11. Device of any of Claims 7 to 10, wherein the device includes pressure sensors on opposed sides of the device operable to receive pressure input from a user.

12. Device of any of Claims 7 to 11, wherein the device includes volume buttons on the device operable to receive input from a user.

13. Device of any of Claims 7 to 12, wherein the device includes an accelerometer sensor and a gyroscope sensor.

14. Device of any previous Claim, wherein the first display screen is a touch screen.

15. Device of Claim 14, wherein the first display is operable to receive multi touch input.

16. Device of any previous Claim, wherein the second display screen is a touch screen.

17. Device of Claim 16, wherein the second display is operable to receive multi touch input.

18. Device of any previous Claim, wherein the computer is programmed with an Android operating system.

19. Device of ~~Claim 18~~, ~~wherein the device~~ operates as a one screen device in the Android operating system.

20. Device of any previous Claim, wherein the first display screen output is generated by a first application and the second display screen output is generated by a second application different to the first application.

21. Device of any previous Claim, wherein the first display is operable to display a home screen pane corresponding to the second display screen.

22. Device of Claim 20, wherein the second application is operable to communicate with specified applications.

23. Device of Claim 20, wherein only specified applications are allowed to communicate with the second application.

24. Device of any previous Claim, wherein the second display is operable to display a plurality of widgets, wherein at least two of the widgets have different update frequencies.

25. Device of Claim 24, wherein the update of at least two widgets are synchronized, wherein synchronization provides for energy saving in device power usage.

26. Device of Claim 24, wherein the update of all widgets are synchronized, wherein synchronization provides for energy saving in device power usage.

27. Device of Claim 25 or 26, wherein the update is a screen update of the second screen.

28. Device of any of Claims 24 to 27, wherein the device is further operable to operate in a mode in which the screen update of widgets on the second screen is not synchronized.

29. Device of any of Claims 24 to 28, wherein the device is further operable to perform a full screen refresh of the second screen.

30. Device of Claim 21, wherein the second display is operable to be configured.

31. Device of Claim 30, wherein the second display configuration is operable to be changed via the first display.

32. Device of Claim 30, wherein a device screen page for initiating the changing of the configuration of the second display is at the same level in the menu hierarchy as other home panes on the device.

33. Device of Claim 32, wherein the device screen page for initiating the changing of the second display configuration is accessible by swiping through other screens.

34. Device of Claims 32 or 33, wherein the device screen page for initiating the changing of the second display configuration is accessible by a screen wide two finger swipe.

35. Device of Claim 34, wherein a two finger swipe in a first direction brings up the the screen page for initiating the changing of the second display configuration, and a two finger swipe in the opposite direction to the first direction brings up a previously displayed home page.

36. Device of any previous Claim, wherein the first display is operable to display a plurality of home panes, wherein a shortcut icon is displayed on each home pane.

37. Device of Claim 36, wherein when the shortcut icon is selected by a user, the icon is expanded to provide a shortcut to each home pane.

38. Device of Claim 37, wherein the expanded icon which provides a short cut to each home page is operable to provide a preview of a home screen in response to a finger touch on the corresponding home screen short cut.

39. Device of Claim 38, wherein the device is operable to display a home screen in response to the release of a finger from the corresponding home screen short cut.

40. Device of any previous Claim, wherein the second display displays only wallpaper when a user is interacting with the first display.

41. Device of Claim 40, wherein the wallpaper is Android live wallpaper.

42. Device of any of Claims 31 to 35, wherein the second display configuration screen displayed on the first display includes a replica of the second display screen.

43. Device of Claim 42, wherein a part of the second display screen is not operable to display widgets.

44. Device of Claim 43, wherein the replica excludes parts of the second display screen which are not operable to display widgets.

45. Device of any of Claims 31 to 35, or 42 to 44, wherein the second display configuration screen is configurable to display a portion of an options menu.

46. Device of Claim 45, wherein when the portion of an options menu is displayed, the portion of the options menu includes an on/off switch for widgets.

47. Device of Claim 46, wherein the portion of the options menu is operable to be folded in response to a user tapping on the screen outside the displayed portion of the options menu.

48. Device of any of Claims 45 to 47, wherein the displayed portion of the options menu provides a selectable option which provides options for adding widgets, configuring the second screen wallpaper and for altering the second screen settings.

49. Device of Claim 46, wherein widgets are operable to be displayed or not displayed on the second screen in response to the setting of the on/off switch for widgets.

50. Device of Claim 49, wherein instead of having more panes, settings and/or profiles there are simply two modes: to not show or to show widgets on the second screen.

51. Device of Claims 49 or 50, wherein if widgets are turned off, they are shown as faded on the configuration screen, and they are not visible on the second screen.

52. Device of any of Claims 49 to 51, wherein the on/off switch for widgets is further operable at some other place in the first screen user interface.

53. Device of Claim 52, wherein the on/off switch for widgets is further operable when turning on or off a device silent mode.

54. Device of Claim 52, wherein the on/off switch for widgets is further operable as a device setting.

55. Device of any previous Claim, wherein the second screen displays an alarm clock indicator in response to an alarm clock having been set on the device, and the second screen is not configurable not to display the alarm clock indicator in response to an alarm clock having been set on the device.

56. Device of any previous Claim, wherein the second screen displays a critical battery indicator in response to the battery reaching a predefined level, and the second screen is not configurable not to display the critical battery indicator in response to the battery reaching a predefined level.

57. Device of any previous Claim, wherein the second display is operable to display a plurality of widgets, wherein the second display is divided into a grid comprising grid elements, wherein each widget is presented using grid elements.

58. Device of Claim 57, wherein grid elements have a lower areal density than pixels of the second display.

59. Device of Claim 58, wherein the grid is a m x n grid, where 2≤m≤20, and 2≤n≤20.

60. Device of Claim 59, wherein the grid is a 4x8 grid.

61. Device of Claims 59 or 60, wherein each widgets has a grid element size p x q in the range of 1≤p≤20, and 1≤q≤20, and p≤m and q≤n.

62. Device of Claim 60, wherein widgets can have the size of: 1x1, 1x2, 1x4, 2x2, 2x4, 3x4 or 4x4 of the grid's elements.

63. Device of any of Claims 31 to 35, wherein the second display configuration is operable to be changed via a second display configuration screen on the first display, and the configuration screen is operable to add or edit widgets for the second display.

64. Device of Claim 63, wherein adding or editing widgets for the second display is initiable by long pressing on a portion of the configuration screen without displayed content.

65. Device of Claim 63, wherein adding or editing widgets for the second display is initiable by selecting a selectable menu item.

66. Device of Claims 64 or 65, wherein after initiation of adding or editing widgets for the second display, a widget editing menu is provided, wherein the widget editing menu is expandable or collapsible.

67. Device of Claim 66, wherein an icon is provided for switching between the expanded and the collapsed widget editing menu.

68. Device of Claim 66, wherein a user can only switch between the expanded and the collapsed widget editing menu after a user selects a menu item.

69. Device of any of Claims 66 to 68, wherein when a menu item is tapped it is expanded, if not already expanded, and a first available layout alternative for the widget is displayed.

70. Device of Claim 69, wherein the device is operable to receive a user finger swipe, wherein a swipe left or right provides further layout alternatives for the widget.

71. Device of Claim 69, wherein the device is operable to receive a user finger input, wherein a finger tap on a directional arrow provides further layout alternatives for the widget.

72. Device of any of Claims 66 to 71, wherein if a header is pressed on an expanded item, the item is folded.

73. Device of any of Claims 63 to 72, wherein to select a widget and place it on the second screen, the user taps it.

74. Device of any of Claims 63 to 73, wherein if a user taps a new item in the menu list that is not a currently expanded item, the currently expanded item is closed and the new item is expanded.

75. Device of any of Claims 63 to 74, wherein when the user selects to add a widget, and there is not enough space on the second screen for the additional widget, the user is taken to a different screen on which a faded layout preview is displayed and an amount of missing space is indicated.

76. Device of Claim 75 wherein a dialog is presented to inform a user that there is not enough space.

77. Device of Claims 75 or 76, wherein a shortcut is presented to go to an edit screen to free up the needed space by either changing the layout of a widget or removing a widget.

78. Device of Claims 75 or 76, wherein the second screen is configured automatically to provide enough space for the selected widgets.

79. Device of any of Claims 63 to 74, wherein when the user selects to add a widget, and there is not enough space on the second screen for the additional widget, an option is presented to free up space for the additional widget.

80. Device of any of Claims 63 to 79, wherein when the user selects to add a widget, a grid is presented representing the space on the second screen, and the device is operable to move the widget on the grid and to place the widget on the grid.

81. Device of Claim 80, wherein the widget layout is operable to be edited.

82. Device of Claim 81, wherein the widget layout is operable to be edited by tapping arrows on the screen.

83. Device of any of Claims 63 to 82, wherein when a user is not dragging an object, a done button appears on the screen.

84. Device of any of Claims 63 to 83, wherein if there already are widgets placed on the second screen they are shown faded, to indicate that that space is occupied; any such widget is selectable by tapping on it; the user is able to move such a widget around and change its layout.

85. Device of any of Claims 63 to 84, wherein tapping an empty grid element takes the user to the add widget screen and he can from there add another widget.

86. Device of any of Claims 63 to 85, wherein when an already selected widget is tapped in edit mode, the settings for that widget are opened.

87. Device of Claim 86, wherein a settings icon is provided on top of the widget to indicate that its settings are accessible.

88. Device of any of Claims 86 to 87, wherein all the widget's settings are saved as soon as the user makes them and pressing the Android back-key, in hardware or in software, takes the user back to the widget layout editing screen.

89. Device of any previous Claim, wherein the second display is operable to display a plurality of widgets, wherein the widgets are associated with a selectable privacy level, and wherein a layout of the widgets is related to the selectable privacy level.

90. Device of Claim 89, wherein the selectable privacy level is a user selectable privacy level for information shown on the second screen.

91. Device of Claim 89 or 90, wherein available layouts of the widgets comprise layout modes of widgets, wherein different layout modes comprise different amounts of information.

92. Device of Claim 89 or 90, wherein available layouts of the widgets comprise layout modes of widgets, wherein different layout modes provide the same information arranged differently.

93. Device of any of Claims 89 to 92, wherein a first selectable privacy level provides that private information is provided in detail on the second screen.

94. Device of Claim 93, wherein private information details include full name of caller on missed calls, and name of sender and part of message for new text-based messages.

95. ~~Device of any of Claims 89 to 94~~, wherein a second selectable privacy level provides that limited private information is provided on the second screen.

96. Device of Claim 95, wherein limited private information includes the number of missed calls and the number of unread messages, but the names of senders and message content are not displayed.

97. Device of any of Claims 89 to 96, wherein a third selectable privacy level provides that only wallpaper is shown on the second screen.

98. Device of Claims 93 or 94, wherein when a device is unlocked by a user, the user is offered the option to deselect the first selectable privacy level.

99. Device of Claim 21, wherein the second screen wallpaper is selectable from a menu which is accessible from the home screen pane.

100. Device of Claim 99, wherein if the menu is not displayed on the home screen pane, the menu is operable to be displayed in response to a pressing of a menu key.

101. Device of Claims 99 or 100, wherein the menu includes an icon operable to provide selectable wallpaper.

102. Device of Claim 101, wherein selection of the icon operable to provide selectable wallpaper provides a New photo option.

103. Device of Claim 102, wherein the New photo option is selectable to take the user to a camera application for taking and adjusting and cropping the new photo and then selecting the new photo as wallpaper.

104. Device of any of Claims 101 to 103, wherein selection of the icon operable to provide selectable wallpaper provides a wallpaper gallery option.

105. Device of Claim 104, wherein the wallpaper gallery option is selectable to take the user to the Wallpaper gallery ~~to select a wallpaper.~~

106. Device of any of Claims 101 to 105, wherein selection of the icon operable to provide selectable wallpaper provides a gallery option.

107. Device of Claim 106, wherein the wallpaper gallery option is selectable to take the user to a native gallery application where the user can select, crop and adjust an image.

108. Device of any of Claims 99 to 107, wherein the second screen is configurable to adjust the brightness of the wallpaper and the brightness of widgets.

109. Device of Claim 108 wherein the brightness of the wallpaper and the brightness of widgets are independently adjustable.

110. Device of Claim 108 wherein the brightness of the wallpaper and the brightness of widgets are adjustable in relation to each other.

111. Device of Claim 102, wherein the New photo option provides a wallpaper consisting of a pattern derived from a device camera image.

112. Device of Claim 111, wherein the pattern consists of a tiling of a camera image.

113. Device of any previous Claim, wherein when a user is interacting with the first screen, the second screen displays only wallpaper.

114. Device of any of Claims 1 to 112, wherein when a user is interacting with the first screen, the second screen displays no private information.

115. Device of any of Claims 1 to 112, wherein when a user is operating a device function, an image corresponding to that device function is shown on the second screen.

116. Device of Claim 115, wherein when the device function is a camera function, the second screen displays an image of a camera.

117. Device of Claims 115 or 116, wherein when the device function is a phone function, the second screen displays an image of a phone.

118. Device of any of Claims 115 to 117, wherein when the device function is a music playing function, the second screen displays a music-related image.

119. Device of any previous Claim, wherein the device is operable to provide a deactivated first screen and an activated second screen in response to a user manipulation of the device.

120. Device of Claim 119, wherein a user manipulation includes turning the device around and placing it on a flat surface with the front screen facing down.

121. Device of Claims 119 or 120, wherein a user manipulation includes squeezing the sides of the device.

122. Device of any of Claims 119 to 121, wherein a user manipulation includes pressing a side button of the device.

123. Device of any of Claims 119 to 122, wherein a user manipulation includes a device rotation.

124. Device of any previous Claim, wherein the device is operable to provide a deactivated first screen and an activated second screen in response to a timeout limit of the device.

125. Device of any previous Claim, wherein the device is operable to answer a call in response to a user manipulation including a device rotation.

126. Device of any previous Claim, wherein the device is operable to cycle between different privacy levels for display of widgets on the second screen in response to a double tap on the device or on the second screen.

127. Device of Claim 126 wherein if a first selectable privacy level is selected which provides that private information is provided in detail on the second screen, the double tapping cycles between the first, a second privacy level and a third privacy level, wherein the second privacy level provides that limited private information is provided on the second screen, and the third privacy level provides that only wallpaper is shown on the second screen.

128. Device of Claim 126 wherein if a first selectable privacy level is selected which provides that private information is provided in detail on the second screen, the double tapping toggles between a second privacy level and a third privacy level, wherein the second privacy level provides that limited private information is provided on the second screen, and the third privacy level provides that only wallpaper is shown on the second screen.

129. Device of any previous Claim, wherein the device provides a selectable option to provide notifications on the second screen.

130. Device of Claim 129, wherein notification includes providing one or more of a received email, a received SMS, a received MMS, a received Facebook message.

131. Device of Claim 129 or 130, wherein a notification is displayed for a predefined time, and then the screen returns to a previous state.

132. Device of any of Claims 129 to 131, wherein when a notification is displayed on the second screen, the notification replaces second screen content.

133. Device of any of Claims 129 to 132, wherein when a notification is displayed the device is operable to expand the displayed content of the notification in response to a double tap of a user on the device.

134. Device of any of Claims 129 to 132, wherein when a notification is displayed the device is operable to receive a PIN code via the first screen in response to a double

tap of a user on the device, wherein the device is further operable to expand the displayed content of the notification in response to a correct PIN code.

135. Device of Claims 133 or 134, wherein following expansion of the notification on the second screen, a message corresponding to the notification is displayed on the first screen in response to the device being turned over.

136. Device of Claim 135, wherein following the display on the first screen of the message, the device is operable for the user to instantly interact with the message.

137. Device of any of Claims 129 to 132, wherein when a notification is displayed the device is operable to dismiss the notification and return the second screen to a previous state.

138. Device of Claim 137, wherein the device is operable to dismiss the notification and return the second screen to a previous state in response to the device being lifted up and returned to its previous position.

139. Device of Claim 137, wherein the device is operable to dismiss the notification and return the second screen to a previous state in response to the device being lifted up on one side and then being let go to return it to its previous position.

140. Device of any of Claims 129 to 139, wherein when no notification is displayed on the second screen, the device is operable to display on the second screen the most recently displayed notification in response to three taps on the device.

141. Device of Claim 140, wherein following display of the most recently displayed notification on the second screen, a message corresponding to the notification is displayed on the first screen in response to the device being turned over.

142. Device of any previous Claim, wherein the device provides a selectable option to provide output on the second screen.

143. Device of Claim 142, wherein an incoming voice call to the device is announced on the entire second screen.

144. Device of Claim 142 or 143, wherein the front screen is turned on in response to an incoming voice call.

145. Device of any of Claims 142 to 144, wherein no interaction in relation to an incoming call is allowed until the device has been turned over from the second screen to the first screen.

146. Device of any of Claims 142 to 145, wherein interaction with the front screen is supported in response to the device being turned over wherein the first screen faces upwards.

147. Device of Claim 146, wherein the interaction with the front screen is supported irrespective of if the front screen was locked or unlocked before the incoming voice call to the device.

148. Device of any of Claims 142 to 147, wherein user is presented with a screen where the user can swipe to answer a call.

149. Device of Claim 148, wherein the device is operable to answer the call in response to a user swipe down the screen, and the device is operable to decline the call in response to a user swipe up the screen.

150. Device of any of Claims 142 to 147, wherein the user is presented with the options "mute", "decline" and "send SMS" in response to the user pressing a software Menu button or a hardware Menu button after notification on the second screen of an incoming call.

151. Device of Claim 150, wherein the device requires input of a PIN code in response to selection of either of the options "decline" or "send SMS".

152. Device of Claim 150, wherein the device displays an overlay of the screen for a predefined time in response to selection of the option "decline".

153. Device of Claim 152, wherein the device is operable to send a message to the declined caller in response to selection of the option "decline".

154. Device of Claim 152, wherein the device is operable to clear an overlaid part of the screen in response to a user tap on a non-overlaid part of the screen.

155. Device of any of Claims 142 to 154, wherein the device is operable to receive a mute instruction in response to an incoming voice call to the device being announced on the second screen.

156. Device of Claim 155 wherein the mute instruction comprises the device being lifted up and returned to its previous position.

157. Device of Claim 155 wherein the mute instruction comprises the device being lifted up at one side and let go to return it to its previous position.

158. Device of any previous Claim, wherein the device is operable to display a full graphics overlay on the second screen in response to an application running on the device, or to an event occurring at the device.

159. Device of Claim 158, wherein the graphics overlay comprises a phone symbol and the event is an active voice call.

160. Device of Claim 159, wherein no information is shown on the second display in addition to the phone symbol.

161. Device of any of Claims 158 to 160, wherein the graphics overlay comprises a camera skin and the application is a camera application.

162. Device of Claim 161, wherein the camera skin is user selectable.

163. Device of any of Claims 158 to 162, wherein the graphics overlay comprises a music-related skin and the application is a media player.

164. Device of Claim 163, wherein the skin is user selectable or predetermined, depending on the media played.

165. Device of any of Claims 158 to 164, wherein the event occurring at the device is a low power level, and the graphics overlay indicates a low power level.

166. Device of any previous Claim, wherein the second screen is operable to display a wallpaper, and wherein an application which provides the wallpaper for display is operable to change the displayed wallpaper without user intervention.

167. Device of Claim 166, wherein the application which provides the wallpaper for display changes the displayed wallpaper in response to activating events.

168. Device of Claim 167, wherein an activating event is one or more of: device location, time, calendar events, weather, weather in combination with location.

169. Device of any of Claims 166 to 168, wherein the wallpaper is changed at a low rate.

170. Device of Claim 166, wherein the wallpaper is changed very slowly.

171. Device of any previous Claim, wherein the first screen is a touch screen, and the first screen is operable to be unlocked by a touch gesture in which a finger starts at either the top or bottom of the screen and moves towards the centre of the screen.

172. Device of Claims 171, wherein the finger must pass a predefined distance up or down the screen in order to complete the unlock.

173. Device of any of Claims 171 to 172, wherein the distance is half way down the screen.

174. Device of Claim 171, wherein the finger must achieve a threshold speed in order to complete the unlock.

175. Device of any of Claims 171 to 174, wherein the finger starts at the top of the screen.

176. Device of any of Claims 171 to 175, wherein there is an inactive area between a top capacitive area and the screen edge to separate unlock gesture from status menu gesture.

177. Device of any previous Claim, wherein the first screen is a touch screen, and the first screen is operable to be locked by a touch gesture in which a finger starts at either the top or bottom of the screen and moves towards the centre of the screen.

178. Device of Claim 177, wherein the direction of the finger for the lock gesture is the opposite to the direction of the finger for a corresponding unlock gesture.

179. Device of Claims 177 or 178, wherein the finger must pass a predefined distance up or down the screen in order to complete the lock.

180. Device of any of Claims 177 to 179, wherein the distance for the lock is half way down the screen.

181. Device of Claims 177 or 178, wherein the finger must achieve a threshold ~~speed in order to complete the lock.~~

182. Device of any of Claims 177 to 181, wherein for the lock the finger starts at the bottom of the screen.

183. Device of any previous Claim, wherein the device is a slate device.

184. Device of any of Claims 1 to 182, wherein the device is a bar or candybar device.

185. Device of any of Claims 1 to 182, wherein the device is a slab-shaped form.

186. Device of any previous Claim, wherein the first display screen is a liquid crystal display screen.

187. Device of any previous Claim, wherein the device is portable.

188. Device of any previous Claim, wherein the device is a mobile phone, a portable digital assistant, a laptop, a digital audio player (eg. ipod), or a tablet computer (eg. ipad).

189. Device of any previous Claim, wherein the device includes a virtual keyboard.

190. Device of any previous Claim, wherein the device includes a concave front face and a convex rear face.

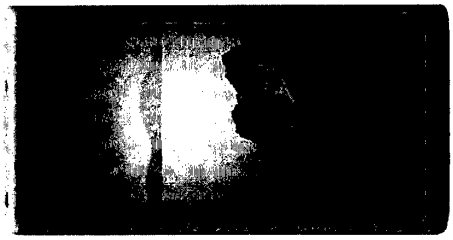
191. Method of operating a device of any previous Claim, comprising the step of the device receiving user input.

192. Method of operating a device of any of Claims 1 to 190, comprising the step of the device changing what is displayed on the device.

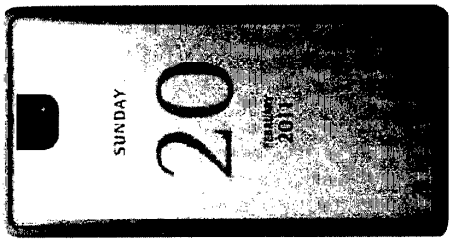
193. Computer program product operable when running on a device of any of Claims 1 to 190 to ~~enable the device to receive a user input to the device~~.

194. Computer program product operable when running on a device of any of Claims 1 to 190 to change what is displayed on the device.

Industrial Design



Front view when device on



Back view when device on



Side view of device

FIGURE 1

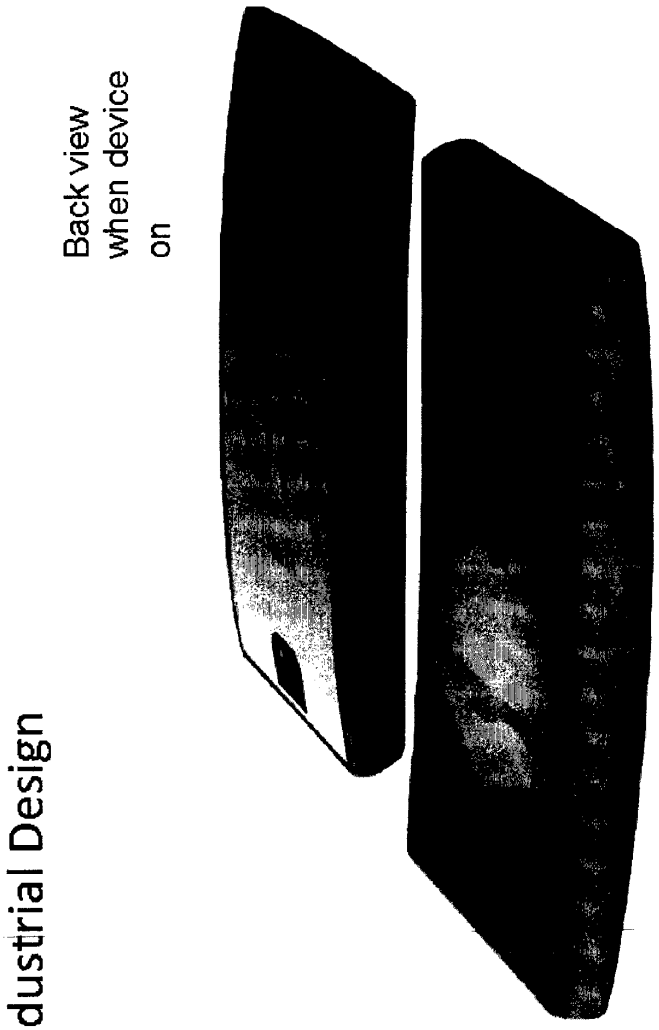

Industrial Design
Back view when device on
Front view when device on

FIGURE 2

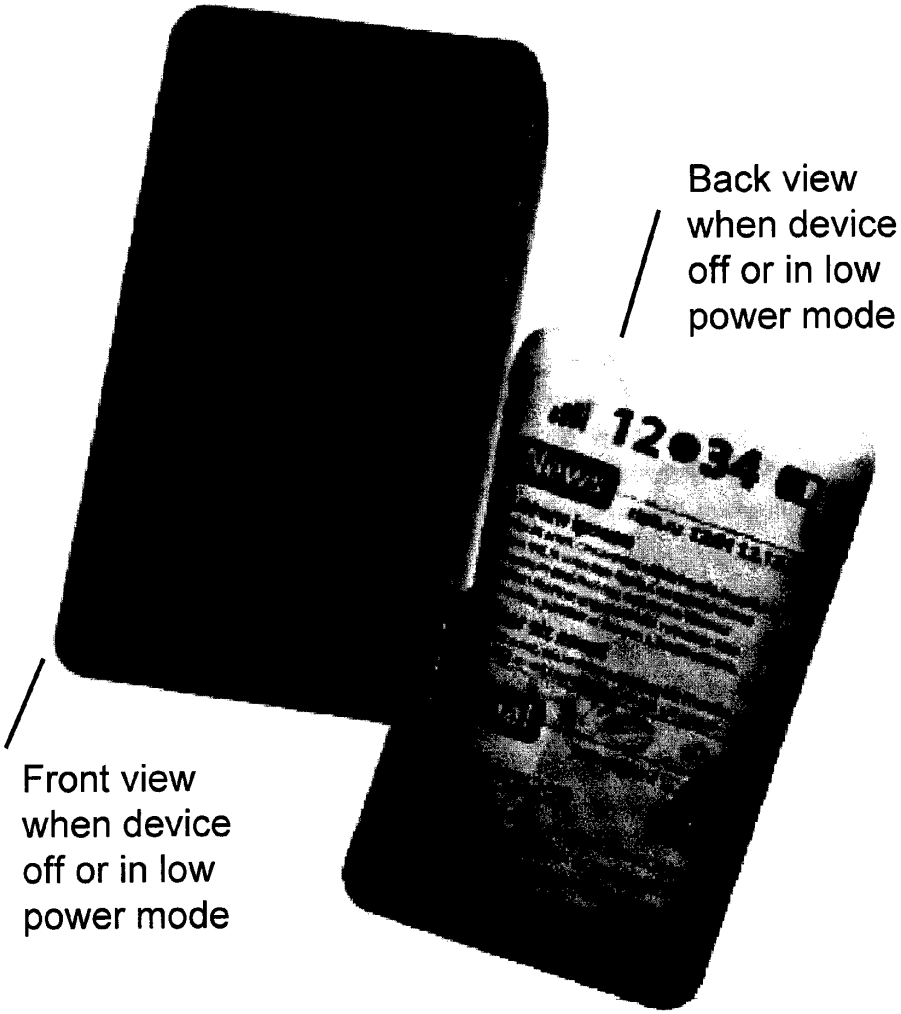

Back view when device off or in low power mode
Front view when device off or in low power mode

FIGURE 3

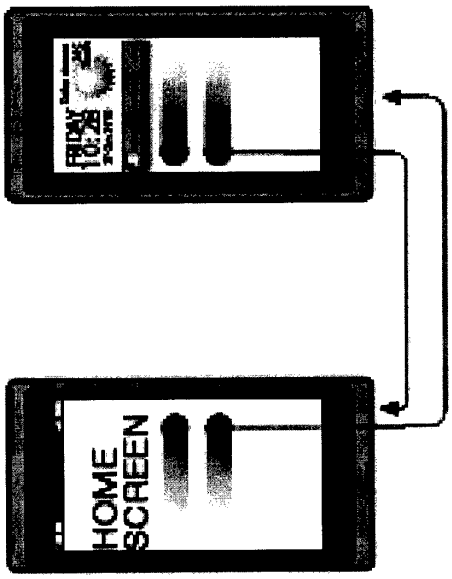


FIGURE 4B

FIGURE 4

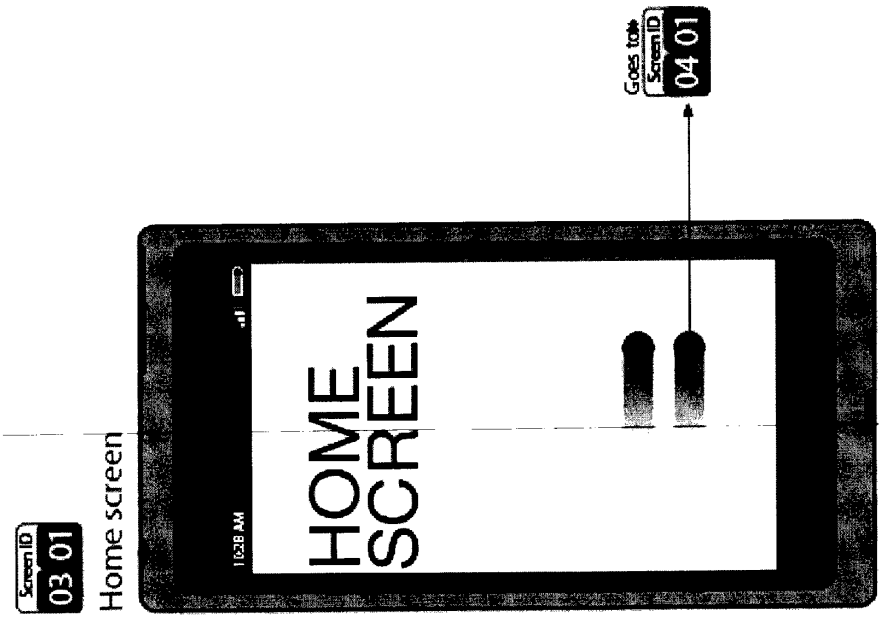


FIGURE 4A

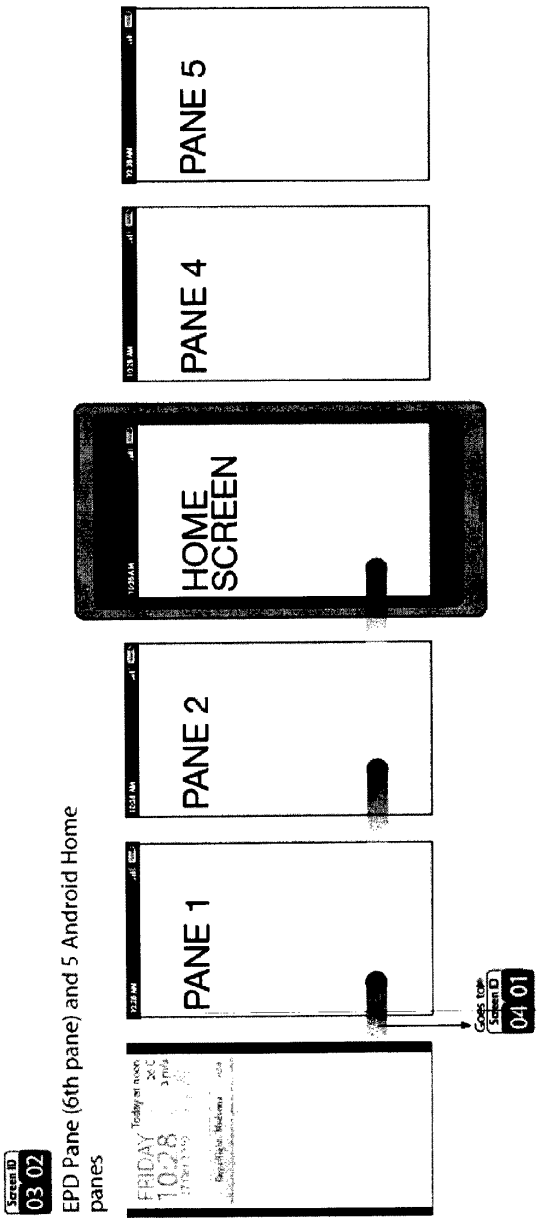

Screen ID
03 02
EPD Pane (6th pane) and 5 Android Home panes
FRIDAY
10:28
PANE 1
PANE 2
HOME SCREEN
PANE 4
PANE 5
Goes to
Screen ID
04 01

FIGURE 5

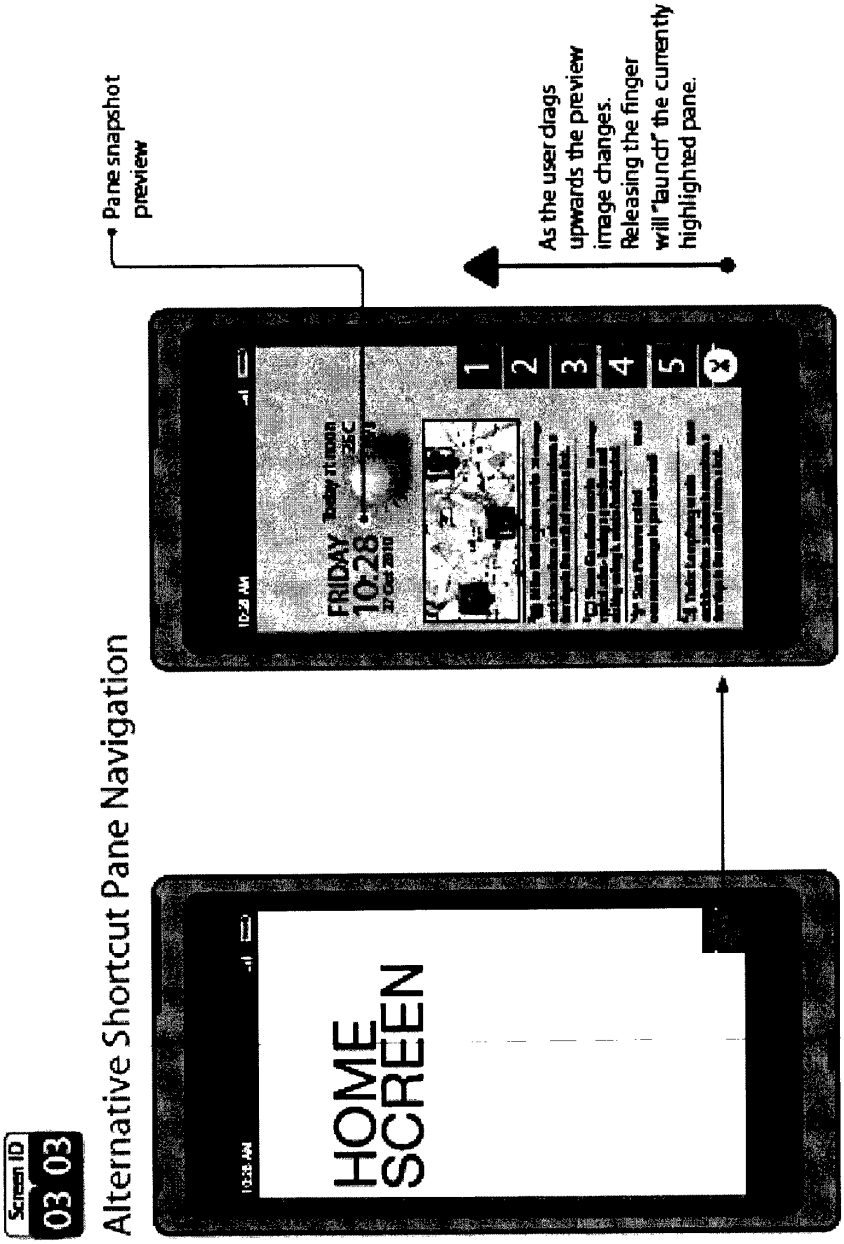

Screen ID
03 03
Alternative Shortcut Pane Navigation
HOME SCREEN
Pane snapshot preview
As the user drags upwards the preview image changes. Releasing the finger will "launch" the currently highlighted pane.
FRIDAY
10:28
1
2
3
4
5

FIGURE 6


Screen ID
04 01
EPD configuration screen (top menu expanded)
FRIDAY
10:28
27 Oct 2010
Today at noon
26 C
ON
EPD WIDGETS
The small screens show how the back of the phone would look if the user turned off the front screen. While the user is interacting with the front screen the only thing showing is always only the wallpaper.
15:55
FRIDAY
10:28

FIGURE 7



FIGURE 8A

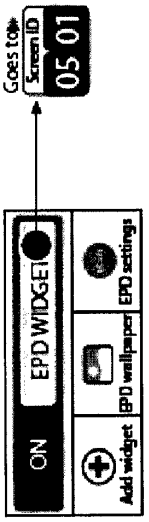


FIGURE 8B

FIGURE 8

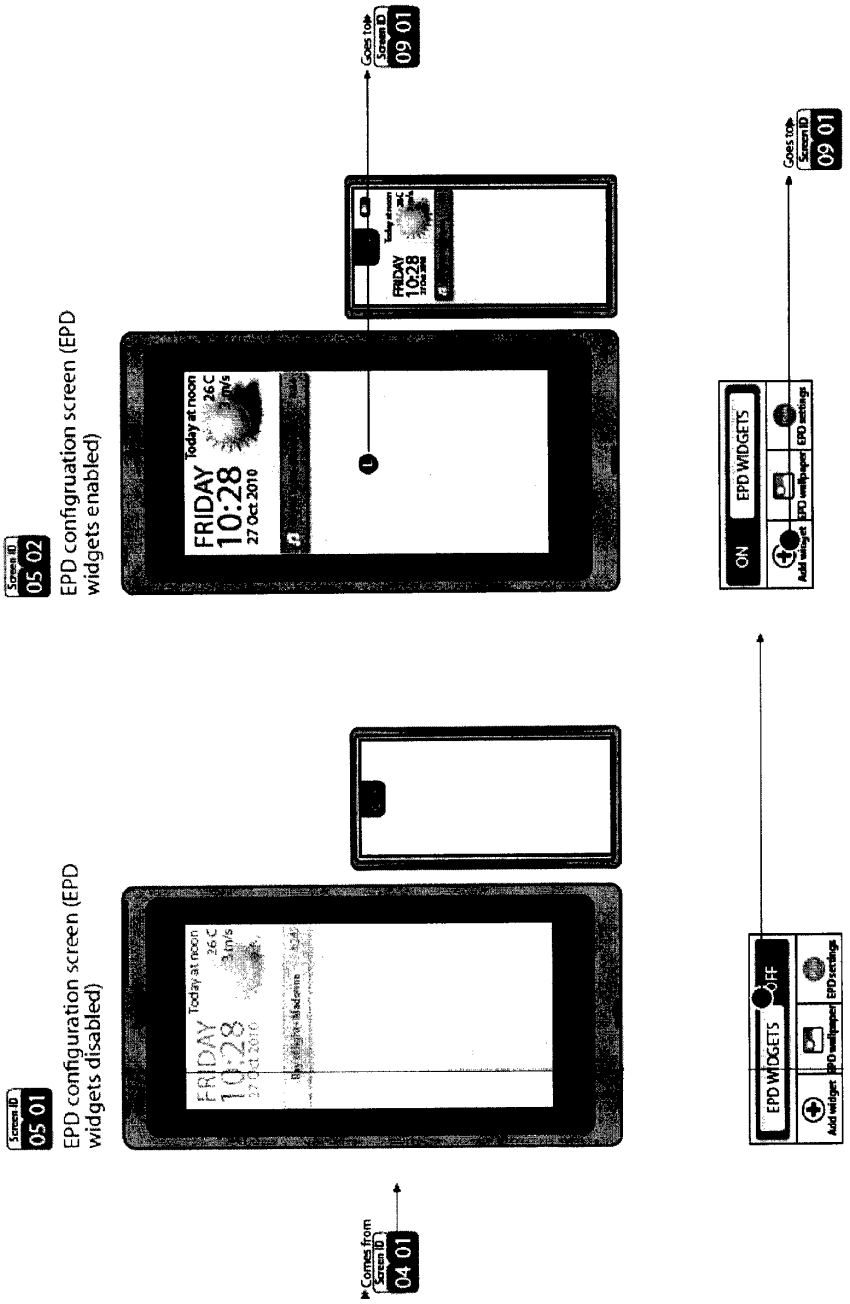

Screen ID 05 01
EPD configuration screen (EPD widgets disabled)
Comes from Screen ID 04 01
FRIDAY 10:28
Today at noon 26 C
EPD WIDGETS
OFF
Add widget
EPD wallpaper
EPD settings
Screen ID 05 02
EPD configuration screen (EPD widgets enabled)
Goes to Screen ID 09 01
FRIDAY 10:28 27 Oct 2010
Today at noon 26C
EPD WIDGETS
ON
Add widget
EPD wallpaper
EPD settings
Goes to Screen ID 09 01

FIGURE 9

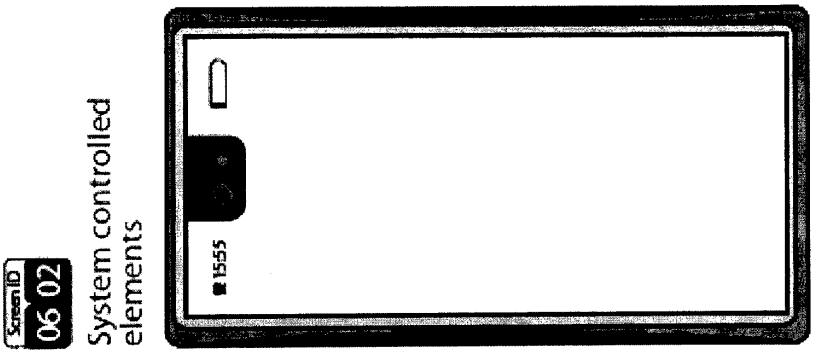


FIGURE 10B

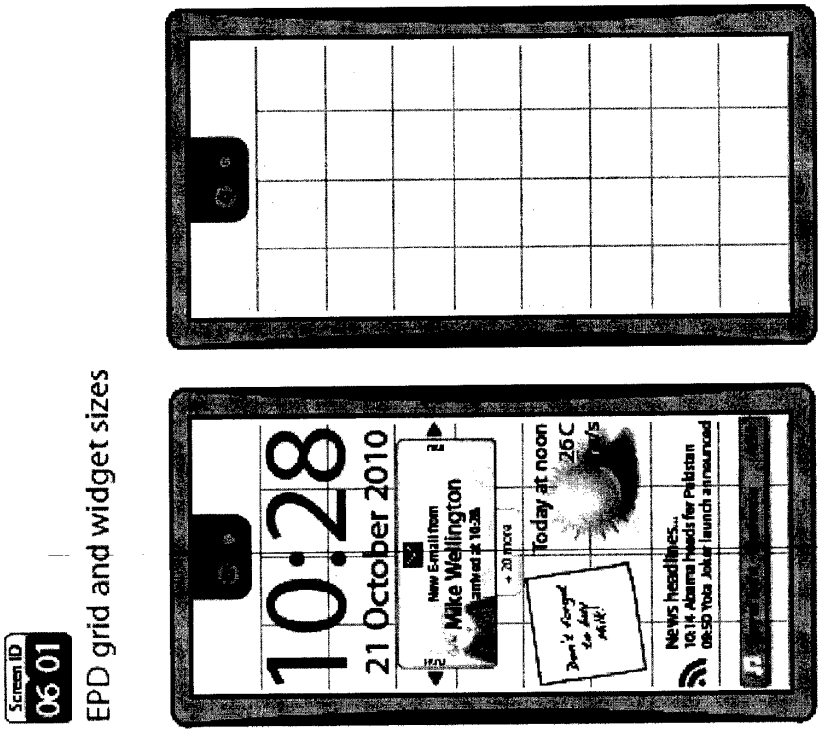


FIGURE 10A

FIGURE 10

FIGURE 11

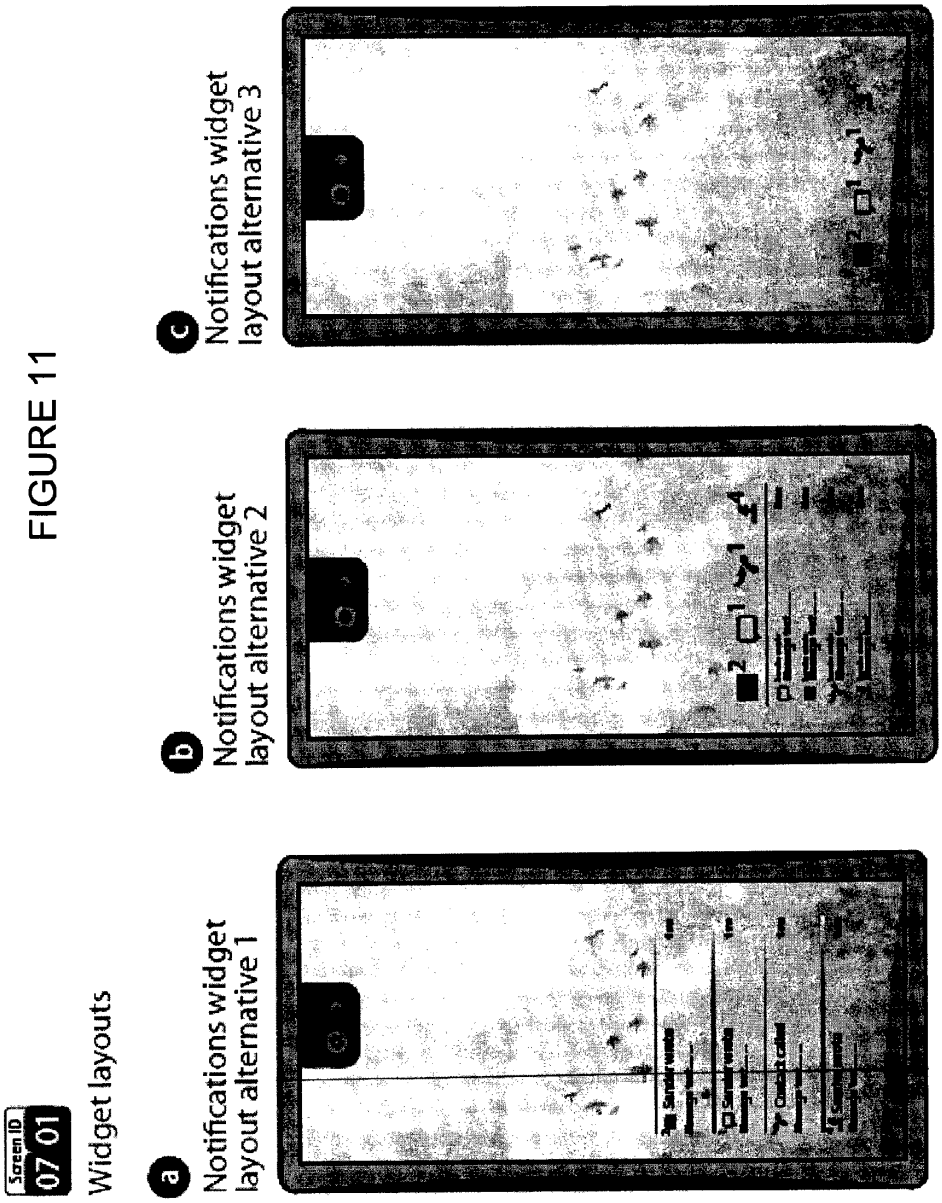
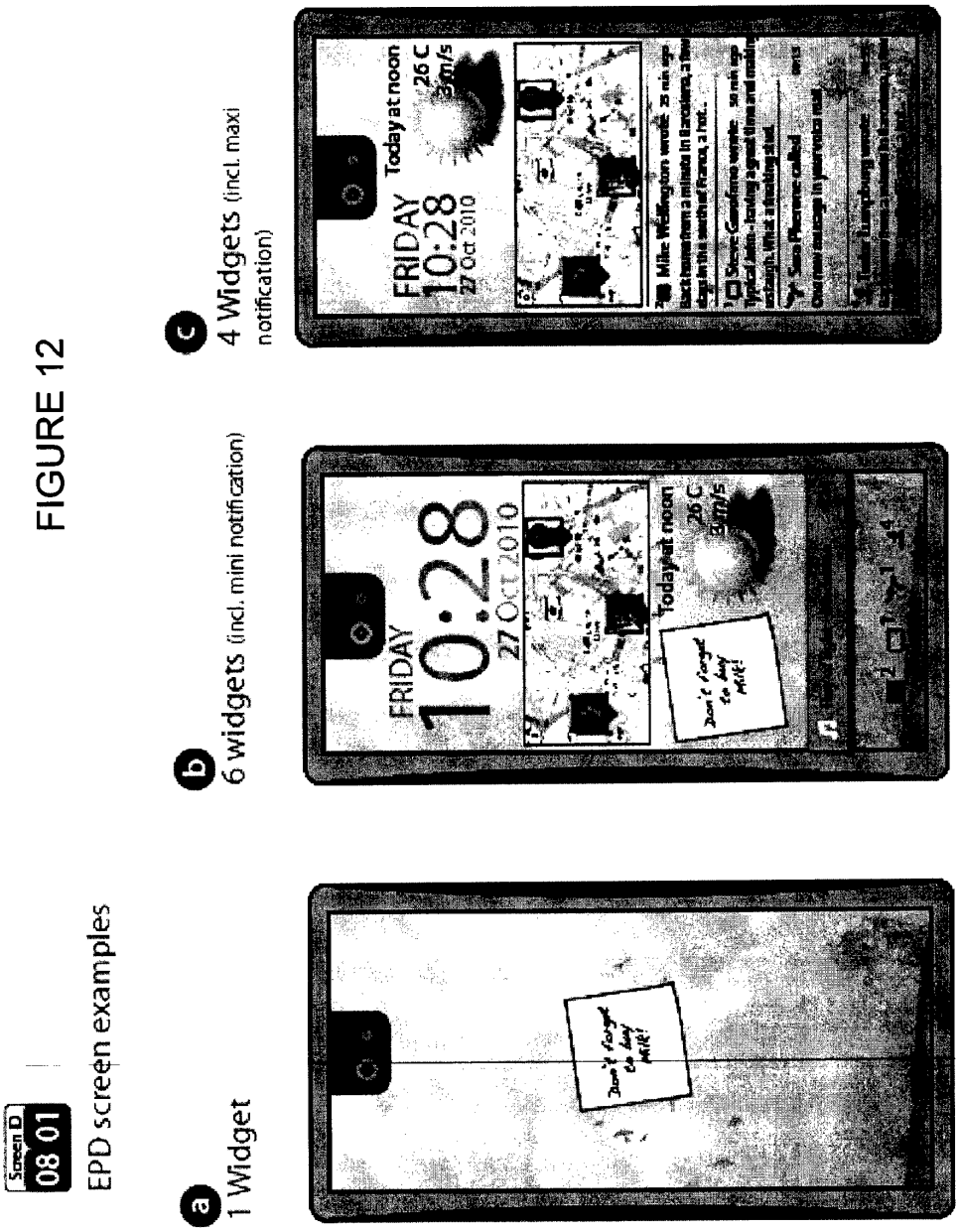

Screen ID
07 01
Widget layouts
a
Notifications widget layout alternative 1
b
Notifications widget layout alternative 2
c
Notifications widget layout alternative 3

FIGURE 12


Screen ID
08 01
EPD screen examples
a
1 Widget
b
6 widgets (incl. mini notification)
c
4 Widgets (incl. maxi notification)
FRIDAY
10:28
27 Oct 2010
Today at noon
26 C
3m/s

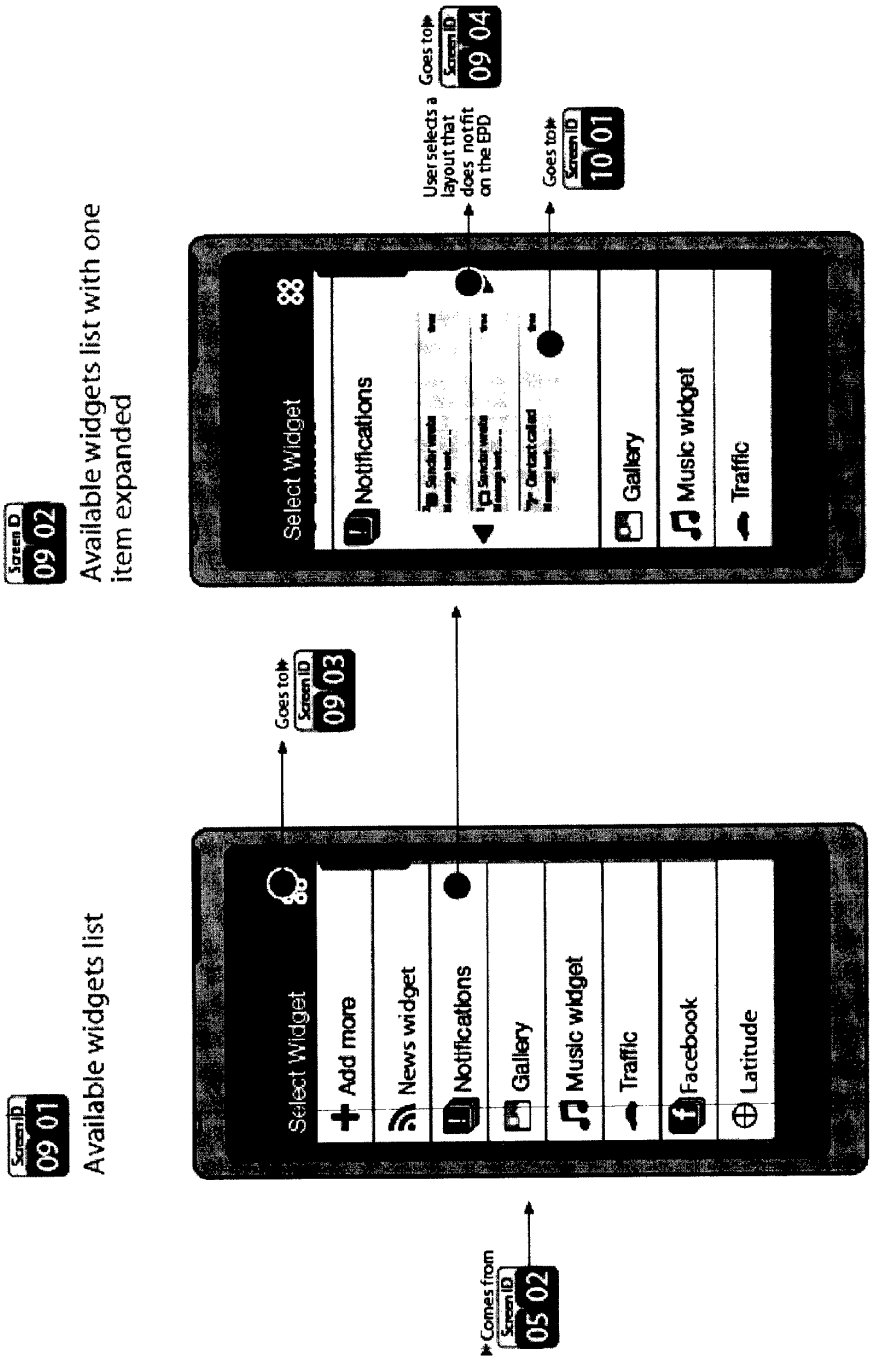

Screen ID 09 01
Available widgets list
Select Widget
Add more
News widget
Notifications
Gallery
Music widget
Traffic
Facebook
Latitude
Comes from Screen ID 05 02
Goes to Screen ID 09 03
Screen ID 09 02
Available widgets list with one item expanded
Select Widget
Notifications
Gallery
Music widget
Traffic
User selects a layout that does not fit on the EPD
Goes to Screen ID 09 04
Goes to Screen ID 10 01

FIGURE 13

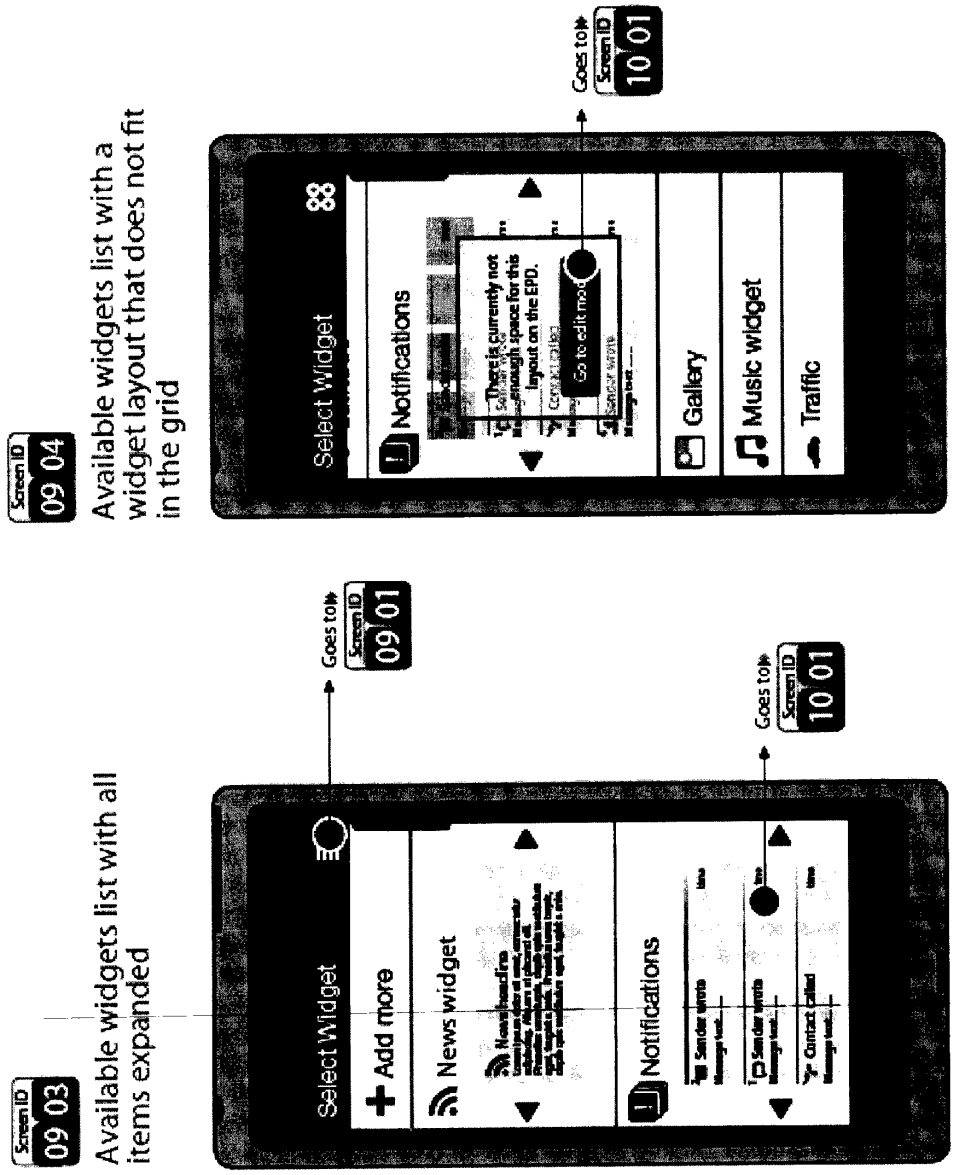

Screen ID 09 03
Available widgets list with all items expanded
Select Widget
Add more
News widget
Notifications
Goes to Screen ID 09 01
Goes to Screen ID 10 01
Screen ID 09 04
Available widgets list with a widget layout that does not fit in the grid
Select Widget
Notifications
There is currently not enough space for this layout on the EPD.
Go to edit mode
Gallery
Music widget
Traffic
Goes to Screen ID 10 01

FIGURE 14

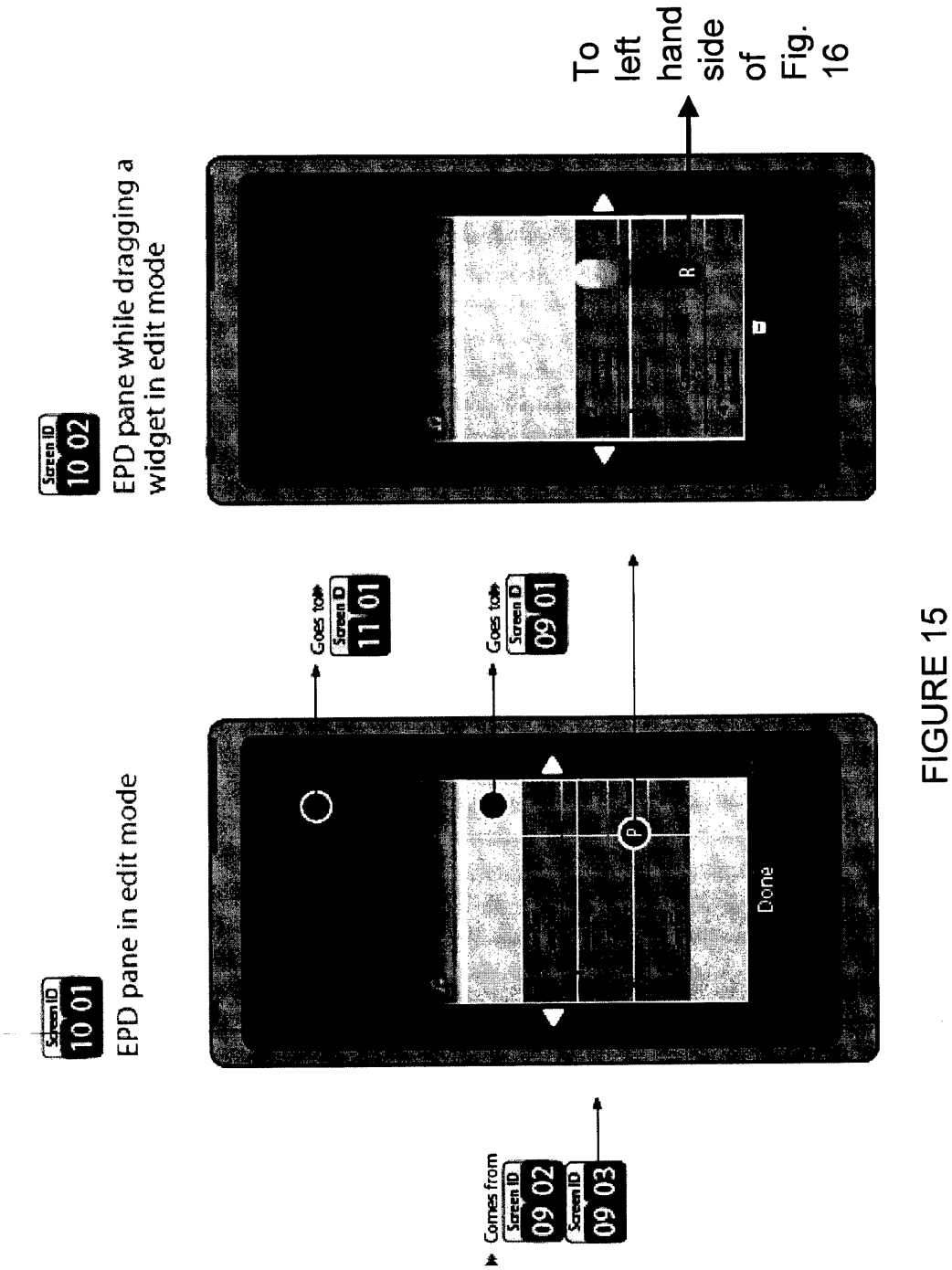

To left hand side of Fig. 16
Screen ID 10 02
EPD pane while dragging a widget in edit mode
Screen ID 10 01
EPD pane in edit mode
Goes to Screen ID 11 01
Goes to Screen ID 09 01
Comes from Screen ID 09 02
Screen ID 09 03
Done

FIGURE 15

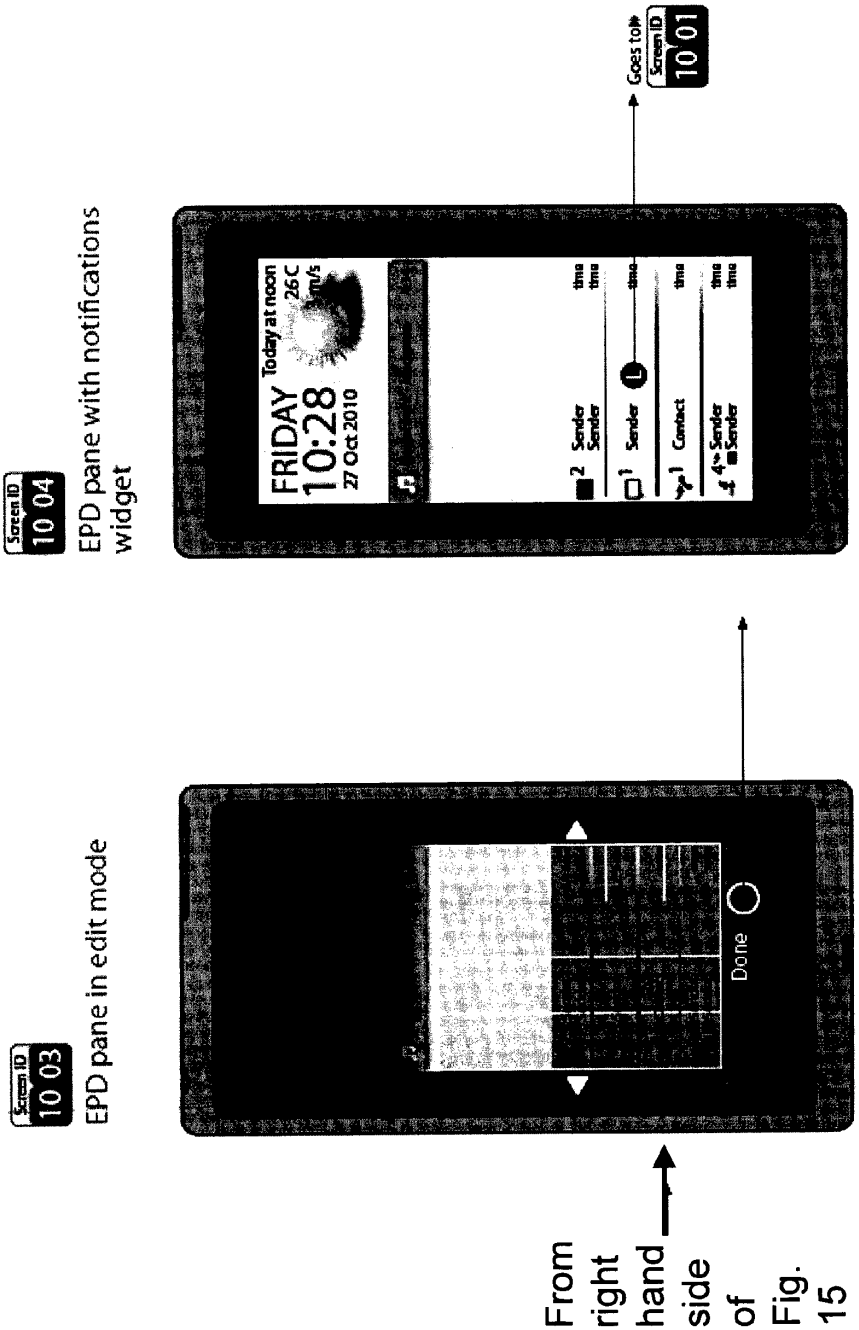

Screen ID 10 04
EPD pane with notifications widget
Goes to Screen ID 10 01
FRIDAY
10:28
27 Oct 2010
Today at noon
26°C
Screen ID 10 03
EPD pane in edit mode
Done
From right hand side of Fig. 15

FIGURE 16

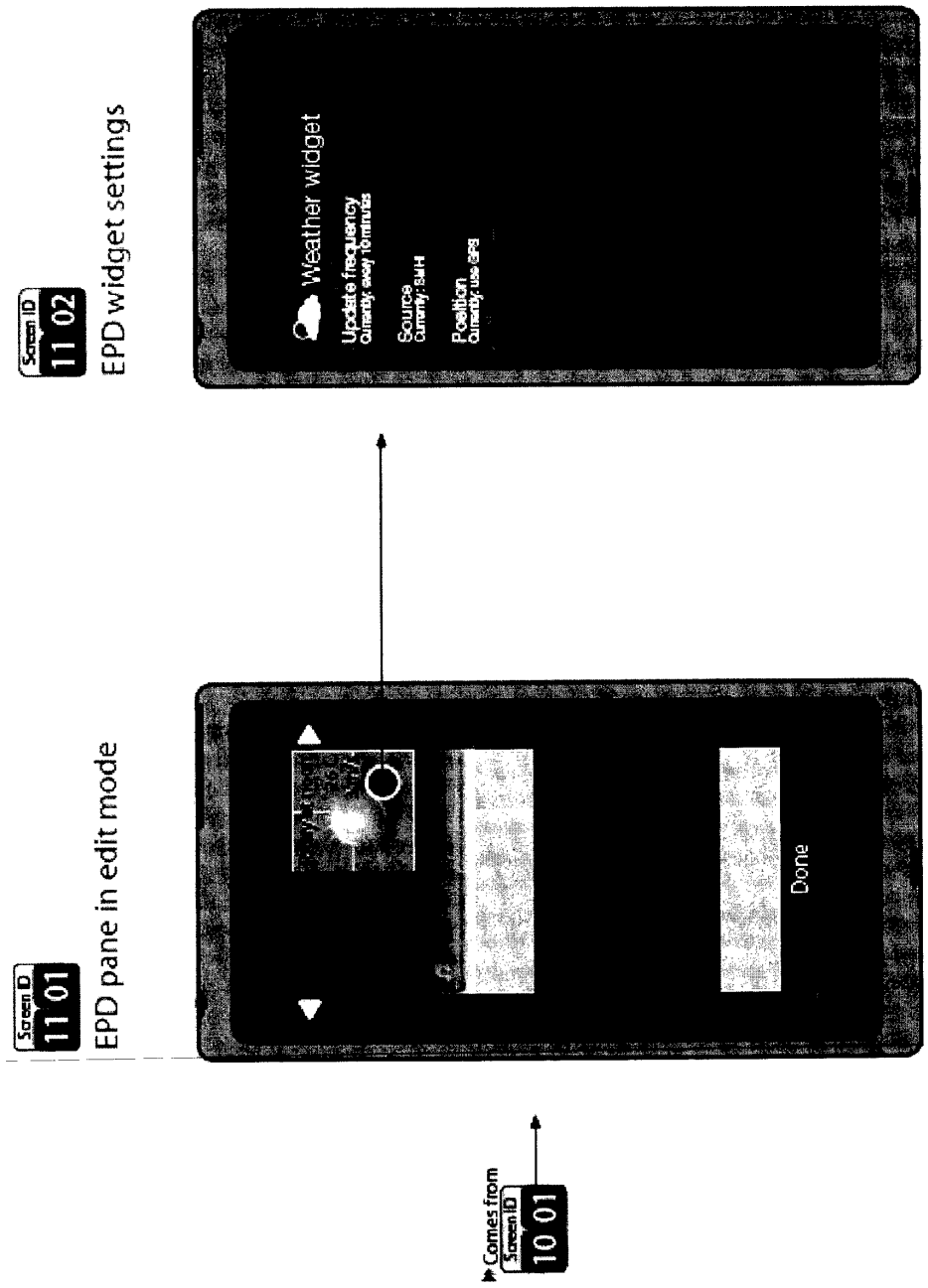

Comes from
Screen ID
10 01
Screen ID
11 01
EPD pane in edit mode
Done
Screen ID
11 02
EPD widget settings
Weather widget
Update frequency
Currently: every 10 minutes
Source
Currently: BBC
Position
Currently: use GPS

FIGURE 17

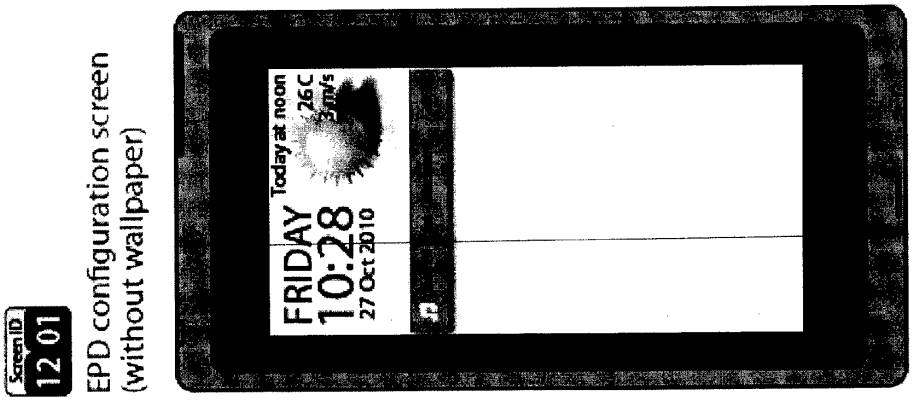


FIGURE 18A

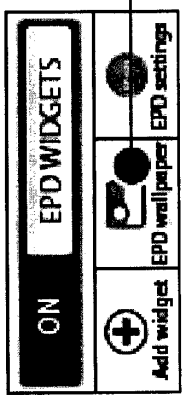


FIGURE 18B

To left hand side of Fig. 19

FIGURE 18

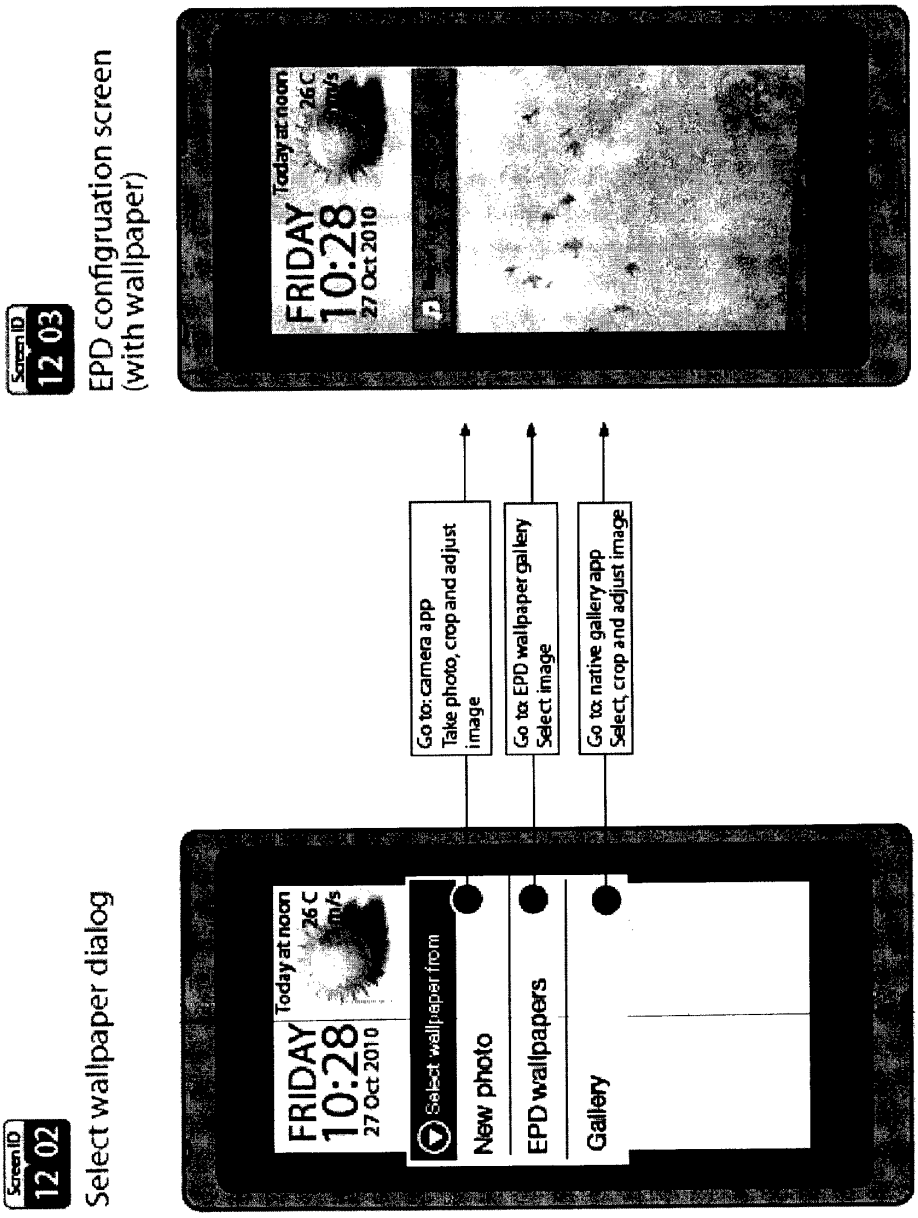

Screen ID
12 02
Select wallpaper dialog
Today at noon
26 C
FRIDAY
10:28
27 Oct 2010
Select wallpaper from
New photo
EPD wallpapers
Gallery
Go to: camera app
Take photo, crop and adjust image
Go to: EPD wallpaper gallery
Select image
Go to: native gallery app
Select, crop and adjust image
Screen ID
12 03
EPD configuration screen
(with wallpaper)
Today at noon
26 C
FRIDAY
10:28
27 Oct 2010

FIGURE 19

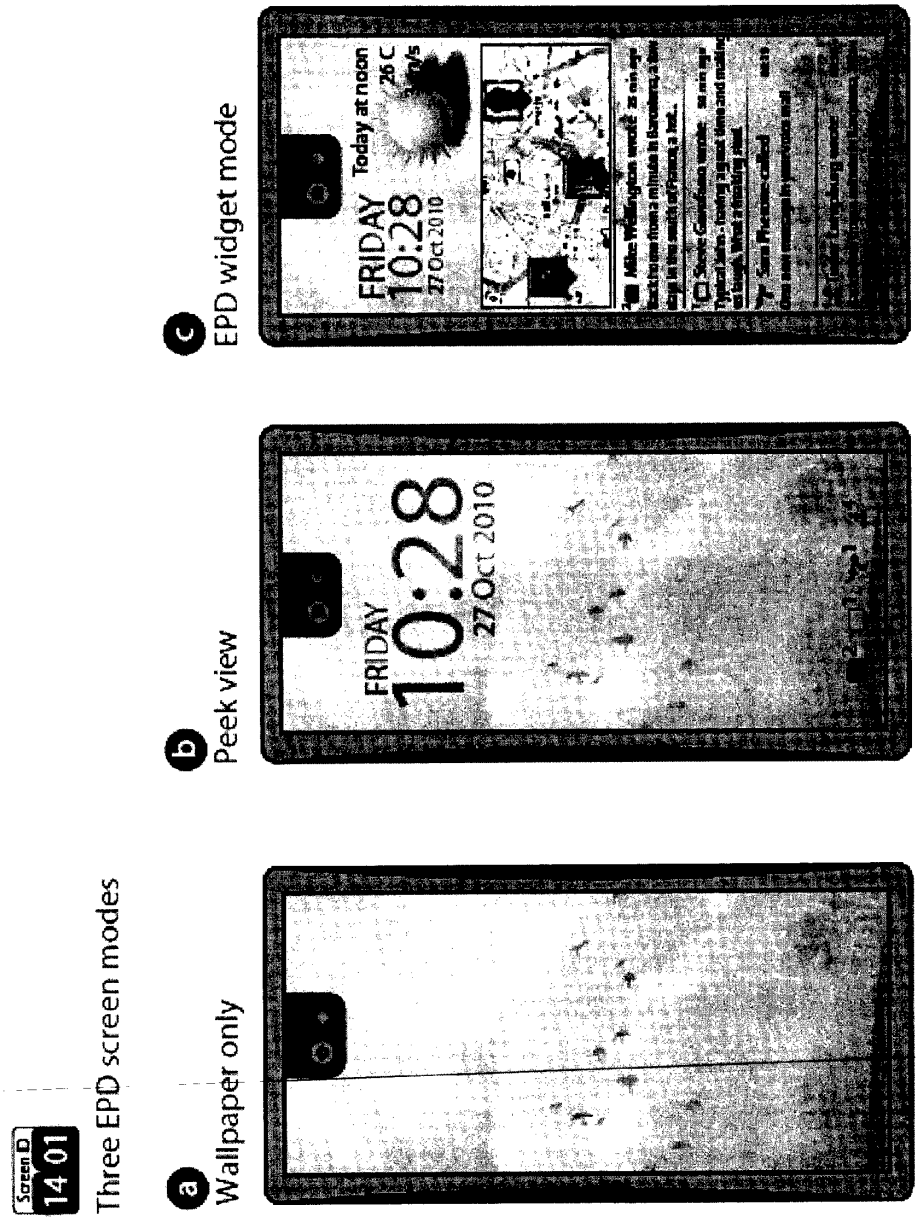

Screen D
14 01
Three EPD screen modes
a
Wallpaper only
b
Peek view
FRIDAY
10:28
27 Oct 2010
c
EPD widget mode
FRIDAY
10:28
27 Oct 2010
Today at noon
26 C

FIGURE 20

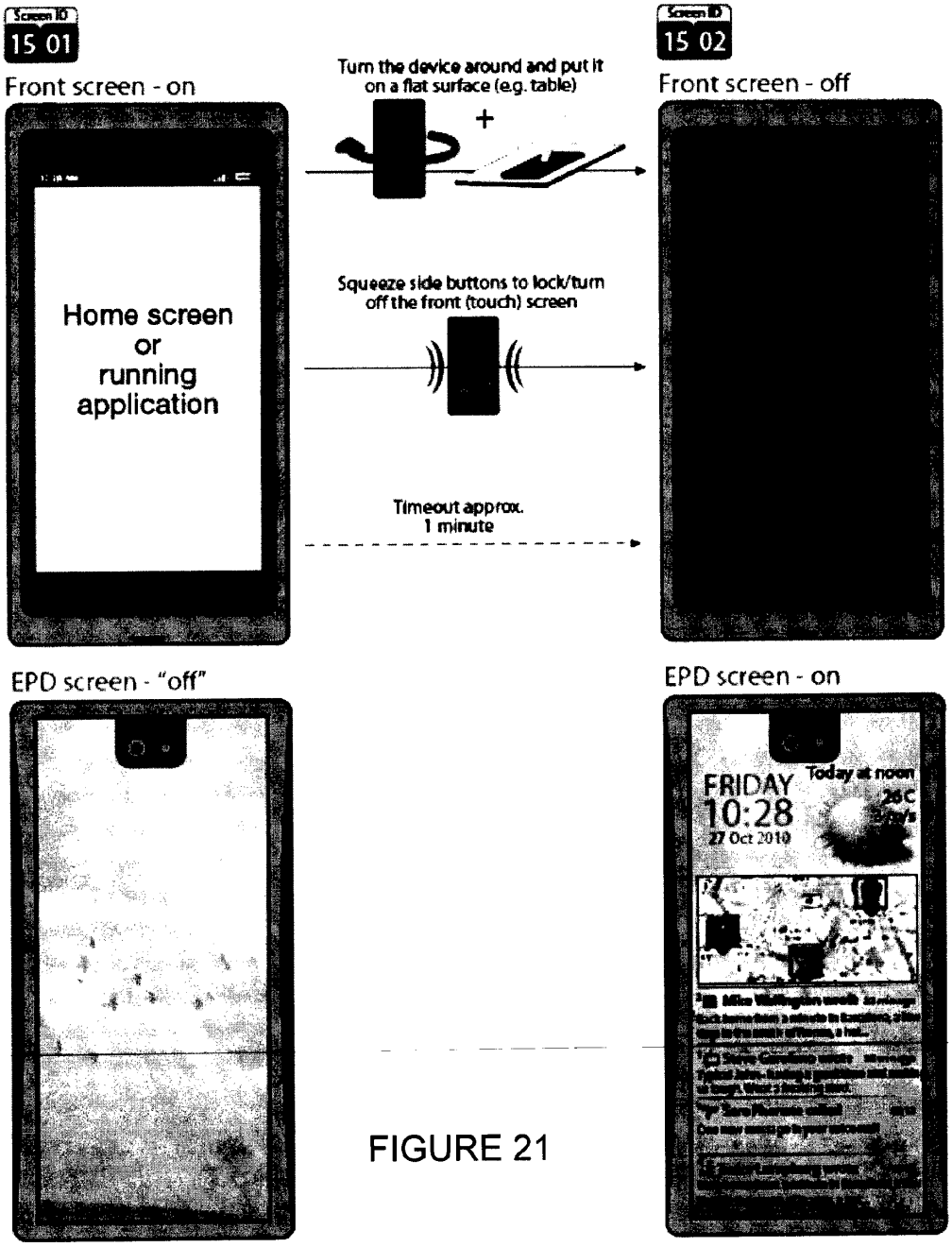

Screen ID
15 01
Front screen - on
Home screen
or
running
application
Turn the device around and put it on a flat surface (e.g. table)
+
Squeeze side buttons to lock/turn off the front (touch) screen
Timeout approx.
1 minute
Screen ID
15 02
Front screen - off
EPD screen - "off"
EPD screen - on
FRIDAY
10:28
27 Oct 2010
Today at noon

FIGURE 21

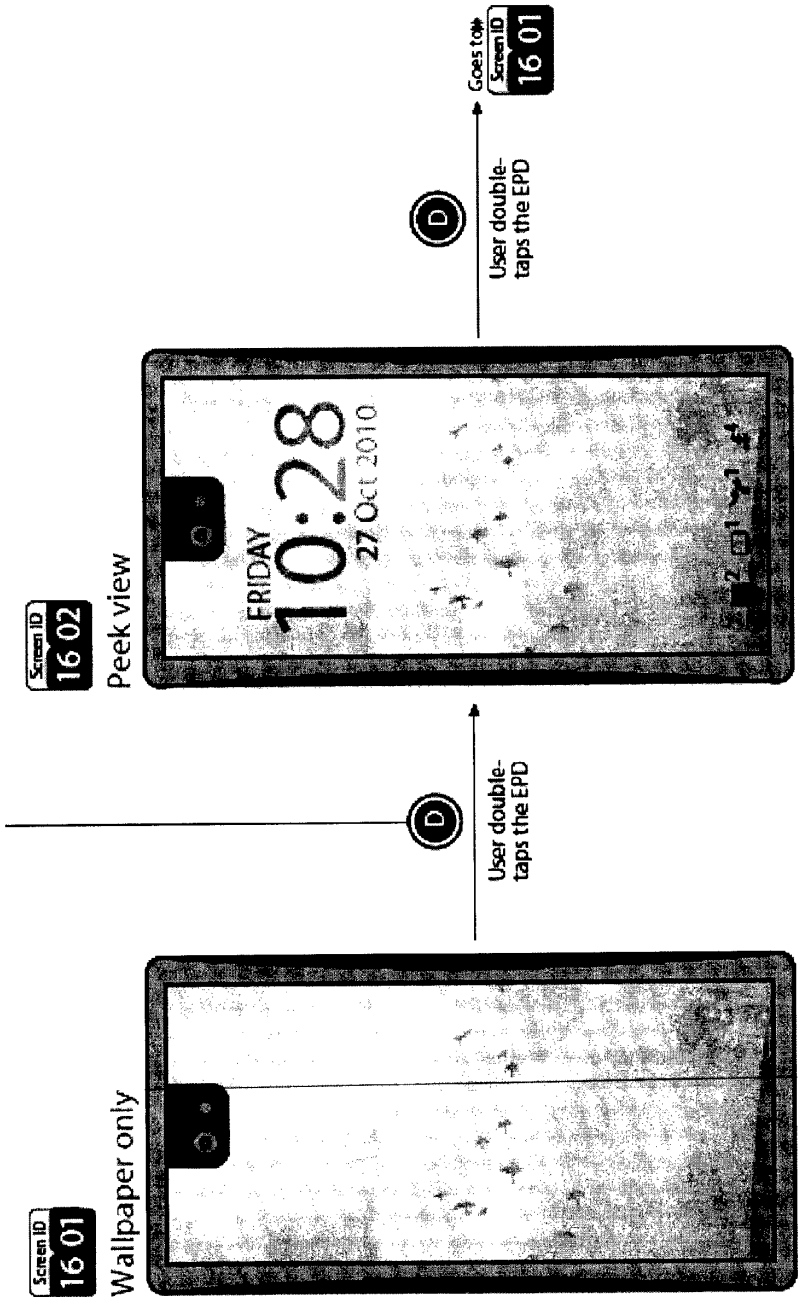
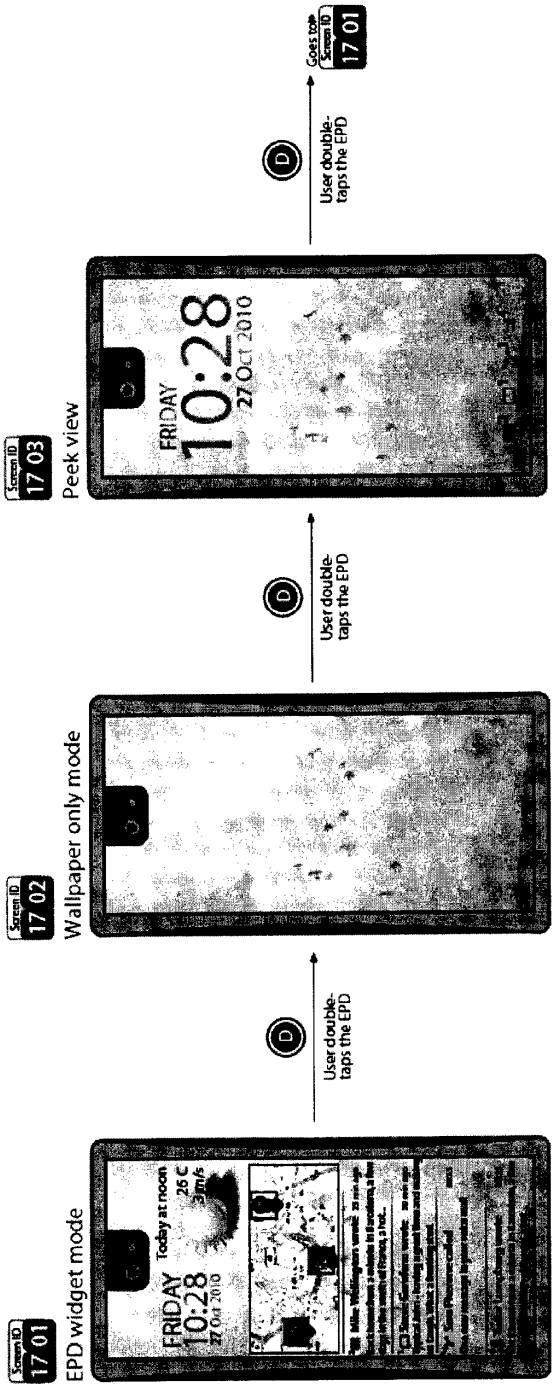

Screen ID
16 01
Wallpaper only
User double-taps the EPD
Screen ID
16 02
Peek view
FRIDAY
10:28
27 Oct 2010
User double-taps the EPD
Goes to
Screen ID
16 01

FIGURE 22

FIGURE 23


Screen ID 17 01
EPD widget mode
FRIDAY
10:28
27 Oct 2010
Today at noon
26 C
3m/s
User double-taps the EPD
Screen ID 17 02
Wallpaper only mode
User double-taps the EPD
Screen ID 17 03
Peek view
FRIDAY
10:28
27 Oct 2010
User double-taps the EPD
Goes to Screen ID 17 01

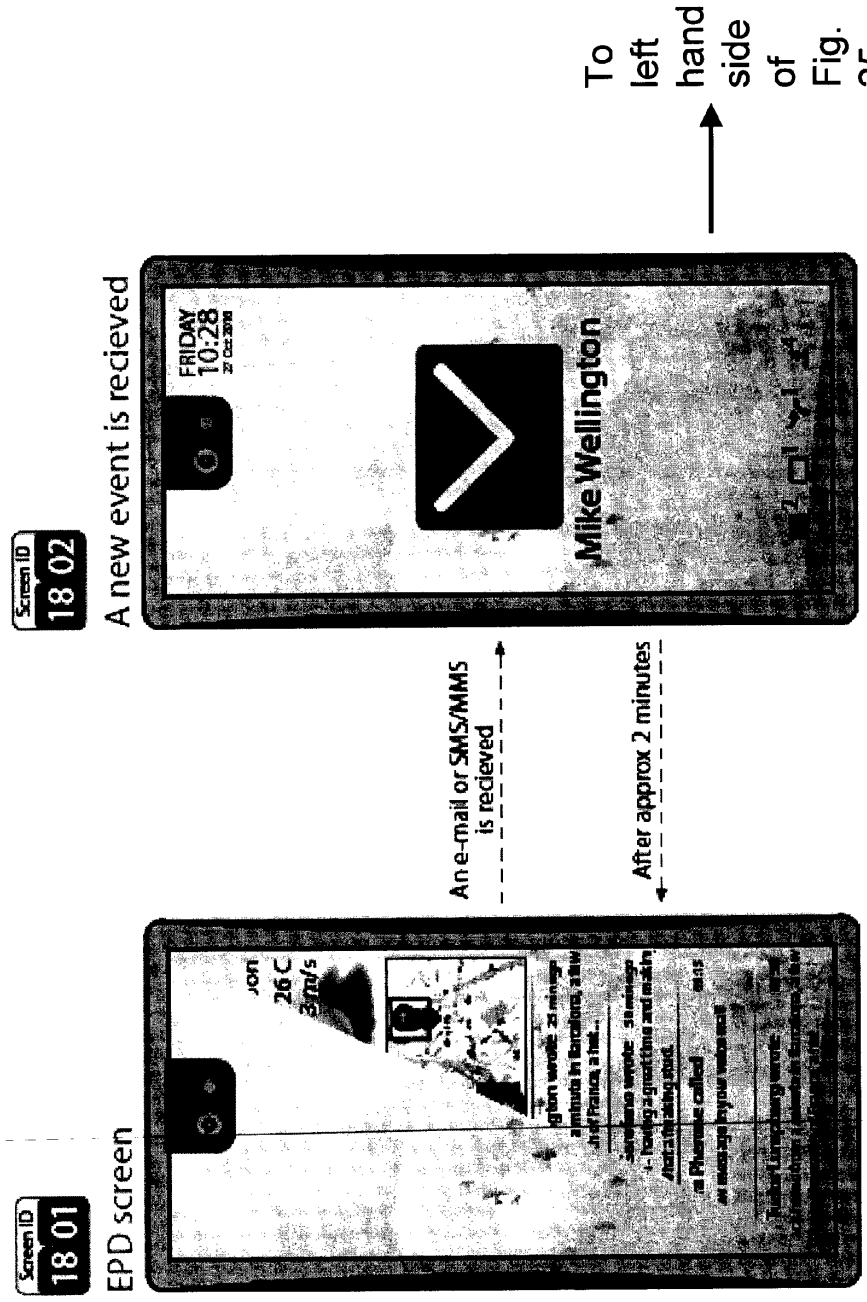

To left hand side of Fig. 25
Screen ID 18 02
A new event is recieved
FRIDAY 10:28
Mike Wellington
An e-mail or SMS/MMS is recieved
After approx 2 minutes
Screen ID 18 01
EPD screen

FIGURE 24

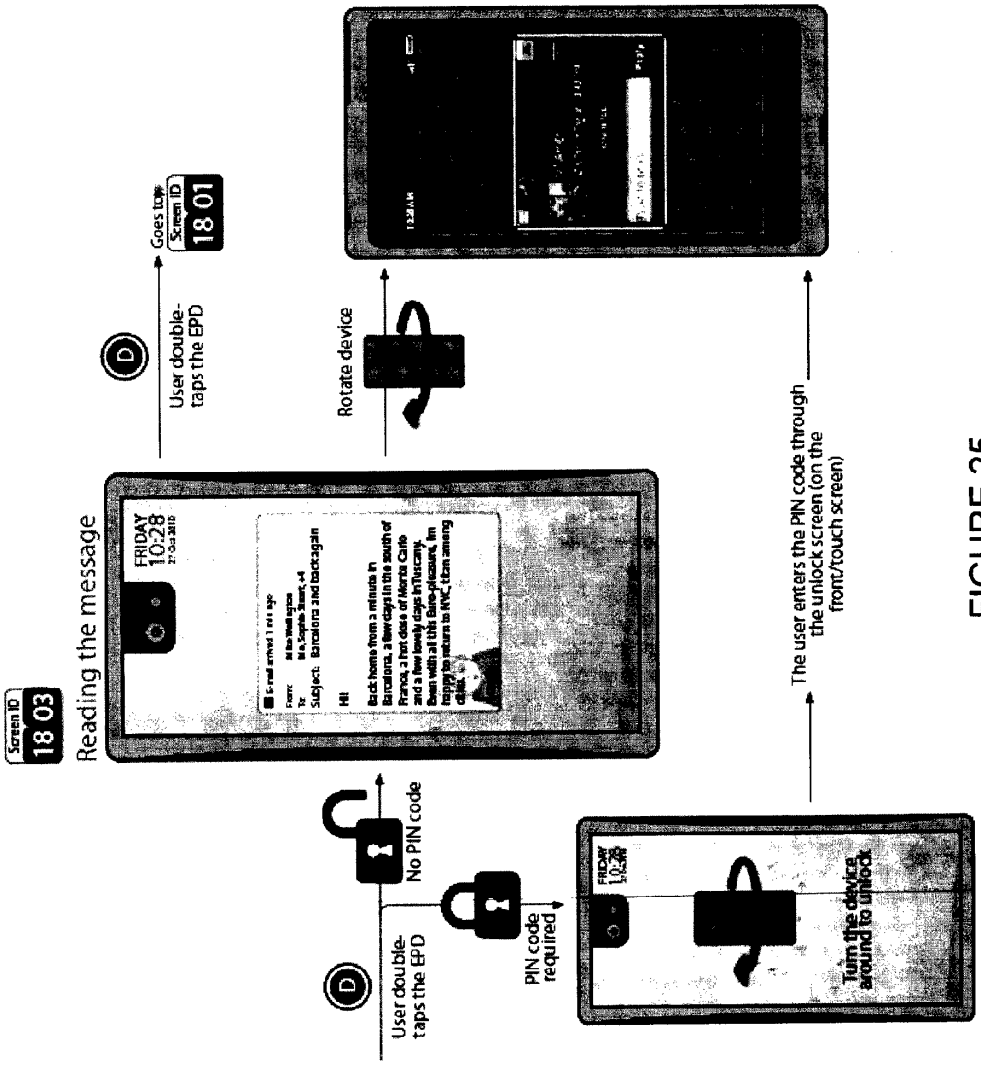

Screen ID 18 03
Reading the message
FRIDAY 10:28
User double-taps the EPD
Goes to Screen ID 18 01
Rotate device
User double-taps the EPD
No PIN code
PIN code required
Turn the device around to unlock
The user enters the PIN code through the unlock screen (on the front/touch screen)

FIGURE 25



FIGURE 26



FIGURE 26A

FIGURE 26B

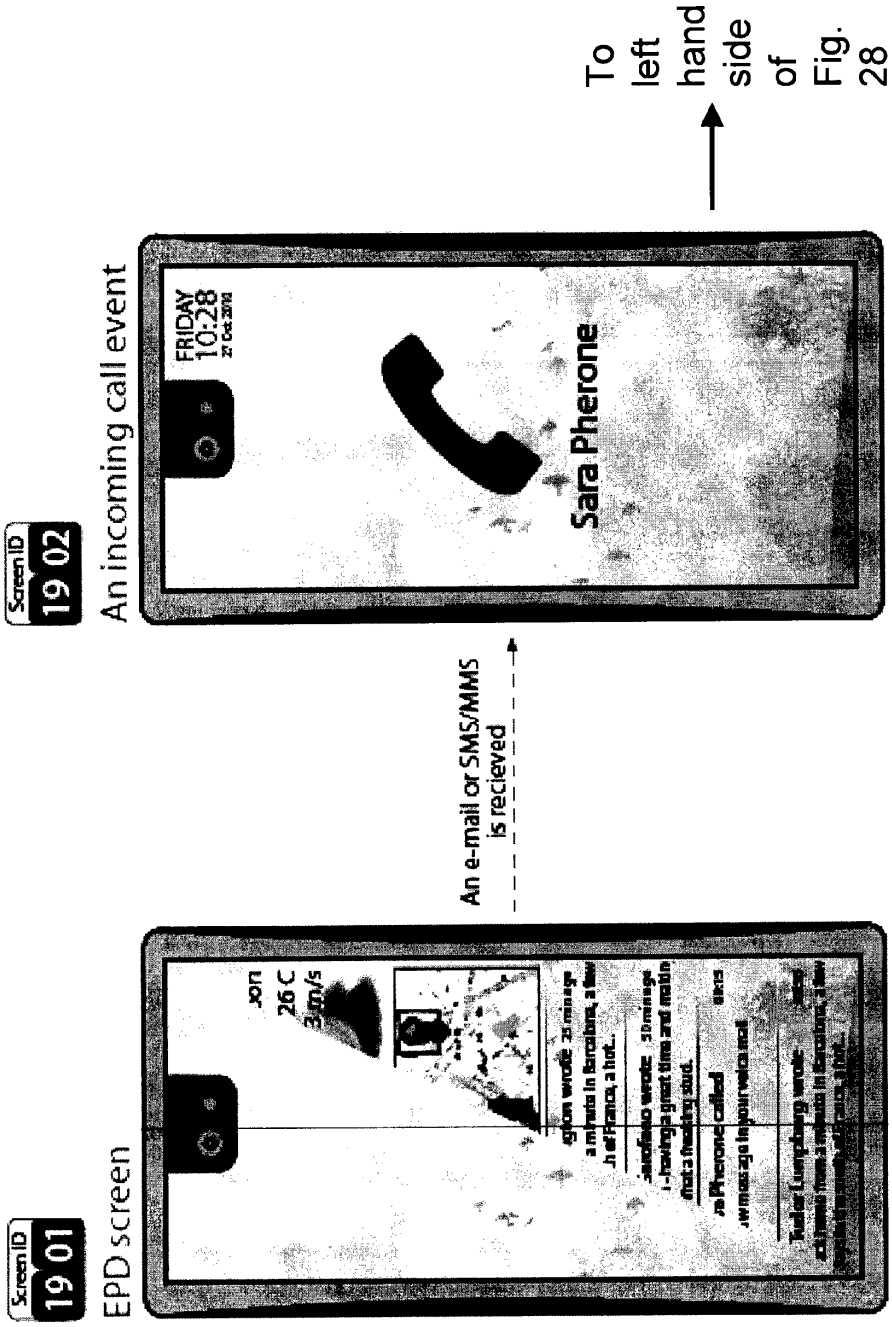

To left hand side of Fig. 28
Screen ID 19 02
An incoming call event
FRIDAY 10:28
Sara Pherone
An e-mail or SMS/MMS is recieved
Screen ID 19 01
EPD screen
26 C
3 m/s

FIGURE 27

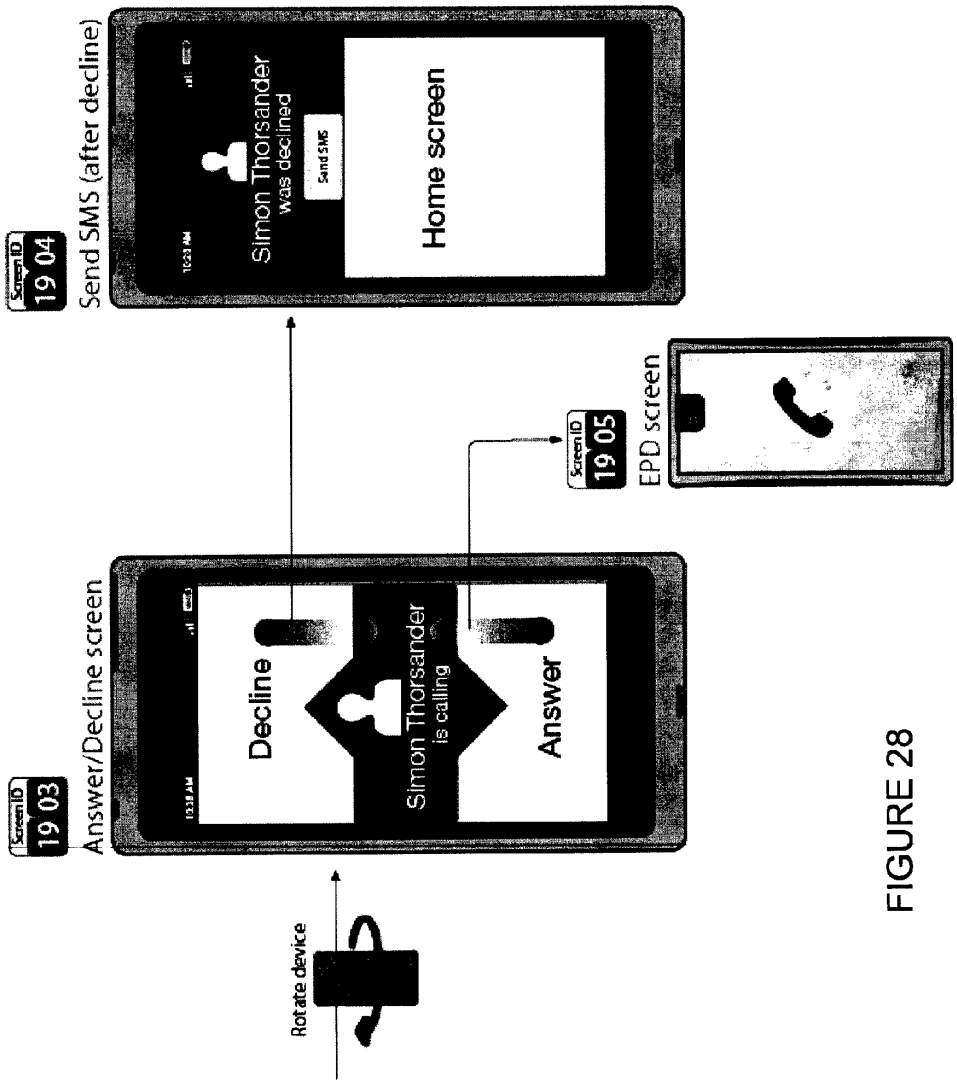

Screen ID 19 03
Answer/Decline screen
Decline
Simon Thorsander
is calling
Answer
Rotate device
Screen ID 19 04
Send SMS (after decline)
Simon Thorsander
was declined
Send SMS
Home screen
Screen ID 19 05
EPD screen

FIGURE 28



FIGURE 29

FIGURE 29A

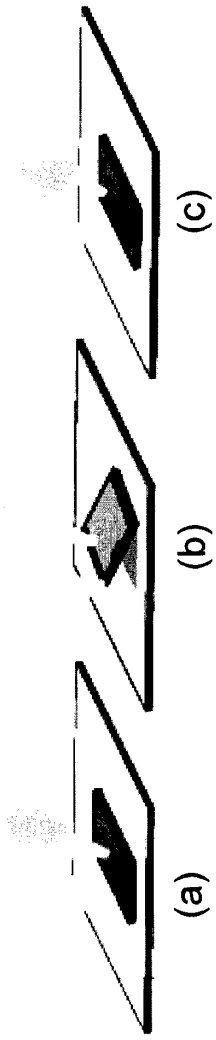


FIGURE 29B

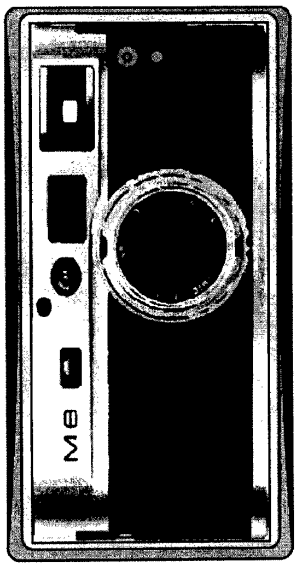


FIGURE 30B



FIGURE 30C

FIGURE 30

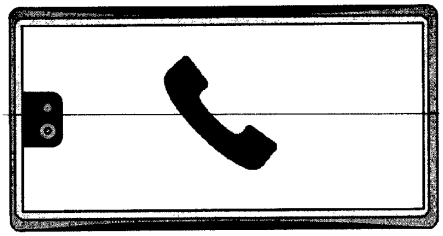


FIGURE 30A

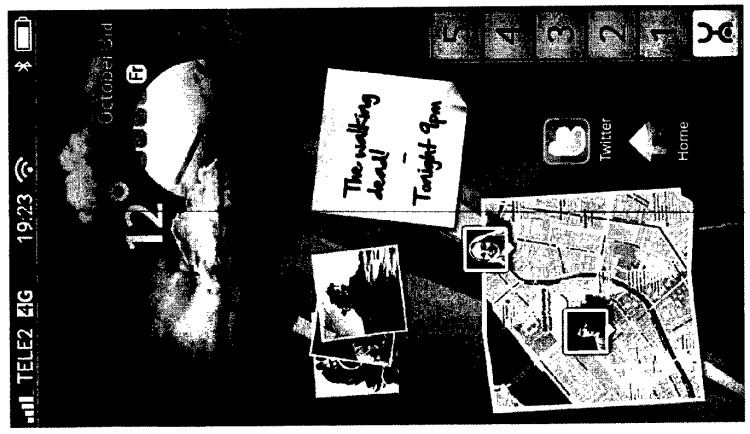


FIGURE 31



FIGURE 32

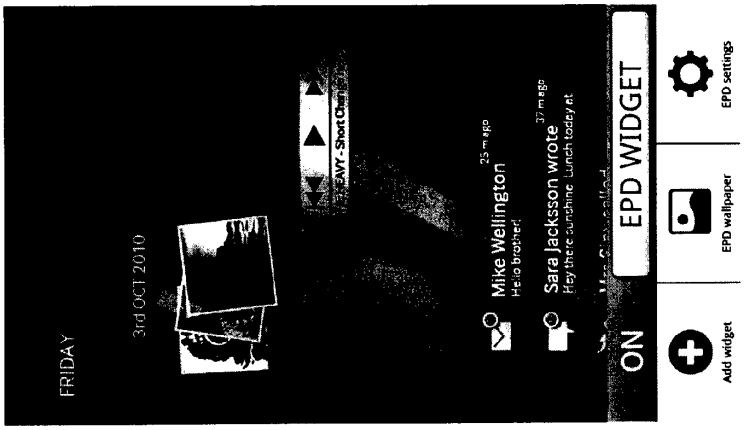


FIGURE 33

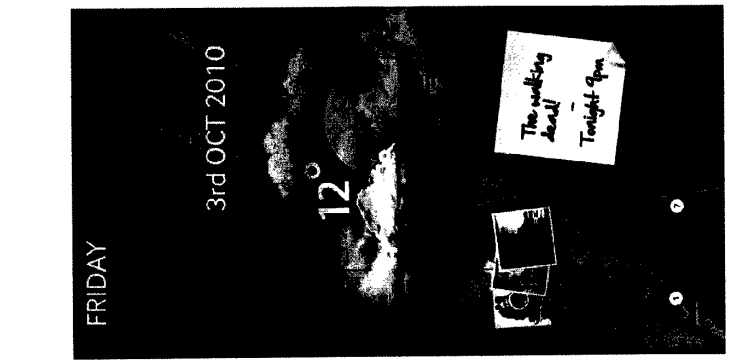


FIGURE 36

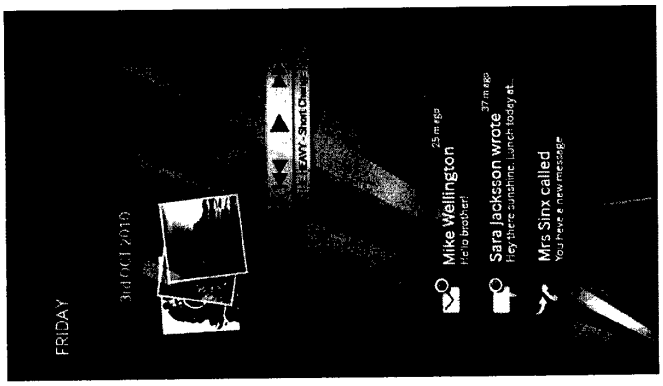


FIGURE 35

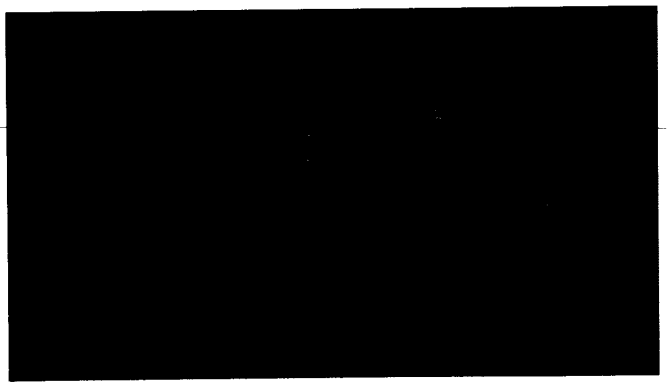


FIGURE 34



FIGURE 39

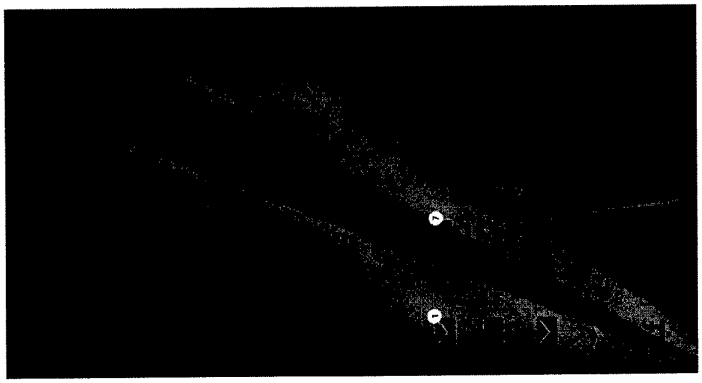


FIGURE 38

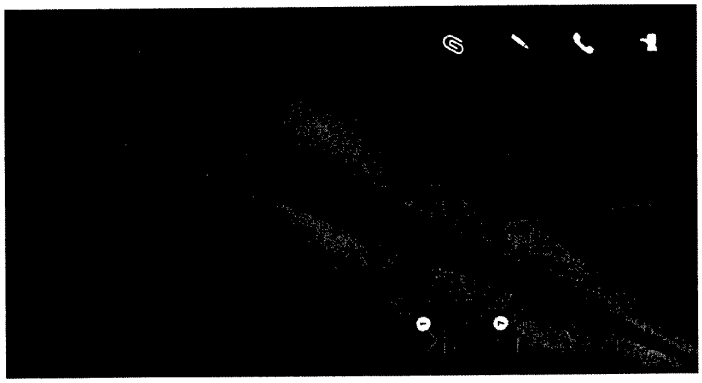


FIGURE 37

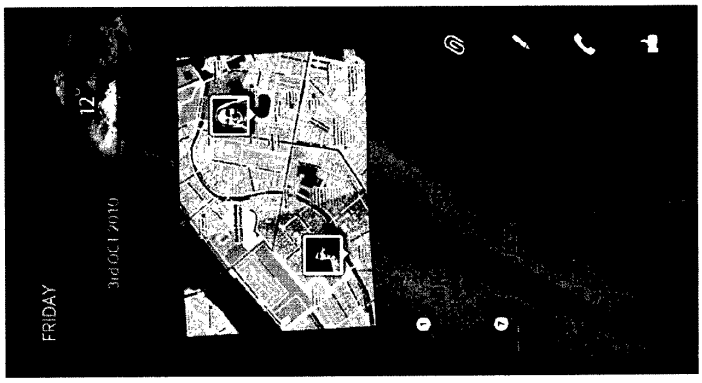


FIGURE 42

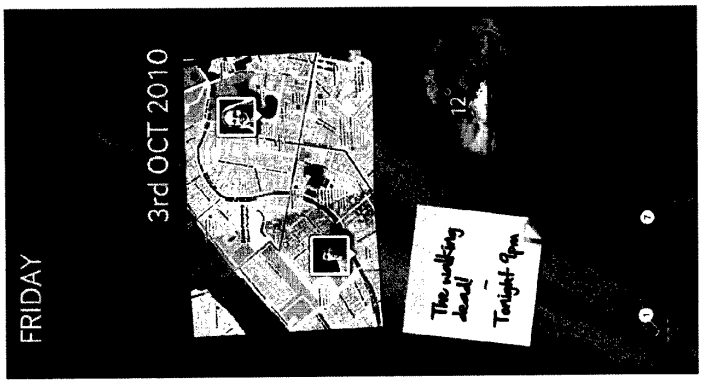


FIGURE 41



FIGURE 40

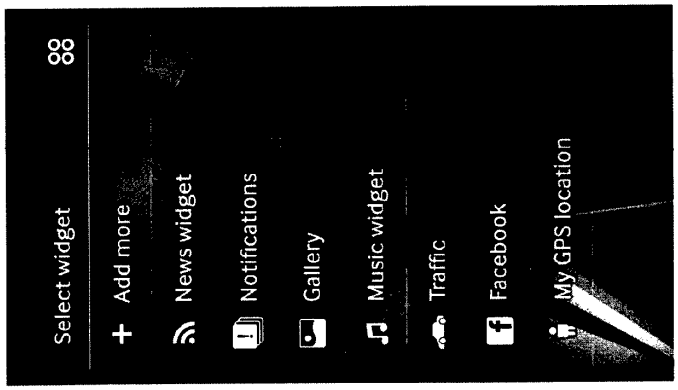


FIGURE 43

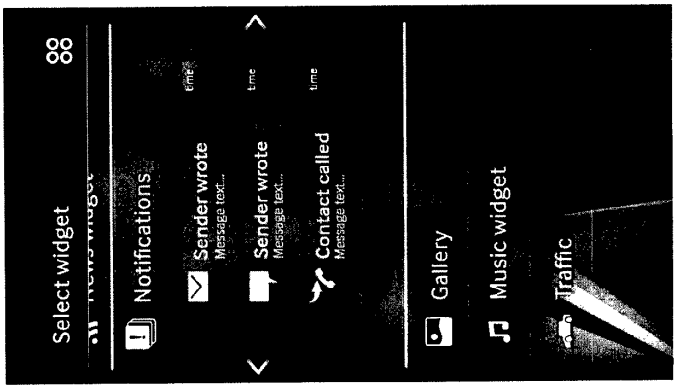


FIGURE 44

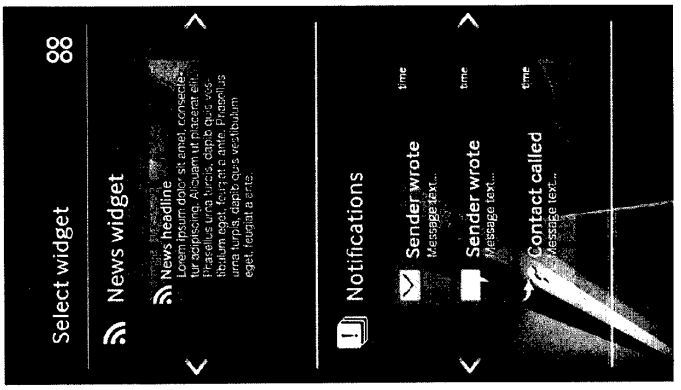


FIGURE 45

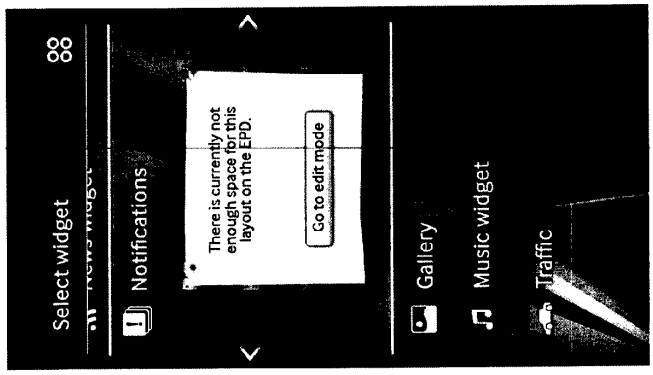


FIGURE 46

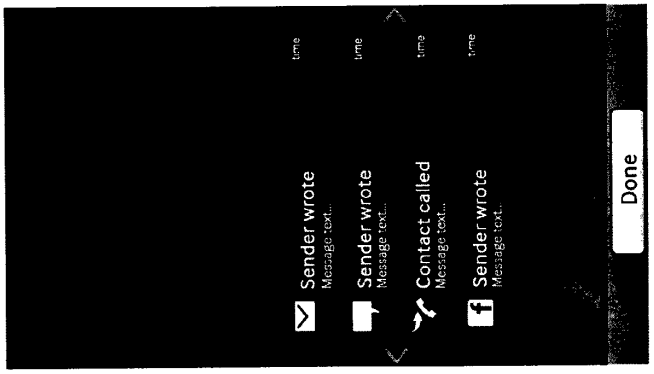


FIGURE 47

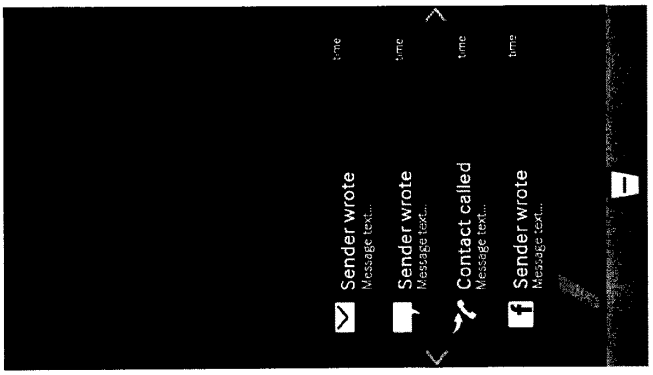


FIGURE 48

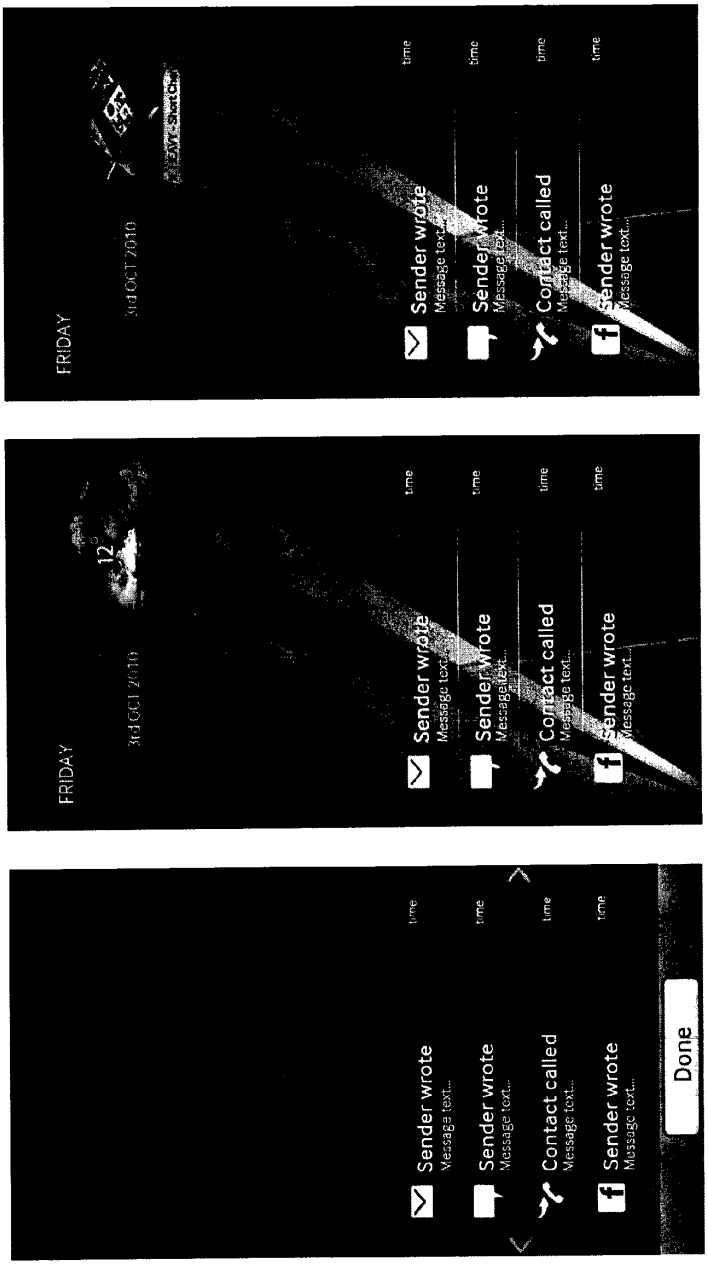


FIGURE 49

FIGURE 50

FIGURE 51

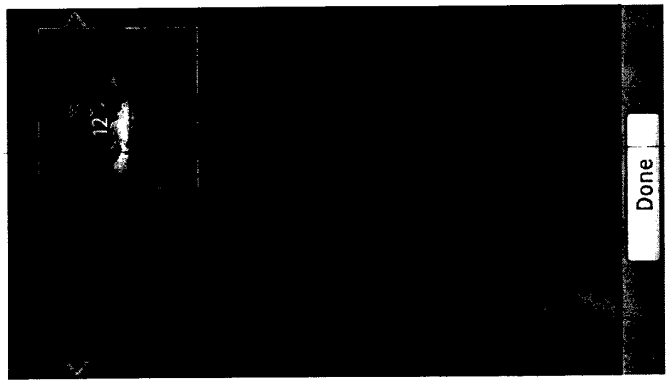


FIGURE 52

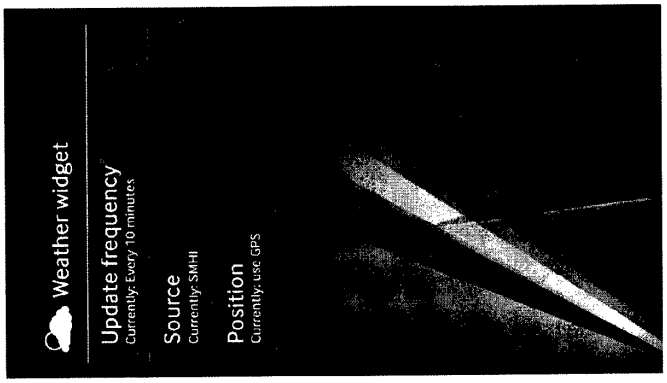


FIGURE 53



FIGURE 54

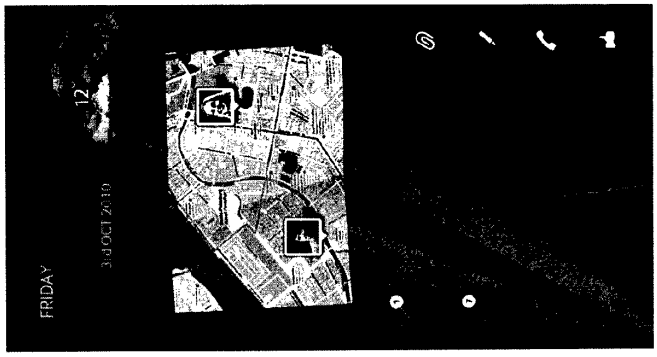


FIGURE 57

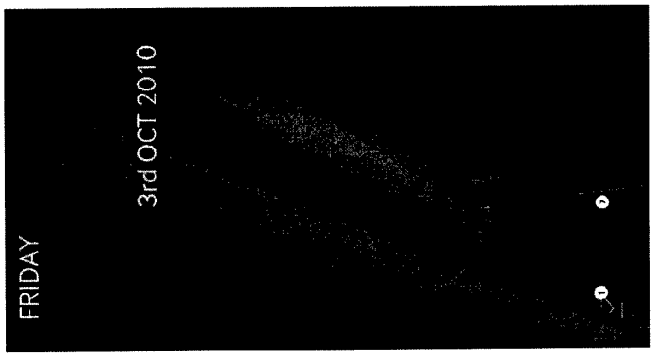


FIGURE 56

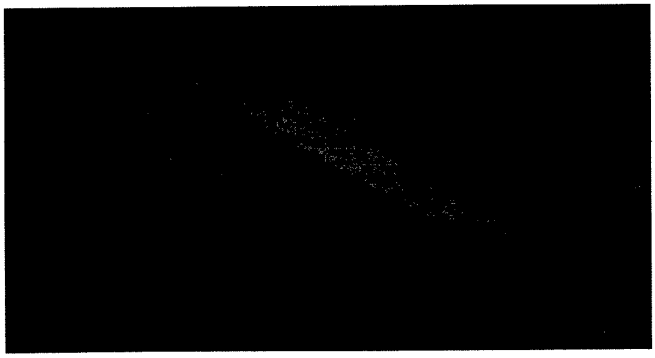


FIGURE 55



FIGURE 60

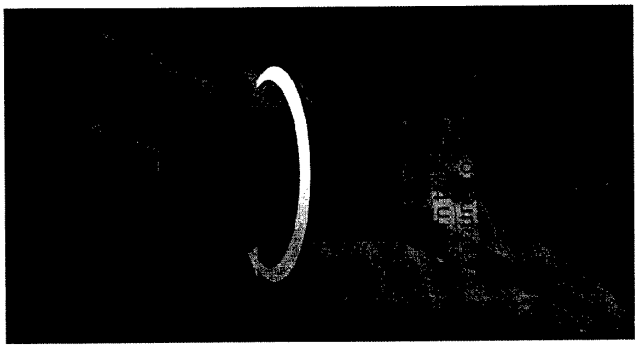


FIGURE 59

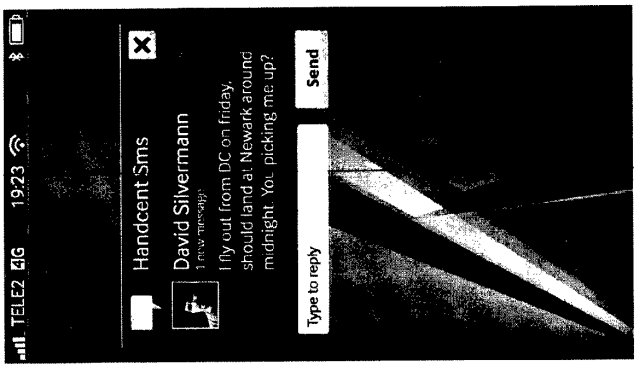


FIGURE 58

FIGURE 61

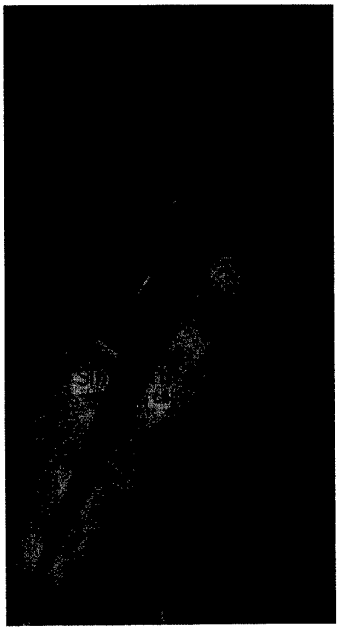


FIGURE 62

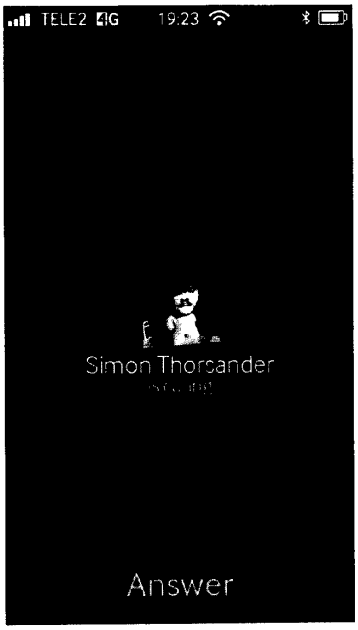


FIGURE 63

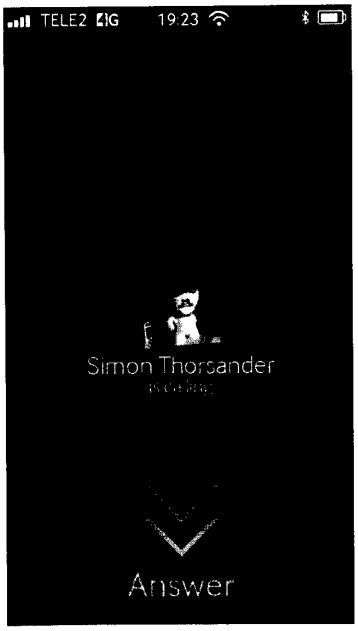
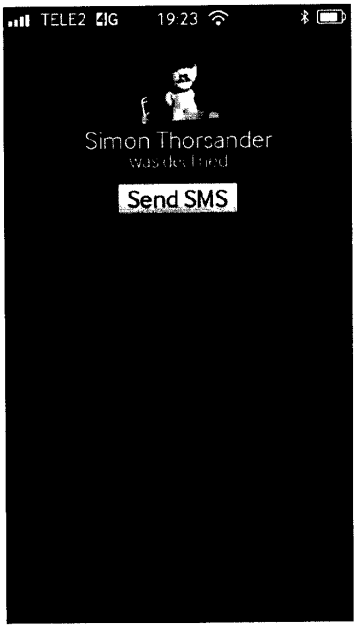


FIGURE 64



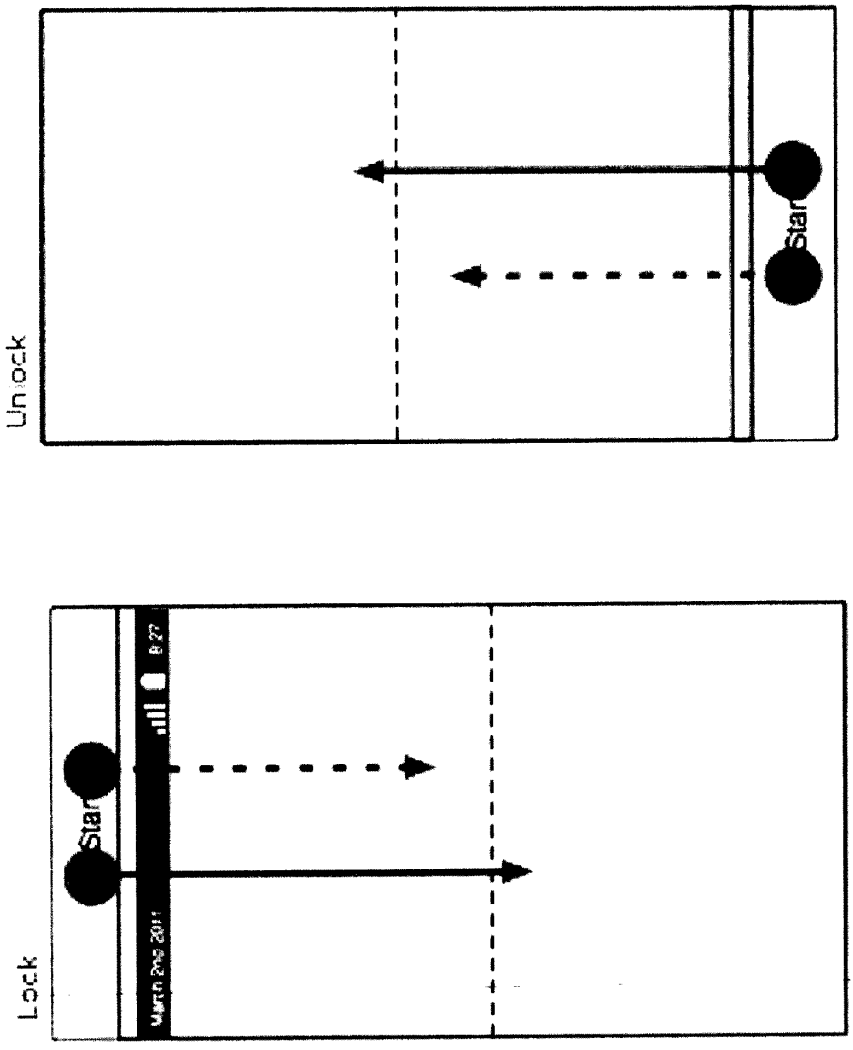


FIGURE 65B

FIGURE 65A

FIGURE 65

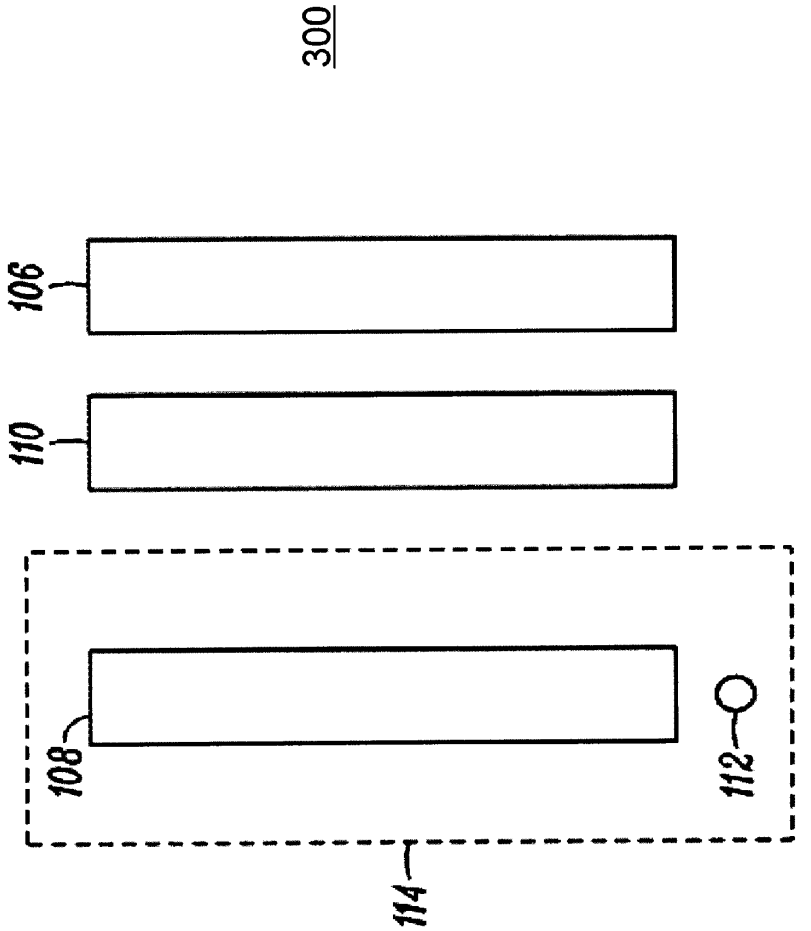


FIGURE 66 PRIOR ART

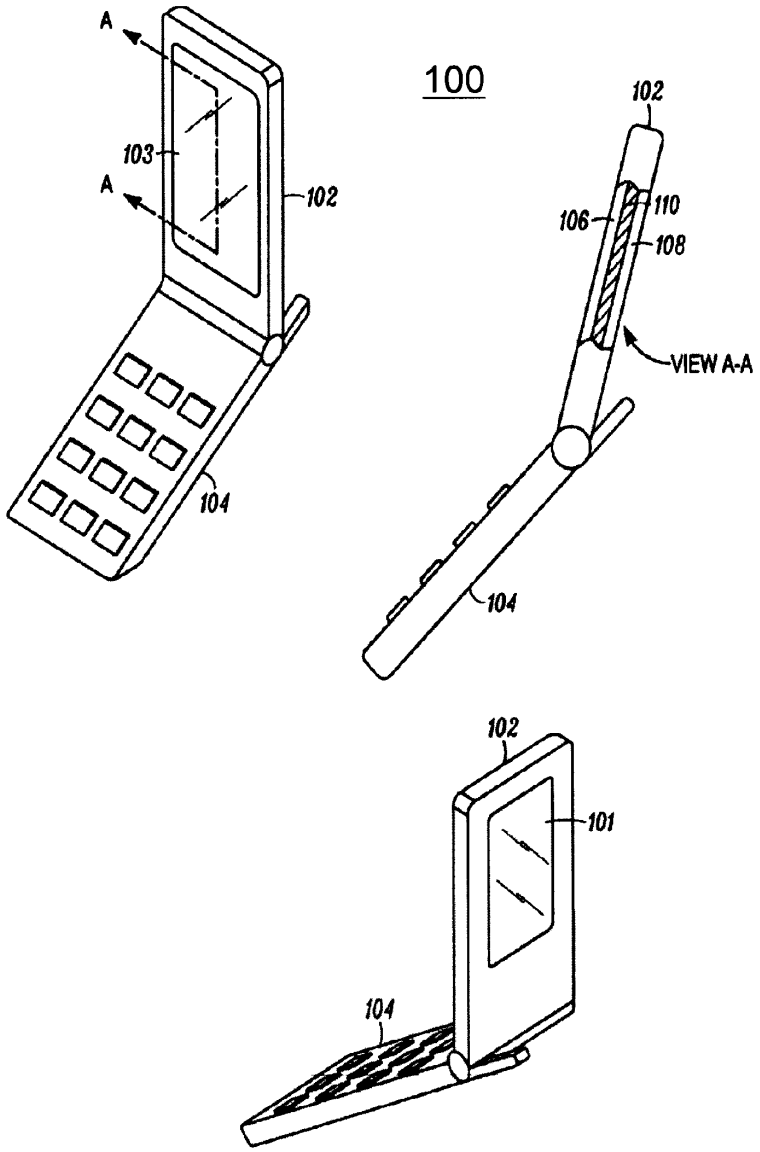


FIGURE 67 PRIOR ART

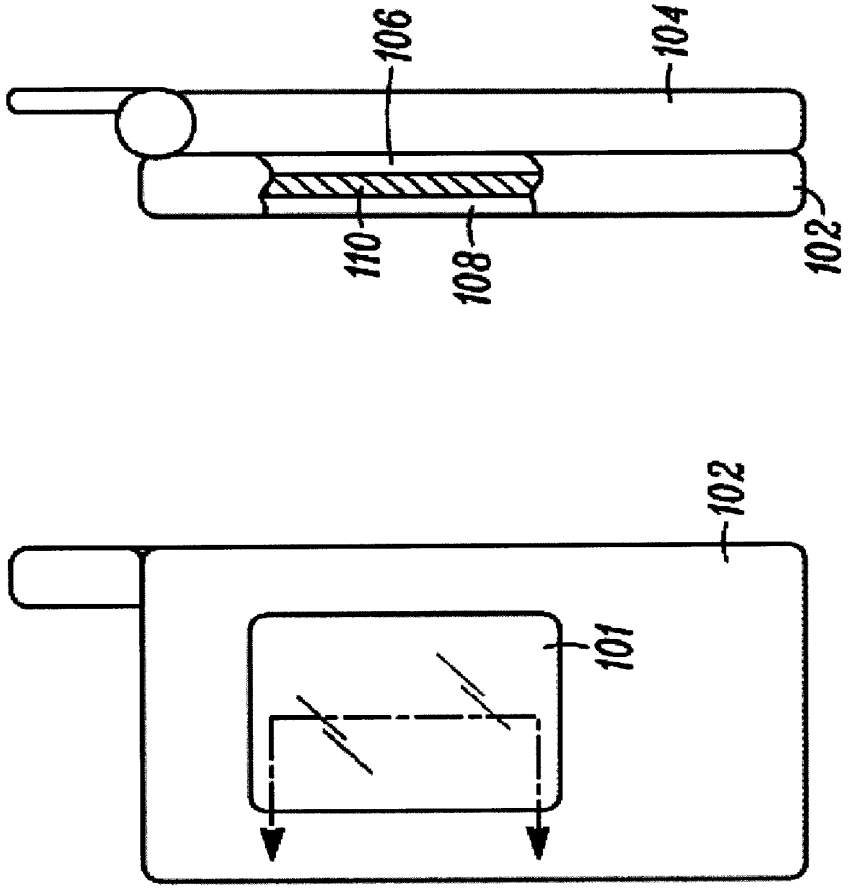


FIGURE 68 PRIOR ART

Espacenet

Bibliographic data: JP2011125633 (A) — 2011-06-30

BIOLOGICAL INFORMATION MEASURING APPARATUS AND BIOLOGICAL INFORMATION MONITORING APPARATUS

Inventor(s): MATSUKI HIROAKI ± (MATSUKI HIROAKI)

Applicant(s): FUKUDA DENSHI KK ± (FUKUDA DENSHI CO LTD)

Classification: **- international:** ***A61B5/1455***
- cooperative:

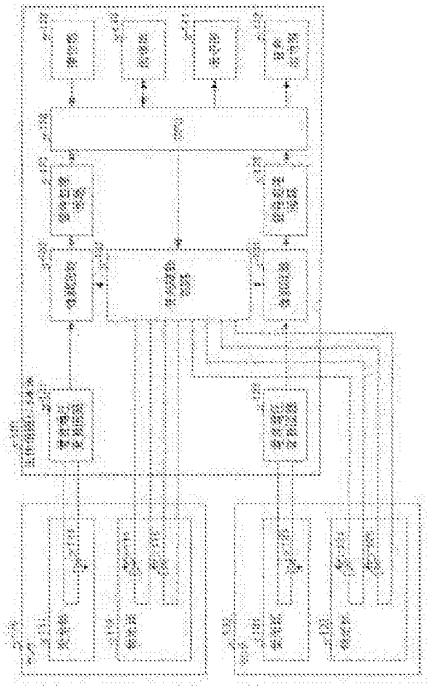
Application number: JP20090289627 20091221 Global Dossier

Priority number(s): JP20090289627 20091221

Also published as: JP5544158 (B2)

Abstract of JP2011125633 (A)

PROBLEM TO BE SOLVED: To measure biological information of a subject continuously for a long time without trouble while the subject is prevented from burn at low temperature.
SOLUTION: A sensor 110 includes a light emitting part 112 and a light receiving part 111 which are composed to mount on a first site of a subject detachably; and the light with various wavelengths is emitted from the light emitting part 112 and transmitted through the first site, and reflected on the first site and detected at the light receiving part 111. A sensor 120 has a light emitting part 122 and a light receiving part 121 which are composed to mount on a second site of the subject detachably, and the light with various wavelength is emitted from the light emitting part 122 and transmitted through the second site, and reflected on the second site and detected at the light receiving part 121. A light emission drive circuit 137 drives the light emitting parts



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112, 122 selectively and make them emit.; CPU 138 introduces the biological information based on a first detected result obtained by the light receiving part 111 while the light emitting part 112 is driven to emit, and the biological information is introduced based on the second detected result obtained by the light receiving part 121 while the light emitting part 122 is driven to emit. ;COPYRIGHT: (C)2011,JPO&INPIT

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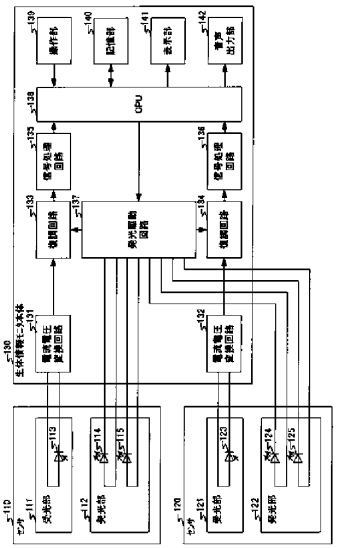
(21)出願番号　特願2009-289627 (P2009-289627)
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Ｆターム(参考)　4C038 KK01　KL05　KL07　KM01　KX01

(54)【発明の名称】生体情報測定装置および生体情報モニタ装置

(57)【要約】
【課題】生体情報の長時間連続測定を、手間をかけずに被検者の低温やけどを予防しつつ行うこと。
【解決手段】センサ１１０は、被検者の第１の部位に装着可能に構成された発光部１１２と受光部１１１とを有し、発光部１１２から発光されて第１の部位を透過しまたは第１の部位にて反射した複数波長の光を受光部１１１にて検知する。センサ１２０は、被検者の第２の部位に装着可能に構成された発光部１２２と受光部１２１とを有し、発光部１２２から発光されて第２の部位を透過しまたは第２の部位にて反射した複数波長の光を受光部１２１にて検知する。発光駆動回路１３７は、発光部１１２、１２２を選択的に駆動して発光させる。ＣＰＵ１３８は、発光部１１２の発光駆動中は、受光部１１１にて得られる第１の検知結果に基づいて生体情報を導出し、発光部１２２の発光駆動中は、受光部１２１にて得られる第２の検知結果に基づいて生体情報を導出する。
【選択図】図１



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【特許請求の範囲】
【請求項１】
被検者の生体情報を測定する生体情報測定装置であって、
前記被検者の第１の部位に装着可能に構成された第１の発光部と第１の受光部とを有し、前記第１の発光部から発光されて前記第１の部位を透過しまたは前記第１の部位にて反射した複数波長の光を前記第１の受光部にて検知する第１の検知部と、
前記被検者の第２の部位に装着可能に構成された第２の発光部と第２の受光部とを有し、前記第２の発光部から発光されて前記第２の部位を透過しまたは前記第２の部位にて反射した複数波長の光を前記第２の受光部にて検知する第２の検知部と、
前記第１の発光部および前記第２の発光部を選択的に駆動して発光させる駆動部と、
前記第１の発光部の発光駆動中は、前記第１の受光部にて得られる第１の検知結果に基づいて前記生体情報を導出し、前記第２の発光部の発光駆動中は、前記第２の受光部にて得られる第２の検知結果に基づいて前記生体情報を導出する導出部と、
を有する生体情報測定装置。
【請求項２】
前記駆動部は、導出される前記生体情報に所定レベル以上のノイズが混入するときには、前記第１の発光部および前記第２の発光部の双方を駆動して発光させる、
請求項１記載の生体情報測定装置。
【請求項３】
前記導出部は、前記第１の発光部および前記第２の発光部の双方の発光駆動中は、前記第１の検知結果および前記第２の検知結果の双方に基づいて、導出される前記生体情報を平均化する、
請求項２記載の生体情報測定装置。
【請求項４】
前記駆動部は、前記生体情報の測定の異常が検出された場合に、駆動する発光部を、前記第１の発光部および前記第２の発光部の一方から他方に切り替える、
請求項１記載の生体情報測定装置。
【請求項５】
請求項１記載の生体情報測定装置と、
前記第１の発光部の発光駆動中は、前記第１の検知結果に基づく前記生体情報を画面に表示し、前記第２の発光部の発光駆動中は、前記第２の検知結果に基づく前記生体情報を前記画面に表示する表示部と、
を有する生体情報モニタ装置。
【請求項６】
前記表示部は、前記第１の検知結果に基づく前記生体情報を表す波形と前記第２の検知結果に基づく前記生体情報を表す波形とを１波形として表示する、
請求項５記載の生体情報モニタ装置。
【請求項７】
前記表示部は、前記第１の発光部の発光駆動中は、前記第２の検知結果に基づく前記生体情報を表す波形または数値を表示せずに、前記第１の検知結果に基づく前記生体情報を表す波形または数値を表示し、前記第２の発光部の発光駆動中は、前記第１の検知結果に基づく前記生体情報を表す波形または数値を表示せずに、前記第２の検知結果に基づく前記生体情報を表す波形または数値を表示する、
請求項５記載の生体情報モニタ装置。
【請求項８】
前記駆動部は、導出される前記生体情報に所定レベル以上のノイズ成分が混入するときには、前記第１の発光部および前記第２の発光部の双方を駆動して発光させ、
前記導出部は、前記第１の発光部および前記第２の発光部の双方の発光駆動中は、前記第１の検知結果および前記第２の検知結果の双方に基づいて、導出される前記生体情報を平均化し、

前記表示部は、平均化された前記生体情報を前記画面に表示する、
請求項５記載の生体情報モニタ装置。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、生体情報として例えば動脈血酸素飽和度（SpO_2）などの生体パラメータを測定する生体情報測定装置および生体情報モニタ装置に関する。
【背景技術】
【０００２】
パルスオキシメータは、動脈血における総ヘモグロビンに対する酸化ヘモグロビンの割合を表す生体パラメータである動脈血酸素飽和度（以下、単に「酸素飽和度」という）を非侵襲的に測定することができる生体情報測定装置である（例えば特許文献１参照）。
【０００３】
酸素飽和度を測定する際には通常、発光部としての発光ダイオードと受光部としてのフォトダイオードとを有するセンサを被検者の特定部位（例えば、指先、つま先など）に装着する。そして、発光部から発光されてセンサ装着部位を透過しまたはそこで反射した赤色光および赤外光を受光部にて検知する。そして、検知結果を示す受光信号に対して復調などの処理を施し、処理後の信号を用いて酸素飽和度を算出する。
【先行技術文献】
【特許文献】
【０００４】
【特許文献１】特開２００１－７８９９０号公報
【発明の概要】
【発明が解決しようとする課題】
【０００５】
しかしながら、上記従来のパルスオキシメータにおいては、発光部が発光中に発熱するため、酸素飽和度を長時間連続測定する場合にその発熱に起因してセンサ装着部位に低温やけどを発症する可能性がある。一般に、このような低温やけどの予防策としては、数時間ごとにセンサを付け替えてセンサ装着部位を変えることが挙げられる。ところが、この手法は、手間がかかるという問題があるだけでなく、一時的なセンサ取り外しを余儀なくされることで波形が途切れるため、実質的には長時間連続測定を行えないという問題がある。
【０００６】
本発明の目的は、生体情報の長時間連続測定を、手間をかけずに被検者の低温やけどを予防しつつ行うことができる生体情報測定装置および生体情報モニタ装置を提供することである。
【課題を解決するための手段】
【０００７】
本発明の生体情報測定装置は、被検者の生体情報を測定する生体情報測定装置であって、前記被検者の第１の部位に装着可能に構成された第１の発光部と第１の受光部とを有し、前記第１の発光部から発光されて前記第１の部位を透過しまたは前記第１の部位にて反射した複数波長の光を前記第１の受光部にて検知する第１の検知部と、前記被検者の第２の部位に装着可能に構成された第２の発光部と第２の受光部とを有し、前記第２の発光部から発光されて前記第２の部位を透過しまたは前記第２の部位にて反射した複数波長の光を前記第２の受光部にて検知する第２の検知部と、前記第１の発光部および前記第２の発光部を選択的に駆動して発光させる駆動部と、前記第１の発光部の発光駆動中は、前記第１の受光部にて得られる第１の検知結果に基づいて前記生体情報を導出し、前記第２の発光部の発光駆動中は、前記第２の受光部にて得られる第２の検知結果に基づいて前記生体情報を導出する導出部と、を有する。
【０００８】

本発明の生体情報モニタ装置は、上記生体情報測定装置と、前記第１の発光部の発光駆動中は、前記第１の受光信号に基づく前記生体情報を画面に表示し、前記第２の発光部の発光駆動中は、前記第２の受光信号に基づく前記生体情報を前記画面に表示する表示部と、を有する。

【発明の効果】

【０００９】

本発明によれば、生体情報の長時間連続測定を、手間をかけずに被検者の低温やけどを予防しつつ行うことができる。

【図面の簡単な説明】

【００１０】

【図１】本発明の一実施の形態に係る生体情報モニタ装置の構成を示すブロック図

【図２】本発明の一実施の形態に係るリユーザブルセンサの外観図

【図３Ａ】図２に示すセンサの装着手順の第１のステップを説明するための図

【図３Ｂ】図２に示すセンサの装着手順の第２のステップを説明するための図

【図４】本発明の一実施の形態に係るディスポーザブルセンサの外観図

【図５Ａ】図４に示すセンサの装着手順の第１のステップを説明するための図

【図５Ｂ】図４に示すセンサの装着手順の第２のステップを説明するための図

【図５Ｃ】図４に示すセンサの装着手順の第３のステップを説明するための図

【図６】本発明の一実施の形態に係る、タイマによるセンサ切り替えの動作を説明するためのフロー図

【図７】本発明の一実施の形態に係る酸素飽和度の表示画面例を説明するための図

【図８】本発明の一実施の形態に係る、ノイズ検出によるセンサ切り替えの動作を説明するためのフロー図

【図９】本発明の一実施の形態に係る、異常検出によるセンサ切り替えの動作を説明するためのフロー図

【発明を実施するための形態】

【００１１】

以下、本発明の実施の形態について、図面を用いて詳細に説明する。

【００１２】

図１は、本発明の一実施の形態に係る生体情報モニタ装置の構成を示すブロック図である。

【００１３】

図１の生体情報モニタ装置は、センサ１１０、１２０および生体情報モニタ本体１３０を有する。

【００１４】

第１の検知部としてのセンサ１１０は、第１の受光部としての受光部１１１および第１の発光部としての発光部１１２を有する。受光部１１１はフォトダイオード１１３を有し、発光部１１２は発光ダイオード１１４、１１５を有する。発光ダイオード１１４は駆動されると波長λ_1の赤外光を発光し、発光ダイオード１１５は駆動されると波長λ_2の赤色光を発光する。フォトダイオード１１３は赤外光および赤色光を受光したときに第１の受光信号としての電流信号を生成することにより、赤外光および赤色光を検知する。

【００１５】

また、センサ１１０は、被検者の特定部位（以下「第１のセンサ装着部位」という）に装着可能である。センサ１１０が第１のセンサ装着部位に装着されているときに発光ダイオード１１４、１１５が駆動されて発光すると、第１のセンサ装着部位が赤外光および赤色光で照射される。このとき、フォトダイオード１１３が第１のセンサ装着部位を透過しまたは第１のセンサ装着部位にて反射した光を検知することができるように、センサ１１０は構成されている。

【００１６】

第２の検知部としてのセンサ１２０は、第２の受光部としての受光部１２１および第２

の発光部としての発光部１２２を有する。受光部１２１はフォトダイオード１２３を有し、発光部１２２は発光ダイオード１２４、１２５を有する。発光ダイオード１２４は駆動されると波長λ_1の赤外光を発光し、発光ダイオード１２５は駆動されると波長λ_2の赤色光を発光する。フォトダイオード１２３は赤外光および赤色光を受光したときに第２の受光信号としての電流信号を生成することにより、赤外光および赤色光を検知する。

【００１７】

また、センサ１２０は、被検者の特定部位（以下「第２のセンサ装着部位」という）に装着可能である。センサ１２０が第２のセンサ装着部位に装着されているときに発光ダイオード１２４、１２５が駆動されて発光すると、第２のセンサ装着部位が赤外光および赤色光で照射される。このとき、フォトダイオード１２３が第２のセンサ装着部位を透過しまたは第２のセンサ装着部位にて反射した光を検知することができるように、センサ１２０は構成されている。

【００１８】

ここで、センサ１１０、１２０の種類について説明する。センサ１１０、１２０には様々な種類があり、被検者の疾患あるいは体重などの諸条件に応じて適切な種類を選択して使用する必要があるが、これらはリユーザブルセンサおよびディスポーザブルセンサの２種類に大別することができる。

【００１９】

図２は、リユーザブルタイプのセンサ１１０、１２０の外観図である。図２に示す例では、センサ１１０は人差し指に、センサ１２０は薬指に、それぞれ装着されている。センサ１１０、１２０は異なる指に装着されるが同じ手に装着されるため、被検者の体動あるいはセンサ１１０、１２０の接触不良などの影響がない限り、略同一の測定結果を得ることができる

【００２０】

リユーザブルタイプのセンサ１１０、１２０は、ケーブル１１０ａ、１２０ａが予め結合された構成となっているため、センサ１１０、１２０を装着するだけで酸素飽和度の測定準備を完了することができる。また、ケーブル１１０ａ、１２０ａを、センサ１１０、１２０と結合する側の数ｃｍ～数十ｃｍを除きケーブル１１０ａ、１２０ａの全長にわたって相互結束させた構成とした場合には、センサ１１０、１２０を同一の手における異なる指に、容易装着可能である。なお、被検者の拘束を軽減するために、装着は利き腕でない方の手にすることが好ましい。また、非観血血圧測定用のカフが巻かれていない方の腕であることが好ましい。

【００２１】

リユーザブルタイプの場合、例えばセンサ１１０は、例えば図３Ａおよび図３Ｂに示す手順で指に装着することができる。まず、図３Ａに示すように、ケーブル１１０ａが接続されていて発光部（図示せず）が設けられている上部１１０ｂを手の甲側に、受光部（図示せず）が設けられている下部１１０ｃを手のひら側に、それぞれ配置する。この状態で、ヒンジ部１１０ｄのつまみ１１０ｅを押してセンサ１１０を開き、指の肉厚部分が下部１１０ｃに設けられた受光部を完全に覆うように位置決めする。そして、図３Ｂに示すように、ヒンジ部１１０ｄのつまみ１１０ｅを開いて、上部１１０ｂと下部１１０ｃとで指を挟持する。このようにしてセンサ装着を行うことができる。

【００２２】

図４は、ディスポーザブルタイプのセンサ１１０、１２０の外観図である。図４に示す例では、センサ１１０は人差し指に、センサ１２０は薬指に、それぞれ装着されている。ディスポーザブルタイプのセンサ１１０、１２０は、ケーブル（図示せず）とは独立した構成となっているため、センサ１１０、１２０を装着した後にケーブルを接続することによって、酸素飽和度の測定準備が完了する。

【００２３】

ディスポーザブルタイプの場合、例えばセンサ１１０は、例えば図５Ａ、図５Ｂおよび図５Ｃに示す手順で指に装着することができる。まず、図５Ａに示すように、センサ１１

０の伸延方向と指の向きとを合わせる。そして、図５Ｂに示すように、指先近くの肉厚部分で受光部１１１が完全に覆われるようにセンサ１１０を指に当てた状態で、Ｔ字状粘着端１１０ｆを指に巻き付けるように折り曲げて指に貼付する。そして、図５Ｃに示すように、中央部１１０ｇにてセンサ１１０を折り曲げて発光部１１２を爪上に配置させた状態で、ウィング状粘着端を指に巻き付けるように折り曲げて指に貼付する。このようにしてセンサ装着を行うことができる。なお、その後コネクタタブ１１０ｉにケーブルを接続することによって、測定準備が完了する。

【００２４】

生体情報モニタ本体１３０は、電流電圧変換回路１３１、１３２、復調回路１３３、１３４、信号処理回路１３５、１３６、発光駆動回路１３７、ＣＰＵ（Central Processing Unit）１３８、操作部１３９、記憶部１４０、表示部１４１および音声出力部１４２を有する。

【００２５】

駆動部としての発光駆動回路１３７は、ＣＰＵ１３８の制御下で、センサ１１０の発光部１１２（発光ダイオード１１４、１１５）およびセンサ１２０の発光部１２２（発光ダイオード１２４、１２５）を個別に駆動して発光させる。発光駆動回路１３７は、発光部１１２を駆動する場合には、発光ダイオード１１４、１１５を交互に発光させ、発光部１２２を駆動する場合には、発光ダイオード１２４、１２５を交互に発光させる。発光駆動回路１３７は、発光ダイオード１１４、１１５の発光タイミングを復調回路１３３に通知し、発光ダイオード１２４、１２５の発光タイミングを復調回路１３４に通知する。

【００２６】

また、発光駆動回路１３７は、通常の場合には、発光部１１２の駆動および発光部１２２の駆動を並行では行わず、いずれか一方のみを行うが、所定の条件を満たした場合に限り、一時的に発光部１１２の駆動および発光部１２２の駆動を並行して両方とも行う。

【００２７】

電流電圧変換回路１３１は、フォトダイオード１１３により第１の受光信号として生成された電流信号を電圧信号に変換する。復調回路１３３は、電流電圧変換回路１３１により生成された電圧信号を、発光駆動回路１３７から通知された発光タイミングに基づいて分離して別々の電圧信号を生成し、それぞれを復調する。ここで、この分離により生成される電圧信号は、発光ダイオード１１４の赤外光発光に起因する電圧信号、および、発光ダイオード１１５の赤色光発光に起因する電圧信号である。これにより、復調回路１３３は、第１のセンサ装着部位における赤外光の吸光度の経時変化を示す第１の赤外光観測信号と、第１のセンサ装着部位における赤色光の吸光度の経時変化を示す第１の赤色光観測信号とを生成する。信号処理回路１３５は、復調回路１３３により生成された第１の赤外光観測信号および第１の赤色光観測信号に対して所定の信号処理（例えば、増幅、Ａ／Ｄ変換など）を行う。信号処理後の第１の赤外光観測信号および第１の赤色光観測信号は、ＣＰＵ１３８に入力される。

【００２８】

よって、センサ１１０、電流電圧変換回路１３１、復調回路１３３および信号処理回路１３５は、１つの測定系統を構成する。

【００２９】

電流電圧変換回路１３２は、フォトダイオード１２３により第２の受光信号として生成された電流信号を電圧信号に変換する。復調回路１３４は、電流電圧変換回路１３２により生成された電圧信号を、発光駆動回路１３７から通知された発光タイミングに基づいて、発光ダイオード１２４の赤外光発光に起因する電圧信号と発光ダイオード１２５の赤色光発光に起因する電圧信号とに分離し、それぞれを復調する。これにより、復調回路１３４は、第２のセンサ装着部位における赤外光の吸光度の経時変化を示す第２の赤外光観測信号と、第２のセンサ装着部位における赤色光の吸光度の経時変化を示す第２の赤色光観測信号とを生成する。信号処理回路１３６は、復調回路１３４により生成された第２の赤外光観測信号および第２の赤色光観測信号に対して所定の信号処理（例えば、増幅、Ａ／

Ｄ変換など）を行い、信号処理後の第２の赤外光観測信号および第２の赤色光観測信号をＣＰＵ１３８に入力する。

【００３０】

よって、センサ１２０、電流電圧変換回路１３２、復調回路１３４および信号処理回路１３６は、もう１つの測定系統を構成する。

【００３１】

導出部としてのＣＰＵ１３８は、発光部１１２の発光駆動中は、第１の赤外光観測信号および第１の赤色光観測信号が入力されるため、第１の赤外光観測信号および第１の赤色光観測信号から、拍動に同期して変化する信号成分をそれぞれ抽出する。そして、ＣＰＵ１３８は、抽出した信号成分の比を算出し、算出した比から酸素飽和度を算出する。

【００３２】

また、ＣＰＵ１３８は、発光部１２２の発光駆動中は、第２の赤外光観測信号および第２の赤色光観測信号が入力されるため、第２の赤外光観測信号および第２の赤色光観測信号から拍動に同期して変化する信号成分をそれぞれ抽出する。そして、ＣＰＵ１３８は、抽出した信号成分の比を算出し、算出した比から酸素飽和度を算出する。

【００３３】

また、ＣＰＵ１３８は、発光部１１２、１２２の双方の発光駆動中は、入力された第１の赤外光観測信号および第１の赤色光観測信号から得られる酸素飽和度と入力された第２の赤外光観測信号および第２の赤色光観測信号から得られる酸素飽和度とを平均化する。例えば、第１の赤外光観測信号から抽出された信号成分と第２の赤外光観測信号から抽出された信号成分とを平均化するとともに、第１の赤色光観測信号から抽出された信号成分と第２の赤色光観測信号から抽出された信号成分とを平均化する。そして、平均化した信号成分間の比を算出し、算出した比から酸素飽和度を算出する。

【００３４】

また、ＣＰＵ１３８は、算出した酸素飽和度を、記憶部１４０に記憶させるほか、表示部１４１に表示させる。ＣＰＵ１３８は、記憶部１４０に予め記憶された酸素飽和度を表示部１４１に表示させることもできる。記憶部１４０は、半導体メモリ装置またはハードディスクなどの記憶装置であり、表示部１４１は、液晶ディスプレイなどの表示装置である。

【００３５】

また、ＣＰＵ１３８は、発光駆動回路１３７、記憶部１４０および表示部１４１の動作を制御する。この制御は例えば操作部１３９の入力操作に従って行われる。操作部１３９は、ボタン、マウス、キーボードまたはタッチパネルなどの入力装置である。

【００３６】

また、ＣＰＵ１３８は、必要時にアラーム音を音声出力部１４２に出力させる。音声出力部１４２はスピーカである。

【００３７】

また、ＣＰＵ１３８は、ノイズ検出部および異常検出部としての機能も有するが、ノイズ検出および異常検出については後述する。

【００３８】

以上、本実施の形態の生体情報モニタ装置の構成について説明した。

【００３９】

次いで、本実施の形態の生体情報モニタ装置において実行されるセンサ切り替え動作について、３つの例を挙げて説明する。

【００４０】

まず、センサ切り替え動作の第１の例として、タイマによってセンサを切り替える場合について、図６を用いて説明する。なお、この例では、センサ１１０、１２０がそれぞれ第１のセンサ装着部位および第２のセンサ装着部位に正しく装着されている場合を前提として説明する。

【００４１】

まず、ＣＰＵ１３８は、操作部１３９による測定開始操作が行われたことを認識すると（ステップＳ１１１：ＹＥＳ）、発光駆動回路１３７に指示を出力することにより、センサ１１０、１２０の一方を使用した酸素飽和度測定を開始させる（ステップＳ１１２）。

【００４２】

使用されるセンサは、デフォルトとしてＣＰＵ１３８が予め選択していてもよいし、操作部１３９による選択操作に従ってＣＰＵ１３８が選択してもよい。なお、ここで「使用」は、発光駆動の対象となることを意味している。

【００４３】

つまり、センサ１１０が使用される場合、ＣＰＵ１３８は、センサ１１０を使用させるための指示を発光駆動回路１３７に出力する。このとき、ＣＰＵ１３８は、センサ１１０の発光部１１２における発光ダイオード１１４、１１５を所定のタイミングで交互に発光させるための発光タイミング信号を発光駆動回路１３７に出力する。あるいは、センサ１２０が使用される場合、ＣＰＵ１３８は、センサ１２０を使用させるための指示を発光駆動回路１３７に出力する。このとき、ＣＰＵ１３８は、センサ１２０の発光部１２２における発光ダイオード１２４、１２５を所定のタイミングで交互に発光させるための発光タイミング信号を発光駆動回路１３７に出力する。このようにしてＣＰＵ１３８は、発光駆動回路１３７が実行する発光駆動を制御する。

【００４４】

ＣＰＵ１３８は、センサ１１０、１２０の一方を使用させた結果として、受光部１１１、１２１の一方にて得られた受光信号に基づいて酸素飽和度を導出する。ＣＰＵ１３８は、導出した酸素飽和度を、記憶部１４０に記憶させるとともに表示部１４１に表示させるための制御を行う。

【００４５】

センサ１１０、１２０の一方を使用した酸素飽和度測定の開始後、ＣＰＵ１３８は、測定および測定結果表示を継続させつつ、タイマを用いて経過時間のカウントを行う。

【００４６】

ここで、酸素飽和度の測定結果は、例えば図７に示すような態様で表示部１４１により画面に表示される。

【００４７】

図７に例示した表示画面１５０では、測定された酸素飽和度を、その経時変化を示す波形１５１として波形表示部１５２に、所定期間での平均測定値（以下、単に「測定値」という）１５３として測定値表示部１５４に、それぞれ表示することができる。

【００４８】

表示画面１５０には、センサ１１０、１２０のうち使用されたセンサに対応する波形１５１および測定値１５３が表示される一方、センサ１１０、１２０のうち使用されていないセンサに対応する波形および数値は表示されない。このため、表示内容を簡素化して見やすくすることができる。

【００４９】

なお、表示画面１５０では、波形表示部１５２に心電図および血圧の波形も表示され、測定値表示部１５４に心拍数、血圧、呼吸数および体温の数値も表示されている。本実施の形態の生体情報モニタ装置はこれらの生体パラメータの測定および表示が可能な構成も有しているが、従来技術の構成と同様であるため、その詳細な説明を省略する。

【００５０】

酸素飽和度の測定およびその結果表示ならびに経過時間のカウントと並行して、ＣＰＵ１３８は、操作部１３９による測定停止操作があったか否かを判断する（ステップＳ１１３）。測定停止操作があったと認識された場合には（ステップＳ１１３：ＹＥＳ）、ＣＰＵ１３８は、酸素飽和度測定およびその結果表示ならびに経過時間のカウントを停止させる。

【００５１】

測定停止操作がないと認識された場合には（ステップＳ１１３：ＮＯ）、ＣＰＵ１３８

は、所定時間（例えば４時間）が経過したか否かを判断する（ステップＳ１１４）。センサ１１０、１２０の一方を使用した酸素飽和度測定が開始してから所定時間が経過していない場合には（ステップＳ１１４：ＮＯ）、処理はステップＳ１１３に戻る。

【００５２】

センサ１１０、１２０の一方を使用した酸素飽和度測定が開始してから所定時間が経過した場合には（ステップＳ１１４：ＹＥＳ）、ＣＰＵ１３８は、酸素飽和度測定に使用するセンサを切り替える（ステップＳ１１５）。つまり、所定時間が経過するまでセンサ１１０が使用されていた場合には、その後はセンサ１２０を使用した酸素飽和度測定が行われる。所定時間が経過するまでセンサ１２０が使用されていた場合には、その後はセンサ１１０を使用した酸素飽和度測定が行われる。

【００５３】

このように、センサ切り替えが行われると、図７に例示した表示画面１５０の測定値表示部１５４では、既に表示されている切り替え前のセンサに対応する測定値が、切り替え後のセンサに対応する測定値に更新される。また、表示画面１５０の波形表示部１５２では、既に表示されている切り替え前のセンサに対応する波形に続けて、切り替え後のセンサに対応する波形が掃引される。このように、切り替え前後の波形が上下段に分離表示されることなく１波形として表示され、切り替え前後の計測値も上下段に分離表示されることがない。よって、酸素飽和度測定に２つのセンサを使用していながら、あたかも１チャンネルのみの測定を行っているような表示内容を形成することができる。このため、表示内容の見やすさを一層向上させることができる。

【００５４】

次に、センサ切り替え動作の第２の例として、ノイズ検出によってセンサを切り替える場合について、図８を用いて説明する。なお、この例では、説明の簡略化のために、センサ１１０、１２０がそれぞれ第１のセンサ装着部位および第２のセンサ装着部位に正しく装着された状態で、酸素飽和度測定が停止されることなく継続実行される場合を前提として説明する。

【００５５】

まず、ＣＰＵ１３８は、前述の第１の例におけるステップＳ１１２と同様に、センサ１１０、１２０の一方を使用した酸素飽和度測定を開始させる（ステップＳ１２１）。そして、その測定の開始後、ＣＰＵ１３８は、測定および測定結果表示を継続させつつ、第１の赤外光観測信号および第１の赤色光観測信号または第２の赤外光観測信号および第２の赤色光観測信号におけるノイズ成分を検出する。

【００５６】

ノイズ成分検出の結果、ＣＰＵ１３８が、検出したノイズ成分の大きさが所定値以上ではなく、導出される酸素飽和度に所定レベル以上のノイズ成分が混入しないと判断した場合には（ステップＳ１２２：ＮＯ）、ＣＰＵ１３８はステップＳ１２２を再度実行する。

【００５７】

ノイズ成分が所定値以上であり、酸素飽和度に所定レベル以上のノイズ成分が混入すると判断された場合には（ステップＳ１２２：ＹＥＳ）、ＣＰＵ１３８は、酸素飽和度測定にセンサ１１０、１２０の一方だけでなく他方も使用させる（ステップＳ１２３）。

【００５８】

このとき、発光部１１２、１２２の双方の発光駆動中となるため、ＣＰＵ１３８は、前述のとおり酸素飽和度の平均化を行う。したがって、図７に例示した表示画面１５０において、測定値表示部１５４では、平均化された酸素飽和度の測定値１５３が表示され、波形表示部１５２では、平均化された酸素飽和度の波形１５１が表示される。

【００５９】

ＣＰＵ１３８は、センサ１１０、１２０の双方の使用を、検出したノイズ成分の大きさが所定値未満となるまで継続させる。ノイズ成分が所定値未満となり、酸素飽和度に所定レベル以上のノイズ成分が混入しないと判断された場合には（ステップＳ１２４：ＹＥＳ）、ＣＰＵ１３８は、酸素飽和度測定にセンサ１１０、１２０の一方のみを使用させる（

ステップＳ１２５）。

【００６０】

このように、導出される酸素飽和度に所定レベル以上のノイズ成分が混入する場合には、センサ１１０、１２０の双方を使用した酸素飽和度測定への切り替えが実行される。そして、一方のセンサを含む一測定系統から得られる酸素飽和度の実測値は、他方のセンサを含む別測定系統から並行して得られる酸素飽和度の実測値との平均化により補正される。よって、より正確なノイズ除去を実現することができる。また、この切り替えは、所定レベル以上のノイズ成分が混入しているときに限った一時的なものであるため、センサ装着部位における低温やけどの発症を抑えることができる。

【００６１】

次に、センサ切り替え動作の第３の例として、測定異常の検出によってセンサを切り替える場合について、図９を用いて説明する。

【００６２】

まず、ＣＰＵ１３８は、操作部１３９による測定開始操作が行われたことを認識すると（ステップＳ１３１：ＹＥＳ）、発光駆動回路１３７に指示を出力することにより、センサ１１０、１２０の一方を使用した酸素飽和度測定を開始させる（ステップＳ１３２）。

【００６３】

センサ１１０、１２０の一方を使用した酸素飽和度測定の開始後、ＣＰＵ１３８は、測定および測定結果表示を継続させつつ、測定異常の検出を行う。ここで、測定異常とは、センサ外れやセンサ故障などを含むものである。センサ外れやセンサ故障などの測定異常は、例えば、センサ１１０またはセンサ１２０を使用して測定された酸素飽和度が異常値を呈しているか否かを判断することにより、認識することができる。あるいは、センサ１１０、１２０の装着状態または動作状態を電気的に診断することにより、認識することができる。

【００６４】

酸素飽和度の測定およびその結果表示ならびに測定異常の検出と並行して、ＣＰＵ１３８は、操作部１３９による測定停止操作があったか否かを判断する（ステップＳ１３３）。測定停止操作があったと認識された場合には（ステップＳ１３３：ＹＥＳ）、ＣＰＵ１３８は、酸素飽和度測定およびその結果表示ならびに測定異常の検出を停止させる。

【００６５】

測定停止操作がないと認識された場合には（ステップＳ１３３：ＮＯ）、ＣＰＵ１３８は、測定異常が検出されたか否かを判断する（ステップＳ１３４）。測定異常が検出されていない場合には（ステップＳ１３４：ＮＯ）、処理はステップＳ１３３に戻る。

【００６６】

測定異常が検出された場合には（ステップＳ１３４：ＹＥＳ）、ＣＰＵ１３８は、酸素飽和度測定に使用するセンサを切り替える（ステップＳ１３５）。つまり、測定異常が検出されるまでセンサ１１０が使用されていた場合には、その後はセンサ１２０を使用した酸素飽和度測定が行われる。測定異常が検出されるまでセンサ１２０が使用されていた場合には、その後はセンサ１１０を使用した酸素飽和度測定が行われる。

【００６７】

また、測定異常が検出された場合には、音声出力部１４２からアラーム音が出力されるようＣＰＵ１３８が音声出力制御を行うとともに、表示部１４１にも酸素飽和度測定異常アラームを表示するようＣＰＵ１４１が表示出力制御を行うことが好ましい。

【００６８】

このように、センサ切り替えが行われると、センサ外れやセンサ故障などのような測定異常が発生したときでも、センサ付け替えなどによって測定の中断を余儀なくされることなく、酸素飽和度の連続測定を行うことができる。

【００６９】

以上のように、本実施の形態によれば、発光部１１２、１２２を選択的に駆動して発光させる。そして、発光部１１２の発光駆動中は、受光部１１１にて得られる受光信号に基

づいて酸素飽和度を導出し、発光部１２２の発光駆動中は、受光部１２１にて得られる第２の受光信号に基づいて酸素飽和度を導出する。これにより、数時間ごとにセンサ付け替えを行うなどの手間をかけることなく、センサ装着部位における低温やけどの発症を予防することができる。また、測定結果として表示される波形が途切れることがないため、酸素飽和度を実質的に長時間連続測定することができる。

【００７０】

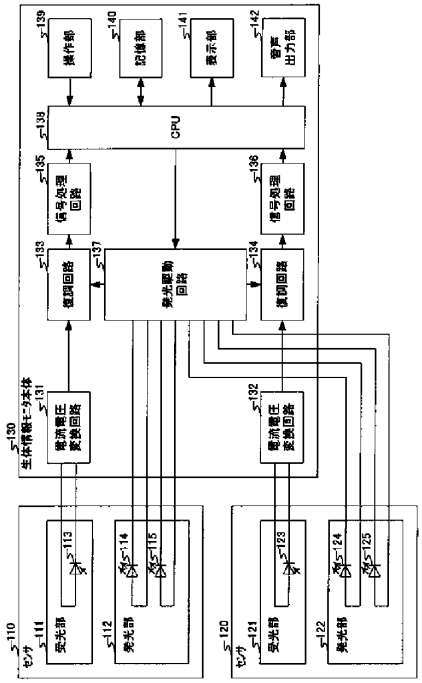
以上、本発明の実施の形態について説明した。なお、本実施の形態は、種々変更して実施することができる。例えば、本実施の形態における上記の構成および動作は、パルスオキシメータや睡眠時無呼吸（ＳＡＳ）測定装置のような生体情報測定装置にも実現可能である。また、本実施の形態では、測定対象の生体情報は動脈血酸素飽和度であるが、動脈血酸素分圧（PaO_2）であってもよい。

【符号の説明】

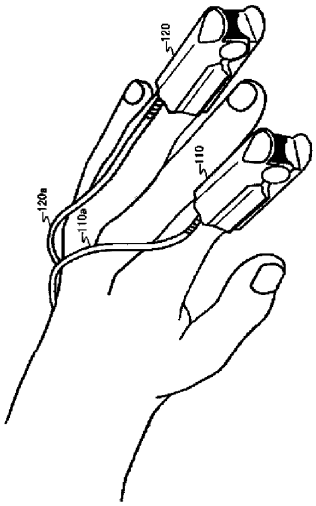
【００７１】

１１０、１２０　センサ
１１１、１２１　受光部
１１２、１２２　発光部
１１３、１２３　フォトダイオード
１１４、１１５、１２４、１２５　発光ダイオード
１３０　生体情報モニタ本体
１３１、１３２　電流電圧変換回路
１３３、１３４　復調回路
１３５、１３６　信号処理回路
１３７　発光駆動回路
１３８　ＣＰＵ
１３９　操作部
１４０　記憶部
１４１　表示部
１４２　音声出力部
１５０　表示画面
１５１　波形
１５２　波形表示部
１５３　測定値
１５４　測定値表示部

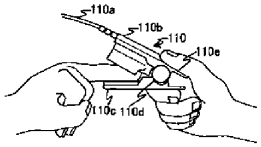
【図１】



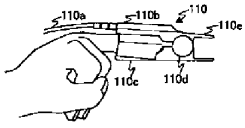
【図２】



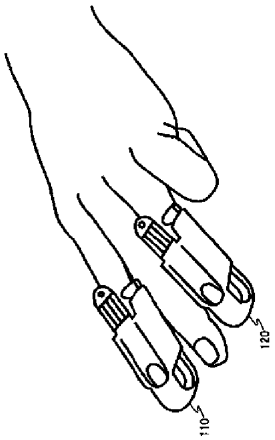
【図３Ａ】



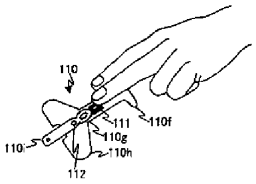
【図３Ｂ】



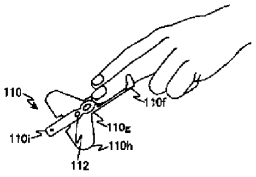
【図４】



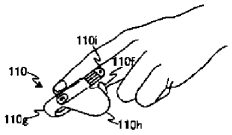
【図５Ａ】



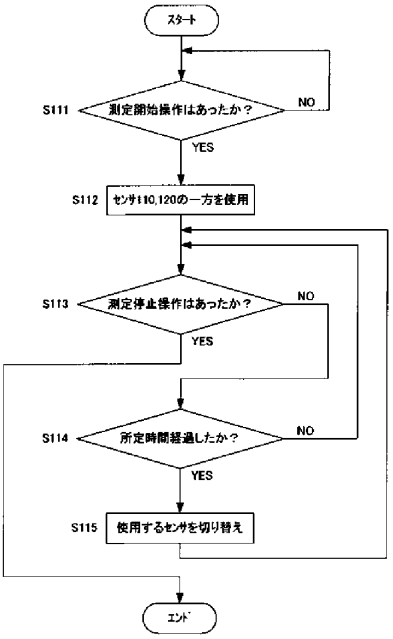
【図５Ｂ】



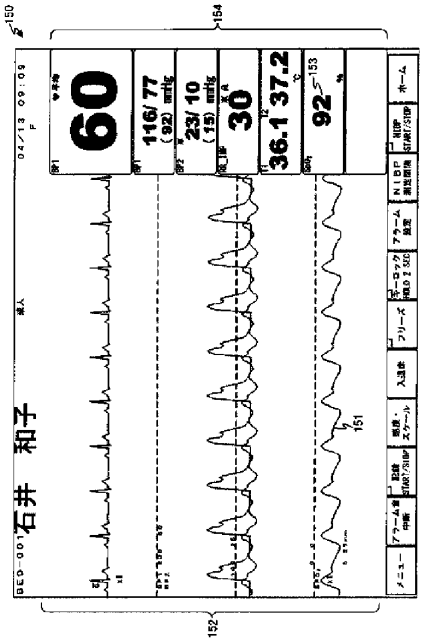
【図５Ｃ】



【図６】

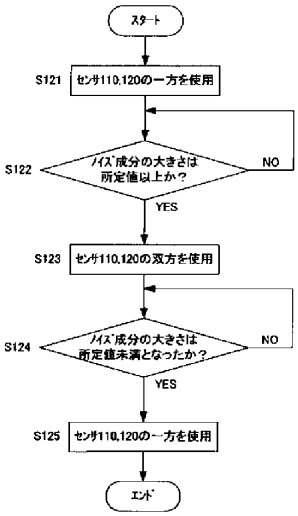


【図７】

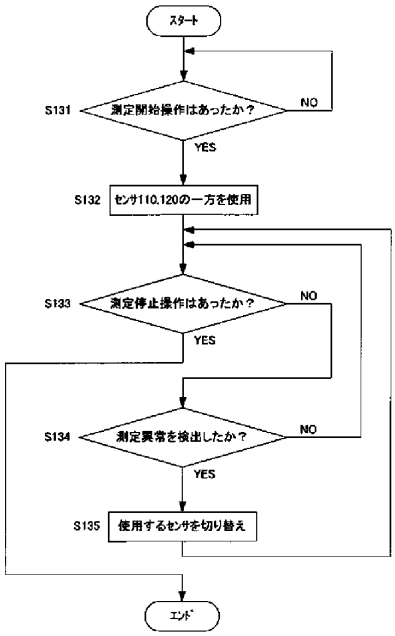


AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
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【図８】



【図９】



AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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Electronic Acknowledgement Receipt

EFS ID:	29813311
Application Number:	14599424
International Application Number:	
Confirmation Number:	3136
Title of Invention:	WELLNESS AGGREGATOR
First Named Inventor/Applicant Name:	Christopher D. Soli
Customer Number:	119082
Filer:	Randy Omid/Amy Spaag
Filer Authorized By:	Randy Omid
Attorney Docket Number:	106842130031 (P23397US3)
Receipt Date:	18-JUL-2017
Filing Date:	16-JAN-2015
Time Stamp:	13:43:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	106842130031_IDS_Communication_Translation.pdf	27176 224a401129ce00a95a2ad289fd302396824dc99b	no	2
Warnings:					

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	106842130031_170615___IDS_combined.pdf	47946 e3801689b78731491f1fbe26a09bbd6b2df49bee	no	4
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Information:					
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11	Other Reference-Patent/App/Search documents	14599425_FOA_5_19_2017.pdf	748931 b71f76317d0fa7c92dd1eb5beec63813cc89e667	no	24
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12	Other Reference-Patent/App/Search documents	104128685_TWNOA_05_03_2017.pdf	1255154 4e0aa36c5ec64ee030d77881a523fc6801cf8e4c	no	3
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13	Other Reference-Patent/App/Search documents	2016535045_JPOA_05_12_2017.pdf	1854446 71e7df89a1595f0560eed0dbd2b595ada48cff6f	no	10
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14	Other Reference-Patent/App/Search documents	1020167033638_KRNOA_05_31_2017.pdf	243335 831c77e512c154340312d8e86f59423c2cf34ca4	no	5
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16	Other Reference-Patent/App/Search documents	PA201770191_DKSR_06_30_2017.pdf	1735955 7f9a4b8ae50535829367 5df67d14928496567566	no	9
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17	Foreign Reference	JP_2011125633_A.pdf	807746 830950da83dad76759822f953fc143e44c7d90e3	no	16
Warnings:					
Information:					
		Total Files Size (in bytes):	21777973		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Atty. Docket No. 106842130031 (P23397US3)
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: Christopher D. SOLI
Application No.: 14/599,424
Filing Date: January 16, 2015
For: WELLNESS AGGREGATOR

Confirmation No.: 3136
Art Unit: 3686
Examiner: E. A. Lam

INFORMATION DISCLOSURE STATEMENT

Via: USPTO Electronic Filing System (EFS)

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

Dear Commissioner:

With regard to the above-referenced application, the items of information listed on the enclosed Form PTO/SB/08 are brought to the attention of the Examiner.

In accordance with 37 CFR § 1.98(a) (3), a concise explanation of the relevance of each non-English language document is as follows:

An English-language abstract or machine translation has been provided for all non-English language documents when available. English translation is not readily available for Non Patent Literature Document "Cite No. 3" on form PTO/SB/08. This Non Patent Literature Document was issued by the Taiwanese Patent Office in related Patent Application No. 104128685, on May 3, 2017.

No representation is made that a reference listed on the accompanying Form PTO/SB/08 is "prior art" within the meaning of 35 USC §102 and §103, and Applicants reserve the right, pursuant to 37 CFR §1.131 for example, to establish that the reference(s) are not "prior art."

The information contained in the Information Disclosure Statement under 37 CFR §1.97 and §1.98 is not to be construed as a representation that: (i) a complete search has been made; (ii) additional information material to the examination of this application does not exist; or (iii) the information, protocols, results and the like reported by third parties are accurate or enabling.

dn-193412

Consideration of the items listed is respectfully requested. Pursuant to the provisions of MPEP 609, it is requested that the Examiner return a copy of Form PTO/SB/08 submitted herewith, marked as being considered and made of record, to the undersigned with the next official communication.

Respectfully submitted,

Dated: July 18, 2017

/Randy Omid/
Randy Omid

Reg. No. 67,439

MORRISON & FOERSTER LLP
425 Market Street
San Francisco, CA 94105-2482
(415) 268-6111

dn-193412

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14599424
	Filing Date	2015-01-16
	First Named Inventor	Christopher D. SOLI
	Art Unit	3626
	Examiner Name	R. W. Morgan
	Attorney Docket Number	106842130031 (P23397US3)

U.S. PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

U.S. PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20060155578	A1	2006-07-13	Eisenberger et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	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]

NON-PATENT LITERATURE DOCUMENTS

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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1.	Non-Final Office Action received for U.S. Patent Application No. 14/839,916, mailed on May 01, 2017, 18 pages.	
	2.	Notice of Allowance received for Taiwanese Patent Application No. 104117509, mailed on March 31, 2017, 3 pages (Official Copy Only) (see attached 37 CFR § 1.98(a) (3)).	
	3.	Office Action received for Australian Patent Application No. 2015267240, mailed on April 10, 2017, 5 pages.	

EXAMINER SIGNATURE

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
1582 of 2716

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14599424
	Filing Date	2015-01-16
	First Named Inventor	Christopher D. SOLI
	Art Unit	3626
	Examiner Name	R. W. Morgan
	Attorney Docket Number	106842130031 (P23397US3)

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	14599424
	Filing Date	2015-01-16
	First Named Inventor	Christopher D. SOLI
	Art Unit	3626
	Examiner Name	R. W. Morgan
	Attorney Docket Number	106842130031 (P23397US3)

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	/Jordan Lofdahl/	Date (YYYY-MM-DD)	2017-05-11
Name/Print	Jordan Lofdahl	Registration Number	59,163

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.**

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
1584 of 2716

Electronic Acknowledgement Receipt

EFS ID:	29183287
Application Number:	14599424
International Application Number:	
Confirmation Number:	3136
Title of Invention:	WELLNESS AGGREGATOR
First Named Inventor/Applicant Name:	Christopher D. Soli
Customer Number:	119082
Filer:	Jordan Michael Lofdahl/Amy Spaag
Filer Authorized By:	Jordan Michael Lofdahl
Attorney Docket Number:	106842130031 (P23397US3)
Receipt Date:	11-MAY-2017
Filing Date:	16-JAN-2015
Time Stamp:	14:17:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	10684_2130031_IDS_Communication_Tran.pdf	27342 25f8a4639bb044e4e15c8f1c4a4b16dbbd2ead1c	no	2

Warnings:

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	10684_2130031_IDS.pdf	41145 7781cb57fac571977f955140bff2a228f33c6d38	no	3
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	14839916_NFOA_05_01_2017.pdf	655827 9ce4613833a4e5870282c9ed9fe9b4e90edecb9f	no	18
Warnings:					
Information:					
4	Non Patent Literature	104117509_TWNOA_03_31_2017.pdf	1212631 36292a03cfb0dccec21127a34568ed5e3a2f0520	no	3
Warnings:					
Information:					
5	Non Patent Literature	2015267240_AUOA_04_10_2017.pdf	600106 d924b4a39fa297f2735afecbfa144d8e13c787f1	no	5
Warnings:					
Information:					
		Total Files Size (in bytes):	2537051		

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.

Atty. Docket No. 106842130031 (P23397US3)
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: Christopher D. SOLI	Confirmation No.: 3136
Application No.: 14/599,424	Art Unit: 3626
Filing Date: January 16, 2015	Examiner: R. W. Morgan
For: WELLNESS AGGREGATOR	

INFORMATION DISCLOSURE STATEMENT

Via: USPTO Electronic Filing System (EFS)

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

Dear Commissioner:

With regard to the above-referenced application, the items of information listed on the enclosed Form PTO/SB/08 are brought to the attention of the Examiner.

In accordance with 37 CFR § 1.98(a) (3), a concise explanation of the relevance of each non-English language document is as follows:

An English-language abstract or machine translation has been provided for all non-English language documents when available. English translation is not readily available for Non Patent Literature Document "Cite No. 2" on form PTO/SB/08. This Non Patent Literature Document was issued by the Taiwanese Patent Office in related Patent Application No. 104117509, on March 31, 2017.

No representation is made that a reference listed on the accompanying Form PTO/SB/08 is "prior art" within the meaning of 35 USC §102 and §103, and Applicants reserve the right, pursuant to 37 CFR §1.131 for example, to establish that the reference(s) are not "prior art."

The information contained in the Information Disclosure Statement under 37 CFR §1.97 and §1.98 is not to be construed as a representation that: (i) a complete search has been made; (ii) additional information material to the examination of this application does not exist; or (iii) the information, protocols, results and the like reported by third parties are accurate or enabling.

dn-192230

Consideration of the items listed is respectfully requested. Pursuant to the provisions of MPEP 609, it is requested that the Examiner return a copy of Form PTO/SB/08 submitted herewith, marked as being considered and made of record, to the undersigned with the next official communication.

Respectfully submitted,

Dated: 5/11/17

/Jordan Lofdahl/
Jordan Lofdahl

Reg. No. 59,163

MORRISON & FOERSTER LLP
4200 Republic Plaza
370 Seventeenth Street
Denver, CO 80202-5638
P (303) 592-1500

dn-192230

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14599424
	Filing Date	2015-01-16
	First Named Inventor	Christopher D. SOLI
	Art Unit	3626
	Examiner Name	R. W. Morgan
	Attorney Docket Number	106842130031 (P23397US3)

U.S. PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

U.S. PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20170053542	A1	2017-02-23	Wilson et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	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]

NON-PATENT LITERATURE DOCUMENTS

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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1.	Advisory Action received for U.S. Patent Application No. 14/839,922, mailed on March 24, 2017, 4 pages.	
	2.	Intention to Grant received for Danish Patent Application No. PA201570668, mailed on March 27, 2017, 2 pages.	
	3.	International Preliminary Report on Patentability received for PCT Patent Application No. PCT/US2015/047282, mailed on March 16, 2017, 26 pages.	
	4.	International Search Report and Written Opinion received for PCT Patent Application No. PCT/US2016/037686, mailed on September 09, 2016, 19 pages.	

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
1589 of 2716

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14599424
	Filing Date	2015-01-16
	First Named Inventor	Christopher D. SOLI
	Art Unit	3626
	Examiner Name	R. W. Morgan
	Attorney Docket Number	106842130031 (P23397US3)

EXAMINER SIGNATURE			
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.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14599424
Filing Date	2015-01-16
First Named Inventor	Christopher D. SOLI
Art Unit	3626
Examiner Name	R. W. Morgan
Attorney Docket Number	106842130031 (P23397US3)

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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14599424
Filing Date	2015-01-16
First Named Inventor	Christopher D. SOLI
Art Unit	3626
Examiner Name	R. W. Morgan
Attorney Docket Number	106842130031 (P23397US3)

☐ 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	/Jordan Lofdahl/	Date (YYYY-MM-DD)	2017-05-10
Name/Print	Jordan Lofdahl	Registration Number	59,163

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.**

PATENT COOPERATION TREATY

ADVANCE E-MAIL

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

HO, Brian, B.
Morrison & Foerster LLP
425 Market Street
San Francisco, CA 94105-2482
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 16 March 2017 (16.03.2017)	
Applicant's or agent's file reference 106842127040	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2015/047282	27 August 2015 (27.08.2015)	02 September 2014 (02.09.2014)

Applicant
APPLE INC.

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Athina Nickitas-Etienne

e-mail: pct.team4@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 106842127040	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2015/047282	International filing date *(day/month/year)* 27 August 2015 (27.08.2015)	Priority date *(day/month/year)* 02 September 2014 (02.09.2014)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant APPLE INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 25 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☒	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 07 March 2017 (07.03.2017)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Athina Nickitas-Etienne e-mail: pct.team4@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2015/047282	27.08.2015	02.09.2014

International Patent Classification (IPC) or both national classification and IPC
INV. G06F19/00

Applicant
APPLE INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	see form PCT/ISA/210	Schechner-Resom, M Telephone No. +31 70 340-0

Form PCT/ISA/237 (Cover Sheet) (January 2015)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

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

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

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:

      ☐ in the form of an Annex C/ST.25 text file.

      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
1596 of 2716

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

☐ the entire international application

☒ claims Nos. 199-222, 354-374, 386, 387, 393, 398

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international search *(specify)*:

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*:

☒ no international search report has been established for the whole application or for said claims Nos. 199-222, 354-374, 386, 387, 393, 398

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

- ☐ furnish a sequence listing in the form of an Annex C/ST.25 text file, and such listing was not available to the International Searching Authority in the form and manner acceptable to it; or the sequence listing furnished did not comply with the standard provided for in Annex C of the Administrative Instructions.
- ☐ furnish a sequence listing on paper or in the form of an image file complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in the form and manner acceptable to it; or the sequence listing furnished did not comply with the standard provided for in Annex C of the Administrative Instructions.
- ☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13*ter*.1(a) or (b).

☒ See Supplemental Box for further details

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:

   ☒ paid additional fees

   ☐ paid additional fees under protest and, where applicable, the protest fee

   ☐ paid additional fees under protest but the applicable protest fee was not paid

   ☐ not paid additional fees

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

   ☐ complied with

   ☒ not complied with for the following reasons:

   see separate sheet

4. Consequently, this report has been established in respect of the following parts of the international application:

   ☐ all parts.

   ☒ the parts relating to claims Nos. 1-198, 223-353, 375-385, 388-392, 394-397

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Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	7-9, 11, 12, 14-20, 28-30, 32, 33, 35-41, 49-52, 55-62, 66, 67, 72-115, 119, 120, 122-128, 138, 139, 141-143, 155-157, 164-166, 169, 170, 172-174, 186-188, 194-196, 227-229, 231, 232, 234-240, 246-249, 252-259, 263, 264, 266-306, 310, 311, 313-319, 326, 327, 329-331, 343-345, 351-353, 380, 381, 390, 395
	No:	Claims	1-6, 10, 13, 21-27, 31, 34, 42-48, 53, 54, 63-65, 68-71, 116-118, 121, 129-137, 140, 144-154, 158-163, 167, 168, 171, 175-185, 189-193, 197, 198, 223-226, 230, 233, 241-245, 250, 251, 260-262, 265, 307-309, 312, 320-325, 328, 332-342, 346-350, 375-379, 382-385, 388, 389, 391, 392, 394, 396, 397
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-198, 223-353, 375-385, 388-392, 394-397
Industrial applicability (IA)	Yes:	Claims	1-198, 223-353, 375-385, 388-392, 394-397
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

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Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

As the fees have only been paid for the 5 first inventions, claims 199-222, 354-374, 386, 387, 393, 398 have not been searched and will not be discussed in the following.

Re Item IV

Lack of unity of invention

1.1 This Authority considers that the application does not meet the requirements of unity of invention and that there are 6 inventions covered by the claims. These inventions correspond to the six sets of claims also noted by the Applicant in his response to the invitation to provide informal clarification. The different inventions are the following:

Invention 1: claims: 1-46, 223-243, 375-377, 388

Apparatus and method to track two types of user physical activities of a user based on sensor data, and display performance vs. goals.

Invention 2: claims: 47-71, 244-265, 378, 379, 389, 394

Apparatus and method to track user physical activity further considering inactivity periods by means of a timer.

Invention 3: claims: 72-115, 266-306, 380, 381, 390, 395

Apparatus and method to track two types of user physical activities further considering inactivity periods, based on sensor data.

Invention 4: claims: 116-135, 307-323, 382, 383, 391, 396

Apparatus and method to track three types of user physical activity and display of the three activities, based on sensor data.

Invention 5: claims: 136-198, 324-353, 384, 385, 392, 397

Apparatus and method to assist a user in setting fitness goals.

Invention 6: claims: 199-222, 354-374, 386, 387, 393, 398

Apparatus and method to review historical data of user physical activities.

1.2 The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows:

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The only possible common feature of claims 1-398 is a method and an apparatus to display user physical activity, by means of a user interface. Inventions 1-4 further comprise sensors. These common features are well-known in the prior art and therefore can not form the required link between the above-mentioned inventions. An example of prior art comprising such features is US 2014/239065 A1 (ZHOU TIGER T G [US] ET AL) 28 August 2014 (2014-08-28).

Since inventions 1 to 6 have no common special technical features, nor do they solve a common problem, these inventions do not form a single inventive concept and do not have unity of invention as required by Rule 13.2 PCT.

As four additional inventions have been paid for the first 5 inventions, the first 5 inventions have been searched and will be discussed in the following.

Invention 1: claims: 1-46, 223-243, 375-377, 388

Apparatus and method to track two types of user physical activities of a user based on sensor data, and display performance vs. goals.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1.3 Reference is made to the following documents:

D1	US 2014/239065 A1 (ZHOU TIGER T G [US] ET AL) 28 August 2014 (2014-08-28)
D2	US 2014/139637 A1 (MISTRY PRANAV [US] ET AL) 22 May 2014 (2014-05-22)
D3	US 2014/244009 A1 (MESTAS ALEX [US]) 28 August 2014 (2014-08-28)
D4	US 2013/203475 A1 (KIL DAVID H [US] ET AL) 8 August 2013 (2013-08-08)

Claims 1-23 (apparatus)

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2 The present application does not meet the requirements of Article 33(1) PCT because the subject-matter of claim 1 is not novel under Article 33(2) PCT.

2.1 Following as much as possible the wording of the claim, document D1 discloses (the references in parenthesis applying to this document):

An electronic device comprising:
a sensor configured to detect movement associated with the electronic device and generate activity data based on the detected movement **(paragraph 0020 "biometric data [...] one or more sensors [...] GPS and/or one or more accelerometers");**

a display **(paragraph 0019 "display");**

a non-transitory computer readable storage medium comprising instructions for:
determining that a physical activity has been performed by a user wearing the electronic device, based on the activity data received from the sensor **(paragraph 0049 "motion sensor"; see also paragraph 0089 "continuously monitor biometric parameters");**

determining whether the physical activity corresponds to a first type based on a first set of criteria and
determining whether the physical activity corresponds to a second type based on a second set of criteria **(paragraph 0050 "identify user activities, identify a specific motion fingerprint of an exercise"; see also paragraph 0049 "boxing, fencing basketball [etc]");**

in response to determining that the physical activity corresponds to the first type, updating a first value stored in a memory based on the activity data;
in response to determining that the physical activity corresponds to the second type, updating a second value stored in the memory based on the activity data **(paragraph 0043 "calculating [...] steps and/or distance walked";**

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paragraph 0050 "count repetitions"; see also paragraph 0044 processed by the processor to receive historical or averaged biometric data");

displaying a first indicator representative of the first value, the first value representing an aggregate amount of the first type of physical activity detected from the sensor over a period of time, and displaying a second indicator representative of the second value, the second value representing an aggregate amount of the second type of physical activity detected from the sensor over the period of time **(paragraph 0044 "the biometric parameters [...] may be shown on the display")**; and

one or more processors operatively coupled to the sensor, the non-transitory computer readable storage medium, and the display, wherein the one or more processors are capable of executing the instructions of the non-transitory computer-readable storage medium **(paragraphs 0023-0024 "a processor, memory unit [...] local processing performed by the processor using various software applications installed on the WPD device").**

2.2 The additional features defined in the following claims are also anticipated in D1 and therefore they are not novel in the sense of Article 33(2) PCT. The relevant passages in D1 are the following:

- Claims 2-4 (sensors): see cited passages for claim 1.

- Claim 5 (steps): Paragraph 0043 "steps".

- Claims 6, 13 (calories): Paragraph 0043 "calories burned".

- Claim 10 (3rd type of activity): see cited passages for claim 1, several activities can be identified.

- Claim 21 (remote connections): Paragraph 0021 discloses network connectivity; see also paragraph 0087

- Claim 22 (touch display): paragraph 0024 "touchscreen display"

- Claim 23 (a watch): Figure 1.

2.3 The additional features defined in the following claims are not considered to involve an inventive step (Article 33(3) PCT) for the following reasons:

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- Claim 7 (speed): Document D1, paragraph 0043 "distance walked". measuring speed is well-known in the art, see document D3.

- Claims 8, 9,11, 12 (subsets of other types): The defined relationships between 1st and 2nd activity types are considered straightforward alternatives and therefore not inventive.

- Claims 14, 15 (aggregates, image/text): Well-known in the art, see document D3, figures 126A-C and 127 A-C as an example.

- Claim 16 (display value vs. goal): Document D1 defines goals (paragraph 0087). Displaying current performance with goals is not deemed inventive in view of D3, see for example figure 126B.

Claims 17, 18 (rings, bars): Known in the art. See cited passages in the search report for D3 as an example, in particular figures 94A-D, 126A-C, 127A-C.

- Claim 19 (goal increase): Known in the art, see D3, paragraph 0325 as an example.

- Claim 20 (1day): Known in the art. See D3, figure 119.

2.4 The attention is further drawn to document D2, in view of which the claimed subject-matter is not considered inventive under Article 33(3) PCT.

3 **Claims 24-44 (method)**

3.1 The features of method claim 24 are a combination of the corresponding apparatus features of claims 1 and 2. Therefore, the same objections apply, mutatis mutandis, to the subject-matter of independent claim 24, which is therefore considered not novel under Article 33(2) PCT.

3.2 The objections raised for claims 4-23 apply, mutatis mutandis, to the subject-matter of claims 245-44, which are therefore considered not novel (Art. 33(2) PCT or not inventive (Art. 33(3) PCT) correspondingly.

4 **Claims 45, 46, 223-243, 375-377, 388 (device)**

4.1 The objections raised for independent claim 1 apply, mutatis mutandis, to the subject-matter of independent claims 45, 46 , 223, 375-377, 388, which are therefore considered not novel under Article 33(2) PCT.

4.2 The objections raised for claims 2-23 apply, mutatis mutandis , to the subject-matter of dependent claims 224-243 which are therefore considered not novel (Article 33(2) PCT) or not inventive (Article 33(3) PCT) correspondingly.

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5 **Article 6 PCT**

5.1 Although claims 1, 46, 223, 375, 377 and 388 have been drafted as separate independent apparatus claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Art. 6 PCT.

Invention 2: claims: 47-71, 244-265, 378, 379, 389, 394

Apparatus and method to track user physical activity further considering inactivity periods by means of a timer.

6 Reference is made to the following document:

D5 US 2006/052727 A1 (PALESTRANT LAURENCE [US]) 9 March 2006 (2006-03-09)

D3 US 2014/244009 A1 (MESTAS ALEX [US]) 28 August 2014 (2014-08-28)

7 The present application does not meet the criteria of Article 33(2) PCT, because the subject-matter of claims 47, 69, 70, 71, 244, 378, 379, 389, 394 is not new.

7.1 D5 discloses:

A computer-implemented method comprising:

- receiving, from a sensor **(see fig. 3(44))**, activity data that is representative of physical activity performed by a user detected by the sensor **(see par 0031);**

- controlling an inactivity timer that measures a length of time that the user is inactive based on the activity data **(see par 0032),**

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- wherein controlling the inactivity timer comprises resetting a value of the inactivity timer in response to determining, based on the activity data, that the user has performed a threshold amount of activity **(see par 0063, fig. 6 (102)(104)(106) "RESET STATIONARY INTERVAL TIMER");** and

- displaying an inactivity tracking interface, wherein the inactivity tracking interface comprises a visual representation of the value of the inactivity timer **(see fig. 4 "50 MIN TOTAL MOVEMENT PER 60 MIN MONITORING PERIOD" gives directly the inactivity time, i.e. 10 MIN, therefore this is merely one way of displaying the inactivity count).**

7.2 Therefore independent claim 47 is not new (Art. 33(2) PCT.

7.3 The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claims 69, 70, 71, 244, 378, 379, 389, 394 which therefore are also considered not new.

8 Dependent claims 48, 53, 54, 63-65, 68, 245, 250, 251, 260-262, 265 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (Art 33(2) PCT).

- Claim 48, 245: **see fig. 6**, **"after pausing the inactivity timer updating an amount of detected activity to include the physical activity performed by the user"**

- Claims 53, 54, 250, 251 (display of detected activity): **see fig. 4(70)(78) "TOTAL MOVEMENT TIME"**

- Claims 63, 260 (start and pause the inactivity timer): **see fig. 6**

- Claims 64, 65, 261, 262: **see par 0063**

- Claims 68, 265: **see par 0030**

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9 Dependent claims 49-52, 55-62, 66, 67, 246-249, 252-259, 263, 264 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Art. 33(3) PCT).

- Claims 49, 246 (user has reached threshold amount of activity): known in the art, see **D3** as an example, in particular **figures 94A-D**

- Claims 50, 52, 247, 249 (reset amount of activity detected when threshold amount of activity is reached): These features are merely obvious and well-known implementations for the person skilled in the art depending on circumstances without the need of inventive skill.

- Claims 51, 248 (threshold amount is 100 steps): It is well-known in the art to adjust the threshold amount, see for example **D3** for threshold, **fig 90A(9003)**

- Claims 55-57, 62, 252-254, 259 (display rings): Known in the art. See cited passages in the search report for **D3** as an example, in particular **figures 94A-D, 126A-C, 127A-C, 128 C**

- Claims 58, 59, 60, 61, 66, 67, 255-258 , 263, 264 (inactivity timer second image/text, store and reset values): These features are merely obvious implementations for the person skilled in the art depending on circumstances without the need of inventive skill.

Article 6 PCT

10 The present application does not meet the requirements of Article 6 PCT for the following reasons:

10.1 Although claims **47, 69, 70, 71, 244, 378, 379, 389, 394** have been drafted as separate independent apparatus claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Art. 6 PCT.

10.2 The term **"threshold"** first used in claim 47 is used for different technical meanings in the claims, i.e. referring to a **"threshold"** from which on movement is considered physical activity and below as inactivity as well as a personal user **"threshold"** referring to a user goal of an amount of physical

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activity wished for **(see for example 49)**. The usage of the same term for different types of thresholds is unclear and leaves the reader in doubt about the exact scope of protection sought.

Invention 3: claims: 72-115, 266-306, 380, 381, 390, 395

Apparatus and method to track two types of user physical activities further considering inactivity periods, based on sensor data.

11 Reference is made to the following documents:

D3 US 2014/244009 A1 (MESTAS ALEX [US]) 28 August 2014 (2014-08-28)

D5 US 2006/052727 A1 (PALESTRANT LAURENCE [US]) 9 March 2006 (2006-03-09)

D6 US 2013/184613 A1 (HOMSI KRISTOPHER L [US] ET AL) 18 July 2013 (2013-07-18)

12 Furthermore, the below-mentioned lack of clarity notwithstanding, the subject-matter of claims 72, 113-115, 266, 380, 381, 390, 395 is not inventive in the sense of Article 33(3) PCT, and the criteria of Article 33(1) PCT are therefore not met.

12.1 D6 discloses:

A computer-implemented method comprising:
determining, using one or more processors, that a physical activity has been performed by a user wearing an electronic device, based on activity data generated by a sensor of the electronic device **(see fig. 1A and par 0040);**

determining whether the physical activity corresponds to a first type based on a first set of criteria or whether it corresponds to a second type based on a second set of criteria **(see fig. 3(302), par 0042, 0044);**

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in response to determining that the physical activity corresponds to the first type, updating a first value, stored in a memory device, based on the activity data **see fig. 3(312), see par 0059);**

in response to determining that the physical activity corresponds to the second type, updating a second value, stored in the memory device, based on the activity data **(see fig. 3(312), furthermore the system of D6 allows for different point totals for different games/activities "The user may earn two different point totals for the two different games and a third point total for their overall energy expenditure. Some point totals may be maintained separate from an overall point total." (see par 0055));**

controlling an inactivity timer that measures a length of time that the user is inactive based on the activity data **(see par 0068)**, wherein controlling the inactivity timer comprises:

resetting a value of the inactivity timer in response to determining, based on the activity data, that the user has performed a threshold amount of activity **(Par 0068 states that several non-consecutive periods of inactivity are measured. This implies that the inactivity timer can be used to add up a total inactive time as well as count each inactive period separately, i.e. reset one part of the inactivity counter every time a threshold amount of activity is measured);**

incrementing the value of an inactivity counter in response to the value of the inactivity timer reaching an inactivity threshold **(see par 0061);** and

resetting the value of the inactivity timer in response to the value of the inactivity timer reaching an inactivity threshold **(see par 0068);** and

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displaying:

indicators representative of aggregate amounts of different physical activity detected from the sensor over the period of time **(see par 0058)**

and indicators representative of the value of the inactivity counter **(see par 0068)**

12.2 Therefore the only difference between D6 and independent claim 72 is that in claim 72 the three indicators are shown on the display at the same time.

12.3 The feature of independent claim 72 to display all calculated indicators to a user on a display at one time is however well-known, also in the field of monitoring different types of physical activities of a user (see for example D3, figs. 124-130c). It is therefore obvious and straightforward for the person skilled in the art to implement this way of displaying the indicators into the system of D6 depending on user wishes and circumstances without using inventive skill.

12.4 Therefore independent claim 72 is not inventive.

12.5 The same objection as for independent claim 72 applies mutatis mutandis to independent claims 113 (additional touch display **see D6, par 0019)**, 114, 115, 266, 380, 381, 390, 395 which are therefore also not inventive.

13 Dependent claims 73-112, 267-306 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Art 33(3) PCT).

- Claims 73-76, 267-270 (steps, walking, running...): **D6, par 0040, 0044**

- Claims 77-81, 83-85,88, 98-106, 110, 111, 271-275, 277-279, 282, 292-300, 304, 305: These features are obvious and straightforward for the person skilled in the art to implement and do not necessitate inventive skill **(see for example D3, figs. 124-130)**

- Claims 82, 276 (calories): **see D6, par 0048-0052**

- Claims 86, 87, 280, 281 (rings, bars): Known in the art. See cited passages in the search report for **D3** as an example, in particular **figures 94A-D, 126A-C, 127A-C, 128C**

- Claims 89, 283(day): **D6, par 0059**

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- Claims 90, 284 (remotely located devices): **D6, par 0027, fig. 1A**

- Claims 91, 285 (touch display): **D6, par 0019**

- Claims 92, 286 (watch): **D6, par 0031**

- Claims 93, 287 (pausing inactivity timer): **D5, see fig. 6, "after pausing the inactivity timer updating an amount of detected activity to include the physical activity performed by the user"**

- Claims 94, 288 (user has reached threshold amount of activity): known in the art, see **D3** as an example, in particular **figures 94A-D**

- Claims 95, 289(reset amount of activity detected when threshold amount of activity is reached): These features are merely obvious implementations for the person skilled in the art depending on circumstances without the need of inventive skill.

- Claims 96, 290 (threshold amount is 100 steps): It is well-known in the art that the user may input whatever threshold amount is desired, see for example **D3 for threshold, fig 90A(9003**)

- Claims 97, 107-109, 291, 301-303 (resetting amount of activity/inactivity timer start): **D6, pars 0064, 0068**

- Claims 112, 306 (types of sensors): **D6, par 0020, 0027**

Article 6 PCT

14 The application does not meet the requirements of Article 6 PCT for the following reasons:

14.1 Although claims **72, 113, 114, 115, 266, 380, 381, 390, 395** have been drafted as separate independent apparatus claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Art. 6 PCT.

14.2 The same objection as above **(see paragraph 11.2)** applies to the term **"threshold"** first used in independent claim 72 for the third invention.

14.3 The term **"inactivity"** in the third invention first used in independent claim 72 is very unclear and does not allow the reader to deduce the exact technical meaning of it.

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The same objection also applies to the **"resetting"** first used in independent claim 72.

Invention 4: claims: 116-135, 307-323, 382, 383, 391, 396

Apparatus and method to track three types of user physical activity and display of the three activities, based on sensor data.

15 Reference is made to the following documents:

D7 US 2013/106684 A1 (WEAST AARON B [US] ET AL) 2 May 2013 (2013-05-02)

16 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 116, 133-135, 307, 382, 383, 391, 396 is not new in the sense of Article 33(2) PCT.

16.1 D7 discloses:

A computer-implemented method comprising:
at one or more processors of an electronic device:
displaying an activity indicator, wherein the activity indicator comprises **(see par 0371-0373) :**
a first indicator representative of an aggregate amount of a first type of physical activity performed by a user over a period of time **(see fig. 124 C BIKE 130);**
a second indicator representative of an aggregate amount of a second type of physical activity performed by the user over a period of time**(see fig. 124 C RUN 243);** and
a third indicator representative of an aggregate amount of a third type of physical activity performed by the user over a period of time **(see fig. 124 C WALK 527);**
receiving, from a sensor of the electronic device, activity data representing movement associated with the electronic device **(see par 0370);** and
updating the aggregate amount of the first type of physical activity, the aggregate amount of the second type of physical activity, and the aggregate amount of the third type of physical activity based on the activity data **(see fig. 124 C, par 0373).**

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16.2 Therefore independent claim 116 is not new.

16.3 The same reasoning applies mutatis mutandis to independent claims 133 (additionally: touch sensitive display **par 0222)**, 134, 135, 307, 382, 383, 391, 396 which are therefore also not considered new.

17 Dependent claims 117, 118, 121, 129, 130-132, 308, 309, 312, 320-323 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (Art 33(2) PCT).

- Claims 117-118, 308, 309 (aggregates of calories, minutes spent): **see fig. 130C, 126C**

- Claims 121, 312 (day): **see fig. 124 C**

- Claims 130, 131, 132, 321-323 (updating the aggregates): **implicitly disclosed in figs. 124-130**

- Claims 129, 320 (concentric ring display): **see fig. 126 C**

18 Dependent claims 119, 120, 122-128, 310, 311, 313-319 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Art. 33(3) PCT).

- Claims 119, 120, 128, 310, 311, 319 (display types): These features are well-known display options that the person skilled in the art would implement without the exercising inventive activity.

- Claims 122-127, 313-318: As far as these claims can be understood they refer to commonplace features the person skilled in the art would implement according to circumstances without exercising inventive activity.

Article 6 PCT

19 The application does not fulfil the requirements of Article 6 PCT for the following reasons:

19.1 Although claims **116, 133, 134, 135, 307, 382, 383, 391, 396** have been drafted as separate independent apparatus claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/

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or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Art. 6 PCT.

19.2 The definition of the term **"set of criteria"** first used in claims 122-126, 313-318 are very unclear and do not allow the reader to deduce the exact technical meaning associated with them.

Invention 5: claims: 136-198, 324-353, 384, 385, 392, 397

Apparatus and method to assist a user in setting fitness goals.

20 Reference is made to the following documents:

D3 US 2014/244009 A1 (MESTAS ALEX [US]) 28 August 2014 (2014-08-28)

D8 US 2011/261079 A1 (INGRASSIA JR MICHAEL [US] ET AL) 27 October 2011 (2011-10-27)

21 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 136, 167, 197, 198, 324, 384, 385, 392, 397 is not new in the sense of Article 33(2) PCT.

21.1 D8 discloses:

An electronic device **(see fig. 1)** comprising:

one or more activity sensors configured to detect movement associated with the electronic device and generate activity data based on the detected movement **(see fig. 1 (110), par 0034, 0035);**

a display **(par 0029);**

a non-transitory computer readable storage medium comprising instructions **(see par 0029)** for:

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receiving an identification of a type of workout to be performed, wherein the type of workout is associated with a plurality of workout attributes **(see par 0039, 0040);**

receiving a goal for the type of workout, wherein the goal comprises an identification of a first workout attribute of the plurality of workout attributes and a goal value for the first workout attribute **(see par 0058);**

determining a current value of the first workout attribute and a current value of a second workout attribute of the plurality of workout attributes based on activity data from at least a portion of the one or more activity sensors **(see par 0052, fig. 8);**

displaying **(see fig. 9):**

a display of a first indicator representative of the current value of the first workout attribute relative to the goal value for the first workout attribute **(see par 0052, 0054);** and

a display of a second indicator representative of the current value of the second workout attribute **(see par 0052, fig 8);** and

one or more processors operatively coupled to the one or more activity sensors, the non-transitory computer readable storage medium, and the display, wherein the one or more processors are capable of executing the instructions of the non-transitory computer-readable storage medium **(see par 0029, fig. 1).**

21.2 Therefore independent claim 136 is not new.

21.3 The same reasoning as for independent claim 136 applies mutatis mutandis to independent claims 167, 197 (additionally with a touch-sensitive display, **see par 0032 of D8)**, 198,324, 384, 385, 392 and 397.

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22 Dependent claims 137, 140, 144-154, 158-163, 168, 171, 175-185, 189-193, 325, 328, 332-342, 346-350 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (Art 33(2) PCT).

- Claims 137, 140, 168, 171, 325, 328 (selection of workout type): **see figs. 2, 3**

- Claims 144, 175, 332 (sensor types): **see pars 0034-0036**

- Claims 145, 146, 176, 177, 333, 334 (adjust goal value): **see par 0027**

- Claims 147, 178, 335 (run, walk, ...): **see par 0038**

- Claims 148, 179, 336 (distance, pace, calories...): **see par 0056**

- Claims 149-154, 162, 180-185, 193, 337-342, 350 (display of goal achievement, workout attributes): **see figs. 4, 6-8, 10**

- Claims 158, 159, 189, 190, 346, 347 (display with previous performances)**: see fig. 8, par 0053**

- Claims 160, 191, 348 (activation of sensors): **see par 0041**

- Claims 161, 192, 349 (update display) : **see par 0062, 0063**

- Claims 163 (watch): **see par 0046**

23 Dependent claims 138, 139,141-143, 155-157, 164-166, 169, 170, 172-174, 186-188, 194-196, 326, 327, 329-331, 343-345, 351-353 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Art. 33(3) PCT).

- Claims 138-139, 141-143, 156, 157, 169, 170, 172-174, 187, 188, 326, 327, 329-331, 344, 345 (display): These are merely well-known option of several straightforward well-known display possibilities for the person skilled in the art

- Claims 155, 186, 343 : As far as these claims can be understood they refer to commonplace features the person skilled in the art would implement according to circumstances without exercising inventive activity.

- Claims 164-166, 194-196, 351-353 (reward display, share): It is well-known in the art to display reward messages, share them with contacts, have contacts with profile images **(see D3, fig. 116, 136A-C, par 0336, 0360)**.

Article 6 PCT

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24 The current application does not meet the requirements of Art. 6 PCT for the following reasons:

24.1 Although claims 136, 167, 197, 198, 324, 384, 385, 392 and 397 have been drafted as separate independent apparatus claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/ or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Art. 6 PCT.

24.2 The term **"workout attribute"** first used in independent claim 136 is unclear and vague and a clear technical meaning cannot be deduced from it.

24.3 There is no clear technical distinction that can be made between claims 145 and 146 and claims 176, 177,333 and 334 merely the wording is different. Therefore unclarity is introduced as it is not clear what the difference in the sought scope of protection of these claims is.

24.4 The meaning of dependent claims 155, 186, 343 to **"updating the display of the time indicator to represent a time other than the current time in response to receiving a selection of the time indicator"** is very unclear does not allow the reader to clearly deduce the scope of protection sought by this claim.

Re Item VIII

Certain observations on the international application

25 To mee the requirements of Rule 6.3(b) PCT, the independent claims should be in the two part form, with those features which in combination are part of the closest prior art being placed in the preamble.

26 The relevant prior art should be identified in the description (Rule 5.1(a)(ii) PCT).

27 It is further noted that, under certain jurisdictions, computer storage medium (storing computer programs) are considered computer programs "as such" and therefore excluded from patentability.

28 To mee the requirements of Rule 6.3(b) PCT, the independent claims should be in the two part form, with those features which in combination are part of the closest prior art being placed in the preamble.

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29 The description should be brought into conformity with the claims (Rule 5.1 (a)(ii)(iii)PCT).

30 The relevant prior art should be identified in the description (Rule 5.1(a)(ii) PCT).

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PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: BRIAN B. HO
MORRISON & FOERSTER LLP
425 MARKET STREET
SAN FRANCISCO, CA 94105-2482

PCT

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

(PCT Rule 44.1)

	Date of mailing *(day/month/year)* 09 SEP 2016
Applicant's or agent's file reference 106842137040	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US 16/37686	International filing date *(day/month/year)* 15 June 2016 (15.06.2016)
Applicant APPLE INC.	

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

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

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   How? Directly to the International Bureau of WIPO preferably through ePCT or on paper to, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

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

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

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.
   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

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

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

   Within **19 months from the priority date, the applicant may request that a supplementary international search be carried out** by a different International Searching Authority that offers this service (Rule 45*bis*.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Lee W. Young PCT Helpdesk: 571-272-4300 Telephone No. PCT OSP: 571-272-7774

Form PCT/ISA/220 (July 2014)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 106842137040	**FOR FURTIIER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 16/37686	International filing date *(day/month/year)* 15 June 2016 (15.06.2016)	(Earliest) Priority Date *(day/month/year)* 20 August 2015 (20.08.2015)
Applicant APPLE INC.		

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

This international search report consists of a total of 8 sheets.

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

1. **Basis of the report**

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

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

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

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

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

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

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

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

   ☒ the text is approved as submitted by the applicant.

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

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

   ☒ the text is approved as submitted by the applicant.

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

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

   a. the figure of the **drawings** to be published with the abstract is Figure No. 56A

   ☒ as suggested by the applicant.

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

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

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

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 16/37686

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A63B 71/00 (2016.01)
CPC - A63B 24/0075
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8): A63B 71/00 (2016.01); CPC: A63B 24/0075

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 482/9, 482/8, 434/247;
IPC(8): A63B 71/00 (2016.01); CPC: A63B24/0075, A63B24/0062, A63B2225/20, A63B2230/06, A63B2024/0078

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase, ProQuest Dialog, Google Web, Google Patents (Search terms: watch, timepiece, workout, exercise, weather, recommend, apparel, clothing, brand, purchase history, do not disturb, DND, autoreply, pedometer, biometric, heart, sensor, touch, update avatar, forecast, affordance, icon, application, calendar, stopwatch, etc.)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2011/0003665 A1 (Burton et al.) 06 January 2011 (06.01.2011), para. [0044]-[0045], [0050], [0054], [0063]-[0064], [0091], [0104], [0107], [0111], [0114], [0118], [0121], [0132], [0171], [0174], [0178], [0187], [0195], [0200]-[0201], [0206], [0235], [0246], [0255], [0272], and [0279], and Figs. 2, 9-10, 16-18, 86c, and 119.	1-23, 26-38, 42-44, 46-82, 85-97, 101-103, 105-108 --- 24-25, 39-41, 45, 83-84, 98-100, 104
Y	US 2014/0344723 A1 (Malik et al.) 20 November 2014 (20.11.2014), para. [0038], [0132], and [0201].	24-25, 83-84
Y	US 2014/0245161 A1 (Yuen et al.) 28 August 2014 (28.08.2014), para. [0068] and [0148].	39-41, 45, 98-100, 104
Y	US 2014/0282153 A1 (Christiansen et al.) 18 September 2014 (18.09.2014), para. [0160], [0229], and [0274]-[0278].	40-41, 99-100
A	US 2011/0230986 A1 (Lafortune et al.) 22 September 2011 (22.09.2011) (entire document).	1-108

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 August 2016 (17.08.2016)	09 SEP 2016
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (January 2015)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: BRIAN B. HO
MORRISON & FOERSTER LLP
425 MARKET STREET
SAN FRANCISCO, CA 94105-2482

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	09 SEP 2016
Applicant's or agent's file reference 106842137040	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 16/37686	15 June 2016 (15.06.2016)	20 August 2015 (20.08.2015)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - A63B 71/00 (2016.01)
CPC - A63B 24/0075

Applicant APPLE INC.

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 *bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	17 August 2016 (17.08.2016)	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 16/37686

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

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

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

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

a. ☐ forming part of the international application as filed:

☐ in the form of an Annex C/ST.25 text file.

☐ on paper or in the form of an image file.

b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

AliveCor Exhibit 1002
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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 16/37686

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	24-25, 39-41, 45, 83-84, 98-100, 104	YES
	Claims	1-23, 26-38, 42-44, 46-82, 85-97, 101-103, 105-108	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-108	NO
Industrial applicability (IA)	Claims	1-108	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-23, 26-38, 42-44, 46-82, 85-97, 101-103, and 105-108 lack novelty under PCT Article 33(2) as being anticipated by US 2011/0003665 A1 to Burton et al. (hereinafter "Burton").

Regarding claim 1, Burton teaches a method (Burton, para. [0187]), comprising: at an electronic device with a display (Burton, para. [0050] and [0063], and Figs. 2 and 18): displaying a user interface screen on the display (Burton, para. [0050] and Fig. 2), the user interface screen including: a user interface object indicating a time of day (Burton, para. [0050] and [0121], and Figs. 2 and 86c); and an affordance representing a workout application (Burton, para. [0050] and [0121], and Figs. 2 and 86c), wherein the affordance is displayed as a complication associated with the user interface object (Burton, para. [0050] and [0121], and Figs. 2 and 86c); detecting a user input corresponding to a selection of the affordance (Burton, para. [0054]); and in response to detecting the user input: beginning a workout routine (Burton, para. [0064]).

Regarding claim 2, Burton further teaches comprising: in response to detecting the user input: launching the workout application (Burton, para. [0064]).

Regarding claim 3, Burton further teaches comprising: displaying on the display a second affordance, wherein the second affordance represents a second application, the second application being different from the workout application (Burton, para. [0114] and [0174], and Fig. 119), and wherein the second affordance is displayed as a complication associated with the user interface object (Burton, para. [0195]).

Regarding claim 4, Burton further teaches wherein the second affordance represents a second application selected from the group consisting of a weather application (Burton, para. [0195]), a calendar application, a pedometer application (Burton, para. [0195]), a stopwatch application, and a world clock application.

Regarding claim 5, Burton further teaches wherein the second affordance represents a pedometer application, wherein the second affordance comprises a set of information obtained from the pedometer application, and wherein the set of information is updated in accordance with data from the pedometer application (Burton, para. [0195]).

Regarding claim 6, Burton further teaches comprising: detecting a second user input corresponding to a selection of the second affordance; in response to detecting the second user input: launching the pedometer application (Burton, para. [0064]).

Regarding claim 7, Burton further teaches wherein the set of information comprises one or more indications of distanced traveled, number of steps taken (Burton, para. [0201]), energy expended, or a combination thereof.

Regarding claim 8, Burton further teaches wherein at least a first indication of the one or more indications reflects a unit of measurement (Burton, para. [0118] and Fig. 2).

Regarding claim 9, Burton further teaches wherein at least a first indication of the one or more indications reflects a fraction of a predetermined goal (Burton, para. [0206]).

Regarding claim 10, Burton further teaches wherein the display is a touch-sensitive display (Burton, para. [0054]), and wherein detecting the user input corresponding to a selection of the affordance comprises: detecting a contact on the displayed affordance (Burton, para. [0054]).

Regarding claim 11, Burton further teaches wherein the electronic device comprises an activity sensor (Burton, para. [0045]), and wherein detecting the user input corresponding to a selection of the affordance comprises: detecting an indication of user physical activity that meets an activity criterion based on activity data generated by the activity sensor (Burton, para. [0045]).

Regarding claim 12, Burton further teaches wherein the activity sensor is configured to detect one or more types of physical activity, the one or more types of physical activity comprising walking (Burton, para. [0114]), running (Burton, para. [0045]), going up stairs, or jumping.

(See Continuation Box)

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box V.2. Citations and explanations:

Regarding claim 13, Burton further teaches wherein the activity criterion comprises one or more of a minimum number of steps taken per unit time, an amount of Calories burned per unit time, or a speed (Burton, para. [0045]).

Regarding claim 14, Burton further teaches wherein the activity criterion comprises an increase in user heart rate (Burton, para. [0045]).

Regarding claim 15, Burton further teaches wherein detecting the user input corresponding to a selection of the affordance further comprises: after detecting the indication of user physical activity that meets the activity criterion: providing a user prompt for confirming a user workout (Burton, para. [0178]); and detecting a user input corresponding to a confirmation of the user workout (Burton, para. [0178]).

Regarding claim 16, Burton further teaches wherein the workout routine is based on one or more workout parameters comprising duration of time, distance, number of steps, heart rate (Burton, para. [0121]), number of Calories burned (Burton, para. [0107]), or a combination thereof.

Regarding claim 17, Burton further teaches comprising: in response to detecting the user input: displaying on the display a value corresponding to the one or more workout parameters (Burton, para. [0107]).

Regarding claim 18, Burton further teaches comprising, after displaying the value corresponding to the first workout parameter: updating the displayed value to reflect user progress with respect to the one or more workout parameters (Burton, para. [0111]).

Regarding claim 19, Burton further teaches wherein the workout routine corresponds to a latest workout routine that is not currently begun (Burton, para. [0132]).

Regarding claim 20, Burton further teaches wherein the workout routine corresponds to a next workout routine according to a list of workout routines (Burton, para. [0114]).

Regarding claim 21, Burton further teaches wherein the workout routine is user-designated (Burton, para. [0114]).

Regarding claim 22, Burton further teaches wherein the workout routine is system-designated (Burton, para. [0114]).

Regarding claim 23, Burton further teaches wherein a visual aspect of the affordance indicates whether the workout routine corresponds to a latest workout routine that is not currently begun (Burton, para. [0132]), corresponds to a next workout routine according to a list of workout routines (Burton, para. [0114]), is user-designated (Burton, para. [0114]), or is system-designated (Burton, para. [0114]).

Regarding claim 26, Burton further teaches comprising: in response to detecting the user input: updating a user avatar (Burton, para. [0246] and [0255]) or user profile picture to indicate a workout (Burton, para. [0255]).

Regarding claim 27, Burton further teaches comprising: in response to detecting the user input: sending a notification indicating a workout to an external device (Burton, para. [0091] and Figs. 9-10 and 16-17).

Regarding claim 28, Burton further teaches wherein the electronic device further comprises a haptic unit (Burton, para. [0171]), and the method further comprises: after beginning the workout routine, ceasing to produce a haptic output in response to an incoming electronic message; detecting a cessation of the workout routine; and in response to detecting the cessation: producing a haptic output in response to a second incoming electronic message received after detecting the cessation (Burton, para. [0171]).

Regarding claim 29, Burton further teaches comprising: in response to detecting the cessation: producing a haptic output corresponding to the first incoming electronic message (Burton, para. [0171]).

Regarding claim 30, Burton further teaches wherein the electronic device further comprises an activity sensor (Burton, para. [0045]), and wherein detecting the cessation is based on a cessation of user physical activity that meets an activity criterion based on data generated by the activity sensor (Burton, para. [0171]).

Regarding claim 31, Burton further teaches wherein detecting the cessation is based on a user input indicating a cessation of the workout routine (Burton, para. [0171]).

Regarding claim 32, Burton further teaches wherein the electronic device further comprises a haptic unit, and the method further comprises: after beginning the workout routine, producing an enhanced haptic output in response to an incoming electronic message (Burton, para. [0171]).

Regarding claim 33, Burton further teaches wherein the enhanced haptic output comprises a more intense haptic output as compared to a haptic output produced before beginning the workout routine (Burton, para. [0171]).

Regarding claim 34, Burton further teaches wherein the enhanced haptic output comprises a first haptic output and a second haptic output, wherein the second haptic output is produced after the first haptic output and is distinct from the second haptic output (Burton, para. [0171]).

(See Next Continuation Box)

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In case **the space in any of the preceding boxes is not sufficient.**
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Box V.2. Citations and explanations:

Regarding claim 35, Burton further teaches a method (Burton, para. [0187]), comprising: at an electronic device with a display (Burton, para. [0050] and [0063], and Figs. 2 and 18): displaying a user interface screen on the display (Burton, para. [0050] and Fig. 2), the user interface screen including: a user interface object indicating a time of day (Burton, para. [0050] and [0121], and Figs. 2 and 86c); and an affordance representing an application that includes one or more weather-related data (Burton, para. [0050], [0121], [0235], and [0279], and Figs. 2 and 86c), wherein the affordance is displayed as a complication associated with the user interface object (Burton, para. [0050] and [0121], and Figs. 2 and 86c); detecting a user input corresponding to a selection of the affordance (Burton, para. [0054]); in response to detecting the user input: launching the application (Burton, para. [0064]); and displaying one or more workout recommendations based on weather information (Burton, para. [0050], [0121], [0235], and [0279]).

Regarding claim 36, Burton further teaches comprising: obtaining, via wireless communication, the weather information (Burton, para. [0279]).

Regarding claim 37, Burton further teaches comprising: updating the displayed affordance to indicate a weather condition based on the obtained weather information (Burton, para. [0279]).

Regarding claim 38, Burton further teaches wherein the display is a touch-sensitive display (Burton, para. [0054]), and wherein detecting the user input corresponding to a selection of the affordance comprises: detecting a contact on the displayed affordance (Burton, para. [0054]).

Regarding claim 42, Burton further teaches wherein the one or more workout recommendations comprise a recommended time of day based on the weather information (Burton, para. [0235]).

Regarding claim 43, Burton further teaches wherein the weather information comprises information on one or more of temperature (Burton, para. [0200]), sunlight, precipitation, humidity, or wind (Burton, para. [0200]).

Regarding claim 44, Burton further teaches wherein the weather information comprises current weather information (Burton, para. [0235] and [0279]).

Regarding claim 46, Burton further teaches comprising: displaying on the display an indication of time since a latest workout routine that is not currently begun (Burton, para. [0107]).

Regarding claim 47, Burton further teaches comprising: displaying on the display an indication of time until a next workout routine according to a list of workout routines (Burton, para. [0064]).

Regarding claim 48, Burton further teaches comprising: displaying on the display one or more preparation recommendations based on the time until the next workout routine (Burton, para. [0272]).

Regarding claim 49, Burton further teaches wherein the electronic device comprises a biometric sensor (Burton, para. [0045]), and the method further comprises: displaying on the display an indication of user heart rate based on biometric data generated by the biometric sensor (Burton, para. [0045]).

Regarding claim 50, Burton further teaches a non-transitory computer-readable storage medium comprising one or more programs for execution by one or more processors (Burton, para. [0104]) of a first device with a display (Burton, para. [0050] and [0063], and Figs. 2 and 18), the one or more programs including instructions which, when executed by the one or more processors, cause the first device to: display a user interface screen on the display (Burton, para. [0050] and Fig. 2), the user interface screen including: a user interface object indicating a time of day (Burton, para. [0050] and [0121], and Figs. 2 and 86c); and an affordance representing a workout application (Burton, para. [0050] and [0121], and Figs. 2 and 86c), wherein the affordance is displayed as a complication associated with the user interface object (Burton, para. [0050] and [0121], and Figs. 2 and 86c); detect a user input corresponding to a selection of the affordance (Burton, para. [0054]); and in response to detecting the user input: begin a workout routine (Burton, para. [0064]).

Regarding claim 51, Burton further teaches a non-transitory computer-readable storage medium comprising one or more programs for execution by one or more processors (Burton, para. [0104]) of a first device with a display (Burton, para. [0050] and [0063], and Figs. 2 and 18), the one or more programs including instructions which, when executed by the one or more processors, cause the first device to: display a user interface screen on the display (Burton, para. [0050] and Fig. 2), the user interface screen including: a user interface object indicating a time of day (Burton, para. [0050] and [0121], and Figs. 2 and 86c); and an affordance representing an application that includes one or more weather-related data (Burton, para. [0050], [0121], [0235], and [0279]), wherein the affordance is displayed as a complication associated with the user interface object (Burton, para. [0050] and [0121], and Figs. 2 and 86c); detect a user input corresponding to a selection of the affordance (Burton, para. [0054]); and in response to detecting the user input: launch the application; and display one or more workout recommendations based on weather information (Burton, para. [0050], [0121], [0235], and [0279]).

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Regarding claim 52, Burton further teaches a device (Burton, para. [0050] and [0063], and Figs. 2 and 18) comprising: a display (Burton, para. [0050] and [0121], and Figs. 2 and 86c); one or more processors (Burton, para. [0104]); a memory (Burton, para. [0104]); and one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions (Burton, para. [0104]) for: displaying a user interface screen on the display (Burton, para. [0050] and [0121], and Figs. 2 and 86c), the user interface screen including: a user interface object indicating a time of day (Burton, para. [0050] and [0121], and Figs. 2 and 86c); and an affordance representing a workout application (Burton, para. [0050] and [0121], and Figs. 2 and 86c), wherein the affordance is displayed as a complication associated with the user interface object (Burton, para. [0050] and [0121], and Figs. 2 and 86c); detecting a user input corresponding to a selection of the affordance (Burton, para. [0054]); and in response to detecting the user input: beginning a workout routine (Burton, para. [0064]).

Regarding claim 53, Burton further teaches a device (Burton, para. [0050] and [0063], and Figs. 2 and 18) comprising: a display (Burton, para. [0050] and [0121], and Figs. 2 and 86c); one or more processors (Burton, para. [0104]); a memory (Burton, para. [0104]); and one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions (Burton, para. [0104]) for: displaying a user interface screen on the display (Burton, para. [0050] and [0121], and Figs. 2 and 86c), the user interface screen including: a user interface object indicating a time of day (Burton, para. [0050] and [0121], and Figs. 2 and 86c); and an affordance representing an application that includes one or more weather-related data (Burton, para. [0050], [0121], [0235], and [0279]), wherein the affordance is displayed as a complication associated with the user interface object (Burton, para. [0050] and [0121], and Figs. 2 and 86c); detecting a user input corresponding to a selection of the affordance (Burton, para. [0050] and [0121], and Figs. 2 and 86c); and in response to detecting the user input: launching the application (Burton, para. [0050] and [0121], and Figs. 2 and 86c); and displaying one or more workout recommendations based on weather information (Burton, para. [0050], [0121], [0235], and [0279]).

Regarding claim 54, Burton further teaches a device (Burton, para. [0050] and [0063], and Figs. 2 and 18) comprising: means for displaying a user interface screen on a display (Burton, para. [0050] and [0121], and Figs. 2 and 86c), the user interface screen including: a user interface object indicating a time of day (Burton, para. [0050] and [0121], and Figs. 2 and 86c); and an affordance representing a workout application (Burton, para. [0050] and [0121], and Figs. 2 and 86c), wherein the affordance is displayed as a complication associated with the user interface object (Burton, para. [0050] and [0121], and Figs. 2 and 86c); means for detecting a user input corresponding to a selection of the affordance (Burton, para. [0054]); and means responsive to detecting the user input for beginning a workout routine (Burton, para. [0063]).

Regarding claim 55, Burton further teaches a device (Burton, para. [0050] and [0063], and Figs. 2 and 18) comprising: means for displaying a user interface screen on a display (Burton, para. [0050] and [0121], and Figs. 2 and 86c), the user interface screen including: a user interface object indicating a time of day(Burton, para. [0050] and [0121], and Figs. 2 and 86c); and an affordance representing an application that includes one or more weather-related data (Burton, para. [0050], [0121], [0235], and [0279]), wherein the affordance is displayed as a complication associated with the user interface object(Burton, para. [0050] and [0121], and Figs. 2 and 86c); means for detecting a user input corresponding to a selection of the affordance (Burton, para. [0054]); and means responsive to detecting the user input for: launching the application; and displaying one or more workout recommendations based on weather information (Burton, para. [0050], [0121], [0235], and [0279]).

Regarding claim 56, Burton further teaches a non-transitory computer-readable storage medium comprising one or more programs for execution by one or more processors (Burton, para. [0104]) of a first device with a display (Burton, para. [0050] and [0063], and Figs. 2 and 18), the one or more programs including instructions which, when executed by the one or more processors (Burton, para. [0104]), cause the first device to perform the method (Burton, para. [0187]) of claim 1 (also see statement for claim 1).

Regarding claim 57, Burton further teaches a system (Burton, para. [0050] and [0063], and Figs. 2 and 18) comprising: the non-transitory computer readable storage medium (Burton, para. [0104]) of claim 56; and one or more processors configured to execute the instructions of the non-transitory computer readable storage medium (Burton, para. [0104]).

Regarding claim 58, Burton further teaches a device comprising a display (Burton, para. [0050] and [0063], and Figs. 2 and 18), one or more processors (Burton, para. [0104]), a memory (Burton, para. [0104]), and one or more programs (Burton, para. [0104]), wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions for performing the method (Burton, para. [0187]) of claim 1 (also see statement for claim 1).

Regarding claim 59, Burton further teaches a device comprising a display (Burton, para. [0050] and [0063], and Figs. 2 and 18) and means for performing the method (Burton, para. [0187]) of claim 1 (also see statement for claim 1).

Regarding claim 60, Burton further teaches an electronic device (Burton, para. [0050] and [0063], and Figs. 2 and 18), comprising: a display unit (Burton, para. [0050] and [0063], and Figs. 2 and 18); and a processing unit coupled to the display unit (Burton, para. [0050] and [0063], and Figs. 2 and 18), the processing unit configured to: enable display, on the display unit, of a user interface screen (Burton, para. [0050] and [0121], and Figs. 2 and 86c), the user interface screen including: a user interface object indicating a time of day (Burton, para. [0050] and [0121], and Figs. 2 and 86c); and an affordance representing a workout application (Burton, para. [0050] and [0121], and Figs. 2 and 86c), wherein the affordance is displayed as a complication associated with the user interface object (Burton, para. [0050] and [0121], and Figs. 2 and 86c); detect a user input corresponding to a selection of the affordance (Burton, para. [0054]); and in response to detecting the user input: begin a workout routine (Burton, para. [0064]).

Regarding claim 61, Burton further teaches wherein, in response to detecting the user input, the processing unit is further configured to: launch the workout application (Burton, para. [0064]).

(See Next Continuation Box)

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
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Box V.2. Citations and explanations:

Regarding claim 62, Burton further teaches wherein the processing unit is further configured to: enable display, on the display unit, of a second affordance, wherein the second affordance represents a second application, the second application being different from the workout application (Burton, para. [0114] and [0174], and Fig. 119), and wherein the second affordance is displayed as a complication associated with the user interface object (Burton, para. [0195]).

Regarding claim 63, Burton further teaches wherein the second affordance represents a second application selected from the group consisting of a weather application (Burton, para. [0195]), a calendar application, a pedometer application (Burton, para. [0195]), a stopwatch application, and a world clock application.

Regarding claim 64, Burton further teaches wherein the second affordance represents a pedometer application (Burton, para. [0195]), wherein the second affordance comprises a set of information obtained from the pedometer application, and wherein the set of information is updated in accordance with data from the pedometer application (Burton, para. [0064]).

Regarding claim 65, Burton further teaches wherein the processing unit is further configured to: detect a second user input corresponding to a selection of the second affordance; and in response to detecting the second user input: launch the pedometer application (Burton, para. [0064]).

Regarding claim 66, Burton further teaches wherein the set of information comprises one or more indications of distanced traveled, number of steps taken (Burton, para. [0201]), energy expended, or a combination thereof.

Regarding claim 67, Burton further teaches wherein at least a first indication of the one or more indications reflects a unit of measurement (Burton, para. [0118] and Fig. 2).

Regarding claim 68, Burton further teaches wherein at least a first indication of the one or more indications reflects a fraction of a predetermined goal (Burton, para. [0206]).

Regarding claim 69, Burton further teaches wherein the display unit is a touch-sensitive display unit (Burton, para. [0045]), and wherein detecting the user input corresponding to a selection of the affordance comprises: detecting a contact on the displayed affordance (Burton, para. [0045]).

Regarding claim 70, Burton further teaches wherein the electronic device further comprises an activity sensing unit (Burton, para. [0178]), wherein the processing unit is coupled to the activity sensing unit, and wherein detecting the user input corresponding to a selection of the affordance comprises: detecting an indication of user physical activity that meets an activity criterion based on activity data generated by the activity sensing unit (Burton, para. [0178]).

Regarding claim 71, Burton further teaches wherein the activity sensor is configured to detect one or more types of physical activity, the one or more types of physical activity comprising walking (Burton, para. [0114]), running (Burton, para. [0045]), going up stairs, or jumping.

Regarding claim 72, Burton further teaches wherein the activity criterion comprises one or more of a minimum number of steps taken per unit time, an amount of Calories burned per unit time, or a speed (Burton, para. [0045]).

Regarding claim 73, Burton further teaches wherein the activity criterion comprises an increase in user heart rate (Burton, para. [0045]).

Regarding claim 74, Burton further teaches wherein detecting the user input corresponding to a selection of the affordance further comprises: after detecting the indication of user physical activity that meets the activity criterion: providing a user prompt for confirming a user workout (Burton, para. [0178]); and detecting a user input corresponding to a confirmation of the user workout (Burton, para. [0178]).

Regarding claim 75, Burton further teaches wherein the workout routine is based on one or more workout parameters comprising duration of time, distance, number of steps (Burton, para. [0121]), heart rate, number of Calories burned (Burton, para. [0107]), or a combination thereof.

Regarding claim 76, Burton further teaches wherein, in response to detecting the user input, the processing unit is further configured to: enable display, on the display unit, of a value corresponding to the one or more workout parameters (Burton, para. [0107]).

Regarding claim 77, Burton further teaches wherein, after enabling display, on the display unit, of the value corresponding to the first workout parameter, the processing unit is further configured to: enable update, on the display unit, of the displayed value to reflect user progress with respect to the one or more workout parameters (Burton, para. [0111]).

Regarding claim 78, Burton further teaches wherein the workout routine corresponds to a latest workout routine that is not currently begun (Burton, para. [0132]).

Regarding claim 79, Burton further teaches wherein the workout routine corresponds to a next workout routine according to a list of workout routines (Burton, para. [0114]).

Regarding claim 80, Burton further teaches wherein the workout routine is user-designated (Burton, para. [0114]).

Regarding claim 81, Burton further teaches wherein the workout routine is system-designated (Burton, para. [0114]).

(See Next Continuation Box)

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Continuation of:
Box V.2. Citations and explanations:

Regarding claim 82, Burton further teaches wherein a visual aspect of the affordance indicates whether the workout routine corresponds to a latest workout routine that is not currently begun (Burton, para. [0132]), corresponds to a next workout routine according to a list of workout routines (Burton, para. [0114]), is user-designated (Burton, para. [0114]), or is system-designated (Burton, para. [0114]).

Regarding claim 85, Burton further teaches wherein, in response to detecting the user input, the processing unit is further configured to: update a user avatar (Burton, para. [0246] and [0255]) or user profile picture (Burton, para. [0255]) to indicate a workout.

Regarding claim 86, Burton further teaches wherein the electronic device further comprises a notifications unit (Burton, para. [0063] and [0091], and Fig. 18), wherein the processing unit is coupled to the notifications unit, and wherein, in response to detecting the user input, the processing unit is further configured to: enable sending, by the notifications unit, a notification indicating a workout to an external device (Burton, para. [0091] and Figs. 9-10 and 16-17).

Regarding claim 87, Burton further teaches wherein the electronic device further comprises a haptic unit (Burton, para. [0171]), wherein the processing unit is coupled to the haptic unit, and wherein the processing unit is further configured to: after beginning the workout routine, cease to produce a haptic output via the haptic unit in response to an incoming electronic message (Burton, para. [0171]); detect a cessation of the workout routine (Burton, para. [0171]); and in response to detecting the cessation: produce, via the haptic unit, a haptic output in response to a second incoming electronic message received after detecting the cessation (Burton, para. [0171]).

Regarding claim 88, Burton further teaches wherein, in response to detecting the cessation, the processing unit is further configured to: produce, via the haptic unit, a haptic output corresponding to the first incoming electronic message (Burton, para. [0171]).

Regarding claim 89, Burton further teaches wherein the electronic device further comprises an activity sensing unit (Burton, para. [0045]), wherein the processing unit is coupled to the activity sensing unit, and wherein detecting the cessation is based on a cessation of user physical activity that meets an activity criterion based on data generated by the activity sensing unit (Burton, para. [0171]).

Regarding claim 90, Burton further teaches wherein detecting the cessation is based on a user input indicating a cessation of the workout routine (Burton, para. [0171]).

Regarding claim 91, Burton further teaches wherein the electronic device further comprises a haptic unit (Burton, para. [0171]), wherein the processing unit is coupled to the haptic unit, and wherein the processing unit is further configured to: after beginning the workout routine, produce, via the haptic unit, an enhanced haptic output in response to an incoming electronic message (Burton, para. [0171]).

Regarding claim 92, Burton further teaches wherein the enhanced haptic output comprises a more intense haptic output as compared to a haptic output produced via the haptic unit before beginning the workout routine (Burton, para. [0171]).

Regarding claim 93, Burton further teaches wherein the enhanced haptic output comprises a first haptic output and a second haptic output, wherein the second haptic output is produced via the haptic unit after the first haptic output and is distinct from the second haptic output (Burton, para. [0171]).

Regarding claim 94, Burton further teaches an electronic device (Burton, para. [0050] and [0063], and Figs. 2 and 18), comprising: a display unit (Burton, para. [0050] and [0063], and Figs. 2 and 18); and a processing unit coupled to the display unit (Burton, para. [0063] and Fig. 18), the processing unit configured to: enable display, on the display unit, of a user interface screen (Burton, para. [0050] and [0121], and Figs. 2 and 86c), the user interface screen including: a user interface object indicating a time of day (Burton, para. [0050] and [0121], and Figs. 2 and 86c); and an affordance representing an application that includes one or more weather-related data (Burton, para. [0050], [0121], [0235], and [0279]), wherein the affordance is displayed as a complication associated with the user interface object (Burton, para. [0050] and [0121], and Figs. 2 and 86c); detect a user input corresponding to a selection of the affordance (Burton, para. [0054]); and in response to detecting the user input: launch the application (Burton, para. [0064]); and enable display, on the display unit, of one or more workout recommendations based on weather information (Burton, para. [0050], [0121], [0235], and [0279]).

Regarding claim 95, Burton further teaches wherein the electronic device further comprises a wireless communications unit (Burton, para. [0279]), wherein the processing unit is coupled to the wireless communications unit, and wherein the processing unit is further configured to: obtain, via the wireless communications unit, the weather information (Burton, para. [0279]).

Regarding claim 96, Burton further teaches wherein the processing unit is further configured to: enable update, on the display unit, of the displayed affordance to indicate a weather condition based on the obtained weather information (Burton, para. [0235] and [0279]).

Regarding claim 97, Burton further teaches wherein the display unit is a touch-sensitive display unit (Burton, para. [0045]), and wherein detecting the user input corresponding to a selection of the affordance comprises: detecting a contact on the displayed affordance (Burton, para. [0045]).

Regarding claim 101, Burton further teaches wherein the one or more workout recommendations comprise a recommended time of day based on the weather information (Burton, para. [0235]).

Regarding claim 102, Burton further teaches wherein the weather information comprises information on one or more of temperature (Burton, para. [0200]), sunlight, precipitation, humidity, or wind (Burton, para. [0200]).

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Box V.2. Citations and explanations:

Regarding claim 103, Burton further teaches wherein the weather information comprises current weather information (Burton, para. [0235] and [0279]).

Regarding claim 105, Burton further teaches wherein the processing unit is further configured to: enable display, on the display unit, of an indication of time since a latest workout routine that is not currently begun (Burton, para. [0107]).

Regarding claim 106, Burton further teaches wherein the processing unit is further configured to: enable display, on the display unit, of an indication of time until a next workout routine according to a list of workout routines (Burton, para. [0064]).

Regarding claim 107, Burton further teaches wherein the processing unit is further configured to: enable display, on the display unit, of one or more preparation recommendations based on the time until the next workout routine (Burton, para. [0272]).

Regarding claim 108, Burton further teaches wherein the electronic device further comprises an activity sensing unit, wherein the processing unit is coupled to the activity sensing unit (Burton, para. [0045]), wherein the activity sensing unit is a biometric sensing unit (Burton, para. [0045]), and wherein the processing unit is further configured to: enable display, on the display unit, of an indication of user heart rate based on biometric data generated by the biometric sensing unit (Burton, para. [0045]).

Claims 24-25 and 83-84 lack an inventive step under PCT Article 33(3) as being obvious over Burton in view of US 2014/0344723 A1 to Malik et al. (hereinafter "Malik").

Regarding claims 24 and 83, Burton teaches the method and device of claims 1 and 60, respectively, but does not explicitly teach in response to detecting the user input: entering a do not disturb (DND) mode of the electronic device, as in claims 24 and 83, respectively. However, Malik does teach in response to detecting the user input: entering a do not disturb (DND) mode of the electronic device (Malik, para. [0132]). It would have been obvious to one skilled in the art to combine the DND mode as taught by Malik with the method and device as taught by Burton to provide in response to detecting the user input: entering a do not disturb (DND) mode of the electronic device, because using the DND mode in Malik with the method and device in Burton extends the Burton method and device to implement a do not disturb mode. Burton and Malik are directed to monitoring user activities (Burton, para. [0044], Malik, para. [0038]).

Regarding claims 25 and 84, Burton teaches the method and device of claims 1 and 60, respectively, but does not explicitly teach in response to detecting the user input: entering an auto-reply mode of the electronic device, as in claims 25 and 84, respectively. However, Malik does teach in response to detecting the user input: entering an auto-reply mode of the electronic device (Malik, para. [0201]). It would have been obvious to one skilled in the art to combine the availability of auto-reply functionality as taught by Malik with the method and device as taught by Burton to provide in response to detecting the user input: entering an auto-reply mode of the electronic device, because using the availability of auto-reply functionality in Malik with the method and device in Burton extends the Burton method and device to implement an auto-reply mode. Burton and Malik are directed to monitoring user activities (Burton, para. [0044], Malik, para. [0038]).

Claims 39, 45, 98, and 104 lack an inventive step under PCT Article 33(3) as being obvious over Burton in view of US 2014/0245161 A1 to Yuen et al. (hereinafter "Yuen").

Regarding claims 39 and 98, Burton teaches the method and device of claims 35 and 94, respectively, but does not explicitly teach wherein the one or more workout recommendations comprise recommended apparel based on the weather information, as in claims 39 and 98, respectively. However, Yuen does teach wherein the one or more workout recommendations comprise recommended apparel based on the weather information (Yuen, para. [0148]). It would have been obvious to one skilled in the art to combine the clothing or accessory recommendations based on the current or predicted weather as taught by Yuen with the method and device as taught by Burton to provide wherein the one or more workout recommendations comprise recommended apparel based on the weather information, because using the clothing or accessory recommendations based on the current or predicted weather in Yuen with the method and device in Burton extends the Burton method and device to implement clothing or accessory recommendations based on the current or predicted weather. Burton and Yuen are directed to monitoring user activities (Burton, para. [0044], Yuen, para. [0068]).

Regarding claims 45 and 104, Burton teaches the method and device of claims 35 and 94, respectively, but does not explicitly teach wherein the weather information comprises forecasted weather information, as in claims 45 and 104, respectively. However, Yuen does teach wherein the weather information comprises forecasted weather information (Yuen, para. [0148]; para [0068]). It would have been obvious to one skilled in the art to combine the predicted weather as taught by Yuen with the method and device as taught by Burton to provide wherein the weather information comprises forecasted weather information, because using the predicted weather in Yuen with the method and device in Burton extends the Burton method and device to implement predicted weather as weather information. Burton and Yuen are directed to monitoring user activities (Burton, para. [0044], Yuen, para. [0068]).

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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 16/37686

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
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Box V.2. Citations and explanations:

Claims 40-41 and 99-100 lack an inventive step under PCT Article 33(3) as being obvious over Burton in view of Yuen, further in view of US 2014/0282153 A1 to Christiansen et al. (hereinafter "Christiansen").

Regarding claims 40 and 99, Burton in view of Yuen teaches the method and device of claims 39 and 98, respectively, but does not explicitly teach wherein the recommended apparel comprises branded apparel, as in claims 40 and 99, respectively. However, Christiansen does teach wherein the recommended apparel comprises branded apparel (Christiansen, para. [0229] and [0274]-[0278]). It would have been obvious to one skilled in the art to combine the recommendations of branded items such as clothing as taught by Christiansen with the method and device as taught by Burton in conjunction with Yuen to provide wherein the recommended apparel comprises branded apparel, because using the recommendations of branded items such as clothing in Christiansen with the method and device in Burton in conjunction with Yuen extends the Burton method and device to implement recommendations of branded items such as clothing. Burton, Yuen, and Christiansen are directed to monitoring user activities (Burton, para. [0044], Yuen, para. [0068], Christiansen, para. [0160]).

Regarding claims 41 and 100, Burton in view of Yuen teaches the method and device of claims 39 and 98, respectively, but does not explicitly teach wherein the recommended apparel comprises apparel from a user purchase history, as in claims 41 and 100, respectively. However, Christiansen does teach wherein the recommended apparel comprises apparel from a user purchase history (Christiansen, para. [0229] and [0276]-[0278]). It would have been obvious to one skilled in the art to combine the user purchase history of items such as clothing as taught by Christiansen with the method and device as taught by Burton in conjunction with Yuen to provide wherein the recommended apparel comprises apparel from a user purchase history, because using the user purchase history of items such as clothing in Christiansen with the method and device in Burton in conjunction with Yuen extends the Burton method and device to implement user purchase history of items such as clothing. Burton, Yuen, and Christiansen are directed to monitoring user activities (Burton, para. [0044], Yuen, para. [0068], Christiansen, para. [0160]).

Claims 1-108 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

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SEARCH HISTORY

Application Number	PCT/US 16/37686
Search Conducted By	AJN
Search Approved By	RLP

IPC/CPC Classifications Searched	IPC(8): A63B 71/00 (2016.01); CPC: A63B 24/0075
Date Conducted	17 August 2016 (17.08.2016)

Documentation Searched	IPC(8): A63B 71/00 (2016.01); CPC: A63B24/0075, A63B24/0062, A63B2225/20, A63B2230/06, A63B2024/0078; USPC: 482/9, 482/8, 434/247; (keyword limited; terms below)
Search Terms Used	watch, timepiece, workout, exercise, weather, recommend, apparel, clothing, brand, purchase history, do not disturb, DND, autoreply, pedometer, fraction, percent, goal, biometric, activity, heart, sensor, touch, tactile, haptic, confirm, routine, update avatar, profile, end, cessation, predict, forecast, current, temperature, wind, rain, sunlight, precipitation, humidity, affordance, icon, application, calendar, stopwatch, etc.
Date Conducted	17 August 2016 (17.08.2016)

Electronic Database Searched	PatBase (http://www.patbase.com/)
Files Searched	Full-text: AU BE BR CA CH CN DE DK EP ES FI FR GB IN JP KR SE TH TW US WO Bibliographic: (Europe) AT BA BE BG CH CS CY CZ DD DK EE ES FI GE GR HR HU IE IS IT LT LU LV MC MD MT NL NO PL PT RO RS SE SI SK SM TR UA YU (Asia) EA GC HK ID IL IN KZ MN MY PH RU SG SU TH TJ TW UZ VN (North America) CA CR CU DO GT HN MX NI PA SV TT (South America) AR BR CL CO EC PE UY (Australasia) AU NZ (Africa) AP DZ EG KE MA MW OA ZA ZM ZW
Date Conducted	17 August 2016 (17.08.2016)

Search Logic:

*** CLASSIFICATION SEARCH ***

1) IPC=A63B71/00 (6,163)
2) CPC=(A63B24/0075 or A63B24/0062 or A63B2225/20 or A63B2230/06 or A63B2024/0078) (2,701)
3) UC=(482/9 or 482/8 or 434/247) (2,350)
4) 1 or 2 or 3 (9,583)
5) 4 and ((watch* or timepiece*) near (workout* or exercis*)) (144)
6) 4 and weather* and (recommend* near (apparel* or clothing*)) (3)
7) 4 and (recommend* near brand*) and (histor* near (apparel* or clothing* or purchas*)) (0)
8) 4 and (disturb* near DND*) and (autoreply* or autoreplie*) (0)
9) 4 and pedometer* (378)
10) 4 and ((fraction* or percent*) near goal*) (83)
11) 4 and ((biometric* or activit* or heart*) near sensor*) (805)
12) 4 and (touch* or tactile* or haptic*) (2,415)
13) 4 and (confirm* near workout*) (14)
14) 4 and ((workout* or exercis*) near routine*) (782)
15) 4 and (updat* near (avatar* or profile*)) (88)
16) 4 and ((ceas* or cessation* or end*) near activit*) (187)
17) 4 and ((predict* or forecast* or current*) near weather*) (45)
18) 4 and (weather* near (temperature* or wind* or rain* or sunlight* or precipitation* or humidity)) (110)
19) 4 and (affordance* or icon*) (430)
20) 4 and (application* near (weather* or calendar* or stopwatch*)) (31)

*** FREEFORM SEARCH ***

21) ((watch* or timepiece*) near (workout* or exercis*)) (737)
22) 21 and weather* and (recommend* near (apparel* or clothing*)) (4)
23) 21 and (recommend* near brand*) and (histor* near (apparel* or clothing* or purchas*)) (1)
24) 21 and (disturb* near DND*) and (autoreply* or autoreplie*) (0)
25) 21 and pedometer* (64)
26) 21 and ((fraction* or percent*) near goal*) (5)
27) 21 and ((biometric* or activit* or heart*) near sensor*) (154)
28) 21 and (touch* or tactile* or haptic*) (288)
29) 21 and (confirm* near workout*) (7)
30) 21 and ((workout* or exercis*) near routine*) (138)
31) 21 and (updat* near (avatar* or profile*)) (26)
32) 21 and ((ceas* or cessation* or end*) near activit*) (61)

33) 21 and ((predict* or forecast* or current*) near weather*) (20)
34) 21 and (weather* near (temperature* or wind* or rain* or sunlight* or precipitation* or humidity)) (17)
35) 21 and (affordance* or icon*) (104)
36) 21 and (application* near (weather* or calendar* or stopwatch*)) (21)

*** CITATION SEARCH ***

37) PN=(US20110003665 or US20140344723 or US20140245161 or US20140282153 or US20110230986) (5)
38) CTF 37 or CTB 37 (2,042)

*** END SEARCH ***

Electronic Database Searched	ProQuest Dialog (http://search.proquest.com/professional/)
Files Searched	NPL Databases: ABI/INFORM® Professional Standard, AGRICOLA, AGRIS, Allied & Complementary Medicine™, Analytical Abstracts, British Library Inside Conferences, British Nursing Index, Business & Industry, Business Monitor International, Chemical Business Newsbase, Chemical Engineering & Biotechnology Abstracts, Current Contents® Search, Economist Intelligence Unit, Ei EnCompassLIT, Emerging Markets Direct, Energy Science and Technology, ESPICOM Pharmaceutical & Medical Device News, FDAnews, FLUIDEX (Fluid Engineering Abstracts), Gale Group Computer Database™, Gale Group Health Periodicals Database, Gale Group New Product Announcements / Plus®, Gale Group Newsletter Database™, Gale Group PharmaBiomed Business Journals, Gale Group PROMT®, Gale Group Trade & Industry Database™, GEOBASE?, HSELINE: Health and Safety, ICONDA - International Construction Database, Inspec®, Jane's Defense & Aerospace News, Lancet Titles, Material Safety Datasheets -OHS™, MEDLINE®, New England Journal of Medicine, Paperbase, PAPERCHEM, PASCAL, PIRABASE, ProQuest Biological & Health Science Professional, ProQuest Environmental Science Professional, ProQuest Newsstand Professional, ProQuest Research, ProQuest Technology Research Professional, Registry of Toxic Effects of Chemical Substances (RTECS®), ToxFile®, Transport Research International Documentation, TULSA™ (Petroleum Abstracts), UBM Computer Full Text, Weldasearch®
Date Conducted	17 August 2016 (17.08.2016)

Search Logic:

NPL Searching:

S1) ((watch* or timepiece*) near/5 (workout* or exercis*)) (52,301)
S2) S1 and weather* and (recommend* near/5 (apparel* or clothing*)) (106)
S3) S1 and (recommend* near/5 brand*) and (histor* near/5 (apparel* or clothing* or purchas*)) (108)
S4) S1 and (disturb* near/5 DND*) and (autoreply* or autoreplie*) (0)
S5) S1 and pedometer* (330)
S6) S1 and ((fraction* or percent*) near/5 goal*) (77)
S7) S1 and ((biometric* or activit* or heart*) near/5 sensor*) (18)
S8) S1 and (touch* or tactile* or haptic*) (2,825)
S9) S1 and (confirm* near/5 workout*) (152)
S10) S1 and ((workout* or exercis*) near/5 routine*) (2,446)
S11) S1 and (updat* near/5 (avatar* or profile*)) (8)
S12) S1 and ((ceas* or cessation* or end*) near/5 activit*) (2,530)
S13) S1 and ((predict* or forecast* or current*) near/5 weather*) (68)
S14) S1 and (weather* near/5 (temperature* or wind* or rain* or sunlight* or precipitation* or humidity)) (429)
S15) S1 and (affordance* or icon*) (432)
S16) S1 and (application* near/5 (weather* or calendar* or stopwatch*)) (234)

*** END SEARCH ***

Electronic Database Searched	Google
Files Searched	Google Patents (http://www.google.com/patents)
Date Conducted	17 August 2016 (17.08.2016)

Search Logic:

timepiece workout biometric heart sensor weather application
About 1,520 results (0.71 sec.)
timepiece workout biometric heart sensor weather application recommend apparel
About 1,170 results (0.67 sec.)
timepiece workout biometric heart sensor weather application brand
About 467 results (0.54 sec.)
timepiece workout biometric heart sensor weather application purchase history
About 579 results (0.70 sec.)
timepiece workout biometric heart sensor weather application DND
7 results (0.43 sec.)
timepiece workout biometric heart sensor weather application autoreply
4 results (0.46 sec.)
timepiece workout biometric heart sensor weather application touch
About 1,260 results (0.52 sec.)
timepiece workout biometric heart sensor weather application update avatar
About 364 results (0.67 sec.)
timepiece workout biometric heart sensor weather application forecast
About 244 results (0.68 sec.)

*** END SEARCH ***

Electronic Database Searched	Google
Files Searched	Google Web (http://www.google.com/)
Date Conducted	17 August 2016 (17.08.2016)

Search Logic:

timepiece workout biometric heart sensor weather application
About 1,920,000 results (0.93 sec.)
timepiece workout biometric heart sensor weather application recommend apparel
About 1,260,000 results (1.17 sec.)
timepiece workout biometric heart sensor weather application brand
About 1,700,000 results (0.96 sec.)
timepiece workout biometric heart sensor weather application purchase history
About 253,000 results (0.99 sec.)
timepiece workout biometric heart sensor weather application DND
About 16,400 results (0.86 sec.)
timepiece workout biometric heart sensor weather application autoreply
About 2,710 results (0.72 sec.)
timepiece workout biometric heart sensor weather application touch
About 1,090,000 results (0.90 sec.)
timepiece workout biometric heart sensor weather application update avatar
About 176,000 results (0.99 sec.)
timepiece workout biometric heart sensor weather application forecast
About 813,000 results (1.01 sec.)

*** END SEARCH ***

Electronic Acknowledgement Receipt

EFS ID:	29165586
Application Number:	14599424
International Application Number:	
Confirmation Number:	3136
Title of Invention:	WELLNESS AGGREGATOR
First Named Inventor/Applicant Name:	Christopher D. Soli
Customer Number:	119082
Filer:	Jordan Michael Lofdahl/Sally Austin
Filer Authorized By:	Jordan Michael Lofdahl
Attorney Docket Number:	106842130031 (P23397US3)
Receipt Date:	10-MAY-2017
Filing Date:	16-JAN-2015
Time Stamp:	08:59:32
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	10684_2130031_IDS.pdf	144503 103de7747cd16d37cd7c009c19e009f02f60db9a	no	4
Warnings:					

Information:					
This is not an USPTO supplied IDS fillable form					
2	Other Reference-Patent/App/Search documents	14839922_ADAR_03_24_2017.pdf	171544 992545174eb67d854e212d52fc1f1d6f1c3e0376	no	4
Warnings:					
Information:					
3	Other Reference-Patent/App/Search documents	PA201570668_DKIG_03_27_2017.pdf	450956 aaf3eb245684d40f8721d13f9022ef1026374244	no	2
Warnings:					
Information:					
4	Other Reference-Patent/App/Search documents	PCTUS2015047282_IPRP_03_16_2017.pdf	1012151 9accd00c1685be0c2e020121f1091570258095680	no	26
Warnings:					
Information:					
5	Other Reference-Patent/App/Search documents	PCTUS2016037686_ISRWO_09_09_2016.pdf	1760668 eb1ef5550aa12a05928ab001db2b01eabf005ebc	no	19
Warnings:					
Information:					
		Total Files Size (in bytes):	3539822		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

I hereby certify that this paper is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: __April 24, 2017_____
Electronic Signature for Morgan Adams: /Morgan Adams/

Docket No.: 106842130031 (P23397US3)
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Christopher D. SOLI et al.

Application No.: 14/599,424 Confirmation No.: 3136

Filed: January 16, 2015 Art Unit: 3626

For: WELLNESS AGGREGATOR Examiner: R. W. Morgan

PRELIMINARY AMENDMENT UNDER 37 C.F.R. 1.115

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

Dear Commissioner:

INTRODUCTORY COMMENTS

Prior to examination on the merits, Applicant respectfully requests entry of this Preliminary Amendment for the above-captioned patent application.

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 9 of this paper.

dn-191264

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A non-transitory computer-readable storage medium storing one or more programs, the one or more programs comprising instructions, which when executed by an electronic device with a display, cause the device to:

display a detailed view of a sub-category of wellness data, the detailed view comprising:

a graph representation of the sub-category of wellness data that includes aggregated values of the sub-category of wellness data, wherein the sub-category of wellness data is from a plurality of approved sources for the sub-category of wellness data; and

a selectable data sharing option;

receive user selection of the selectable data sharing option; and

in response to receiving the selection of the selectable data sharing option, display:

~~receive, from a user, information identifying a~~ the plurality of approved sources ~~of~~ for the sub-category of wellness data, wherein the sub-category of wellness data is ~~information identifying the plurality of approved sources identifies one or more types of wellness data that are~~ approved to be received from the plurality of approved sources and stored in a wellness database; and

~~receive, from the user, information identifying~~ a plurality of approved destinations ~~of~~ for the sub-category of wellness data, wherein the sub-category of wellness data is ~~information identifying the plurality of approved destinations identifies one or more types of wellness data that are~~ approved to be accessed from the wellness database by the plurality of approved destinations of wellness data.

2. (Original) The non-transitory computer-readable storage medium of claim 1, wherein the plurality of approved sources comprise an electronic device or software application.

3. (Original) The non-transitory computer-readable storage medium of claim 1, wherein the plurality of approved destinations comprise an electronic device or software application.

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4. (Original) The non-transitory computer-readable storage medium of claim 1, wherein the plurality of approved sources are ranked amongst each other.

5. (Currently Amended) The non-transitory computer-readable storage medium of claim 1, further comprising instructions to cause the electronic device to:

identify a first wellness data entry in the wellness database that was received from a first approved source of the plurality of approved sources, the first wellness data entry associated with a first sub-category of wellness data comprising ~~a first wellness data type and~~ a first timestamp; and

identify a second wellness data entry in the wellness database that was received from a second approved source of the plurality of approved sources, the second wellness data entry comprising ~~a second wellness data type~~ the first sub-category of wellness data, and a second timestamp, ~~wherein the first wellness data type and the second wellness data type are the same,~~ and wherein the first timestamp is within a threshold length of time from the second timestamp.

6. (Original) The non-transitory computer-readable storage medium of claim 5, wherein the first approved source has been identified by the user as being preferred over the second approved source, and wherein the non-transitory computer-readable storage medium further comprises instructions to cause the electronic device to use the first wellness data entry instead of using the second wellness data entry.

7. (Original) The non-transitory computer-readable storage medium of claim 5, wherein the first approved source has been identified by the user as being preferred over the second approved source, and wherein the non-transitory computer-readable storage medium further comprises instructions to cause the electronic device to prioritize the first wellness data entry over the second wellness data entry.

8. (Original) The non-transitory computer-readable storage medium of claim 7, further comprising instructions to cause the electronic device to: in accordance with a determination

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that the first wellness data entry is prioritized over the second wellness data entry, use the first wellness data entry instead of using the second wellness data entry.

9. (Original) The non-transitory computer-readable storage medium of claim 5, wherein the second approved source has been identified by the user as being preferred over the first approved source, and wherein the non-transitory computer-readable storage medium further comprises instructions to cause the electronic device to prioritize the second wellness data entry over the first wellness data entry.

10. (Original) The non-transitory computer-readable storage medium of claim 9, further comprising instructions to cause the electronic device to: in accordance with a determination that the second wellness data entry is prioritized over the first wellness data entry, use the second wellness data entry instead of using the first wellness data entry.

11. (Original) The non-transitory computer-readable storage medium of claim 1, further comprising instructions to cause the electronic device to:

display, on the display, a plurality of categories of wellness data stored in the wellness database.

12. (Original) The non-transitory computer-readable storage medium of claim 11, further comprising instructions to cause the electronic device to:

detect a selection of a category of wellness data from the displayed plurality of categories of wellness data; and

in response to detecting the selection of the category of wellness data, display, on the display, one or more sub-categories of the category of wellness data.

13. (Canceled)

14. (Canceled)

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IPR2023-01434, U.S. Patent No. 10,270,898
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15. (Currently Amended) The non-transitory computer-readable storage medium of claim ~~13~~ 12, wherein the detailed view of the sub-category further comprises an input field for entering a wellness data entry, and wherein the non-transitory computer-readable storage medium further comprises instructions to cause the electronic device to:

receive a wellness data entry to be stored in the wellness database that was input into the input field.

16. (Currently Amended) The non-transitory computer-readable storage medium of claim ~~13~~ 12, wherein the detailed view of the sub-category further comprises a textual description of the sub-category.

17. (Currently Amended) The non-transitory computer-readable storage medium of claim ~~13~~ 12, wherein the detailed view of the sub-category further comprises an option to view wellness data entries corresponding to the sub-category, and wherein the non-transitory computer-readable storage medium further comprises instructions to cause the electronic device to:

display, on the display, a plurality of wellness data entries corresponding to the sub-category stored in the wellness database.

18. (Original) The non-transitory computer-readable storage medium of claim 17, wherein each of the plurality of wellness data entries comprises a numerical value of the data entry, a timestamp, and an identification of a source of the data entry.

19. (Canceled)

20. (Currently Amended) The non-transitory computer-readable storage medium of claim ~~19~~ 12, further comprising instructions to cause the electronic device to:

detect a request to reorder the displayed plurality of approved sources; and

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in response to detecting the request to reorder the displayed plurality of approved sources, reorder the displayed plurality of approved sources in accordance with the detected request to reorder the displayed plurality of approved sources

21. (Currently Amended) The non-transitory computer-readable storage medium of claim ~~19~~ 12, wherein the data sharing interface further comprises options to add an approved destination to the plurality of approved destinations and to remove an approved destination from the plurality of approved destinations.

22. (Original) The non-transitory computer-readable storage medium of claim 11, further comprising instructions to cause the electronic device to:

receive a search query; and

display, on the display, one or more sub-categories of the plurality of categories that match the search query, wherein the displayed one or more sub-categories that match the search query are color-coded based on their respective categories.

23. (Original) The non-transitory computer-readable storage medium of claim 11, further comprising instructions to cause the electronic device to:

display, on the display, a source interface comprising a list of known sources.

24. (Original) The non-transitory computer-readable storage medium of claim 23, wherein the source interface further comprises a numerical indicator associated a known source of the known sources that represents a number of new types of wellness data that can be provided by the known source.

25. (Original) The non-transitory computer-readable storage medium of claim 23, further comprising instructions to cause the electronic device to:

detect a selection of a known source from the displayed list of known sources; and

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IPR2023-01434, U.S. Patent No. 10,270,898
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in response to detecting the selection of the known source, display, on the display, a list of types of wellness data that the known source can provide.

26. (Original) The non-transitory computer-readable storage medium of claim 25, wherein the list of types of wellness data that the known source can provide comprises a selectable option for each of the types of wellness data that the known source can provide to approve or reject the associated type of wellness data.

27. (Original) The non-transitory computer-readable storage medium of claim 26, further comprising instructions to cause the electronic device to:

detect a selection of the selectable option for a type of wellness data that the known source can provide; and

in response to detecting the selection of the selectable option, approve or reject the type of wellness data that the known source can provide in accordance with the detected selection of the selectable option.

28. (Currently Amended) A computer-implemented method comprising:

at an electronic device:

displaying a detailed view of a sub-category of wellness data, the detailed view comprising:

a graph representation of the sub-category of wellness data that includes aggregated values of the sub-category of wellness data, wherein the sub-category of wellness data is from a plurality of approved sources for the sub-category of wellness data; and

a selectable data sharing option;

receiving user selection of the selectable data sharing option; and

in response to receiving the selection of the selectable data sharing option, displaying:

~~receiving, from a user, information identifying a~~ the plurality of approved sources ~~of~~ for the sub-category of wellness data, wherein the sub-category of wellness data is ~~information identifying the plurality of approved sources identifies one or more types of wellness data that are~~

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approved to be received from the plurality of approved sources and stored in a wellness database; and

~~receiving, from the user, information identifying~~ a plurality of approved destinations ~~of~~ for the sub-category of wellness data, wherein the sub-category of wellness data is ~~information identifying the plurality of approved destinations identifies one or more types of wellness data that are~~ approved to be accessed from the wellness database by the plurality of approved destinations of wellness data.

29. (Currently Amended) An electronic device comprising:

a display;

a memory; and

a processor coupled to the display and the memory, the processor configured to:

display a detailed view of a sub-category of wellness data, the detailed view comprising:

a graph representation of the sub-category of wellness data that includes aggregated values of the sub-category of wellness data, wherein the sub-category of wellness data is from a plurality of approved sources for the sub-category of wellness data; and

a selectable data sharing option;

receive user selection of the selectable data sharing option; and

in response to receiving the selection of the selectable data sharing option, display:

~~receive, from a user, information identifying a~~ the plurality of approved sources ~~of~~ for the sub-category of wellness data, wherein the sub-category of wellness data is ~~information identifying the plurality of approved sources identifies one or more types of wellness data that are~~ approved to be received from the plurality of approved sources and stored in a wellness database; and

~~receive, from the user, information identifying~~ a plurality of approved destinations ~~of~~ for the sub-category of wellness data, wherein the sub-category of wellness data is ~~information identifying the plurality of approved destinations identifies one or more types of wellness data that are~~ approved to be accessed from the wellness database by the plurality of approved destinations of wellness data.

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IPR2023-01434, U.S. Patent No. 10,270,898
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REMARKS

Claims 1, 5, 15-17, 20, 21, 28 and 29 are amended herein. Claims 13, 14 and 19 are canceled.

If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing **Docket No. 106842130031 (P23397US3)**. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Dated: April 24, 2017

Respectfully submitted,

Electronic signature: /Brian B. Ho/
Brian B. Ho
Registration No.: 60,199
MORRISON & FOERSTER LLP
425 Market Street
San Francisco, California 94105-2482
(415) 268-7624

dn-191264

Electronic Acknowledgement Receipt

EFS ID:	29012665
Application Number:	14599424
International Application Number:	
Confirmation Number:	3136
Title of Invention:	WELLNESS AGGREGATOR
First Named Inventor/Applicant Name:	Christopher D. Soli
Customer Number:	119082
Filer:	Brian B. Ho/Morgan Adams
Filer Authorized By:	Brian B. Ho
Attorney Docket Number:	106842130031 (P23397US3)
Receipt Date:	24-APR-2017
Filing Date:	16-JAN-2015
Time Stamp:	18:18:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10684_2130031_Preliminary_Amendment.pdf	41710 374663b44378ab84a706fce73b6ba70256bf8a98	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Claims	2	8
	Applicant Arguments/Remarks Made in an Amendment	9	9
Warnings:			
Information:			
	Total Files Size (in bytes):	41710	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/599,424	Filing Date 01/16/2015	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **04/24/2017**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 26	Minus	** 29	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
TAMMY D. MCBETH BROWN

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14599424
Filing Date	2015-01-16
First Named Inventor	Christopher D. SOLI
Art Unit	3626
Examiner Name	R. W. Morgan
Attorney Docket Number	106842130031 (P23397US3)

U.S. PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	5788655	A	1998-08-04	Yoshimura et al.	

U.S. PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20020118121	A1	2002-08-29	Lehrman et al.	
	2.	20110003665	A1	2011-01-06	Burton et al.	
	3.	20110230986	A1	2011-09-22	Lafortune et al.	
	4.	20130188322	A1	2013-07-25	Lowe, Steve	
	5.	20140081666	A1	2014-03-20	Teller et al.	
	6.	20140245161	A1	2014-08-28	Yuen et al.	
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	9.	20140344723	A1	2014-11-20	Malik et al.	
	10.	20150106025	A1	2015-04-16	Keller et al.	
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FOREIGN PATENT DOCUMENTS

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14599424
	Filing Date	2015-01-16
	First Named Inventor	Christopher D. SOLI
	Art Unit	3626
	Examiner Name	R. W. Morgan
	Attorney Docket Number	106842130031 (P23397US3)

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	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]
	1.	201210368	TW	A	2012-03-01	HTC Corporation	English Abstract Submitted	
	2.	201240499	TW	A	2012-10-01	HTC Corporation	English Abstract Submitted	

NON-PATENT LITERATURE DOCUMENTS

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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1.	Final Office Action received for U.S. Patent Application No. 14/839,922, mailed on December 14, 2016, 22 pages.	
	2.	International Preliminary Report on Patentability Received for PCT Patent Application No. PCT/US2015/032474, mailed on December 15, 2016, 7 pages.	
	3.	Non-Final Office Action received for U.S. Patent Application No. 14/599,425, mailed on October 26, 2016, 22 pages.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14599424
	Filing Date	2015-01-16
	First Named Inventor	Christopher D. SOLI
	Art Unit	3626
	Examiner Name	R. W. Morgan
	Attorney Docket Number	106842130031 (P23397US3)

	4.	Non-Final Office Action received for U.S. Patent Application No. 14/839,922, mailed on August 17, 2016, 25 pages.	
	5.	Notice of Allowance received for Danish Patent Application No. PA201570666, mailed on September 15, 2016, 1 page.	
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	8.	Office Action Received for Danish Patent Application No. PA201670656, mailed on November 03, 2016, 8 pages.	
	9.	Office Action received for Danish Patent Application No. PA201570668, mailed on September 09, 2016, 3 pages.	
	10.	Office Action received for Korean Patent Application No. 10-2016-7033638, mailed on January 31, 2017, 6 pages (2 pages of English Translation and 4 pages of Official Copy).	☒
	11.	Office Action received for Taiwanese Patent Application No. 104117509, mailed on August 22, 2016, 6 pages (3 pages of English Translation and 3 pages of Official Copy).	☒
	12.	Office Action received for Taiwanese Patent Application No. 104128685, mailed on January 04, 2017, 40 pages (15 pages of English Translation and 25 pages of Official Copy).	☒

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	Filing Date	2015-01-16
	First Named Inventor	Christopher D. SOLI
	Art Unit	3626
	Examiner Name	R. W. Morgan
	Attorney Docket Number	106842130031 (P23397US3)

	13.	Written Opinion received for PCT Patent Application No. PCT/US2013/073195, mailed on June 23, 2014, 8 pages.	
EXAMINER SIGNATURE			
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.

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	First Named Inventor	Christopher D. SOLI
	Art Unit	3626
	Examiner Name	R. W. Morgan
	Attorney Docket Number	106842130031 (P23397US3)

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	/Jordan Lofdahl/	Date (YYYY-MM-DD)	2017-03-10
Name/Print	Jordan Lofdahl	Registration Number	59,163

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Espacenet

Bibliographic data: TW201210368 (A) — 2012-03-01

Method of handling emergency session and related communication device

Inventor(s): TIWARI KUNDAN [IN] ± (TIWARI, KUNDAN)

Applicant(s): HTC CORP [TW] ± (HTC CORPORATION)

Classification: - international: ***H04W36/00; H04W4/22***
- cooperative: **H04W4/22**; **H04W60/06**; **H04W76/007**; H04W76/064

Application number: TW20110128024 20110805

Priority number(s): US20100370813P 20100805 ; US201113196910 20110803

Also published as: TWI423701 (B) EP2416597 (A2) EP2416597 (A3) EP2416597 (B1) US2014335860 (A1) more

Abstract of TW201210368 (A)

A method for handling an emergency session for a network in a wireless communication system is disclosed. The method comprises having an emergency context for a mobile device corresponding to the emergency session; not deactivating the emergency context for the mobile device when the network does not allocate radio resources to the emergency context, and preserving the emergency context.

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(19)中華民國智慧財產局
(12)發明說明書公開本 (11)公開編號：TW 201210368 A1
(43)公開日： 中華民國 101 (2012) 年 03 月 01 日

(21)申請案號：100128024 (22)申請日： 中華民國 100 (2011) 年 08 月 05 日
(51)Int. Cl.： *H04W4/22 (2009.01)* *H04W36/00 (2009.01)*
(30)優先權：2010/08/05 美國 61/370,813
2011/08/03 美國 13/196,910
(71)申請人：宏達國際電子股份有限公司 (中華民國) HTC CORPORATION (TW)
桃園縣桃園市龜山工業區興華路 23 號
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(74)代理人：吳豐任；戴俊彥
申請實體審查：有 申請專利範圍項數：20 項 圖式數：9 共 38 頁

(54)名稱

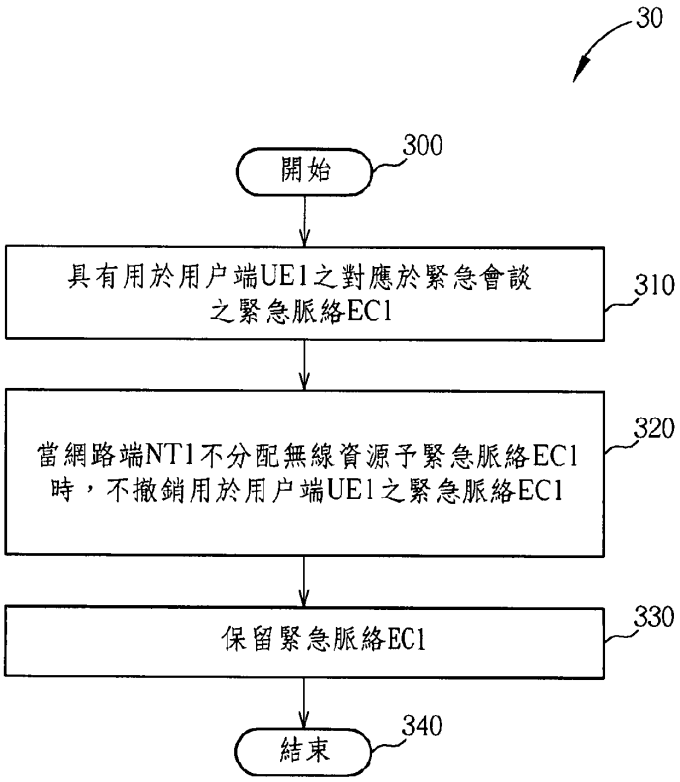
處理緊急會談之方法及其相關通訊裝置

METHOD OF HANDLING EMERGENCY SESSION AND RELATED COMMUNICATION DEVICE

(57)摘要

本發明係指一種用來處理一無線通訊系統之一網路端中緊急會議(emergency session)之方法。該方法包含有具有用於一行動裝置之對應於該緊急會談之一緊急脈絡(emergency context)；當該網路端不分配無線資源予該緊急脈絡時，不撤銷用於該行動裝置之該緊急脈絡；以及保留該緊急脈絡。

30：流程
310：步驟
320：步驟
330：步驟
340：步驟



六、發明說明：

【發明所屬之技術領域】

本發明係指一種用來處理一無線通訊系統中一緊急會議（emergency session）之方法及其相關通訊裝置，尤指一種用來處理於異常情形下，一無線通訊系統中之一緊急會談，及其相關通訊裝置。

【先前技術】

在通用移動通訊系統（universal mobile telecommunications system，UMTS）或長期演進（long term evolution，LTE）系統等無線通訊系統中，一網路端可提供一緊急會談予處於服務受限狀態中的一行動裝置。於服務受限狀態下，行動裝置不須訂閱（subscription）即可接收緊急服務，然而行動裝置仍需先與網路端建立一會談，以存取緊急服務。

通用移動通訊系統提供電路切換（circuit-switched，CS）及封包切換（packet-switched，PS）等兩種服務，而長期演進系統被設計只支援封包交換服務。在通用移動通訊系統中，網路端可為一通用陸地全球無線存取網路（Universal Terrestrial Radio Access Network，UTRAN），其可包含複數個基地台（NBs）及複數個無線網路控制器（Radio Network Controllers，RNCs）。行動裝置可視作用戶端（UEs），如行動電話、電腦系統等裝置。在長期演進系統中，網路端可為一演進式通用陸地全球無線存取網路（Evolved Universal Terrestrial Radio Access Network，E-UTRAN），其可包含複數個演進

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型無線基地台(evolved Node-B，eNodeBs)，而行動裝置亦可視作用戶端（UEs）。

在通用移動通訊系統中，用戶端在存取一外部網路端（如網際網路）之服務時，需進行一封包資料通訊協定（packet data protocol，PDP）脈絡啟動程序（context activation procedure），讓所屬的整合封包無線電服務服務支援節點（Service GPRS Support Node，SGSN）與一特定整合封包無線電服務閘道支援節點（Gateway GPRS Support Node，GGSN）產生封包資料通訊協定脈絡。其中，封包資料通訊協定脈絡可提供封包路徑選擇（Routing）資訊。

在長期演進系統中，用戶端及一封包資料網路端（PDN）之間無間隙的網際網路通訊協定（Internet Protocol，IP）連結係透過一演進式封包系統（evolved packet system，EPS）承載（bearer），以提供用戶端存取網際網路。演進式封包系統承載係透過一演進式封包系統承載脈絡啟動程序建立。值得注意的是，在長期演進系統中，整合封包無線電服務閘道支援節點可稱為封包資料網路閘道（packet data network gateway，P-GW），且整合封包無線電服務服務支援節點可為服務閘道（serving gateway，S-GW）。

第三代行動通訊聯盟(3rd Generation Partnership Project，3GPP）技術文件 TS24.301 Release 9 指明若於一服務請求程序中，所對應之使用者平台無線承載未被建立，則用戶端及網路端中之一移動管理實體（Mobility Management Entity，MME）將會由本地撤銷演進式封包系統脈絡或封包資料通訊協定脈絡。這代表當建立緊急演進式封包系統脈絡或封包資料通訊協定脈絡，以進行緊急通話服務時，

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若網路端並無可用無線資源（例如演進式通用陸地全球無線存取網路沒有足夠資源）且演進式通用陸地全球無線存取網路不分配使用者平台無線承載予該緊急脈絡，則用戶端及網路端將會撤銷用於緊急承載服務之演進式封包系統脈絡。因此，當用戶再次撥打一緊急通話時，用戶端必須再次起始脈絡啟動程序及服務請求程序以建立緊急會談。如此多餘的撤銷及重複啟動該緊急脈絡將耗費額外時間，此為緊急情況下所不容許的。於最壞狀況下，若用戶端僅有一用於緊急承載服務之演進式封包系統脈絡，且網路端無法分配資源，則用戶端將於本地撤銷緊急演進式封包系統脈絡及再次進行附加程序。如此將導致不必要的額外信令及建立緊急會談之延遲。

除此之外，根據先前技術，在異常情況下，緊急會談亦有可能被緊急會談之服務請求程序及網路端發起之一分離程序之間的衝突（collision）所中斷。第三代合作夥伴計畫技術文件 TS24.008 Release 9 指明當該用戶端已起始用於緊急服務會談之服務請求程序時（即處於一 GMM-SERVICE-REQUEST-INITIATED 狀態或一 EMM-SERVICE-REQUEST-INITIATED 狀態），在接收到來自於網路端之分離請求訊息後，用戶端將取消服務請求程序並繼續進行分離程序。舉例來說，在接收到具有分離類型為"國際移動用戶識別碼（International Mobile Subscriber Identification Number，IMSI）分離"之一分離請求訊息，指示將用戶端自線路交換服務分離時，用戶端必須進行一組合跟踪區更新程序（combined tracking area update procedure），以再次附加至線路交換服務。此一程序將取消緊急通話啟動程序，因此用戶在分離程序及一後續附加程序結束之前，將無

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法起始另一緊急服務。另一方面，若用戶端接收到分離類型為"不需重新附加"之一分離請求訊息，指示將用戶端自封包交換服務分離，則用戶端將會取消服務請求程序並繼續進行分離程序。類似地，網路端將取消服務請求程序並繼續進行分離程序。在此情形下，緊急會談只能於分離程序及一後續緊急附加程序完成後，才能被建立。因此，緊急通話將會被延遲。而在某些時間為關鍵的情形下，此延遲將超出容許範圍。

最後，網路端可傳送具有分離類型為"不需重新附加"及通用封包無線服務技術移動管理（GPRS Mobility Management，GMM）因子為"國際移動用戶識別碼於所屬位置暫存器（Home Location Register，HLR）中未知"之分離請求訊息，以將用戶端自線路交換服務分離。在此情形下，當網路端起始一分離程序時，若用戶端試圖進行一路由區更新（routing area update，RAU）程序以更新用戶端於網路端中之位置，則用戶端及網路端將取消路由區更新程序，並進行網路端發起之分離程序。此情形下，必須等待一週期性的路由區更新計時器屆滿，或待用戶端更改一路由區，方能再次起始下一次的路由區更新程序。在此期間內，用戶端將會錯過來自於網路端之傳呼（paging），而因此緊急通話將會失敗。

由上可知，習知技術中之種種異常情形皆該可能造成建立緊急會談時不必要及多餘的信令傳輸延遲。因此，習知技術實有改進的必要。

【發明內容】

因此，本發明提供一種用於一無線通訊系統中處理緊急會議之方

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法。

本發明揭露一種處理緊急會談（emergency session）之方法，用於一無線通訊系統之一網路端，該方法包含有具有用於一行動裝置之對應於該緊急會談之一緊急脈絡；當該網路端不分配無線資源予該緊急脈絡時，不撤銷用於該行動裝置之該緊急脈絡；以及保留該緊急脈絡。

本發明另揭露一種處理緊急會談之方法，用於一無線通訊系統之一行動裝置，該方法包含有具有來自一網路端之對應於該緊急會談之一緊急脈絡；以及當該網路端不分配無線資源予該緊急脈絡時，不撤銷該緊急脈絡。

本發明另揭露一種處理緊急會談之方法，用於一無線通訊系統之一行動裝置，該方法包含有於一網路端起始對應該緊急會談之一服務請求程序；於起始該服務請求程序時，或於起始該服務請求程序後，接收來自於該網路端之一分離請求訊息；以及當該分離請求訊息被接收時，不中止該服務請求程序。

本發明另揭露一種處理緊急會談之方法，用於一無線通訊系統之一網絡端，該方法包含有當該網路端正在起始一分離程序時，接收來自一行動裝置之一服務請求訊息；以及不中止或忽略該服務請求訊息，並持續進行對應於該服務請求信息之一服務請求程序。

本發明另揭露一種處理緊急會談之方法，用於一無線通訊系統之一行動裝置，該方法包含有當一路由區更新（Routing Area Update，RAU）程序正在進行時，接收來自一網路端之一分離請求訊息;當該分離請求訊息已被接收時，不中止該路由區更新程序；以及同時進

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行該路由區更新程序及對應於該分離請求信之一分離程序。

本發明另揭露一種處理緊急會談之方法，用於一無線通訊系統之一網絡端，該方法包含有當該網路端正在傳送一分離請求訊息至一行動裝置時，接收來自該行動裝置之對應於一路由區更新程序之一路由區更新請求訊息；以及當該路由區更新請求訊息被接收時，處理該路由區更新請求訊息，並回覆一路由區更新接受信息或一路由區更新拒絕訊息至該行動裝置。

本發明另揭露一種處理緊急會談之方法，用於一無線通訊系統之一行動裝置，該方法包含有當一路由區更新程序正在進行時，接收來自一網路端之一分離請求訊息;當該分離請求訊息被接收時，中止該路由區更新程序並進行對應於該分離請求訊息之一分離程序；以及於該分離程序完成時，立即重新啟動該路由區更新程序；其中該網路端為一演進式通用陸地全球無線存取網路（Evolved Universal Terrestrial Radio Access Network，E-UTRAN）或一通用陸地全球無線存取網路（Universal Terrestrial Radio Access Network，UTRAN），且該分離程序係用來將該行動裝置自該網路端之線路交換服務（circuit-switched，CS）分離。

【實施方式】

請參考第 1 圖，第 1 圖為本發明實施例一無線通訊系統 10 之示意圖。簡單的說，無線通訊系統 10，例如一長期演進系統（long-term evolution，LTE）、通用移動通訊系統（Universal Mobile Telecommunications System，UMTS）或其他行動通訊系統，由一網路及複數個用戶端（user equipments，UEs）所組成。在第 1 圖中，

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網路及用戶端可簡單利用無線通訊系統 10 的架構來說明。實際來說，長期演進系統的網路端包含複數個基地台（base stations），例如一演進式通用陸地全球無線存取網路（Evolved Universal Terrestrial Radio Access Network，E-UTRAN），其包含複數個演進式基地台（evolved Node-Bs，eNodeBs）、通用移動通訊系統的網路端包含複數個基地台，例如一通用陸地全球無線存取網路（Universal Terrestrial Radio Access Network，UTRAN），其包含複數個基地台（Node-Bs，NodeBs）。而用戶端可為行動電話、電腦系統等裝置。在本發明實施例中，根據傳輸方向，網路端及用戶端可視為一傳送器及一接收器。舉例來說，對於一上鏈路（uplink，UL）傳輸，用戶端為傳送端而網路端為接收端；對於一下鏈路（downlink，DL）傳輸，網路端為傳送端而用戶端為接收端。

請參考第 2 圖，第 2 圖為本發明實施例一通訊裝置 20 之示意圖。通訊裝置 20 可以是第 1 圖的用戶端，以及可包含一處理裝置 200，例如，一微處理器或是特殊應用積體電路（Application-Specific Integrated Circuit，ASIC）、一儲存單元 210 以及一通訊介面單元 220。儲存單元 210 可以是任何資料儲存裝置，這是用來儲存用於被處理裝置 200 取出之程式碼 214。舉例來說，儲存單元 210 包含用戶識別模組（subscriber identity module，SIM）、唯讀式記憶體（read-only memory，ROM）、隨機存取記憶體（random-access memory，RAM）、光碟唯讀記憶體（CD-ROMs）、磁帶（magnetic tapes）、硬碟（hard disks）、光學資料儲存裝置（optical data storage devices）等等，而不限於此。通訊介面單元 220 可為一無線收發器，

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用來根據處理裝置200的處理結果，與網路端交換無線訊號。

請參考第3圖，第3圖為本發明實施例一流程30之示意圖。流程30可用於一網路端NT1（如第1圖所示之網路端），用來處理無線通訊系統10中之一緊急會談，且包含網路端NT1及一用戶端UE1。流程30可編譯為程式碼214且包含以下步驟：

步驟300：開始。

步驟310：具有用於用戶端UE1之對應於緊急會談之緊急脈絡EC1。

步驟320：當網路端NT1不分配無線資源予緊急脈絡EC1時，不撤銷用於用戶端UE1之緊急脈絡EC1。

步驟330：保留緊急脈絡EC1。

步驟340：結束。

根據流程30，網路端NT1具有用於用戶端UE1之緊急脈絡EC1。緊急脈絡EC1可為用於長期演進系統之一緊急演進式封包系統（evolved packet system，EPS）承載脈絡（bearer context），或用於通用移動通訊系統之一緊急封包資料通訊協定（packet data protocol，PDP）脈絡。網路端NT1可為用於長期演進系統之演進式通用陸地全球無線存取網路。當網路端NT1沒有可利用之無線資源，且不分配無線電承載至緊急脈絡EC1時，網路端NT1不撤銷用於緊急承載服務之緊急脈絡EC1，並保留緊急脈絡EC1。較佳地，緊急脈絡EC1為一緊急演進式封包系統脈絡。在此情形下，當用戶端UE1需撥出緊急通話時，不需再次起始一演進式封包系統脈絡程序。因此，可節省多餘的撤銷及啟動步驟。另外，亦可避免建立該

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緊急會談時不必要的額外信令及延遲。

據此，無線通訊系統之用戶端 UE1 可有所對應動作。請參考第 4 圖，第 4 圖為本發明實施例一流程 40 之示意圖。流程 40 係用於用戶端 UE1，用來處理緊急會談。流程 40 可編譯為程式碼 214 並包含以下步驟：

步驟 400：開始。

步驟 410：當網路端 NT1 不分配無線資源予緊急脈絡 EC1 時，具有來自於網路端 NT1 之對應於緊急會談之緊急脈絡 EC1。

步驟 420：不撤銷緊急脈絡 EC1。

步驟 430：結束。

根據流程 40，若網路端 NT1 具有用於用戶端 UE1 之緊急脈絡 EC1，但不分配無線資源予緊急脈絡 EC1，則用戶端 UE1 禁止於本地撤銷緊急脈絡 EC1。因此，當用戶端 UE1 撥打一緊急通話時，不需再次起始一演進式封包系統脈絡程序。因此，多餘的撤銷及啟動步驟可省略。更進一步，建立該緊急會談之不必要的額外信令及延遲可被避免。

簡言之，根據流程 30 及 40，當網路端 NT1 不分配使用者平台無線資源予用戶端 UE1 時，網路端 NT1 及用戶端 UE1 皆保留緊急脈絡 EC1（例如一緊急演進式封包系統承載脈絡），使得建立緊急會談之不必要的額外信令及延遲可被避免。

請參考第 5 圖，第 5 圖為本發明實施例一流程 50 之示意圖。流程 50 係用於附加至一網路端 NT2 之封包交換及線路交換兩種服

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務之一用戶端 UE2，並用來處理包含網路端 NT2 及用戶端 UE2 之無線通訊系統中的緊急會談。流程 50 可編譯為程式碼 214，並包含以下步驟：

步驟 500：開始。

步驟 510：於網路端 NT2 中，起始對應於緊急會談之一服務請求程序 SRQ_p。

步驟 520：當起始服務請求程序 SRQ_p 時，或在服務請求程序 SRQ_p 被起始後，接收來自於網路端 NT2 之一分離請求訊息 DRQ_m。

步驟 530：當接收到分離請求訊息 DRQ_m 時，不取消服務請求程序 SRQ_p。

步驟 540：結束。

根據流程 50，用戶端 UE2 係附加至網路端 NT2 之封包交換及線路交換兩種服務。網路端 NT2 可為用於長期演進系統之演進式通用陸地全球無線存取網路或用於通用移動通訊系統之通用陸地全球無線存取網路。服務請求程序 SRQ_p 係用於請求對應於該緊急會談之網路端 NT2 中的封包交換服務，例如用來建立網路端 NT2 之一緊急演進式封包系統脈絡、一緊急封包資料通訊協定脈絡或使用者平台無線承載。當服務請求程序 SRQ_p 被起始時，或在服務請求程序 SRQ_p 被起始後，用戶端 UE2 接收來自於網路端 NT2 之分離請求訊息 DRQ_m。換言之，用戶端 UE2 處於一 GMM-SERVICE-REQUEST-INITIATED（用於通用移動通訊系統）或一 EMM-SERVICE-REQUEST-INITIATED（用於長期演進系統）

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之移動管理（Mobility Manangement，MM）狀態。此情形下，該服務（例如緊急承載服務）可持續進行而不被取消。多餘的延遲亦可被避免。

在一種情形下，分離請求訊息 DRQ_m 可對應於將用戶端 UE2 自網路端 NT2 之線路交換服務分離之一分離程序 DRQ1_p。當用戶端 UE2 於起始封包交換服務之服務請求程序 SRQ_p 時（或起始服務請求程序 SRQ_p 之後），接收到來自於網路端 NT2 之分離請求訊息 DRQ_m，則用戶端 UE2 禁止取消封包交換服務請求程序 SRQ_p，而繼續進行服務請求程序 SRQ_p。舉例來說，用戶端 UE2 可依據國際移動用戶識別碼（International Mobile Subscriber Identification Number，IMSI）附加至操作於網路端操作模式 I（Network Mode of Operation I，NMO I）之一網路端之封包交換及線路交換服務。接著，於用戶端 UE2 正在起始封包交換服務請求程序 SRQ_p 以建立封包資料通訊協定脈絡（或建立使用者平台承載）時，接收到具有一分離類型為"國際移動用戶識別碼分離"或一分離類型"不需重新附加"，並具有一 GMM 因子為"國際移動用戶識別碼於所屬位置暫存器（Home Location Register，HLR）中未知"之分離請求訊息 DRQ_m。此時，用戶端 UE2 則不取消封包交換服務程序 SRQ_p，並持續進行封包交換服務請求程序 SRQ_p。網路端 NT2 不忽略來自於用戶端 UE2 之用於封包交換服務之該服務請求，因此建立緊急會談之不必要的額外信令及延遲可被避免。

於另一種情形下，分離請求訊息 DRQ_m 可對應至將用戶端 UE2 自網路端 NT2 中之封包交換服務分離的一分離程序 DRQ2_p。若於

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用戶端 UE2 正在起始服務請求程序 SRQ_p(或已起始服務請求程序 SRQ_p）時，接收到具有一分離類型爲"不需重新附加"之分離請求訊息 DRQ_m，以將用戶端 UE2 自封包交換服務分離，則用戶端 UE2 禁止取消服務請求程序 SRQ_p 並持續進行用戶端服務請求程序 SRQ_p。服務請求程序 SRQ_p 可為用來建立用於緊急承載服務之一封包資料通訊協定脈絡。用戶端 UE2 撤銷所有非緊急的封包資料通訊協定脈絡。用戶端 UE2 傳送一分離接受訊息至網路端 NT2，並視之為僅附加於緊急承載服務。用戶端 UE2 隨即起始用於該緊急封包資料通訊協定（或該演進式封包系統脈絡）之一封包資料通訊協定（或演進式封包系統脈絡）啟動程序。

據此，無線通訊系統中之網路端 NT2 可有所對應動作。請參考第 6 圖，第 6 圖為為本發明實施例一流程 60 之示意圖。流程 60 係用於網路端 NT2，用來處理包含網路端 NT2 及用戶端 UE2 之無線通訊系統之緊急會談。流程 60 可編譯為程式碼 214，並包含以下步驟：

步驟 600：開始。

步驟 610：當網路端 NT2 起始一分離程序 DRQ_p 時，接收來自於用戶端 UE2 之一服務請求訊息 SRQ_m。

步驟 620：不取消亦不忽略服務請求訊息 SRQ_m，並持續進行對應於服務請求訊息 SRQ_m 之服務請求程序 SRQ_p。

步驟 630：結束。

根據流程 60，服務請求訊息 SRQ_m 對應於服務請求程序

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SRQ_p，用於請求對應於緊急會談之網路端 NT2 中的封包交換服務，例如用來建立一緊急演進式封包系統脈絡（或封包資料通訊協定脈絡），或建立使用者平台無線承載。分離程序 DRQ_p 可為分離程序 DRQ1_p 或分離程序 DRQ1_p，以分別將用戶端 UE2 自線路交換服務或封包交換服務分離。網路端 NT2 禁止忽略或取消用於封包交換服務之服務請求訊息 SRQ_m，並持續進行對應的服務請求程序 SRQ_p。

舉例來說，若網路端 NT2 操作於網路端操作模式 I，並於已發出一分離請求訊息 DRQ_m（分離請求訊息 DRQ_m 具有一分離類型為"國際移動用戶識別碼分離"或"不需重新附加"並具有一 GMM 因子為"國際移動用戶識別碼於所屬位置暫存器中未知"）時，接收到來自於用戶端 UE2 之封包交換服務請求訊息 SRQ_m（用戶端 UE2 附加至封包交換及線路交換等兩種服務）。此時，網路端 NT2 禁止忽略來自於用戶端 UE2 之封包交換服務請求訊息 SRQ_m，並進行封包交換服務請求程序 SRQ_p。換言之，網路端 NT2 可建立封包資料通訊協定脈絡或分配用於使用者平台承載服務之資源。因此，分離程序 DRQ_p 及後續多餘的重新附加步驟可被跳過，且建立緊急會談之不必要的延遲可被避免。

簡言之，根據流程 50 及 60，當起始分離程序 DRQ_p 時，網路端 NT2 不取消或忽略來自於用戶端 UE2 之服務請求訊息 SRQ_m，使得緊急會談之建立不被分離程序 DRQ_p 所延誤。

請參考第 7 圖，第 7 圖為本發明實施例一流程 70 之示意圖。該流程 70 係用於一用戶端 UE3，並用來處理包含有一網路端 NT3 及

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該用戶端 UE3 之一無線通訊系統中的一緊急會談。流程 70 可編譯為程式碼 214，並包含以下步驟：

步驟 700：開始。

步驟 710：當一路由區更新程序 RAU_p 正在進行時，接收來自於網路端 NT3 之一分離請求訊息 DRQ'_m。

步驟 720：當已接收分離請求訊息 DRQ'_m 時，不取消路由區更新程序 RAU_p。

步驟 730：同時進行該路由區更新程序 RAU_p 及對應於該分離請求訊息 DRQ'_m 之一分離程序 DRQ'_p。

步驟 740：開始一計時器 T1，並轉換至指示用戶端 UE3 正在嘗試路由區更新程序 RAU_p 之一狀態 S1。

步驟 750：結束。

根據流程 70，當用戶端 UE3 在路由區更新程序 RAU_p 正在進行時，接收到來自於該網路端 NT3 之對應於一分離請求程序 DRQ'_p 之一分離請求訊息 DRQ'_m，則用戶端 UE3 不取消路由區更新程序 RAU_p。分離請求訊息 DRQ'_m 可具有分離類型為"不需重新附加"及 GMM 因子為"國際移動用戶識別碼於所屬位置暫存器中未知"，以將用戶端 UE3 自網路端 NT3 之線路交換服務分離。用戶端 UE3 進行路由區更新程序 RAU_p 及分離程序 DRQ'_p 以自網路端 NT3 之線路交換服務分離，隨即開始計時器 T1 並轉換至指示用戶端 UE3 正在嘗試路由區更新程序 RAU_p 之狀態 S1。計時器 T1 可為根據第三代合作夥伴計畫技術文件 TS24.008 之一計時器 T3302，而狀態 S1 可為一

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GMM-REGISTERED-ATTEMMPING-TO-UPDATE 狀態，但不在此限。因此，當路由區更新程序 RAU_p 與分離程序 DRQ'_p 衝突時，路由區更新程序 RAU_p 將不會被取消而會成功進行。再者，路由區更新程序 RAU_p 將不會被延遲至計時器 T1 屆滿或用戶端 UE3 改變路由區之後。

據此，無線通訊系統之網路端 NT3 可有所對應動作。請參考第 8 圖，第 8 圖為為本發明實施例一流程 80 之示意圖。流程 80 係用於網路端 NT3，並用來處理包含有網路端 NT3 及用戶端 UE3 之無線通訊系統中之緊急會談。流程 80 可編譯為程式碼 214，並包含以下步驟：

步驟 800：開始。

步驟 810：當傳送一分離請求訊息 DRQ'_m 至用戶端 UE3 時，接收來自於用戶端 UE3 之對應於路由區更新程序 RAU_p 之一路由區更新請求訊息 RAU_m。

步驟 820：當路由區更新請求訊息 RAU_m 被接受時，處理路由區更新請求訊息 RAU_m，並以一路由區更新接受訊息 RAU_AC_m 或一路由區更新拒絕訊息 RAU_RJ_m 回覆用戶端 UE3。

步驟 830：同時進行路由區更新程序 RAU_p 及對應於分離請求訊息 DRQ'_m 之分離程序 DRQ'_p。

步驟 840：結束。

根據流程 80，當網路端 NT3 於傳送分離請求訊息 DRQ'_m 以將用戶端 UE3 自線路交換服務分離時，接收到來自於用戶端 UE3 之

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路由區更新請求訊息 RAU_m，則該網路端 NT3 同時進行路由區更新程序 RAU_p 及分離程序 DRQ'_p，以將用戶端 UE3 自線路交換服務分離，並以路由區更新接受訊息 RAU_AC_m 或該路由區更新拒絕訊息 RAU_RJ_m 回覆用戶端 UE3。

另一方面，網路端 NT3 亦有可能不同時進行路由區更新程序 RAU_p 及分離程序 DRQ'_p。請參考第 9 圖，第 9 圖為為本發明實施例一流程 90 之示意圖。流程 90 係用於用戶端 UE3。流程 90 可編譯為程式碼 214，並包含以下步驟：

步驟 900：開始。

步驟 910：當路由區更新程序 RAU_p 正在進行時，接收來自於網路端 NT3 之分離請求訊息 DRQ'_m。

步驟 920：當分離請求訊息 DRQ'_m 被接受時，取消路由區更新程序 RAU_p 並繼續進行對應於分離請求訊息 DRQ'_m 之分離程序 DRQ'_p。

步驟 930：當分離程序 DRQ'_p 完成時，立即重新開始路由區更新程序 RAU_p。

步驟 940：結束。

根據流程 90，路由區更新程序 RAU_p 及用來將用戶端 UE3 自網路端 NT3 之線路交換服務分離的分離程序 DRQ'_p 並非同時進行。路由區更新程序會先被取消，待分離程序 DRQ'_p 完成後，立即重新開始。

簡言之，根據流程 70，80 及 90，路由區更新程序 RAU_p 可與分離程序 DRQ'_p 同時處理，或待分離程序 DRQ'_p 完成後，再重

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新開始。因此，路由區更新程序 RAU_p 並不會被延遲到計時器 T1 過期或至用戶端 UE3 變更一路由區，也因此用戶端 UE3 不會錯過來自於網路端 NT3 的傳呼，而緊急回撥程序也不會因此失敗。

請注意以上所提裝置的步驟，包含建議步驟，可以由硬體、韌體或是一電子系統實現。韌體被認知為一硬體裝置和電腦指令，以及資料是存在於該硬體裝置上的唯讀軟體。硬體的範例可以包括類比、數位以及混合電路，混合電路被認知為微電路、微晶片或矽晶片。該電子系統的範例可以包含系統單晶片（system on chip，SOC）、系統級封裝（system in package，Sip）、電腦模組化（computer on module，COM）以及該通訊裝置 20。其中，上述處理程序相關之程式碼 214 以及處理結果可用於無線通訊系統 10 用來處理緊急會議。

綜上所述，以上實施例可用來處理緊急會談，並於異常情形下，保持緊急脈絡不被撤銷，進而節省建立緊急會談時不必要的額外信令及延遲。

以上所述僅為本發明之較佳實施例，凡依本發明申請專利範圍所做之均等變化與修飾，皆應屬本發明之涵蓋範圍。

【圖式簡單說明】

第 1 圖為本發明實施例一無線通訊系統之示意圖。

第 2 圖為本發明實施例一通訊裝置之示意圖。

第 3 圖為本發明實施例之流程圖。

第 4 圖為本發明實施例之流程圖。

第 5 圖為本發明實施例之流程圖。

第 6 圖為本發明實施例之流程圖。

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第 7 圖為本發明實施例之流程圖。

第 8 圖為本發明實施例之流程圖。

第 9 圖為本發明實施例之流程圖。

【主要元件符號說明】

10	無線通訊系統
200	處理裝置
210	儲存單元
214	程式碼
220	通訊介面單元
30、40、50、60、70、80、90	流程

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201210368

發明專利說明書

（本說明書格式、順序，請勿任意更動，※記號部分請勿填寫）

※申請案號：100128024

※申請日：100. 8. 05　※IPC 分類：H04W 4/32 (2009.01)
36/00 (2009.01)

一、發明名稱：（中文/英文）

處理緊急會談之方法及其相關通訊裝置/Method of Handling Emergency Session And Related Communication Device

二、中文發明摘要：

本發明係指一種用來處理一無線通訊系統之一網路端中緊急會議（emergency session）之方法。該方法包含有具有用於一行動裝置之對應於該緊急會談之一緊急脈絡（emergency context）；當該網路端不分配無線資源予該緊急脈絡時，不撤銷用於該行動裝置之該緊急脈絡；以及保留該緊急脈絡。

三、英文發明摘要：

A method for handling an emergency session for a network in a wireless communication system is disclosed. The method comprises having an emergency context for a mobile device corresponding to the emergency session; not deactivating the emergency context for the mobile device when the network does not allocate radio resources to the emergency context; and preserving the emergency context.

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七、申請專利範圍：

1. 一種處理緊急會談（emergency session）之方法，用於一無線通訊系統之一網路端，該方法包含有：

具有用於一行動裝置且對應於該緊急會談之一緊急脈絡;

當該網路端不分配無線資源予該緊急脈絡時，不撤銷用於該行動裝置之該緊急脈絡；以及

保留該緊急脈絡。

2. 如請求項 1 所述之方法，其中該網路端為一演進式通用行動通訊系統（Evolved Universal Terrestrial Radio Access Network，E-UTRAN），且該緊急脈絡為一緊急演進式封包系統（evolved packet system，EPS）脈絡。

3. 一種處理緊急會談（emergency session）之方法，用於一無線通訊系統之一行動裝置，該方法包含有：

具有來自一網路端且對應於該緊急會談之一緊急脈絡；以及

當該網路端不分配無線資源予該緊急脈絡時，不撤銷該緊急脈絡。

4. 如請求項 3 所述之方法，其中該網路端為一演進式通用行動通訊系統（Evolved Universal Terrestrial Radio Access Network，E-UTRAN），且該緊急脈絡為一緊急演進式封包系統（evolved packet system，EPS）脈絡。

5. 一種處理緊急會談（emergency session）之方法，用於一無線通訊系統之一行動裝置，該方法包含有：

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於一網路端中，起始對應該緊急會談之一服務請求程序;

於起始該服務請求程序時，或於起始該服務請求程序後，接收來自於該網路端之一分離請求訊息；以及

當該分離請求訊息被接收時，不中止該服務請求程序。

6. 如請求項 5 所述之方法，其中該行動裝置附加於該網路端之封包交換（packet-switched，PS）服務及線路交換（circuit-switched，CS）服務，該網路端為一演進式通用陸地全球無線存取網路（Evolved Universal Terrestrial Radio Access Network，E-UTRAN）或一通用陸地全球無線存取網路（Universal Terrestrial Radio Access Network，UTRAN），且該服務請求程序係用於該網路端之封包交換服務，且該分離請求訊息對應於將該行動裝置自該網路端之線路交換服務分離之一分離程序。

7. 如請求項 5 所述之方法，其中該網路端為一演進式通用陸地全球無線存取網路（Evolved Universal Terrestrial Radio Access Network，E-UTRAN）或一通用陸地全球無線存取網路（Universal Terrestrial Radio Access Network，UTRAN），該服務請求程序係用來建立該網路端之一緊急演進式封包系統（evolved packet system，EPS）脈絡或一封包資料通訊協定（packet data protocol，PDP）脈絡，或用來建立用於該緊急封包資料通訊協定脈絡或該緊急演進式封包系統脈絡之一無線電承載，且該分離請求訊息係對應於將該行動裝置自該網路端之封包交換（packet-switched，PS）服務分離之一分離程序。

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8. 如請求項7所述之方法，其另包含：

撤銷任何非緊急脈絡；以及

傳送一分離接受訊息至該網路端。

9. 如請求項7所述之方法，其另包含：

起始用於該緊急封包資料通訊協定或該演進式封包系統脈絡之一封包資料通訊協定啟動程序或演進式封包系統脈絡啟動程序，或起始用來建立用於該緊急封包資料通訊協定脈絡或該緊急演進式封包系統脈絡之一無線電承載之一封包資料通訊協定啟動程序或演進式封包系統脈絡啟動程序。

10. 一種處理緊急會談（emergency session）之方法，用於一無線通訊系統之一網絡端，該方法包含有：

當該網路端正在起始一分離程序時，接收來自一行動裝置之一服務請求訊息；以及

不中止或忽略該服務請求訊息，並持續進行對應於該服務請求信息之一服務請求程序。

11. 如請求項10所述之方法，其中該網路端為一演進式通用陸地全球無線存取網路（Evolved Universal Terrestrial Radio Access Network，E-UTRAN）或一通用陸地全球無線存取網路（Universal Terrestrial Radio Access Network，UTRAN），該服務請求程序係用於該網路端之封包交換（packet-switched，PS）服務，且該分離程序係用將該行動裝置自該網路端之線路交換服務（circuit-switched，CS）分離。

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12. 如請求項 10 所述之方法，其中該網路端為一演進式通用陸地全球無線存取網路（Evolved Universal Terrestrial Radio Access Network，E-UTRAN）或一通用陸地全球無線存取網路（Universal Terrestrial Radio Access Network，UTRAN），該服務請求程序係用來建立一緊急演進式封包系統（evolved packet system，EPS）脈絡或一封包資料通訊協定（packet data protocol，PDP）脈絡，或用來於該網路端中建立用於該緊急封包資料通訊協定脈絡或該緊急演進式封包系統脈絡之一無線電承載，且該分離請求程序係用來將該行動裝置自該網路端之封包交換（packet-switched，PS）服務分離。

13. 如請求項 12 所述之方法，其另包含：

當該網路端接收來自於該行動裝置且對應於該分離程序之一分離接受訊息時，持續進行該分離程序。

14. 如請求項 12 所述之方法，其另包含啟動對應於該緊急演進式封包系統脈絡或該緊急封包資料通訊協定脈絡之一緊急脈絡啟動程序，或建立用於該緊急封包資料通訊協定脈絡或該緊急演進式封包系統脈絡之一無線電承載。

15. 一種處理緊急會談（emergency session）之方法，用於一無線通訊系統之一行動裝置，該方法包含有：

當一路由區更新（Routing Area Update，RAU）程序正在進行時，接收來自一網路端之一分離請求訊息;

當該分離請求訊息已被接收時，不中止該路由區更新程序；以及同時進行該路由區更新程序及對應於該分離請求信息之一分離

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程序。

16. 如請求項 15 所述之方法，其中該網路端為一演進式通用陸地全球無線存取網路（Evolved Universal Terrestrial Radio Access Network，E-UTRAN）或一通用陸地全球無線存取網路（Universal Terrestrial Radio Access Network，UTRAN），且該分離程序係用來將該行動裝置自該網路端之線路交換服務（circuit-switched，CS）分離。

17. 如請求項 15 所述之方法，其另包含啟動一計時器並轉換至一可指示該行動裝置正在嘗試該路由區更新程序之狀態。

18. 一種處理緊急會談（emergency session）之方法，用於一無線通訊系統之一網絡端，該方法包含有：

當該網路端正在傳送一分離請求訊息至一行動裝置時，接收來自該行動裝置且對應於一路由區更新程序之一路由區更新（Routing Area Update，RAU）請求訊息；以及

當該路由區更新請求訊息被接收時，處理該路由區更新請求訊息，並回覆一路由區更新接受信息或一路由區更新拒絕訊息至該行動裝置。

19. 如請求項 18 所述之方法，其另包含同時進行該路由區更新程序及對應於該分離請求信息之一分離程序。

20. 一種處理緊急會談（emergency session）之方法，用於一無線通訊系統之一行動裝置，該方法包含有：

當一路由區更新（Routing Area Update，RAU）程序正在進行時，接收來自一網路端之一分離請求訊息；

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當該分離請求訊息被接收時，中止該路由區更新程序並進行對應於該分離請求訊息之一分離程序；以及

於該分離程序完成時，立即重新啟動該路由區更新程序；

其中該網路端為一演進式通用陸地全球無線存取網路（Evolved Universal Terrestrial Radio Access Network，E-UTRAN）或一通用陸地全球無線存取網路（Universal Terrestrial Radio Access Network，UTRAN），且該分離程序係用來將該行動裝置自該網路端之線路交換服務（circuit-switched，CS）分離。

八、圖式：

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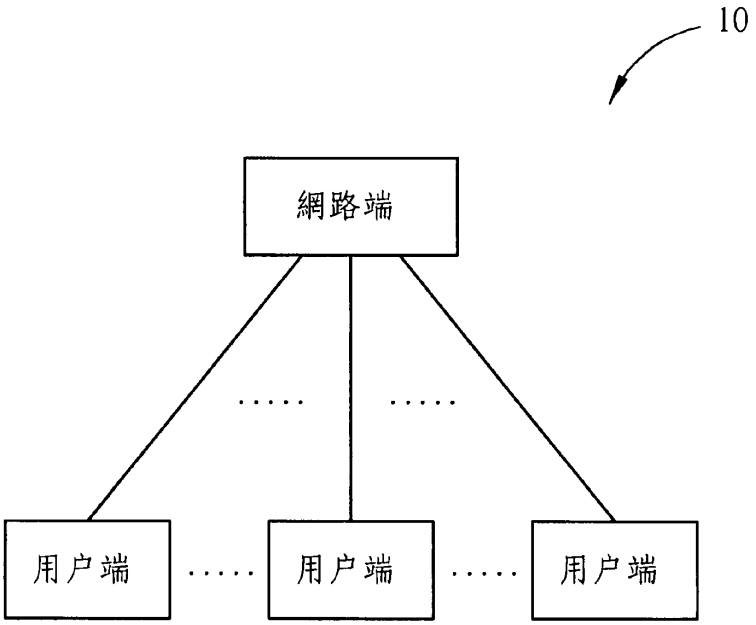
當該分離請求訊息被接收時，中止該路由區更新程序並進行對應於該分離請求訊息之一分離程序；以及

於該分離程序完成時，立即重新啟動該路由區更新程序；

其中該網路端為一演進式通用陸地全球無線存取網路（Evolved Universal Terrestrial Radio Access Network，E-UTRAN）或一通用陸地全球無線存取網路（Universal Terrestrial Radio Access Network，UTRAN），且該分離程序係用來將該行動裝置自該網路端之線路交換服務（circuit-switched，CS）分離。

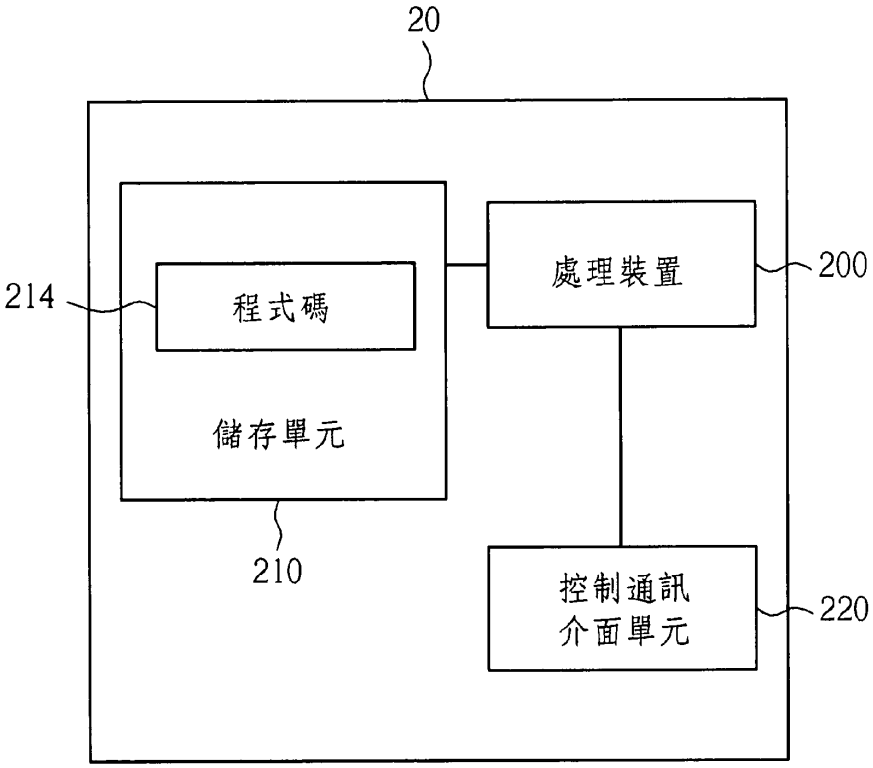
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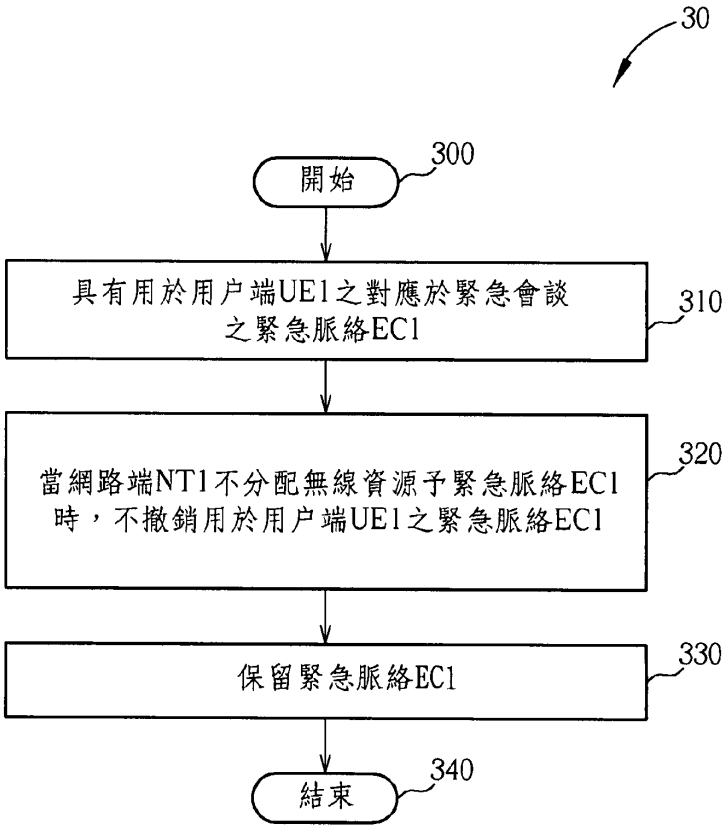


第1圖

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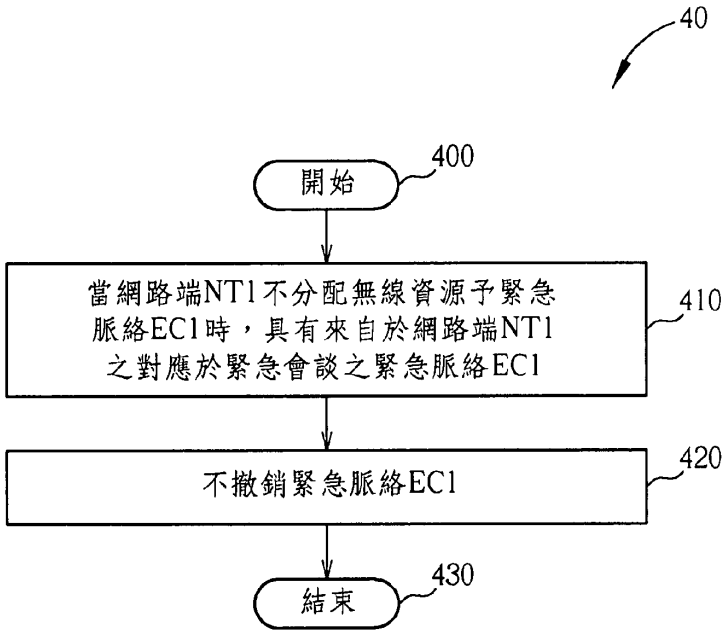


第2圖



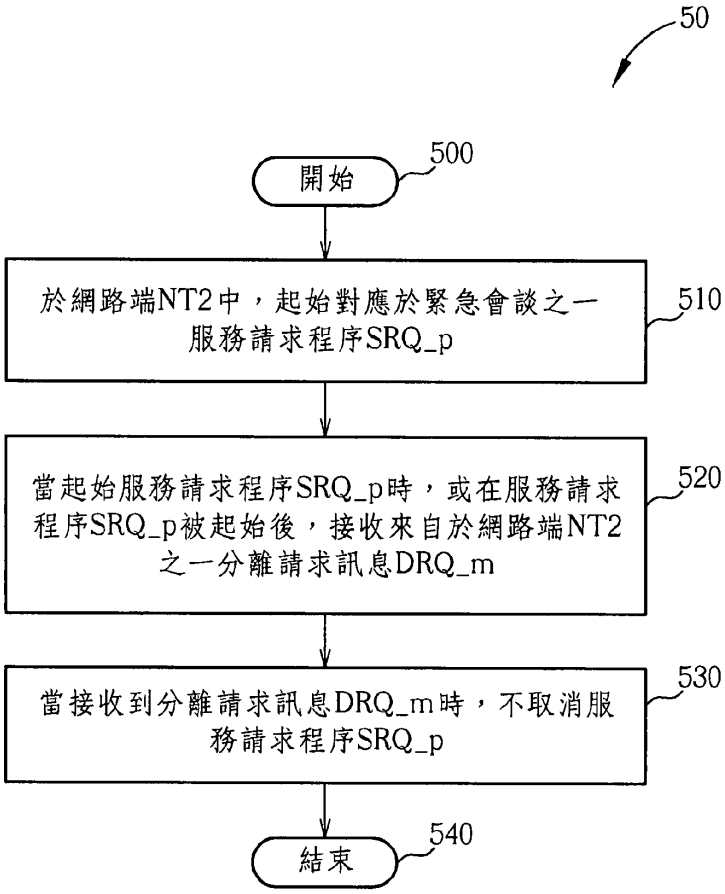
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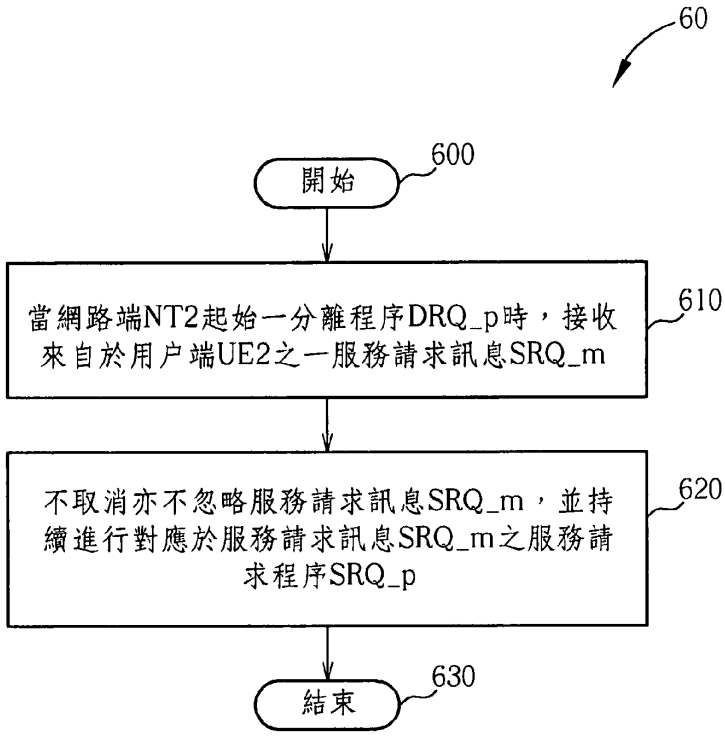
第4圖

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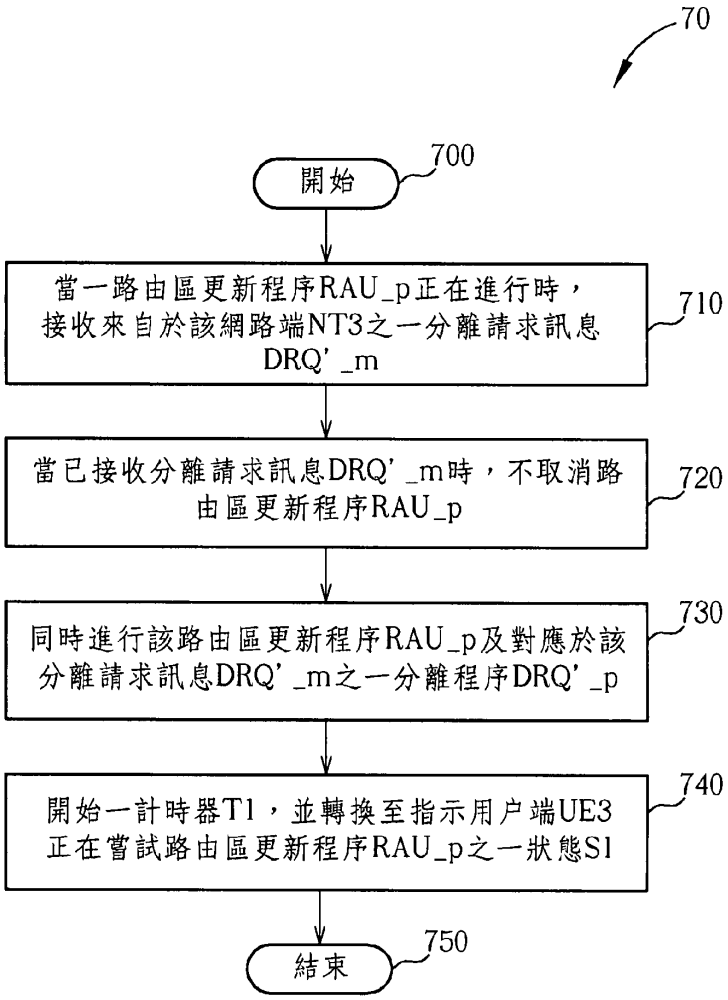
第5圖

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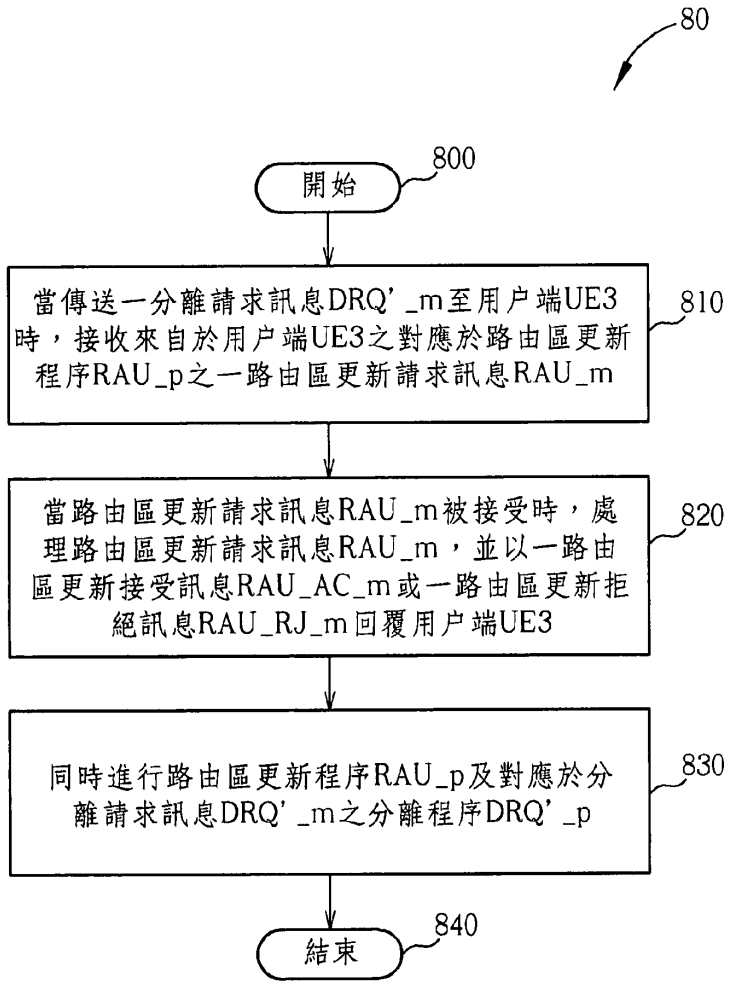
第6圖

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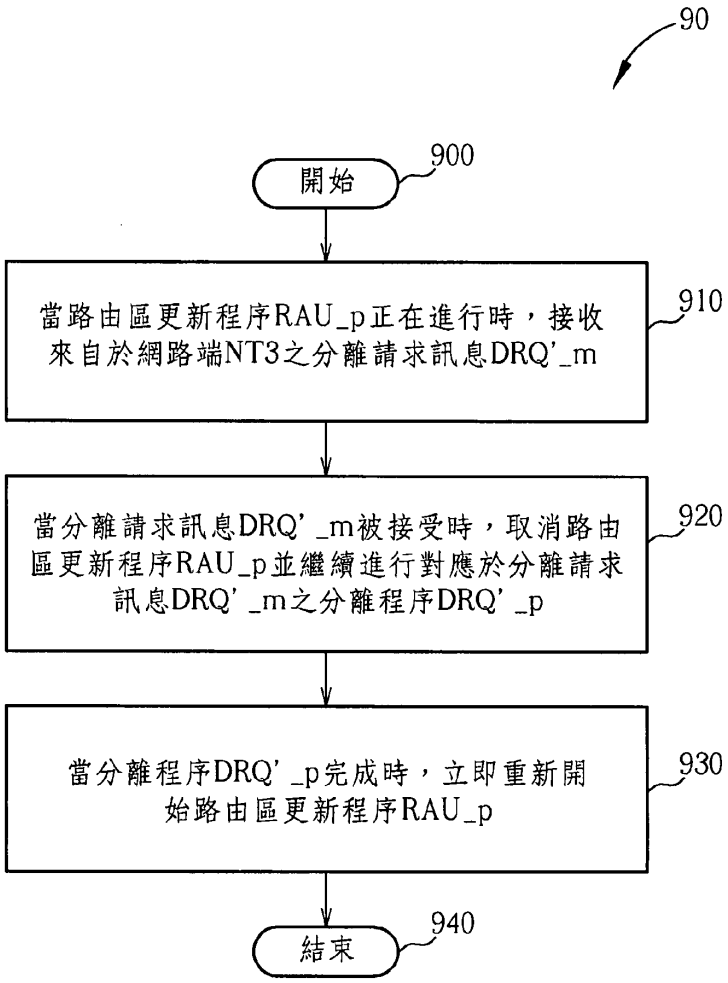
第7圖

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第8圖

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第9圖

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四、指定代表圖：

(一)本案指定代表圖為：第（ 3 ）圖。

(二)本代表圖之元件符號簡單說明：

30	流程
310、320、330、340	步驟

五、本案若有化學式時，請揭示最能顯示發明特徵的化學式：

無

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Espacenet

Bibliographic data: TW201240499 (A) — 2012-10-01

Methods for handling a request for emergency bearer services for low priority devices, and apparatuses using the same

Inventor(s): TIWARI KUNDAN [IN] ± (TIWARI, KUNDAN)

Applicant(s): HTC CORP [TW] ± (HTC CORPORATION)

Classification: - international: *H04W4/22; H04W76/02*
- cooperative: H04W76/007

Application number: TW20120108793 20120315

Priority number(s): US201161454861P 20110321 ; US201161476533P 20110418 ; US201213419006 20120313

Also published as: TWI436666 (B) EP2503838 (A2) EP2503838 (A3) EP2503838 (B1) US2012244828 (A1) more

Abstract of TW201240499 (A)

A mobile communication device configured for Non Access Stratum (NAS) signaling low priority is provided. In the mobile communication device, a wireless module performs wireless transmissions and receptions to and from a service network, and a controller module originates an EXTENDED SERVICE REQUEST message for requesting emergency bearer services in an EMM IDLE mode. The controller module further transmits an RRC CONNECTION REQUEST message comprising an establishment cause indicating an emergency case to the service network via the wireless module in response to originating the EXTENDED SERVICE REQUEST message.

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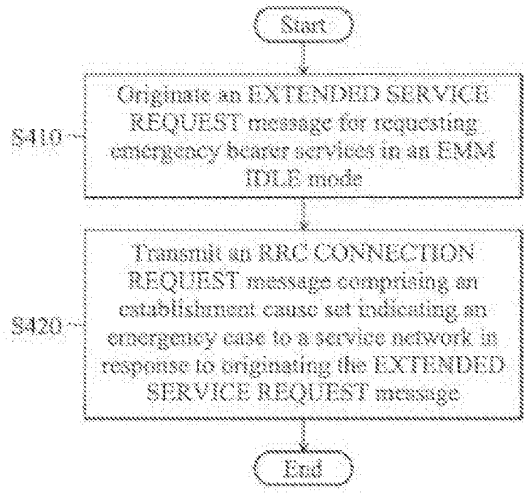


FIG. 4

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(19)中華民國智慧財產局
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(43)公開日： 中華民國 101 (2012) 年 10 月 01 日

(21)申請案號：101108793 (22)申請日： 中華民國 101 (2012) 年 03 月 15 日
(51)Int. Cl.： *H04W4/22 (2009.01)* *H04W76/02 (2009.01)*
(30)優先權：2011/03/21 美國 61/454,861
2011/04/18 美國 61/476,533
2012/03/13 美國 13/419,006
(71)申請人：宏達國際電子股份有限公司 (中華民國) HTC CORPORATION (TW)
桃園縣桃園市龜山工業區興華路 23 號
(72)發明人：提瓦利 昆丹 TIWARI, KUNDAN (IN)
(74)代理人：洪澄文；顏錦順
申請實體審查：有 申請專利範圍項數：16 項 圖式數：5 共 29 頁

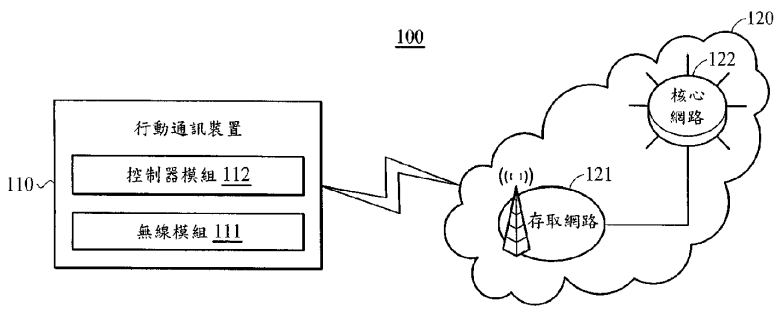
(54)名稱

行動通訊裝置及請求緊急乘載服務之處理方法

METHODS FOR HANDLING A REQUEST FOR EMERGENCY BEARER SERVICES FOR LOW PRIORITY DEVICES, AND APPARATUSES USING THE SAME

(57)摘要

本發明提供了一種行動通訊裝置，被設定為非存取通信低優先級。行動通訊裝置具有無線模組與控制器模組。無線模組係用以執行與服務網路之間之無線傳送與接收。控制器模組係用以於演進封包系統移動管理之閒置模式下產生延伸服務請求訊息以請求進行緊急乘載服務，以及因應延伸服務請求訊息之產生而透過無線模組傳送包括建立原因之無線資源控制連線請求訊息至服務網路，其中建立原因指示了緊急情況。



六、發明說明：

【發明所屬之技術領域】

本發明主要關於請求緊急乘載（bearer）服務之處理方法，特別係有關於針對低優先級裝置請求緊急乘載服務之處理方法以及適用該方法之裝置。

【先前技術】

長久以來，我們的日常生活都藉由各式機器設備而變得更為便利，一般來說，如今的機器設備都配有計算處理器與軟體以提供智慧型的服務。另一方面，由於無線通訊技術的普及，因而發展出了機器類別通訊（Machine Type Communication，為方便敘述，於文後簡稱為 MTC）技術，使相隔遙遠的機器之間能夠透過無線通訊得以交換資訊並於無人為操作的情況下運作。特別是對水利設施與橋樑等等的重大公共建設而言，可使用 M2M 感測器（sensor）來監測公共建設的運作狀態並將監測結果透過無線通訊技術回報到管控中心，無線通訊技術包括：全球行動通訊系統（Global System for Moblie communications，GSM） 技術、封包式無線數據服務（General Packet Radio Service，GPRS）技術、全球進化型數據傳輸率（Enhanced Data rates for Global Evolution，EDGE）技術、寬頻分碼多工存取（Wideband Code Division Multiple Access，WCDMA）技術、分碼多工存取 2000（Code Division Multiple Access

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2000，CDMA-2000）技術、分時同步分碼多工存取（Time Division-Synchronous Code Division Multiple Access，TD-SCDMA）技術、全球互通微波存取（Worldwide Interoperability for Microwave Access，WiMAX）技術、長期演進（Long Term Evolution，LTE）技術、長期演進強化（LTE-Advanced）技術等等。

以長期演進技術為例，根據第三代合作夥伴計劃（3rd Generation Partnership Project，3GPP）組織所制訂之規格標準書 TS 24.301 v.10.3.0（以下簡稱為規格標準書 TS 24.301），針對容忍延遲之使用者裝置（User Equipment，UE）定義了一低優先權指標或 M2M 指標，一般使用者裝置可於製造的過程中被設定為非存取通信低優先級（NAS signaling low priority）、以及/或可於存取服務網路時透過開放行動聯盟（Open Mobile Alliance，OMA）所制訂的裝置管理（Device Management，DM）進行設定，以及/或可透過用戶識別模組/通用用戶識別模組（Subscriber Identity Module/Universal Subscriber Identity Module，SIM/USIM）之空中傳輸（Over-The-Air，OTA）方式進行設定。對於被設定為非存取通信低優先級之使用者裝置（或可稱為低優先級裝置）而言，在產生（originate）用以請求封包服務之一延伸服務請求（EXTENDED SERVICE REQUEST）訊息時所用到的無線資源控制建立原因（RRC establishment cause）一定都會設為「容忍延遲（Delay tolerant）」，即便所請求的封包服務是緊急乘載服務也一樣。因此造成了

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緊急乘載服務無法如預期般被優先處理。

【發明內容】

為了解決上述問題，本發明提出的解決方案能夠在針對緊急乘載服務產生延伸服務請求訊息時，明確地指出緊急情況，使得緊急乘載服務得以於存取（Access Stratum，AS）層以及/或非存取（Non Access Stratum，NAS）層中被優先處理。

本發明之第一實施例提供了一種行動通訊裝置，被設定為非存取通信低優先級。上述行動通訊裝置包括一無線模組與一控制器模組。上述無線模組係用以執行與一服務網路之間之無線傳送與接收。上述控制器模組係用以於一演進封包系統移動管理之閒置（EPS Mobility Management IDLE，EMM IDLE）模式下產生一延伸服務請求訊息以請求進行複數緊急乘載服務，以及因應上述延伸服務請求訊息之產生而透過上述無線模組傳送包括一建立原因之一無線資源控制連線請求（RRC CONNECTION REQUEST）訊息至上述服務網路，其中上述建立原因指示一緊急情況。

本發明之第二實施例提供了一種請求緊急乘載服務之處理方法，適用於被設定為非存取通信低優先級之一行動通訊裝置。上述方法包括以下步驟：於一演進封包系統移動管理之閒置模式下產生一延伸服務請求訊息以請求進行複數緊急乘載服務；以及因應上述延伸服務請求訊息之產

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生而傳送包括一建立原因之一無線資源控制連線請求訊息至上述服務網路，其中上述建立原因指示一緊急情況。

本發明之第三實施例提供了一種行動通訊裝置，被設定為非存取通信低優先級。上述行動通訊裝置包括一無線模組與一控制器模組。上述無線模組係用以執行與一服務網路之間之無線傳送與接收。上述控制器模組係用以產生一延伸服務請求訊息以請求進行複數緊急乘載服務，以及於上述延伸服務請求訊息中包括一服務類型以指示該請求係針對上述緊急乘載服務。此外，上述無線模組還透過上述無線模組將上述延伸服務請求訊息傳送至上述服務網路。

本發明之第四實施例提供了一種請求緊急乘載服務之處理方法，適用於被設定為非存取通信低優先級之一行動通訊裝置。上述方法包括以下步驟：產生一延伸服務請求訊息以請求進行複數緊急乘載服務；於上述延伸服務請求訊息中包括一服務類型以指示該請求係針對上述緊急乘載服務；以及將上述延伸服務請求訊息傳送至上述服務網路。

關於本發明其他附加的特徵與優點，此領域之熟習技術人士，在不脫離本發明之精神和範圍內，當可根據本案實施方法中所揭露之行動通訊裝置以及請求緊急乘載服務之處理方法，加以更動與潤飾而得到。

【實施方式】

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本章節所敘述的是實施本發明之範例，以下範例係以所附圖式配合說明。然而，以下實施例僅為實施本發明之代表範例，並非代表實施本發明之所有方式，文中述及之第三代合作夥伴計劃組織所制訂之規格標準書係僅用以協助表達本發明之精神，而非用以限制本發明之範圍。

第 1 圖係根據本發明一實施例所述之行動通訊環境之示意圖。在行動通訊環境 100 中，行動通訊裝置 110 係被設定為非存取通信低優先級，且係無線地連接至服務網路 120 以取得無線服務。服務網路 120 包括存取網路 121 與核心網路 122，其中存取網路 121 可為長期演進技術/長期演進強化技術中的演進通用陸地無線存取網路（Evolved UTRAN， E-UTRAN），而核心網路 122 可為長期演進技術/長期演進強化技術中的演進封包核心（Evolved Packet Core，EPC）。行動通訊裝置 110 包括無線模組 111 與控制器模組 112，其中無線模組 111 係用以執行與服務網路 120 之間的無線傳輸與接收功能，控制器模組 112 係用以控制無線模組 111 以根據所使用之通訊協定與服務網路 120 進行通訊。以長期演進技術為例，通訊協定堆疊（protocol stack）一般都包括兩個功能層：非存取層、以及存取層，其中非存取層係用以提供行動通訊裝置 110 與核心網路 122 之間的通信與訊務（traffic），而存取層係用以提供行動通訊裝置 110 與存取網路 121 之間的通信與訊務。此外，控制器模組 112 還可控制其它功能模組之作業，例如：用以提供人機介面（Man-Machine Interface，MMI）

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之顯示單元以及/或按鍵(keypad)、以及用以儲存應用程式之程式碼之儲存單元等等。進一步說明，無線模組 111 可為一射頻（radio frequency，RF）單元，控制器模組 112 可為一基頻（baseband）單元中的通用處理器或微控制單元（Micro-Control Unit，MCU）。基頻單元可包括多個硬體裝置以執行基頻信號處理，包括類比數位轉換（analog to digital conversion，ADC）/數位類比轉換（digital to analog conversion，DAC）、增益（gain）調整、調變與解調變、以及編碼/解碼等。射頻單元可接收射頻無線信號，並將射頻無線信號轉換為基頻信號以交由基頻模組進一步處理，或自基頻信號模組接收基頻信號，並將基頻信號轉換為射頻無線信號以進行傳送。射頻單元亦可包括多個硬體裝置以執行上述射頻轉換，舉例來說，射頻單元可包括一混頻器（mixer）以將基頻信號乘上行動通訊系統之射頻中之一震盪載波，其中該射頻可為長期演進技術/長期演進強化技術所使用之 900 兆赫、2100 兆赫、或 2.6 吉赫，或視其它無線存取技術之標準而定。

進一步說明，控制器模組 112 係控制無線模組 111 以處理針對緊急乘載服務之請求。第 2A、2B 圖係根據本發明一實施例所述處理緊急乘載服務請求之訊息序列圖。在此實施例，針對緊急乘載服務請求之處理係發生於行動通訊裝置 110 中。文後為方便敘述，在行動通訊裝置 110 端，係以 UE NAS 與 US AS 分別代表通訊協定中的非存取層與存取層。如第 2A 圖所示，UE NAS 在一開始係處於演進封

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包系統移動管理之閒置（EMM IDLE）模式，然後觸發要使用延伸服務請求（為方便理解，於文後簡稱為EXTENDED SERVICE REQUEST）訊息發起緊急乘載服務（步驟 S210）。換句話說，UE NAS 係產生 EXTENDED SERVICE REQUEST 訊息以請求進行緊急乘載服務。接著，UE NAS 請求 UE AS 為緊急乘載服務建立無線資源控制（Radio Resource Control，RRC）連線（步驟 S220）。明確來說，該請求中包括了無線資源控制建立原因（RRC establishment cause），其值被設為「緊急通話（Emergency call）」。為了因應該請求，UE AS 根據無線資源控制建立原因傳送無線資源控制連線請求（為方便理解，於文後簡稱為 RRC CONNECTION REQUEST）訊息至存取網路 121，其中 RRC CONNECTION REQUEST 訊息包括了建立原因，其值被設為「緊急通話」以指示緊急情況（步驟 S230）。

當收到 RRC CONNECTION REQUEST 訊息時，存取網路 121 根據所收到的建立原因而識別出該請求係針對緊急情況所發出，所以回傳無線資源控制連線建立（為方便理解，於文後簡稱為 RRC CONNECTION SETUP）訊息給行動通訊裝置 110（步驟 S240）。RRC CONNECTION SETUP 訊息可包括建立無線資源控制連線時所需的參數及設定。當收到 RRC CONNECTION SETUP 訊息時，UE AS 便根據所收到的參數及設定去建立無線資源控制連線，然後再傳送無線資源控制連線建立完成（RRC CONNECTION

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SETUP COMPLETE）訊息至存取網路 121（步驟 S250），即完成無線資源控制連線之建立。

進一步，UE AS 指示 UE NAS 已完成無線資源控制連線之建立（步驟 S260）。之後，UE NAS 在 EXTENDED SERVICE REQUEST 訊息中包括服務類型之資訊元素（Information Element，IE），其值被設為「透過 S1 進行針對緊急乘載服務之封包服務（packet service via S1 for emergency bearer services）」，然後再將 EXTENDED SERVICE REQUEST 訊息傳送至核心網路 122（步驟 S270）。如此一來，經由將建立原因設為「緊急通話」，UE AS 與存取網路 121（亦可視為網路端的通訊協定中的存取層）雙方都會優先處理無線資源控制連線之建立，所以會連帶也使得緊急乘載服務被優先處理。此外，經由將服務類型設為「透過 S1 進行針對緊急乘載服務之封包服務」，UE NAS 與核心網路 122（亦可視為網路端的通訊協定中的非存取層）雙方都會優先處理所請求之緊急乘載服務。

在另一實施例，可將 EXTENDED SERVICE REQUEST 訊息中的服務類型資訊元素設為「透過 S1 進行之封包服務（packet service via S1）」，而僅依賴 UE AS 對建立原因之設定以使緊急乘載服務被優先處理。

第 3A、3B 圖係根據本發明另一實施例所述處理緊急乘載服務請求之訊息序列圖。類似於第 2A、2B 圖，針對緊急乘載服務請求之處理係發生於行動通訊裝置 110 中。

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在此實施例，UE NAS 在一開始可能處於演進封包系統移動管理之閒置模式、或演進封包系統移動管理之連線（EMM CONNECTED）模式，然後被觸發要使用 EXTENDED SERVICE REQUEST 訊息發起緊急乘載服務（步驟 S310）。如果 UE NAS 係處於演進封包系統移動管理之閒置模式，則 UE NAS 可請求 UE AS 為緊急乘載服務建立無線資源控制連線，其中該請求中包括了被設為「容忍延遲」的無線資源控制建立原因（步驟 S320）。然後，UE AS 可根據無線資源控制建立原因執行連線建立程序（步驟 S330~S350），之後再指示 UE NAS 已完成連線建立（步驟 S360）。需注意的是，步驟 S320~S360 可選擇性地被執行或不執行，故於第 3A、3B 圖中係以虛線框標示；且除了所使用的建立原因不同之外，步驟 S330~S350 係類似於第 2A、2B 圖中的步驟 S230~S250。之後，UE NAS 傳送 EXTENDED SERVICE REQUEST 訊息至核心網路 122，其中 EXTENDED SERVICE REQUEST 訊息中包括服務類型之資訊元素，其值被設為「透過 S1 進行針對緊急乘載服務之封包服務」（步驟 S370）。

如果 UE NAS 係處於演進封包系統移動管理之連線模式，表示 UE AS 與存取網路 121 之間已存在無線資源控制連線，且 UE NAS 已聯繫（attach）至核心網路 122，所以可跳過步驟 S320~S360，直接執行步驟 S370。如此一來，經由將服務類型設為「透過 S1 進行針對緊急乘載服務之封包服務」，UE NAS 與核心網路 122（亦可視為網路端的通

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訊協定中的非存取層）雙方都會優先處理所請求之緊急乘載服務。

需注意的是，在第 2A、2B、3A、以及 3B 圖中所示的服務請求程序中未提及的其它相關作業並不在本發明的範疇內，其詳細描述請參考規格標準書 TS 24.301，故在此省略不提。

第 4 圖係根據本發明一實施例所述之請求緊急乘載服務之處理方法流程圖。在此實施例，本發明之方法可適用於任何被設定為非存取通信低優先級之行動通訊裝置。首先，行動通訊裝置在一演進封包系統移動管理之閒置模式下產生 EXTENDED SERVICE REQUEST 訊息以請求進行緊急乘載服務（步驟 S410），接著，行動通訊裝置再因應 EXTENDED SERVICE REQUEST 訊息之產生而傳送包括一建立原因之 RRC CONNECTION REQUEST 訊息至服務網路，其中該建立原因指示一緊急情況（步驟 S420）。進一步說明，EXTENDED SERVICE REQUEST 訊息之產生可由行動通訊裝置中的通訊協定非存取層所觸發；而 RRC CONNECTION REQUEST 訊息之傳送則可由行動通訊裝置中的通訊協定存取層在收到非存取層之請求時所執行，其中非存取層之請求係用以請求建立無線資源控制連線，特別是，非存取層之請求中包括了無線資源控制建立原因，其值係用以指示將 RRC CONNECTION REQUEST 訊息中的建立原因設為「緊急通話」。如此一來，經由將建立原因設為「緊急通話」，使用者裝置端以及服務網路端雙方

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的存取層都會優先處理無線資源控制連線之建立，而進一步使緊急乘載服務得以被優先處理。

第 5 圖係根據本發明另一實施例所述之請求緊急乘載服務之處理方法流程圖。類似於第 4 圖，該方法可適用於任何被設定為非存取通信低優先級之行動通訊裝置。首先，行動通訊裝置產生 EXTENDED SERVICE REQUEST 訊息以請求進行緊急乘載服務（步驟 S510），並且於 EXTENDED SERVICE REQUEST 訊息中包括一服務類型以指示該請求係針對緊急乘載服務（步驟 S520），然後，行動通訊裝置將 EXTENDED SERVICE REQUEST 訊息傳送至服務網路（步驟 S530）。在另一實施例，如果行動通訊裝置在產生 EXTENDED SERVICE REQUEST 訊息時係處於一演進封包系統移動管理之閒置模式，則行動通訊裝置可於步驟 S530 之前先建立無線資源控制連線。進一步說明，EXTENDED SERVICE REQUEST 訊息之產生可由行動通訊裝置中的通訊協定非存取層所觸發，且該服務類型可設為「透過 S1 進行針對緊急乘載服務之封包服務」以指示緊急情況。如此一來，經由服務類型之設定，使用者裝置端以及服務網路端雙方的非存取層都會優先處理所請求之緊急乘載服務。

本發明雖以各種實施例揭露如上，然而其僅為範例參考而非用以限定本發明的範圍，任何熟習此項技藝者，在不脫離本發明之精神和範圍內，當可做些許的更動與潤飾。例如：本發明之請求緊急乘載服務之處理方法亦可適

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用於支援長期演進技術/長期演進強化技術之未來發展技術之任何低優先級裝置。因此上述實施例並非用以限定本發明之範圍，本發明之保護範圍當視後附之申請專利範圍所界定者為準。

【圖式簡單說明】

第 1 圖係根據本發明一實施例所述之行動通訊環境之示意圖。

第 2A、2B 圖係根據本發明一實施例所述處理緊急乘載服務請求之訊息序列圖。

第 3A、3B 圖係根據本發明另一實施例所述處理緊急乘載服務請求之訊息序列圖。

第 4 圖係根據本發明一實施例所述之請求緊急乘載服務之處理方法流程圖。

第 5 圖係根據本發明另一實施例所述之請求緊急乘載服務之處理方法流程圖。

【主要元件符號說明】

100～行動通訊環境；

110～行動通訊裝置；

111～無線模組；

112～控制器模組；

120～服務網路；

121～存取網路；

122～核心網路。

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發明專利說明書

（本說明書格式、順序及粗體字，請勿任意更動，※記號部分請勿填寫）

※ 申請案號：101108993

※ 申請日期：101.3.15　※IPC 分類：H04W 4/22 (2009.01)
H04W 76/02 (2009.01)

一、發明名稱：(中文/英文)

行動通訊裝置及請求緊急乘載服務之處理方法
/METHODS FOR HANDLING A REQUEST FOR EMERGENCY BEARER SERVICES FOR LOW PRIORITY DEVICES, AND APPARATUSES USING THE SAME

二、中文發明摘要：

本發明提供了一種行動通訊裝置，被設定為非存取通信低優先級。行動通訊裝置具有無線模組與控制器模組。無線模組係用以執行與服務網路之間之無線傳送與接收。控制器模組係用以於演進封包系統移動管理之閒置模式下產生延伸服務請求訊息以請求進行緊急乘載服務，以及因應延伸服務請求訊息之產生而透過無線模組傳送包括建立原因之無線資源控制連線請求訊息至服務網路，其中建立原因指示了緊急情況。

三、英文發明摘要：

A mobile communication device configured for Non Access Stratum (NAS) signaling low priority is provided. In the mobile communication device, a wireless module performs wireless transmissions and receptions to and from a service

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network, and a controller module originates an EXTENDED SERVICE REQUEST message for requesting emergency bearer services in an EMM IDLE mode. The controller module further transmits an RRC CONNECTION REQUEST message comprising an establishment cause indicating an emergency case to the service network via the wireless module in response to originating the EXTENDED SERVICE REQUEST message.

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七、申請專利範圍：

1.一種行動通訊裝置，被設定為非存取通信低優先級（NAS signaling low priority），包括：

一無線模組，執行與一服務網路之間之無線傳送與接收；以及

一控制器模組，於一演進封包系統移動管理之閒置（EPS Mobility Management IDLE，EMM IDLE）模式下產生（originate）一延伸服務請求（EXTENDED SERVICE REQUEST）訊息以請求進行複數緊急乘載（bearer）服務，以及因應上述延伸服務請求訊息之產生而透過上述無線模組傳送包括一建立原因之一無線資源控制連線請求（RRC CONNECTION REQUEST）訊息至上述服務網路，其中上述建立原因指示一緊急情況。

2.如申請專利範圍第 1 項所述之行動通訊裝置，其中上述建立原因係根據一非存取（Non Access Stratum，NAS）層之一無線資源控制建立原因（RRC establishment cause）而被設為「緊急通話（Emergency call）」以指示上述緊急情況。

3.如申請專利範圍第 1 項所述之行動通訊裝置，其中因為上述建立原因指示了上述緊急情況，而使得上述緊急乘載服務得以於一存取（Access Stratum，AS）層中被優先處理。

4.如申請專利範圍第 1 項所述之行動通訊裝置，其中上述控制器模組更透過上述無線模組從上述服務網路接收

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對應至上述無線資源控制連線請求訊息之一無線資源控制連線建立（RRC CONNECTION SETUP）訊息，以及因應上述無線資源控制連線建立訊息之接收而透過上述無線模組傳送一無線資源控制連線建立完成（RRC CONNECTION SETUP COMPLETE）訊息至上述服務網路。

5.如申請專利範圍第 4 項所述之行動通訊裝置，其中上述控制器模組更於上述延伸服務請求訊息中包括一服務類型以指示該請求係針對上述緊急乘載服務，以及因應上述無線資源控制連線建立完成訊息之傳送而透過上述無線模組將上述延伸服務請求訊息傳送至上述服務網路。

6.如申請專利範圍第 5 項所述之行動通訊裝置，其中因為上述服務類型指示了該請求係針對上述緊急乘載服務，而使得上述緊急乘載服務得以於一非存取層中被優先處理。

7.一種請求緊急乘載服務之處理方法，適用於被設定為非存取通信低優先級之一行動通訊裝置，包括：

於一演進封包系統移動管理之閒置模式下產生一延伸服務請求訊息以請求進行複數緊急乘載服務；以及

因應上述延伸服務請求訊息之產生而傳送包括一建立原因之一無線資源控制連線請求訊息至上述服務網路，其中上述建立原因指示一緊急情況。

8.如申請專利範圍第 7 項所述之方法，其中上述建立原因係根據一非存取層之一無線資源控制建立原因而被設為「緊急通話」以指示上述緊急情況。

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9.如申請專利範圍第 7 項所述之方法，其中因為上述建立原因指示了上述緊急情況，而使得上述緊急乘載服務得以於一存取層中被優先處理。

10.如申請專利範圍第 7 項所述之方法，更包括：

從上述服務網路接收對應至上述無線資源控制連線請求訊息之一無線資源控制連線建立訊息；以及

因應上述無線資源控制連線建立訊息之接收而傳送一無線資源控制連線建立完成訊息至上述服務網路。

11.如申請專利範圍第 10 項所述之方法，更包括：

於上述延伸服務請求訊息中包括一服務類型以指示該請求係針對上述緊急乘載服務；以及

因應上述無線資源控制連線建立完成訊息之傳送而將上述延伸服務請求訊息傳送至上述服務網路。

12.如申請專利範圍第 11 項所述之方法，其中因為上述服務類型指示了該請求係針對上述緊急乘載服務，而使得上述緊急乘載服務得以於一非存取層中被優先處理。

13.一種行動通訊裝置，被設定為非存取通信低優先級，包括：

一無線模組，執行與一服務網路之間之無線傳送與接收；以及

一控制器模組，產生一延伸服務請求訊息以請求進行複數緊急乘載服務，於上述延伸服務請求訊息中包括一服務類型以指示該請求係針對上述緊急乘載服務，以及透過上述無線模組將上述延伸服務請求訊息傳送至上述服務網

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路。

14.如申請專利範圍第 13 項所述之行動通訊裝置，其中因為上述服務類型指示了該請求係針對上述緊急乘載服務，而使得上述緊急乘載服務得以於一非存取層中被優先處理。

15.一種請求緊急乘載服務之處理方法，適用於被設定為非存取通信低優先級之一行動通訊裝置，包括：

產生一延伸服務請求訊息以請求進行複數緊急乘載服務；

於上述延伸服務請求訊息中包括一服務類型以指示該請求係針對上述緊急乘載服務；以及

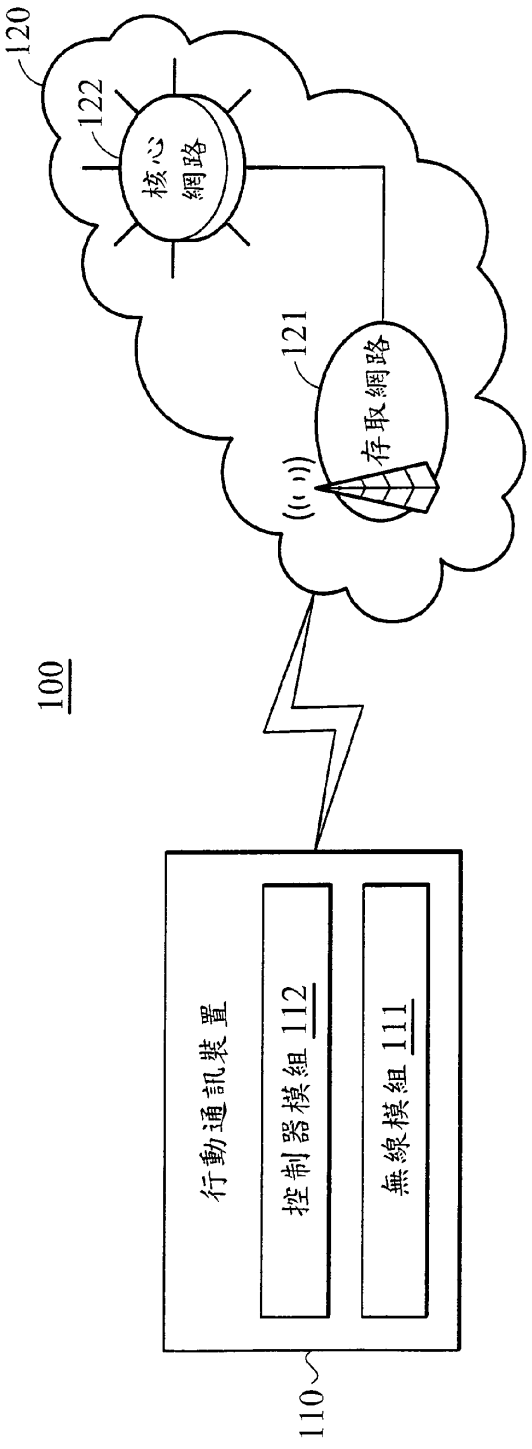
將上述延伸服務請求訊息傳送至上述服務網路。

16.如申請專利範圍第 15 項所述之方法，其中因為上述服務類型指示了該請求係針對上述緊急乘載服務，而使得上述緊急乘載服務得以於一非存取層中被優先處理。

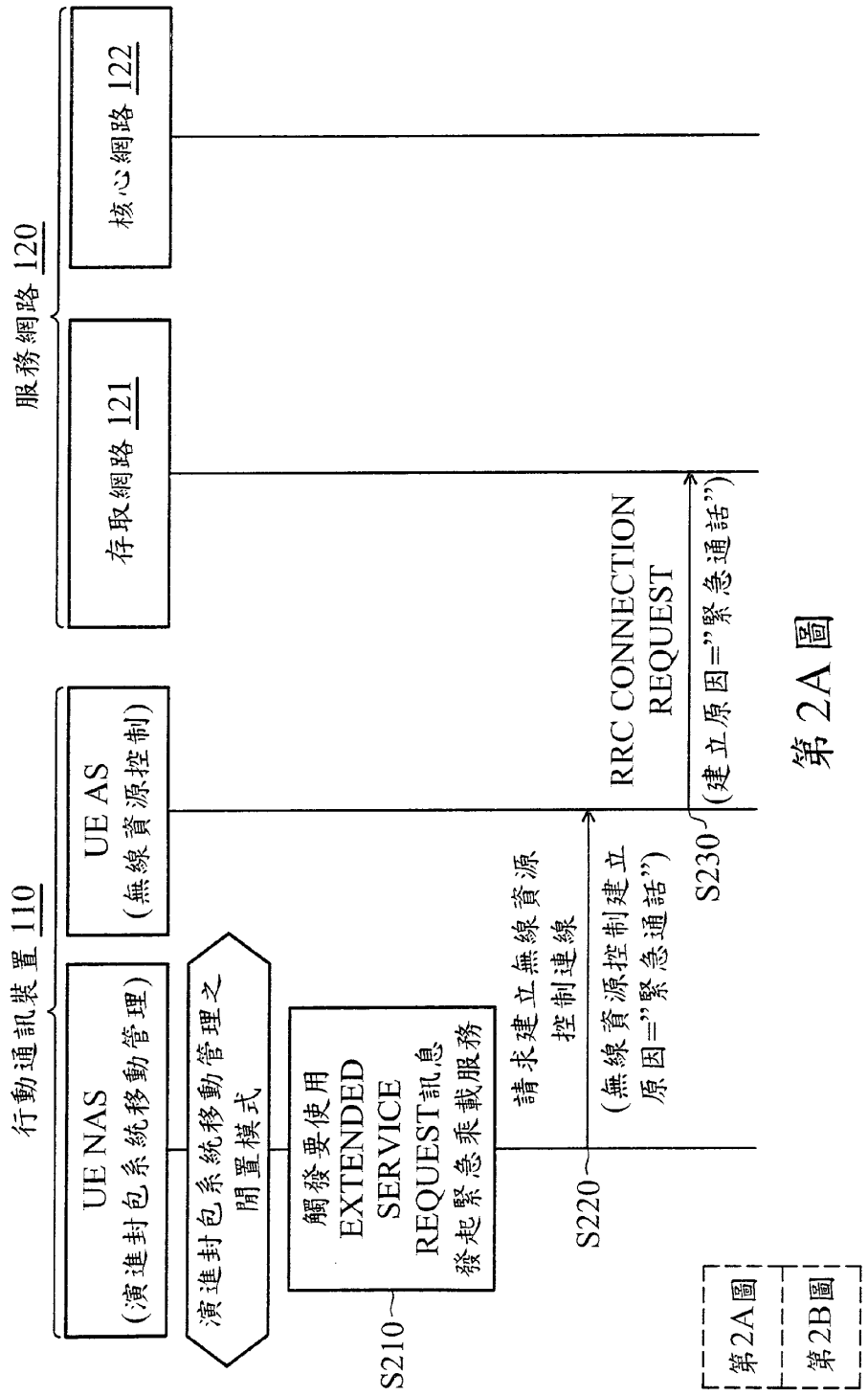
AliveCor Exhibit 1002
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八、圖式：

AliveCor Exhibit 1002
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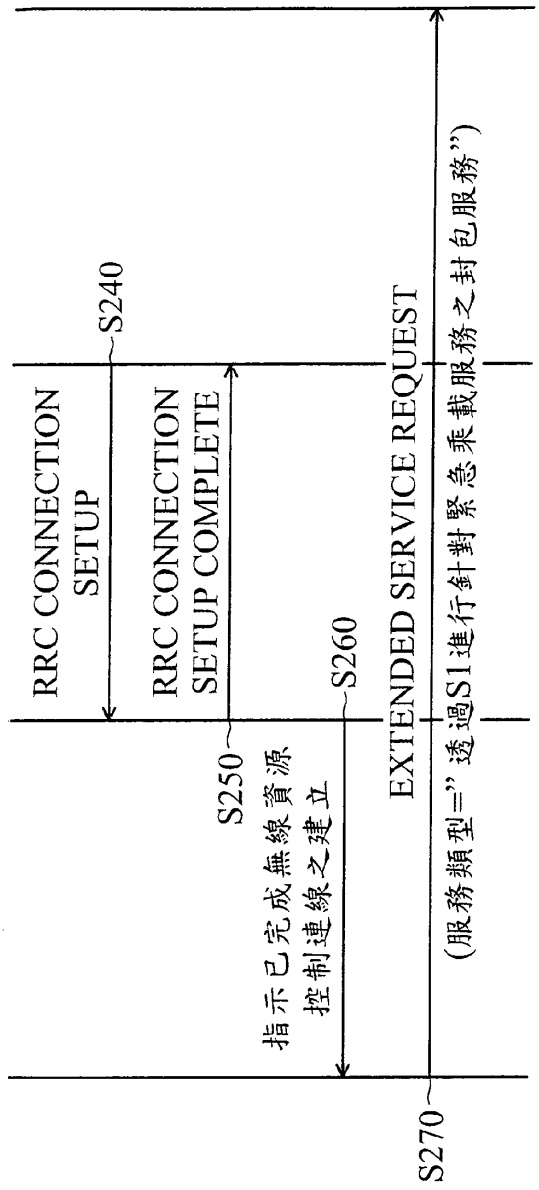


第 1 圖



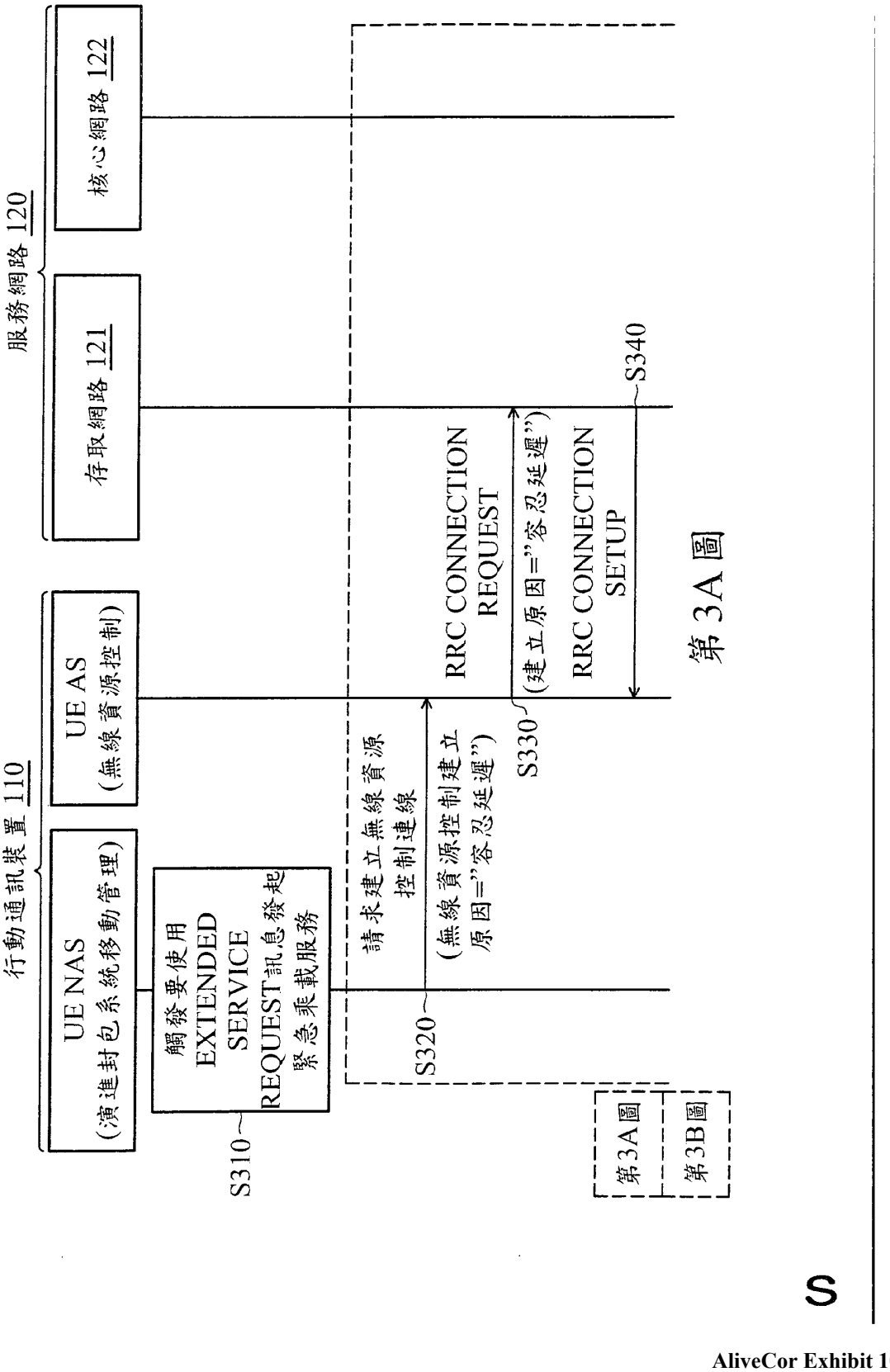
第 2A 圖

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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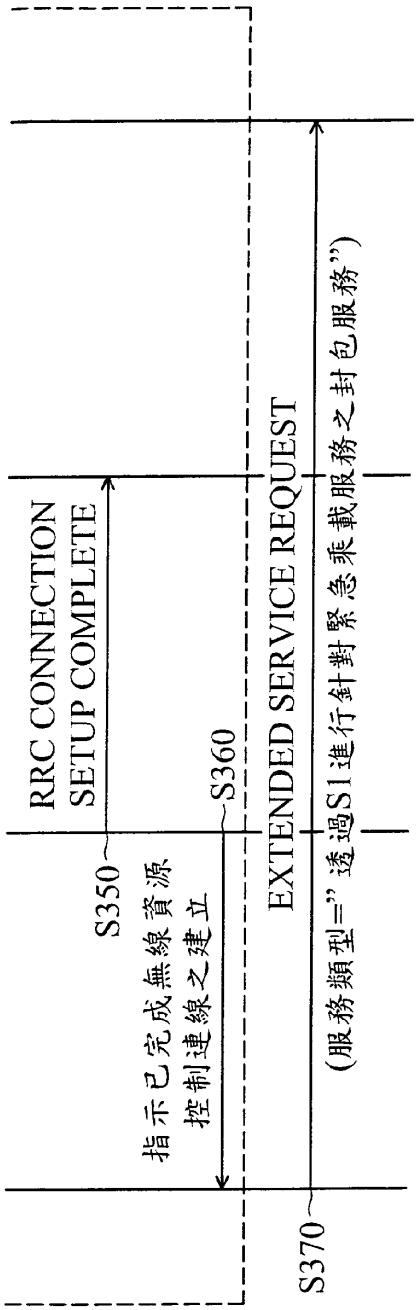


第 2B 圖

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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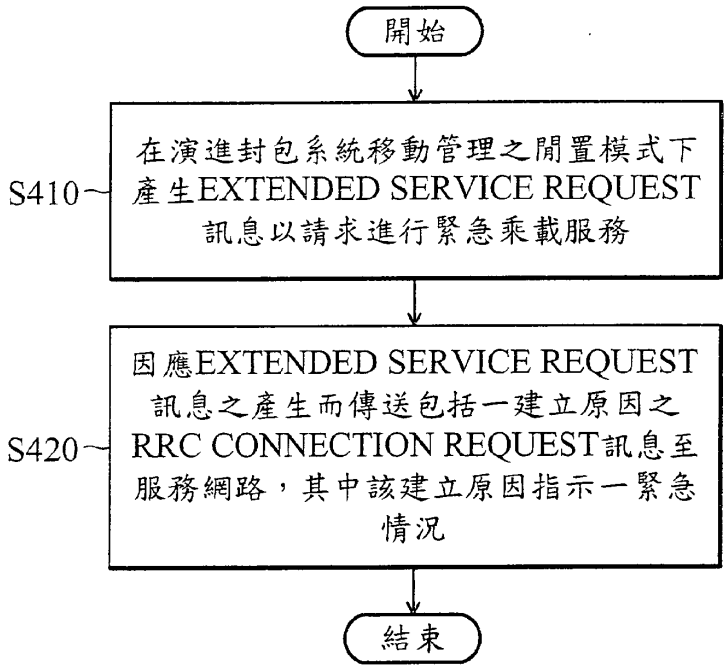

行動通訊裝置 110
UE NAS
(演進封包系統移動管理)
UE AS
(無線資源控制)
服務網路 120
存取網路 121
核心網路 122
觸發要使用
EXTENDED
SERVICE
REQUEST訊息發起
緊急乘載服務
S310
請求建立無線資源
控制連線
(無線資源控制建立
原因="容忍延遲")
S320
RRC CONNECTION
REQUEST
(建立原因="容忍延遲")
S330
RRC CONNECTION
SETUP
S340
第3A圖
第3B圖
S

第 3A 圖



第 3B 圖

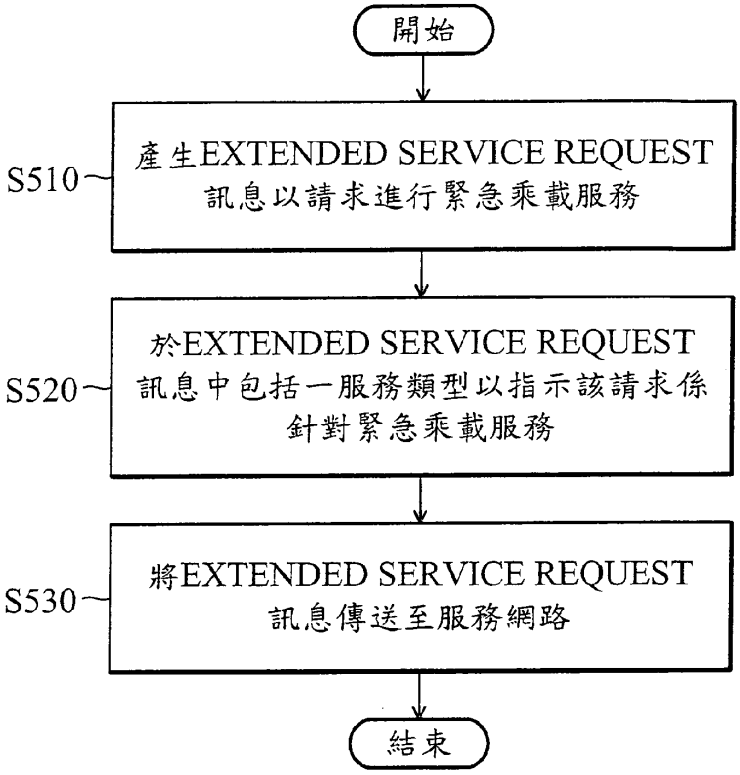
AliveCor Exhibit 1002
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第 4 圖

S

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第 5 圖

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四、指定代表圖：

（一）本案指定代表圖為：第 1 圖。

（二）本代表圖之元件符號簡單說明：

100～行動通訊環境；

110～行動通訊裝置；

111～無線模組；

112～控制器模組；

120～服務網路；

121～存取網路；

122～核心網路。

五、本案若有化學式時，請揭示最能顯示發明特徵的化學式：

略

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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2013/073195	04.12.2013	

International Patent Classification (IPC) or both national classification and IPC
INV. G06Q50/22 G06Q50/24

Applicant
PEARL CAPITAL DEVELOPMENTS LLC

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Laub, Christoph Telephone No. +49 89 2399-2809

Form PCT/ISA/237 (Cover Sheet) (July 2009)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/073195

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

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

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

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-28
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-28
Industrial applicability (IA)	Yes:	Claims	1-28
	No:	Claims	

2. Citations and explanations

see separate sheet

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Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: US 2013/262155 A1 (HINKAMP THOMAS J [US]) 3 October 2013 (2013-10-03)

D2: WO 99/41682 A2 (SOUTHERN RES INST [US]; DEAN ALAN HOYT [US]; JOHNSON DAVID WAYNE [US];) 19 August 1999 (1999-08-19)

D3: US 2011/137678 A1 (WILLIAMS MICHAEL C [US]) 9 June 2011 (2011-06-09)

1 **Background**

The present application relates to the field of aggregation and sharing of wellness data.

(cf. application, p. 1)

2 **Rule 39.1 (iii) PCT and the EPO procedure concerning administrative methods and methods of doing business**

Notice from the European Patent Office dated 1 October 2007 (OJ 11/2007, p. 592 f.) concerning business methods PCT:

2.1 *The EPO wishes to remind applicants that pursuant to Rule 39.1(iii) PCT it will not carry out an international search on an application to the extent that its subject matter relates to no more than a method of doing business, in the absence of any apparent technical character. The same holds for purely administrative methods implemented on a common place computer.*

2.2 *In cases where the claimed subject matter involves technical means the EPO will issue a search report. Where the employed technical means are so conventional that they were widely available and no documentary evidence is considered required because of their notoriety, no document will be cited in the search report. A statement will be inserted in the search report indicating that these technical means are considered to be so commonplace that no citation is considered necessary.*

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2.3 Should the application comprise an aggregation of business/administrative features which qualify under item 2.1 and technical features which would require a search, the technical character and problem will be evaluated taking into account the technical features.

3 **Independent claim 1**

It is claimed

3.1 A computer-implemented method comprising:

causing a display of an aggregated view of a plurality of types of wellness data, wherein the aggregated view comprises a plurality of partitions, each partition of the plurality of partitions associated with a type of the plurality of types of wellness data;

Assessment of the examiner - Taking into account the provisions concerning mixed type claims mentioned above under item 2 the following content of claim 1 is relevant for substantive patentability feature analysis according to the PCT: *A computer-implemented method comprising: causing a display to show cognitive information separated into a plurality of partitions;*

3.2 receiving a selection of a partition of the plurality of partitions; and

3.3 causing a display of an expanded view of the selected partition of the plurality of partitions.

Assessment of the examiner - Taking into account the provisions concerning mixed type claims mentioned above under item 2 the following content of claim 1 is relevant for substantive patentability feature analysis according to the PCT: *modifying the view of the selected partition of the plurality of partitions.*

4 Independent Claim 12

A computer-implemented method comprising:

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causing, on a device, a display of a plurality of partitions, wherein each partition of the plurality of partitions is associated with a type of wellness data of a plurality of types of wellness data;

in response to detecting a change in an orientation of the device, selecting a subset of the plurality of partitions; and

causing a display of the selected subset of the plurality of partitions.

5 Independent Claim 17

A computer-implemented method comprising:

causing a display of a first plurality of partitions associated with a first user, wherein each partition of the first plurality of partitions is associated with a type of wellness data of the first user; and

in response to receiving a request to view a second plurality of partitions associated with a second user, causing a display of a second plurality of partitions associated with a second user, wherein each partition of the second plurality of partitions is associated with a type of wellness data of the second user.

6 Independent claim 21

A computer-implemented method comprising:

causing a display of a first plurality of partitions associated with a first user, wherein each partition of the first plurality of partitions is associated with a type of wellness data of the first user; and

in response to receiving a request to view a second plurality of partitions associated with a second user, causing a display of a second plurality of partitions associated with a second user, wherein each partition of the second plurality of partitions is associated with a type of wellness data of the second user.

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7 Independent claim 24

A computer-implemented method comprising:

receiving, from a first user, a request to access wellness data associated with a second user;

transmitting, to the second user, a request to authorize the first user to access the wellness data associated with the second user; and

in response to receiving an authorization from the second user, transmitting the wellness data associated with the second user to the first user.

Articles 33(3) PCT

The application comprises a mixture of technical and non-technical features. Accordingly, a distinction has to be made in line with the provisions given under items 2.2 and 2.3.

8 **Inventive step assessment of claim 1**

The application primarily relates to the administration of cognitive data and to the mere display and formatting of cognitive information.

8.1 The concerned steps define merely features of an administrative and/or cognitive quality and consequently do not define any technical features: the mere idea of partitioned presentation of medical diagnosis data is not technical. Neither are technical considerations involved when implementing these steps on a notoriously known server client environment. When regarded on its own, those process features define merely an administration process which constitutes subject-matter in the sense of Rule 39.1 (iii) PCT.

8.2 The process is carried out on a notoriously known and accordingly programmed smartphone or similar device in connection with a server/ database system.

Thus, claim 1 comprises a mixture of non-technical, business aspects and technical aspects.

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8.3 **Document D1 is considered the closest prior art**

D1 equally discloses all of the technically relevant features of claim 1 as discussed under item 3:

Feature 3.1

cf. Fig. 3

Feature 3.2

cf. Fig. 3

Feature 3.3

cf. Fig. 4, paragraph 112

8.3.1 **The problem to be solved** is therefore to

causing a display of an aggregated view of a plurality of types of wellness data, wherein the aggregated view comprises a plurality of partitions, each partition of the plurality of partitions associated with a type of the plurality of types of wellness data;

causing a display of an expanded view of the selected partition of the plurality of partitions.

As already explained under item 8.1, the underlying considerations related to the mere display of cognitive information are not regarded technical. It would therefore be a matter of non-inventive activity for the skilled person to program the server client environment according to D1 in order to solve the identified problem. Claim 1 therefore does not satisfy the requirements of Article 33(3) PCT.

8.4 **Independent Claims 12, 17, 21, 24, 27 and 28**

The objections according to item 8 equally apply mutatis mutandis to the methods, the computer readable medium and to the system according to independent claims 12, 17, 21, 24, 27 and 28.

9 **Dependent Claims**

9.1 The additional features of dependent claims 2, 5, 7, 16, 20, 22, 23, 25 define further aspects of the non-technical administrative process.

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Administrative considerations related to the display of cognitive health related dat, when regarded on its own, define merely a process which constitutes subject-matter in the sense of Rule 39.1 (iii) PCT. These features do not contribute to the technical solution of an objective technical problem and are therefore not relevant for the assessment of inventive step.

9.2 The additional features of dependent claims 3, 4, 6, 9-11, 15,18, 19 relate to the mere display of cognitive information by means of notoriously known technical devices.

Cognitive considerations related to the display of information, when regarded on its own, define merely a process which constitutes subject-matter in the sense of Rule 39.1 (iii) PCT. These features do not contribute to the technical solution of an objective technical problem and are therefore not relevant for the assessment of inventive step.

9.3 The remaining dependent claims refer to trivial technical features such as the use of sensors to detect information without providing any technical information with respect to the sensing technology. These features do not provide any synergetic technical functionality with the claimed embodiment.

Consequently, the same objections apply as for independent claims 1, 12, 17, 21 and 24.

10 **Disclosure in the description**

The examiner cannot derive any technical effect which may be achieved by the distinguishing features beyond the mere automation of a non-technical administrative process. The person skilled in the art of data processing would implement this non-technical process in a straightforward manner using merely well known data processing techniques. Consequently, the subject-matter does not fulfill the requirement of inventive step (Article 33(3) PCT).

The steps constituting the non-technical process cannot be seen to make any contribution, either independently or in combination with other features, to the solution of a technical problem and are thus not relevant for assessing inventive step (see Official Journal 11/2007, p. 592).

It is noted that if it was intended to automate the business process on a commonplace data processing system, the person skilled in the art of data processing would implement this in a straightforward manner using merely commonly known data processing techniques.

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PATENT COOPERATION TREATY

ADVANCE E-MAIL

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

HO, Brian B.
Morrison & Foerster LLP
425 Market Street
San Francisco, CA 94105-2482
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 15 December 2016 (15.12.2016)	
Applicant's or agent's file reference 106842130040	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2015/032474	26 May 2015 (26.05.2015)	30 May 2014 (30.05.2014)

Applicant
APPLE INC.

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Athina Nickitas-Etienne

e-mail: pt04.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 106842130040	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2015/032474	International filing date *(day/month/year)* 26 May 2015 (26.05.2015)	Priority date *(day/month/year)* 30 May 2014 (30.05.2014)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant APPLE INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 06 December 2016 (06.12.2016)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Athina Nickitas-Etienne e-mail: pt04.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2015/032474	26.05.2015	30.05.2014

International Patent Classification (IPC) or both national classification and IPC
INV. G06Q10/06 G06F3/048 G06Q50/22 G06F19/00

Applicant
APPLE INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Stratford, Colin Telephone No. +49 89 2399-0

Form PCT/ISA/237 (Cover Sheet) (January 2015)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

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

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

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:

      ☐ in the form of an Annex C/ST.25 text file.

      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

AliveCor Exhibit 1002
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IPR2023-01434, U.S. Patent No. 10,270,898
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Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-155
Industrial applicability (IA)	Yes:	Claims	1-155
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

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1 **Item V**

1.1 Reference is made to the following document:

D1 "iPhone User Guide For iOS 7.1 Software", 10 March 2014 (2014-03-10), pages 1-162, XP55207043, Retrieved from the Internet: URL:https://manuals.info.apple.com/en_US/iphone_ios7_user_guide.pdf [retrieved on 2015-08-10]

1.2 The claimed subject-matter relates principally to various presentations of information (such as medical data, emergency contact information etc.) and administrative matters concerning a choice of data sources and recipients.

1.3 From a technical point of view, a generic smartphone is considered to constitute the relevant state of the art. Such a smartphone, as notoriously known prior to 2014, is deemed to have the following capabilities:

a. A processor

b. Memory (both volatile and non-volatile)

c. Touchscreen for displaying information and receiving user input

d. Means to detect a change in smartphone orientation

e. Means to make a phone call, send an email and an SMS message

1.4 Although not contributing to the technical character of the invention, for completeness it is noted that the following aspects would also have been anticipated by the notoriously known smartphone:

f. Touch gestures to select or scroll

g. A locked status in which a "lock screen" is displayed and functionality (including communications functionality) is limited. In this status certain inputs are recognised, such as the unlock gesture (which unlocks the device) and the emergency call function (which does not).

1.5 Such a smartphone was described, for example, in D1.

1.6 Claim 1 differs from the state of the art in that it displays two graphs, and alters the display (by providing an indication that something has been selected) in response to user input. This is a mere presentation of information devoid of any technical effect.

1.7 Claim 30 differs from the state of the art in that emergency information about the user of the device is displayed. This is clearly also devoid of any technical effect.

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1.8 Claim 47 differs from the state of the art in that the user can identify a plurality of approved sources and types of wellness data that can be stored in a database, and similarly can identify a plurality of approved destinations which may receive certain types of wellness data from the database. Given that the choice of sources and destinations for data is purely administrative (based on e.g. privacy considerations rather than technical reasons) also these aspects are devoid of any technical effect.

1.9 From the description, it is apparent that the Applicants did not seek to solve any technical problem, but rather wanted to allow users to store, view and share wellness data collected by different devices [0004]. The intuitiveness of one of the methods is also mentioned [0257]. However, these effects are unrelated to any specific technical implementation, and are in some cases subjective. The devices which collect the wellness data are actually absent from the claimed subject-matter, which is limited to receiving, processing, displaying and outputting cognitive (non-technical) data. This, however, is the standard task of the prior art smartphone.

1.10 The same objections apply to all of the claims, which provide further non-technical details. In conclusion, none of the claims demonstrate a technical contribution over the state of the art, and therefore their subject-matter is found not to involve an inventive step.

1.11 The industrial applicability of the claimed subject-matter is self-evident (Article 33(4) PCT).

2 **Item VII**

2.1 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

2.2 Figures 1-5b do not meet the quality requirements set out in Rule 11.13(a) PCT.

3 **Item VIII**

3.1 The large number of independent claims leads to a lack of conciseness. Also in light of the requirements of unity of invention, it would appear appropriate to draft the claims in terms of a single method claim, a single device claim and a single computer-readable medium claim (see PCT Guidelines, 5.14).

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Electronic Acknowledgement Receipt

EFS ID:	28592216
Application Number:	14599424
International Application Number:	
Confirmation Number:	3136
Title of Invention:	WELLNESS AGGREGATOR
First Named Inventor/Applicant Name:	Christopher D. Soli
Customer Number:	119082
Filer:	Jordan Michael Lofdahl/Amy Spaag
Filer Authorized By:	Jordan Michael Lofdahl
Attorney Docket Number:	106842130031 (P23397US3)
Receipt Date:	10-MAR-2017
Filing Date:	16-JAN-2015
Time Stamp:	11:24:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	10684_2130031_IDS.pdf	55854 8596a3d423b13a0bcafe787abbbb5ccb1a665d4b	no	5

Warnings:

Information:					
This is not an USPTO supplied IDS fillable form					
2	Foreign Reference	TW_201210368_A.pdf	1525916 c1f0b05c82e29490d144cb5db2987623b2b105e0	no	39
Warnings:					
Information:					
3	Foreign Reference	TW_201240499_A.pdf	1259179 86e966c8304b4412d4d242a311cdeabb43202276	no	30
Warnings:					
Information:					
4	Non Patent Literature	14599425_NFOA_10_26_2016.pdf	670558 929d42f02158287250775fa1237cde0f841b8aa1	no	22
Warnings:					
Information:					
5	Non Patent Literature	14839916_NOA_08_31_2016.pdf	534059 9a15e27c24e56dde94fb65a9ba5ccccbc096 4eef	no	11
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Information:					
6	Non Patent Literature	14839922_FOA_12_14_2016.pdf	788674 cbde46f72a2f7e14da488d1119fb7538542a e3c9	no	22
Warnings:					
Information:					
7	Non Patent Literature	14839922_NFOA_08_17_2016.pdf	884336 560dffcf6a62718e2feff1aca8a14620c25b11 35	no	25
Warnings:					
Information:					
8	Non Patent Literature	104117509_TWOA_8_22_2016.pdf	2329412 e4ac7f47b0b0f51ed10ce0ebe1dcb481eac6 efaf	no	6
Warnings:					
Information:					

9	Non Patent Literature	104128685_TWOA_01_04_2017.pdf	19346448 99774e732ac0d91bb446d0b24294384a35412332	no	40
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10	Non Patent Literature	2015312215_AUOA_10_13_2016.pdf	140912 f6d7d7d9210e1d006d8003ed23fc84d531e46fe5	no	3
Warnings:					
Information:					
11	Non Patent Literature	1020167033638_KROA_01_31_2017.pdf	928707 aa08fe6c097e60bfaafaa91fe825f330ac2014b0	no	6
Warnings:					
Information:					
12	Non Patent Literature	PA201570666_DKNOA_09_15_2016.pdf	119160 20050e6c63b90072458c08a32021ce06ba473991	no	1
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Information:					
13	Non Patent Literature	PA201570668_DKOA_09_09_2016.pdf	961311 fa498db841cfd03b0fa90951cc7fe9da3f3f0533	no	3
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Information:					
14	Non Patent Literature	PA201670656_DKOA_11_03_2016.pdf	1127912 5a8af9dd0f8a89dc60f28dbac768045905c7ac94	no	8
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Information:					
15	Non Patent Literature	PCTUS2013073195_WO_06_23_2014.pdf	331784 c9076030b7d002b5a332acf2d9a3bc56a2d221fc	no	8
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Information:					

16	Non Patent Literature	PCTUS2015032474_IPRP_12_15_2016.pdf	252810 330704dfbd3c888a5f89a7af5c20e64579b75847	no	7
Warnings:					
Information:					
		Total Files Size (in bytes):	31257032		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14599424
	Filing Date	2015-01-16
	First Named Inventor	Christopher D. SOLI
	Art Unit	3626
	Examiner Name	R. W. Morgan
	Attorney Docket Number	106842130031 (P23397US3)

U.S. PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

U.S. PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20110261079	A1	2011-10-27	Ingrassia et al.	
	2.	20130106684	A1	2013-05-02	Weast et al.	
	3.	20160089569	A1	2016-03-31	Blahnik, Jay	

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	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]
	1.	2025368	EP	A2	2009-02-18	Adidas International Marketing B.V.		

NON-PATENT LITERATURE DOCUMENTS

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14599424
	Filing Date	2015-01-16
	First Named Inventor	Christopher D. SOLI
	Art Unit	3626
	Examiner Name	R. W. Morgan
	Attorney Docket Number	106842130031 (P23397US3)

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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1.	Office Action received for Danish Patent Application No. PA201570666, mailed on June 27, 2016, 4 pages.	
	2.	International Preliminary Report on Patentability received for PCT Patent Application No. PCT/US2013/073195, mailed on June 07, 2016, 9 pages.	
	3.	Office Action received for Danish Patent Application No. PA201570668, mailed on April 08, 2016, 8 pages.	
	4.	International Search Report and Written Opinion received for PCT Patent Application No. PCT/US2015/047282, mailed on May 09, 2016, 33 pages.	

EXAMINER SIGNATURE			
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	14599424
	Filing Date	2015-01-16
	First Named Inventor	Christopher D. SOLI
	Art Unit	3626
	Examiner Name	R. W. Morgan
	Attorney Docket Number	106842130031 (P23397US3)

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	/Diek Van Nort/	Date (YYYY-MM-DD)	2016-08-31
Name/Print	Diek Van Nort	Registration Number	60,777

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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(19) Europäisches Patentamt
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(11) EP 2 025 368 A2

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(71) Applicant: **adidas International Marketing B.V.**
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(54) Sports training system

(57) A sports electronic training system, and applications thereof, are disclosed. In an embodiment, the system comprises at least one monitor and a portable electronic processing device for receiving data from the at least one monitor and providing feedback to an individual based on the received data. The monitor can be a motion monitor that measures an individual's performance such as, for example, speed, pace and distance for a runner. Other monitors might include a heart rate monitor, a temperature monitor, an altimeter, et cetera. Feedback provided to a user typically includes, for example, training information such as whether the user is satisfying specific workout and/or training criteria. In an embodiment, the functionality of the sports electronic training system is enhanced by enabling the portable electronic processing device to interact with other devices and applications, for example, using the Internet.

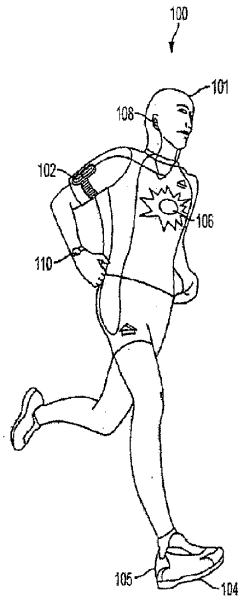


FIG. 1

EP 2 025 368 A2

Printed by Jouve, 75001 PARIS (FR)

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is related to commonly owned U.S. Patent Application No. _____ (Attorney Docket No. 2483.0350001), titled "Sports Electronic Training System With Electronic Gaming Features, And Applications Thereof," filed on the same day herewith, and commonly owned U.S. Patent Application No. (Attorney Docket No. 2483.0350002), titled "Sports Electronic Training System With Sport Ball, And Applications Thereof," filed on the same day herewith, each of which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention generally relates to sports electronics. More particularly, the present invention relates to a sports electronic training system, and applications thereof.

BACKGROUND OF THE INVENTION

[0003] Exercise is important to maintaining a healthy lifestyle and individual well-being. Accordingly, many individuals want to participate in an exercise program. The most successful exercise programs are ones tailored to a fitness level of an individual and aimed at assisting the individual to achieve one or more specific fitness or exercise goals.

[0004] Sports trainers, as well as other exercise and fitness professionals, are available to assist individuals in developing exercise programs appropriate for their individual fitness levels and their specific fitness or exercise goals. Hiring such professionals, however, can be expensive. Furthermore, the busy schedules of many individuals make it difficult for these individuals to set aside time to meet with an exercise and fitness professional on a routine basis. Thus, many individuals forego using the services of exercise and fitness professionals, and they never achieve the benefits that can be obtained from an exercise program tailored, for example, to one's fitness level.

What is needed are new systems and methods that make it easier for individuals to exercise at a level appropriate for their fitness, and which enable individuals to achieve specific fitness or exercise goals.

BRIEF SUMMARY OF THE INVENTION

[0005] The present invention provides a sports electronic training system, and applications thereof. In an embodiment, the system comprises at least one monitor and a portable electronic processing device for receiving data from the at least one monitor and providing feedback to an individual based on the received data. The monitor can be a motion monitor that determines an individual's performance such as, for example, speed, pace and distance for a runner. Other monitors might include a heart rate monitor, a temperature monitor, an altimeter, a hydration monitor, an ionization monitor, et cetera. Feedback provided to a user typically includes, for example, training information such as whether the user is satisfying specific workout and/or training criteria. In embodiments, the feedback provided can be audio feedback, visual feedback and/or biofeedback.

[0006] In an embodiment, the functionality of the sports electronic training system is enhanced by including a satellite-based positioning system receiver in the portable electronic processing device and/or by enabling the portable electronic processing device to interact with other devices and applications, for example, using the Internet.

[0007] It is a feature of the present invention that it can assess a fitness level for an individual. It is also a feature of the present invention that it can provide feedback to an individual, for example, aimed at assisting the individual to achieve one or more specific fitness or exercise goals.

[0008] Further embodiments, features, and advantages of the present invention, as well as the structure and operation of the various embodiments of the present invention, are described in detail below with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS/FIGURES

[0009] The accompanying drawings, which are incorporated herein and form a part of the specification, illustrate the present invention and, together with the description, further serve to explain the principles of the invention and to enable a person skilled in the pertinent art to make and use the invention.

FIG. 1 is a diagram of a runner using a sports electronic training system according to an embodiment of the present invention.

FIG. 2A is a diagram illustrating selected components of a sports electronic training system according to an embod-

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iment of the present invention.

FIGS. 2B-C are diagrams of an example mobile phone having a sports operating mode according to an embodiment of the present invention.

FIGS. 2D-F are diagrams of additional example portable electronic processing devices that have a sports operating mode according to embodiments of the present invention.

FIG. 3A is a more detailed diagram of a first example portable electronic processing device according to an embodiment of the present invention.

FIG. 3B is a more detailed diagram of a second example portable electronic processing device according to an embodiment of the present invention.

FIG. 4A is a diagram of an example motion monitor according to an embodiment of the present invention.

FIGS. 4B-C are diagrams that illustrate how the motion monitor of FIG. 4A operates.

FIG. 5 is a diagram of an example heart rate monitor according to an embodiment of the present invention.

FIG. 6A is a diagram of a shoe having a motion monitor inserted into a recess in the sole of the shoe according to an embodiment of the present invention.

FIG. 6B is a diagram of a shoe having a motion monitor mounted on an external portion of the shoe.

FIG. 6C is a diagram of an example motion monitor according to an embodiment of the present invention.

FIG. 6D is a diagram of an example mounting device for a motion monitor according to an embodiment of the present invention.

FIG. 6E is a diagram of a motion monitor that has an example winged-battery cap for mounting the motion monitor on a shoe according to an embodiment of the present invention.

FIG. 6F is a diagram that shows the motion monitor of FIG. 6E mounted on a shoe according to an embodiment of the present invention.

FIG. 6G is a diagram of a motion monitor that has a second example winged-battery cap for mounting the motion monitor on a shoe according to an embodiment of the present invention.

FIG. 6H is a diagram that further illustrates the motion monitor and wing-battery cap of FIG. 6G.

FIG. 6I is a diagram of a third example winged-battery cap for a motion monitor according to an embodiment of the present invention.

FIG. 6J is a diagram of a fourth example winged-battery cap for a motion monitor according to an embodiment of the present invention.

FIG. 7 is a diagram of a heart rate monitor with built in sensors for determining percent body fat according to an embodiment of the present invention.

FIG. 8 is a diagram of a heart rate/percent body fat monitor according to an embodiment of the present invention.

FIG. 9 is a diagram of a first portable electronic processing device interacting with a computer according to an embodiment of the present invention.

FIG. 10 is a diagram of a second portable electronic processing device interacting with a computer according to an embodiment of the present invention.

FIG. 11A is a diagram of a first portable electronic processing device interacting with a computer and a web server according to an embodiment of the present invention.

FIG. 11B is a diagram of a second portable electronic processing device interacting with a computer and a web server according to an embodiment of the present invention.

FIG. 12 is a diagram of an example portable electronic processing device interacting with exercise machines according to an embodiment of the present invention.

FIG. 13 is a diagram of an example portable electronic processing device that includes virtual trainer functionality according to an embodiment of the present invention.

FIG. 14A is a diagram that illustrates workout features of a sports electronic training system according to an embodiment of the present invention.

FIG. 14B is a table that illustrates example feedback provided by a sport training system according to an embodiment of the present invention.

FIG. 15A-D are diagrams that illustrate example customizable parameter displays for a sports electronic training system according to embodiments of the present invention.

FIGS. 15E-G are tables that illustrate examples of how to calculate calories burned while exercising according to embodiments of the present invention.

FIGS. 16-18 are diagrams that illustrate a method for creating a workout using a sports electronic training system according to an embodiment of the present invention.

FIG. 19 is a diagram that illustrates music features of a sports electronic training system according to an embodiment of the present invention.

FIG. 20 is a diagram that illustrates photo features of a sports electronic training system according to an embodiment of the present invention.

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FIG. 21 is a diagram that illustrates calendar features of a sports electronic training system according to an embodiment of the present invention.

FIGS. 22-23 are diagrams that illustrate an interaction between workout and calendar features of a sports electronic training system according to an embodiment of the present invention.

FIG. 24 is a diagram that illustrates the selection of settings for a portable electronic processing device according to an embodiment of the present invention.

FIG. 25 is a diagram that illustrates one method for inputting and updating personal data for a sports electronic training system according to an embodiment of the present invention.

FIG. 26 is a diagram that illustrates one method for assessing a fitness level with a sports electronic training system according to an embodiment of the present invention.

FIG. 27 is a diagram of an example table used to determine a fitness level according to an embodiment of the present invention.

FIG. 28 is a diagram that illustrates component identification features of a sports electronic training system according to an embodiment of the present invention.

FIG. 29 is a diagram that illustrates setting telephone features of a sports electronic training system according to an embodiment of the present invention.

FIGS. 30-32 are diagrams that illustrate setting virtual trainer features of a sports electronic training system according to an embodiment of the present invention.

FIG. 33 is a diagram that illustrates pedometer features of a sports electronic training system according to an embodiment of the present invention.

FIGS. 34-36 are diagrams that illustrate music features of a sports electronic training system according to an embodiment of the present invention.

FIGS. 37-40 are diagrams that illustrate virtual training features of a sports electronic training system according to an embodiment of the present invention.

FIG. 41 is a diagram that illustrates sport balls having motion monitors that communicate with a portable electronic processing device according to an embodiment of the present invention.

FIG. 42 is a diagram that illustrates a multi-sensor monitor according to an embodiment of the present invention

FIG. 43 is a diagram that illustrates using components of the present invention to monitor a sports player and a sport ball.

FIGS. 44 and 45 are diagrams that illustrate using components of the present invention for electronic gaming.

[0010] The present invention is described with reference to the accompanying drawings. The drawing in which an element first appears is typically indicated by the leftmost digit or digits in the corresponding reference number.

DETAILED DESCRIPTION OF THE INVENTION

[0011] The present invention provides a sports electronic training system, and applications thereof. In the detailed description of the invention that follows, references to "one embodiment", "an embodiment", "an example embodiment", etc., indicate that the embodiment described may include a particular feature, structure, or characteristic, but every embodiment may not necessarily include the particular feature, structure, or characteristic. Moreover, such phrases are not necessarily referring to the same embodiment. Further, when a particular feature, structure, or characteristic is described in connection with an embodiment, it is submitted that it is within the knowledge of one skilled in the art to effect such feature, structure, or characteristic in connection with other embodiments whether or not explicitly described.

[0012] FIG. 1 is a diagram of a runner 101 using a sports electronic training system 100 according to an embodiment of the present invention. As depicted in FIG. 1, in an embodiment, training system 100 includes a first portable electronic processing device 102, a motion monitor 104, a heart rate monitor 106, and a second portable electronic processing device 110. First portable electronic processing device 102, motion monitor 104, heart rate monitor 106, and second portable electronic processing device 110 communicate using a low-power wireless communications protocol and form part of a wireless personal area network (WPAN).

[0013] Portable electronic processing device 102 is shown worn on an arm of runner 101. In addition to being worn on an arm, portable electronic processing device 102 can be worn somewhere else on the runner's body such as, for example, on the runner's hip. Portable electronic processing device 102 can also be carried, for example, in a waist pack or a backpack.

[0014] In an embodiment, portable electronic processing device 102 is a device such as, for example, a mobile phone, a personal digital assistant (PDA) or a music file player (e.g., an MPEG-1 Audio Layer 3 (MP3) music file player) that includes a sports operating mode. Portable electronic processing device 102 typically acts as a WPAN receiver. It receives data from other components of training system 100 and provides training feedback to runner 101. In an embodiment, feedback is provided to runner 101 using earphones 108 that are plugged into portable electronic processing

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device 102. In one embodiment, portable electronic processing device 102 is used with wireless earphones (e.g., earphones that are capable of receiving wireless communications from portable electronic processing device 102).

[0015] Motion monitor 104 is shown as located in a shoe 105 worn by runner 101. In an embodiment, motion monitor 104 includes an accelerometer and determines performance parameters such as, for example, the speed, the pace, the stride rate, and the stride length of runner 101. Motion monitor 104 is also capable of determining, for example, the total distance traveled by runner 101 during a workout run. Motion monitor 104 typically acts as a WPAN transmitter.

[0016] In embodiments, motion monitor 104 is located in a location other than in shoe 105. For example, in an embodiment, motion monitor 104 is located on an exterior portion of a shoe. Furthermore, in embodiments, motion monitor 104 is located on other parts of a person's body such as, for example, on a person's hand, wrist, arm, hip, et cetera, to measure movement of the person.

[0017] Heart rate monitor 106 determines the heart rate of runner 101. In an embodiment, as depicted in FIG. 1, heart rate monitor 106 is incorporated into or attached to clothing worn by runner 101. In another embodiment, heart rate monitor 106 is worn by runner 101 using, for example, a chest strap. Heart rate monitor 106 typically acts as a WPAN transmitter.

[0018] Portable electronic processing device 110 is shown worn on a wrist of runner 101. In an embodiment, portable electronic processing device 110 is a device such as, for example, a watch that includes a sports operating mode. Portable electronic processing device 110 typically acts as a WPAN receiver. It receives data from other components of training system 100 and provides training feedback to runner 101. In an embodiment, feedback is provided to runner 101 visually using a display. In an embodiment, portable electronic processing device 110 acts as a transmitter and transmits information to components of training system 100.

[0019] FIG. 2A is a diagram further illustrating selected components of sports electronic training system 100 according to an embodiment of the present invention. These components include a mobile phone 202 having earphones 207 and a sports operating mode, a sports shirt 203 having an integral or attachable heart rate monitor 106a, a sports bra having an integral or attachable heart rate monitor 106b, an athletic shoe 205 that includes a motion monitor 104, a heart rate monitor 106c integral or attached to a chest strap 206, and a sports watch 210.

[0020] As illustrated by FIG. 2A, sports electronic training system 100 is a modular system of interconnected and interactive components and products. These components and products may be acquired individually and over time as desired.

[0021] In an embodiment, mobile phone 202 includes all of the functionality typically available in a cell phone, and it is capable of playing music files (e.g., MP3 music files). In addition, mobile phone 202 includes a sports operating mode. When placed in sports operating mode, selected buttons and keys of mobile phone 202 are used to select sports mode functions. These sports mode functions are described in detail below, for example, with reference to FIGS. 13-33.

[0022] FIGS. 2B and 2C are more detailed diagrams of mobile phone 202. As shown in these figures, in an embodiment, mobile phone 202 is a flip-type mobile phone.

[0023] FIG. 2B depicts mobile phone 202 in a closed position. FIG. 2C depicts mobile phone 202 in an open position.

[0024] As shown in FIG. 2B, mobile phone 202 has a user input control 215 in the middle of flip top 212 that includes four input options. User input control 215 is intended to be used primarily when mobile phone 202 is in a mode other than sports operating mode. Mobile phone 202 also has four large input buttons 220a-d. Input buttons 220a-d are active when mobile phone 202 is in sports operating mode and a rotating ring 230 is positioned in a sports lock position. The large input buttons 220a-d make it easy, for example, for runner 101 to provide input to mobile phone 202 without having to physically look at the input buttons 220a-d. This enables runner 101, for example, to wear mobile phone 202 on an arm and use the input buttons while running.

[0025] The operating mode of mobile phone 202 can be selected using a button 225 on a side of mobile phone 202. In an embodiment, pressing button 225 cycles mobile phone 202 through its various operating modes. Mobile phone 202 also includes an earphone jack 235. This permits mobile phone 202 to be used with earphones, for example, when runner 101 is exercising and/or listening to music.

[0026] As shown in FIG. 2C, a second user input control 250 is available when mobile phone 202 is in an open position. User input control 250 duplicates the user input features noted above. When mobile phone 202 is open, information can be provided to a user on a display 255.

[0027] In an embodiment, when mobile phone 202 is placed in sports operating mode (e.g., by pressing button 225), mobile phone 202 identifies and begins communicating with other components of sports electronic training system 100 to form a WPAN. This is accomplished by mobile phone 202 listening for transmissions, for example, from motion monitor 104, heart rate monitor 106, and watch 210. When mobile phone 202 receives a transmission from motion monitor 104 and/or heart rate monitor 106, for example, mobile phone 202 sends a return message that causes motion monitor 104 and/or heart rate monitor 106 to activate its sensor, if not already active, and to start transmitting performance data. Once established, the WPAN formed among the components of sports electronic training system 100 continues to operate until mobile phone 202 is placed in an operating mode other than sports operating mode. This causes mobile phone 202 to transmit a message to motion monitor 104 and/or heart rate monitor 106 that indicates to these devices

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that they may enter a low power mode and de-active their sensors in embodiments of these devices that include a low power mode of operation.

[0028] FIGS. 2D-F are diagrams of additional example portable electronic processing devices that have a sports operating mode according to an embodiment of the present invention.

[0029] FIG. 2D shows a mobile phone 270. Mobile phone 270 has a display 272 and a user input control 274 that is similar to user input control 250 described above.

[0030] FIG. 2E shows a portable electronic processing device 280 that includes a clip-on strap 282. Clip-on strap 282 permits portable electronic processing device 280 to be worn on an arm of a user, for example, during workouts. In an embodiment, a user can provide inputs to portable electronic processing device 280 by tapping on it when the device is in sports operating mode. For example, in an embodiment, tapping portable electronic processing device 280 twice when it is in sports operating mode activates a programmable soft key that prompts portable electronic processing device 280 to provide audible training feedback. As described in more detail below, the specific type of feedback provided is user-selectable. Additional programmable soft keys can be activated, for example, by tapping portable electronic processing device 280 three, four, or more times in a row. In one embodiment, tapping the device is used to record a change in a runner's direction (e.g., when a runner is running back-and-forth between points on a field).

[0031] FIG. 2F is a diagram of a portable electronic processing device 290. Portable electronic processing device 290 has a large display 292 that includes several touch-screen keys. A user provides inputs to portable electronic processing device 290 by touching one of the keys shown on display 292.

[0032] As illustrated by example portable electronic processing devices 270, 280, and 290, as well as other portable electronic processing devices described herein, the present invention is flexible and can be used with practically any portable electronic processing device. Accordingly, the present invention is not limited to only the devices described herein.

[0033] Referring to FIG. 2A again, athletic shoe 205 is preferably a shoe appropriate for the sport in which a user is engaged. In the case of runner 101, shoe 205 is preferably an athletic shoe built for running. In an embodiment, shoe 205 is specifically adapted to include motion monitor 104, for example, by having a recess in its sole that accepts motion monitor 104. Motion monitor 104 is preferably capable of being placed into the recess and removed from the recess by a user. This allows motion monitor 104 to be used, for example, with more than one pair of shoes.

[0034] In an embodiment, motion monitor 104 has two operating modes, an active mode and a low-power mode. In the active mode, motion monitor 104 periodically transmits a message that includes a device type identification value, a unique serial number identification value, and performance data based on input from an accelerometer. The device type identification value identifies, to a receiving device, the type of monitor from which the message was sent (e.g., a motion monitor 104 or a heart rate monitor 106). This enables the receiving device to know how the message is to be decoded. The unique serial number identification value enables the receiving device to determine whether the received message is from a device that is a part of the WPAN to which the receiving device belongs. The unique serial number identification value ensures, for example, that when multiple runners are running in a close group, mobile phone 202 only processes data from the motion monitor associated with one runner (e.g., the motion monitor that is a part of the WPAN controlled by mobile phone 202).

[0035] In low-power mode, the accelerometer and other non-essential components of motion monitor 104 are powered-down to conserve battery power. In this mode, motion monitor 104 still periodically transmits a message that contains a device type identification value and a unique serial number identification value. Because the accelerometer and other components are not functioning in low-power mode, no performance data is transmitted in low-power mode.

[0036] Immediately after each broadcast, whether in active mode or in low-power mode, motion monitor 104 turns on a receiver and listens for a message, for example, from mobile phone 202. If mobile phone 202 is in a mode other than sports mode, no message will be received and after a short period of time, motion monitor 104 can power-down its receiver until after its next transmission. If motion monitor 104 is in a low-power mode, and mobile phone 202 has been recently switched to sports operating mode, mobile phone 202 will send motion monitor 104 a message directing motion monitor 104 to switch from low-power mode to active mode. When motion monitor 104 receives this message, it will power up its components such as, for example, its accelerometer and start sending performance data as part of its periodic transmissions. Once in active mode, motion monitor 104 remains in active mode until it receives a message from mobile phone 202 telling motion monitor 104 it may return to a low-power mode.

[0037] In one embodiment, mobile phone 202 is required to periodically send a message to motion monitor 104 telling motion monitor 104 to remain in active mode. If after a predetermined period of time or number of transmissions by motion monitor 104, no such message is received from mobile phone 202, motion monitor 104 will assume that mobile phone 202 has been turned-off, and motion monitor 104 will switch to low-power mode.

[0038] In some embodiments of the present invention, communications protocols other than that described above are used. There are a number of known standard protocols and proprietary protocols that are suitable for implementing a WPAN. Accordingly, the present invention is not limited to using any particular protocol to communicate among the various components of sports electronic training system 100.

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[0039] As shown in FIG. 2A, sports shirt 203 has an integral or attachable heart rate monitor 106a. Heart rate monitor 106a determines a heart rate for a wearer of sports shirt 203 and communicates this information, for example, to mobile phone 202. In an embodiment, heart rate monitor 106a communicates with mobile phone 202 in a manner similar to that described herein with regard to motion monitor 104.

[0040] Sports bra 204 also has an integral or attachable heart rate monitor 106b. Similar to heart rate monitor 106a of sports shirt 203, heart rate monitor 106b of sports bra 204 determines a heart rate for a wearer of sports bra 204 and communicates this information, for example, to mobile phone 202. In an embodiment, heart rate monitor 106b communicates with mobile phone 202 in a manner similar to that described herein with regard to motion monitor 104.

[0041] Heart rate monitor 106c is integral or attached to a chest strap 206. The monitor is worn around a user's chest in the conventional manner. Heart rate monitor 106c determines a heart rate for a wearer and communicates this information, for example, to mobile phone 202. In an embodiment, heart rate monitor 106c communicates with mobile phone 202 in a manner similar to that described herein with regard to motion monitor 104.

[0042] Sports watch 210 is similar to mobile phone 202 in that it has a sports operating mode in which it can receive messages from motion monitor 104 and/or heart rate monitor 106 and provide visual feedback to a user. Sports watch 210, however, typically does not have as much memory and/or processing power as mobile phone 202. Accordingly, sports watch 210 may not retain all of the data it receives from motion monitor 104 and/or heart rate monitor 106 during a workout for subsequent download to a computer, as described in more detail below. In an embodiment, sports watch 210 communicates with motion monitor 104 and/or heart rate monitor 106 in a manner similar to that described herein with regard to mobile phone 202.

[0043] In an embodiment, sports watch 210 acts as a controller for a portable electronic processing device such as, for example, a mobile phone, an MP3 music file player and/or a PDA. This allows the portable electronic processing device to be carried, for example, in a pocket or a backpack and still be fully controlled by sports watch 210 using wireless communications.

[0044] It should be noted that while watch 210 is described herein as a sports watch, the present invention is not limited to sports watches. Watches other than a sport watch can be used.

[0045] In an embodiment, a portable electronic processing device such as, for example, a mobile phone, an MP3 music file player and/or a PDA is controlled using soft keys/switches that are integrated into a garment (e.g., a running shirt or jacket). The garment allows the portable electronic processing device to be carried or worn underneath the garment and still be fully controlled by the garment. This is particularly beneficial, for example, in the winter when jackets are required for outdoor sport activities. In an embodiment, the garment also has an integrated display (e.g., on a sleeve in the example of a running jacket).

[0046] In one embodiment, the watchband of sports watch 210 has a moving display zone (e.g., one that moves along the band), which is always positioned for viewing by a wearer. The watchband can also include a pressure device to provide biofeedback to the wearer. In an embodiment, the feedback provided includes, for example, pressure pulsations that correspond to a stride rate goal. The wearer adjusts his or her stride rate to match the pressure pulsations. The pulsations are only provided, in one embodiment, when the wearer is running above or below the stride rate goal.

[0047] In embodiments of the present invention, forms of biofeedback other than pressure pulsations can be used to provide feedback. The biofeedback can also be applied to an area other than an individual's wrist.

[0048] In an embodiment, arrows displayed on a watchband of a sports watch indicate which way a wearer of the watch should run (e.g., the arrows provide navigation information to the wearer, for example, using satellite-based positioning system location data and mapping information). In another embodiment, a laser embodied in a component of the sports electronic training system projects a spot of light, for example, onto a runner's hand or arm, or on the ground in front of the runner, to indicate to the runner which way to run. In an embodiment, the projecting laser also provides performance information such as, for example, heart rate, pace, distance, et cetera. This information can be projected, for example, onto the ground in front of a runner.

[0049] FIG. 3A is a more detailed diagram of a first example portable electronic processing device 300 according to an embodiment of the present invention. In an embodiment, portable electronic processing device 300 corresponds to a mobile phone such as, for example, mobile phone 202. As shown in FIG. 3A, portable electronic processing device 300 includes a processor 302, memory 304, a user input control 306, a display 308, an audio unit 310, a transceiver 312, a cellular transceiver 316, an optional satellite-based positioning system receiver 305, a camera 309, and a battery 320.

[0050] Processor 302 is a conventional processor capable of implementing application programs stored in memory 304. Processor 302 is also capable of implementing digital signal processing algorithms. Processor 302 is coupled to memory 304, user input control 306, display 308, audio unit 310, transceiver 312, and cellular transceiver 316.

[0051] Memory 304 is used to store application program instructions and data. In an embodiment, memory 304 stores programs, for example, used to implement all of the functionality of a typical mobile phone as well as a program to play music files and one or more programs used to implement aspects of the functionality of sports electronic training system 100 described herein. In an embodiment, memory 304 includes both read only memory and random access memory.

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[0052] User input control 306 is used by an individual to interact with portable electronic processing device 300. In an embodiment, user input control 306 includes a variety of input buttons and/or keys. The function of each of these buttons and/or keys is typically determined based on an operating mode of portable electronic processing device 300. In one embodiment, user input control 306 includes a touch pad or scroll pad and/or touch screen buttons.

[0053] Display 308 is used to display information to a user. In an embodiment, display 308 is a liquid crystal display.

[0054] Camera 309 is a small digital camera used to take digital photos. In one embodiment, camera 309 is a CCD camera. In another embodiment, camera 309 is a CMOS camera.

[0055] Audio unit 310 is used to process audio signals. In an embodiment, voice signals picked up using a microphone are converted to digital signals so that they can be operated upon, for example, by processor 302. Audio unit 310 also converts, for example, digital audio signals into amplified analog audio signals that can be used to drive one or more speakers. In an embodiment, audio unit 310 implements signal processing algorithms such as those available from Dolby Laboratories, Inc., which enhance the quality of music.

[0056] Transceiver 312 is a low-power transceiver used to communicate with other components of sports electronic training system 100. In an embodiment, transceiver 312 operates in an unlicensed frequency band such as 2.4 GHz. Transceiver 312 is coupled to an antenna 314. As used herein, the term transceiver means a combination of a transmitter and a receiver. In an embodiment, the transmitter and the receiver are integrated and form, for example, a part of an intergraded circuit.

[0057] Cellular transceiver 316 is used to send and receive, for example, voice cellular telephone signals. Transceiver 316 can also be used to exchange information with a computer network such as, for example, the Internet. Cellular transceiver 316 is coupled to an antenna 318. As used herein, the term cellular transceiver means a combination of a cellular transmitter and a cellular receiver. In an embodiment, the transmitter and the receiver are integrated together into a single device.

[0058] In one embodiment, cellular transceiver 316 is used to send data described herein to a location where it is analyzed, for example, by a professional trainer. The professional trainer can call or text message the individual and provide the individual real-time feedback based on the data. If the individuals wants to call the professional trainer, for example, during a workout, the individual can place a call to the professional trainer, for example, by tapping device 300 to place a call to a stored telephone number. In one embodiment, tapping device 300 sends a text message to the professional trainer requesting that the professional trainer call the individual.

[0059] Battery 320 is used to provide power to operate the various components of portable electronic processing device 300. In an embodiment, battery 320 is recharged periodically using a power adapter that plugs into a typical household power outlet. Battery 320 can also be a non-rechargeable battery.

[0060] In an embodiment, portable electronic processing device 300 also includes an optional satellite-based positioning system (e.g., global positioning system (GPS) or Galileo system) receiver 305. This enables portable electronic processing device 300 to determine its location anywhere on the earth. The satellite-based positioning system (e.g., GPS) receiver 305 is coupled to an antenna 307.

[0061] In an embodiment, GPS receiver 305 enables the portable electronic processing device, for example, to provide navigational instructions to a runner using the device. The directions for a running route can be down-loaded to the portable electronic processing device prior to a run and stored in memory 304. In addition to navigational instructions, attributes about the running route such as, for example, whether the route has sidewalks, is on a trail, is located within a safe neighborhood, et cetera, can also be down-loaded and viewed.

[0062] GPS receiver 305 can be used, in an embodiment, to track a route run by a runner. The route can be saved in memory 304 and viewed by the runner after the run. The route can also be shared with other runners, for example, by posting the route on a computer/web server for down-loading by other runners.

[0063] In an embodiment, GPS receiver 305 and information stored in the memory of portable electronic processing device 300 (or information received, e.g., from the internet using cellular transceiver 316) are used to provide navigational instructions, for example, to a runner. In an embodiment, the runner can enter into portable electronic processing device 300 that he or she would like to run five kilometers, for example, and the portable electronic processing device will automatically select/map-out an appropriate route and provide navigation instructions to the runner during the run. In an embodiment, the runner can specify both a start point and a stop point for the run. In an embodiment, only one point is specified, which serves as both the start point and the stop point. In an embodiment, the start and stop points are the point at which the runner is standing (e.g., as determined by GPS receiver 305) when the runner enters, for example, that he or she would like to run five kilometers.

[0064] In an embodiment, portable electronic processing device 300 includes a radio. The radio can be an AM only radio, an FM only radio, or both an AM and FM radio. In an embodiment, the radio is controlled using soft keys presented to a user on display 308.

[0065] In one embodiment, portable electronic processing device 300 includes optional sensors (not shown) for detecting selected weather related data such as, for example, temperature, humidity, ultra-violet radiation and/or barometric pressure. This data can be used, for example, to determine how an individual's performance is effected by environmental

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factors.

[0066] In one embodiment, a portable electronic processing device according to the present invention does not include a display. In this embodiment, information such as, for example, performance and/or feedback information is provided to a user audibly during a workout. The information can be display to the user, for example, after the workout using a computer display once the information has been transferred to the computer. In an embodiment, the information can be transferred to a second processing device such as, for example, a sports watch during the workout and displayed to the user during the workout on the display of the second processing device.

[0067] FIG. 3B is a diagram of an example portable electronic processing device 350 according to an embodiment of the present invention. In an embodiment, portable electronic processing device 350 corresponds to a device such as, for example, a PDA device, MP3 player, or an electronic watch having a sports operating mode. As shown in FIG. 3B, portable electronic processing device 350 includes a processor 352, memory 354, a user input control 356, a display 358, an audio unit 360, a transceiver 362, and a battery 366.

[0068] Processor 352 is a conventional processor capable of implementing application programs stored in memory 354. Processor 352 is also capable of implementing digital signal processing algorithms. Processor 352 is coupled to memory 354, user input control 356, display 358, audio unit 360, and transceiver 362.

[0069] Memory 354 is used to store application program instructions and data. In an embodiment, memory 354 stores programs, for example, used to implement all of the functionality of a typical PDA, MP3 player, or electronic watch and one or more programs used to implement aspects of the functionality of sports electronic training system 100 described herein. In an embodiment, memory 354 includes both read only memory and random access memory.

[0070] User input control 356 is used by an individual to interact with portable electronic processing device 350. In an embodiment, user input control 356 includes a variety of input buttons and/or keys. The function of each of these buttons and/or keys is typically determined based on an operating mode of portable electronic processing device 350. In one embodiment, user input control 356 includes a touch pad or scroll pad and/or touch screen buttons.

[0071] Display 358 is used to display information to a user. In an embodiment, display 358 is a liquid crystal display.

[0072] Audio unit 360 is used to process audio signals. In an embodiment, audio unit 360 converts, for example, digital audio signals into amplified analog audio signals that can be used to drive one or more speakers. In an embodiment, audio unit 360 implements signal processing algorithms such as those available from Dolby Laboratories, Inc., which enhance the quality of music.

[0073] Transceiver 362 is a low-power transceiver used to communicate with other components of sports electronic training system 100. In an embodiment, transceiver 362 operates in an unlicensed frequency band such as 2.4 GHz. Transceiver 362 is coupled to an antenna 364.

[0074] Battery 366 is used to provide power to operate the various components of portable electronic processing device 350. In an embodiment, battery 366 is recharged periodically using a power adapter that plugs into a typical household power outlet. Battery 366 can also be a non-rechargeable battery.

[0075] In embodiments, a portable electronic processing device according to the present invention can be formed, for example, by attaching a dongle (e.g., a small hardware device that protects software) to a conventional phone, a music file player, a personal digital assistant, et cetera. The dongle includes, for example, downloadable software that implements some or all of the sport functions described herein. In an embodiment, the software includes a sport user interface written in the Java programming language. In an embodiment, the software includes drivers, for example, that enable the software to be used with any ultra low power Bluetooth communications protocol compatible device. Other embodiments are compatible with other communications protocol compatible devices.

[0076] In an embodiment of the present invention, a portable electronic processing device according to the present invention is a dedicated device (rather than a device such as, for example, a phone, a music file player, or a personal digital assistant) that implements the sports electronic training functions described herein.

[0077] FIG. 4A is a diagram of an example motion monitor 400 according to an embodiment of the present invention. Motion monitor 400 represents one embodiment for the motion monitors described above. As shown in FIG. 4A, motion monitor 400 includes a processor 402, memory 404, an acceleration sensor 406, a transceiver 408, and a battery 410.

[0078] Processor 402 is a conventional processor such as, for example, a microcontroller capable of implementing application programs stored in memory 404. Processor 402 is coupled to memory 404, acceleration sensor 406, and transceiver 408.

[0079] Memory 404 is used to store application program instructions and data. In an embodiment, memory 404 stores programs, for example, used to generate performance data from data output by acceleration sensor 406. In an embodiment, memory 404 includes both read only memory and random access memory.

[0080] In an embodiment, acceleration sensor 406 is an electronic accelerometer that measures acceleration in one or more axes. The one or more axes provide a stream of acceleration data that correspond, for example, to the motion of a runner's foot whenever motion monitor 400 is attached to a runner's shoe.

[0081] Transceiver 408 is a low-power transceiver used to communicate with other components of sports electronic training system 100. In an embodiment, transceiver 408 operates in an unlicensed frequency band such as 2.4 GHz.

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Transceiver 408 is coupled to an antenna 412.

[0082] Battery 410 is used to provide power to operate the various components of motion monitor 400. In an embodiment, battery 410 is either a rechargeable battery or a non-rechargeable battery that must be periodically replaced (e.g. every one to two years or longer).

[0083] In an embodiment, processor 402 operates on data provided by acceleration sensor 406 to generate performance data such as, for example, the speed, the pace, the stride rate, the stride length, and the total distance traveled by a runner. The performance data is transmitted using transceiver 408 for reception by a portable electronic processing device such as, for example, portable electronic processing device 300 and/or portable electronic processing device 350.

[0084] In one embodiment, motion monitor 400 generates performance data as follows. Processor 402 low-pass filters and examines the stream of output values generated by one axis of acceleration sensor 406 (e.g., an axis aligned with the heel-to-toe axis of an individual) to identify a maximum acceleration value and/or a minimum acceleration value for each stride of an individual. The average speed of the individual during each stride is then calculated by processor 402 using an appropriate algorithm stored in memory 404. This is possible because the average speed of an individual (whether running or walking) is proportional to the maximum and minimum acceleration values that occur during each stride of the individual. Why this is so is illustrated, for example, by FIGS. 4B and 4C.

[0085] FIGS. 4B and 4C are diagrams that illustrate how motion monitor 400 determines performance data such as, for example, the speed, the pace, the stride rate, the stride length, and the total distance traveled by an individual in an embodiment of the present invention.

[0086] As shown in FIG. 4B, an individual's leg has a specific movement pattern during each stride relative to the direction in which the individual is traveling (e.g., direction X). At a time period 420, for example, the beginning of a stride, the foot of one leg of an individual is planted firmly on the ground and is not moving in the direction of travel. Since there is no movement of the foot, there is also no acceleration in the direction of travel. As the individual's hips and upper body move forward in the direction of travel at a speed S_X, the upper portion of the individual's leg begins to move forward at a time period 422 relative to the direction in which the individual is traveling, while the lower portion of the individual's leg begins to move backwards relative to the direction of travel. This generates a negative acceleration in the direction of travel that is detected by a first axis (e.g., the X axis) of acceleration sensor 406.

[0087] At a later point in time during the stride, time period 424 in FIG. 4B, the upper portion of the individual's leg is still moving forward relative to the direction of travel when the lower portion of the individual's leg begins to move forward relative to the direction of travel of the individual. This generates a positive acceleration in the direction of travel of the individual that is detected by the first axis of acceleration sensor 406.

[0088] At a time period 426 during the stride, the upper portion of the individual's leg has stopped moving forward relative to the direction of travel while the lower portion of the individual's leg is continuing to move forward relative to the direction of travel of the individual. This stage of the stride also generates a positive acceleration in the direction of travel of the individual that is detected by the axis of acceleration sensor 406.

[0089] Finally, at the end of the stride, time period 428 in FIG. 4B, the individual's foot is again firmly planted on the ground. There is no movement of the foot in the direction of travel at this time period, and the acceleration along the first axis is zero.

[0090] FIG. 4C illustrates an idealized, filtered output of acceleration sensor 406 of motion monitor 400 corresponding to the stride of an individual (e.g., whether running or walking). As depicted, there is a period of negative acceleration having a minimum acceleration value and a period of positive acceleration having a maximum acceleration value during each stride. Using this information, the average speed of the individual in the direction of travel during the stride is given, for example, by equation 1 below:

$$S_X = K_1 \{fx_1(A_{max}, T_3 - T_2)\} + K_2 \qquad \text{EQ. 1}$$

where S_X is the average speed for the stride, K_1 is a proportionality constant, fx_1 is a function involving Amax (the maximum acceleration value generated during the stride processed through a low pass filter) and $T_3 - T_2$ (the period of positive acceleration), and K_2 is an adjustment constant. The values K_1 and K_2 are empirical values that are determined experimentally, and in an embodiment they are different for different ranges of speed (e.g., one set of values is used if an individual is walking and another set of values is used if the individual is running). The function fx_1 is determined experimentally, and in embodiments can be a higher order (e.g., a second order or a third order) equation.

[0091] In one embodiment, the value(s) for K_1 and/or K_2 are initially determined, for example, based on an input length for a user's leg (e.g., measured from the knee to the heel) or an input height for the user (e.g., using an assumption that the length of the leg is some fraction of the height).

[0092] In an embodiment, the value(s) for K_1 and/or K_2 are determined and/or updated by having the user run a known distance and using this known distance to determine and/or update the value(s) for K_1 and/or K_2.

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[0093] As noted herein, it is possible to determine the average speed for the stride using the minimum acceleration value. This is done, for example, using equation 2 below:

$$S_X = K_3 \{fx_2(A_{min}, T_2 - T_1)\} + K_4 \qquad \text{EQ. 2}$$

where S_X is the average speed for the stride, K_3 is a proportionality constant, fx_2 is a function involving A_{min} (the minimum acceleration value generated during the stride processed through a low pass filter) and $T_2 - T_1$ (the period of negative acceleration), and K_4 is an adjustment constant. The values K_3 and K_4 and the function fx_2 are determined experimentally. In embodiments, the function fx_2 can be a higher order (e.g., a second order or a third order) equation.

[0094] In one embodiment, the average speed is calculated by combining equations 1 and 2 and forming a third equation for the average speed during a stride. This third equation is:

$$S_X = K_1 \{fx_1(A_{max}, (T_3 - T_2)\} - K_3 \{fx_2(A_{min}, (T_2 - T_1)\} + K_{2+4} \qquad \text{EQ. 3}$$

where S_X is the average speed for the stride, K_1 and K_2 are proportionality constants, fx_1 is a function involving Amax (the maximum acceleration value generated during the stride processed through a low pass filter) and $T_3 - T_2$ (the period of positive acceleration), fx_2 is a function involving A_{min} (the minimum acceleration value generated during the stride processed through a low pass filter) and $T_2 - T_1$ (the period of negative acceleration), and K_{2+4} is an adjustment constant. The values K_1, K_3 and K_{2+4} and the functions fx_1 and fx_2 are determined experimentally. In embodiments, the functions fx_1 and fx_2 can be higher order (e.g., second order or third order) equations.

[0095] Using the information provided herein, it is possible to develop other algorithms for determining the average speed during a stride. For example, the output of more than one axes of acceleration sensor 406 can be used, in which the output values would be combined using, for example, a square root of the sum of the squares approach. Accordingly, the present invention is not limited to using just the algorithms described herein.

[0096] Once the average speed for each stride is calculated, calculating other performance parameters is possible. For example, the distance traveled during each stride (e.g., stride length) is given by equation 4 below:

$$D_X = S_X(T_3 - T_1) \qquad \text{EQ. 4}$$

where D_X is the stride length, S_x is the average speed during the stride, and $T_3 - T_1$ is the time of a single stride. Stride rate is determined by dividing 1 minute by $T_3 - T_1$ to determine the number of strides per minute. The total distance traveled by the individual is the sum of all stride lengths. Pace is calculated, for example, by inverting the average speed value and adjusting the unit to obtain a desired time per distance value (e.g., minutes per kilometer, minute per mile, et cetera).

[0097] It is to be noted that while the values for K_1 and K_2 can be determined and selected based on information provide by a user (e.g., by asking a user to provide the length of his or her leg or his or her height), it is desirable to have the individual walk or run a particular known distance and use this information to adjust the values for K_1 and K_2 (i.e., to calibrate motion monitor 400 for the particular user). Doing this leads to improved accuracy. Additionally, it may also be beneficial to have one set of K values that are used in an algorithm when a user is walking and another set of K values that are used when the user is running. Whether the user is walking or running can be determined, for example, using a threshold acceleration value. For example, if the maximum acceleration value detected is below a certain threshold, it is assumed that the user is walking. Otherwise, it is assumed the user is running.

[0098] In an embodiment, calibration of motion monitor 400 is performed using, for example, received GPS signals. The received GPS signals can be used, for example, to determine a distance that a user runs or walks during a workout.

[0099] In one embodiment, motion monitors according to the present invention are used to detect changes in an individual's direction of motion. For example, one or more motion monitors can be worn by a basketball player and used to track the basketball player's forwards and backwards motion as well as side-to-side motion. In an embodiment, every basketball player's position on a basketball court during a basketball game can be tracked using motion monitors and displayed, for example, for analysis by a coach. Motion monitors according to the present invention can also be worn by individuals and used to detect and/or track other motions such as, for example, motions associated with push-ups, pull-ups, weightlifting, diving, gymnastics, et cetera.

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[0100] FIG. 5 is a diagram of an example heart rate monitor 500 according to an embodiment of the present invention. Heart rate monitor 500 represents one embodiment for the example heart rate monitors described above. As shown in FIG. 5, heart rate monitor 500 includes a processor 502, memory 504, a heart rate sensor 506, a transceiver 508, and a battery 512.

[0101] Processor 502 is a conventional processor such as, for example, a microcontroller capable of implementing application programs stored in memory 504. Processor 502 is coupled to memory 504, heart rate sensor 506, and transceiver 508.

[0102] Memory 504 is used to store application program instructions and data. In an embodiment, memory 504 stores programs, for example, used to generate heart rate data from data output by heart rate sensor 506. In an embodiment, memory 504 includes both read only memory and random access memory.

[0103] Heart rate sensor 506 is an electronic sensor that detects heart beats. This data is provided to processor 502 and used to determine a heart beat rate (e.g., number of beats per minute).

[0104] Transceiver 508 is a low-power transceiver used to communicate with other components of sports electronic training system 100. In an embodiment, transceiver 508 operates in an unlicensed frequency band such as 2.4 GHz. Transceiver 508 is coupled to an antenna 510.

[0105] Battery 512 is used to provide power to operate the various components of heart rate monitor 500. In an embodiment, battery 512 is either a rechargeable battery or a non-rechargeable battery that must be periodically replaced.

[0106] In one embodiment, heart rate can be monitored, for example, using portable electronic processing device 300 and earphones plugged into device 300. In this embodiment, the heart rate sensors are integral to the earphones, and because the earphones are worn on opposite sides of the user's heart, they can be used to detect heart beats. In another embodiment, heart rate is monitored using devices that clip onto a user's ear or a user's finger and determine heart rate by looking at blood flow. In embodiments, heart rate monitors can be used that clip onto products such as, for example, sunglasses.

[0107] FIG. 6A is a diagram of a shoe 600 having a motion monitor 602 inserted into a recess in sole 604 of shoe 600 according to an embodiment of the present invention. The recess positions motion monitor 602 in such a way that a surface of the motion monitor's housing is parallel to and in the plane of the top of sole 604. Placing motion monitor 602 in the recess of sole 604 is desirable because, in an embodiment, one of the acceleration sensor axis of motion monitor 602 is parallel to the plane of the motion monitor's housing surface, and placing the motion monitor in this orientation may provide greater accuracy than other orientations such as, for example, attaching motion monitor 602 to an external surface of shoe 600. In an embodiment, the recess in the sole that houses motion monitor 602 is located in the mid-foot region of shoe 600 (e.g., where there is a minimum of flex of shoe 600).

[0108] FIG. 6B is a diagram of a shoe 606 having motion monitor 602 mounted on an external portion of shoe 606. As shown in FIG. 6B, motion monitor 602 is mounted using a mounting device 608. Mounting device 608 is held onto the top of shoe 606, for example, using shoe laces. Mounting device 608 permits motion monitor 602 to be removed and inserted into the mounting device without taking the mounting device off of shoe 606.

[0109] FIG. 6C is a more detailed diagram of motion monitor 602 according to an embodiment of the present invention. In an embodiment, motion monitor 602 is enclosed in a hard plastic protective housing 620. A surface 621 of motion monitor 602 includes a mark 622 that is used to ensure proper orientation of motion monitor 602, for example, when it is inserted into a shoe. In an embodiment, mark 622 should be oriented facing towards the toe portion of the shoe. In other embodiments, however, the motion monitor will work properly regardless of orientation.

[0110] A second surface 624 of motion monitor 602 includes a removable cap 626. In an embodiment, removable cap 626 is removed by turning it less than a quarter turn in one direction. Removable cap 626 provides access to a battery 628, which can be removed and replace with a fully charged battery, as needed. In an embodiment, battery 628 is a button type battery.

[0111] FIG. 6D is a more detailed diagram of mounting device 608. In an embodiment, mounting device 608 is made of a semi-rigid plastic that allows motion monitor 602 to be snapped into mounting device 608 and firmly held in place. Mounting device 608 includes four clips 630a-d that hold motion monitor 602 in place. The mounting device can be placed on a shoe, for example, by slipping clips 630a and 630b under one or more shoe laces so that the shoe laces rest on surface 632 of mounting device 608. In an embodiment, the surface of mounting device 608 that rests on the shoe is textured to reduce any slippage that might otherwise occur.

[0112] FIG. 6E is a diagram of a motion monitor 602 that has a housing 639 and a winged-battery cap 640 for mounting the motion monitor on a shoe according to an embodiment of the present invention. The housing 639 and the winged-battery cap 640 have bayonet-type quick connect and disconnect treads that only require, for example, a one-quarter turn of housing 639 to securely fasten housing 639 to winged-battery cap 640.

[0113] FIG. 6F is a diagram that shows motion monitor 602 of FIG. 6E mounted on a shoe 642. The shoe laces of shoe 642 cross-over winged-battery cap 640 to hold motion monitor 602 in place.

[0114] FIG. 6G is a diagram of a housing 643 for motion monitor 602 that has a winged-battery cap 644 for mounting the motion monitor on a shoe according to an embodiment of the present invention. Housing 643 and winged-battery

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cap 644 are similar to housing 639 and winged-battery cap 640, except for the type of treads that is used to couple winged-battery cap 644 to housing 643. The treads used with housing 643 and winged-battery cap 644 require several turns to couple housing 643 to winged-battery cap 644.

[0115] FIG. 6H is a diagram that further illustrates how winged-battery cap 644 is screwed into housing 643.

[0116] FIG. 6I is a diagram of a winged-battery cap 646 for use, for example, with housing 643. Winged-battery cap 646 has ends with openings through which the laces of a shoe can be threaded. A similar winged-battery cap with bayonet-type quick connect and disconnect threads can be used with housing 639.

[0117] FIG. 6J is a diagram of a winged-battery cap 648 for use, for example, with housing 643. Winged-battery cap 648 has ends with two holes each through which the laces of a shoe can be threaded. A similar winged-battery cap with bayonet-type quick connect and disconnect threads can be used with housing 639.

[0118] FIG. 7 is a diagram of a heart rate monitor 700 with built-in sensors 702a-b for determining a user's percent body fat according to an embodiment of the present invention. In an embodiment, a percent body fat value is determined by having a user grasp sensors 702a and 702b with his or her hands. Using sensors 702a and 702b, a weak electrical current is passed through the user's body to determine the amount of fat tissue. The weak electrical current is not felt by the user. A processor within monitor 700 calculates the user's body fat percentage using a bioelectrical impedance method for determining body fat. Muscles, blood vessels and bones are body tissues having a high water content that conduct electricity easily. Body fat, however, is tissue that has little electric conductivity. In an embodiment, the formula used to determine a user's percent body fat takes into account, for example, measured electric resistance and the height, weight, age and gender of the user.

[0119] FIG. 8 is a diagram of a heart rate/percent body fat monitor 800 according to an embodiment of the present invention. Heart rate/percent body fat monitor 800 represents one embodiment for the heart rate monitor 700 with built in sensors for detecting body fat described above. As shown in FIG. 8, heart rate/percent body fat monitor 800 includes a processor 802, memory 804, a heart rate sensor 806, body fat monitoring circuitry 808, a transceiver 812, and a battery 816.

[0120] Processor 802 is a conventional processor such as, for example, a microcontroller capable of implementing application programs stored in memory 804. Processor 802 is coupled to memory 804, heart rate sensor 806, body fat monitoring circuitry 808, and transceiver 812.

[0121] Memory 804 is used to store application program instructions and data. In an embodiment, memory 804 stores programs, for example, used to process data from heart rate sensor 806 and body fat monitoring circuitry 808. In an embodiment, memory 804 includes both read only memory and random access memory.

[0122] Heart rate sensor 806 is an electronic sensor that detects heart beats. This data is provided to processor 802 and used to determine a heart beat rate (e.g., number of beats per minute).

[0123] Body fat monitoring circuitry 808 is responsible, for example, for generating a weak electrical current that is passed through the user's body and for measuring electric resistance. The weak current is passed through the user's body by having the user grasp sensors 810a and 810b with his or her hands. Based on the determined electrical resistance, a formula is used to calculate the user's percent body fat. In an embodiment, the formula takes into account, for example, measured electric resistance and the height, weight, age and gender of the user.

[0124] Transceiver 812 is a low-power transceiver used to communicate with other components of sports electronic training system 100. In an embodiment, transceiver 812 operates in an unlicensed frequency band such as 2.4 GHz. Transceiver 812 is coupled to an antenna 814.

[0125] Battery 816 is used to provide power to operate the various components of heart rate/percent body fat monitor 800. Battery 816 can be either a rechargeable battery or a non-rechargeable battery.

[0126] In embodiments of the present invention, as described above, various components of the sports electronic training system periodically transmit data to a portable electronic processing device during a workout. In other embodiments, data collected and/or generated by components of the sports electronic training system such as, for example, a motion monitor and/or a heart rate monitor store the data during the entire workout and transmit the data only after the workout is completed (e.g., during a synchronization session). This is particularly beneficial for certain sports and for instances in which a user chooses not to carry or wear a portable electronic processing device.

[0127] FIG. 9 is a diagram that illustrates a portable electronic processing device 900 interacting with a computer 910. In an embodiment, portable electronic processing device 900 (e.g., a cell phone) communicates with computer 910 (e.g., a personal computer) using wireless communications. In another embodiment, portable electronic processing device 900 communicates with computer 910 using wire communications, for example, by placing portable electronic processing device 900 in a docking unit that is attached to computer 910 using a communications wire plugged into a communications port of computer 910.

[0128] As shown in FIG. 9, portable electronic processing device 900 has a button 902 that when pressed places portable electronic processing device 900 into a sports operating mode according to an embodiment of the present invention. The sports operating mode and it various features are discussed in more detail below, for example, with reference to FIGS. 13-33.

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[0129] In an embodiment, data collected by portable electronic processing device 900, for example, when it is in sports operating mode, is uploaded to computer 910 for long term storage. This data can include, for example, workout data, photos, et cetera. This frees up memory space in portable electronic processing device 900 so that it can collect additional data without having to overwrite previously collected data. A program running on computer 910 can be used to retrieve and interact with the uploaded data. In addition, as explained in more detail below, for example, with reference to FIGS. 34-40, computer 910 can download data such as workout routines, music, running routes, et cetera, to portable electronic processing device 900.

[0130] FIG. 10 is a diagram that illustrates a portable electronic processing device 1000 interacting with computer 910. In an embodiment, portable electronic processing device 1000 (e.g., a sports watch) communicates with computer 910 using wireless communications. In another embodiment, portable electronic processing device 1000 communicates with computer 910 using wire communications. In this embodiment, portable electronic processing device 1000 interacts with computer 910 using, for example, a universal serial bus (USB) cable or other type cable.

[0131] In an embodiment, data collected by portable electronic processing device 1000 is uploaded to computer 910 for long term storage. This data can include, for example, workout data. This frees up memory space in portable electronic processing device 1000 so that it can collect additional data without having to overwrite previously collected data. A program running on computer 910 can be used to retrieve and interact with the uploaded data. In addition, computer 910 can download data to portable electronic processing device 1000.

[0132] FIG. 11A is a diagram of portable electronic processing device 900 interacting with a computer/web server 1100 according to an embodiment of the present invention. As shown in FIG. 11A, portable electronic processing device 900 interacts with computer 910, which interacts with computer/web server 1100 using network 1102. In an embodiment, network 1102 is the Internet. The interaction between portable electronic processing device 900 and computer 910, and the interaction between computer 910 and computer/web server 1100 may occur at different times. For example, in an embodiment, a user may use computer 910 to log-in to computer/web server 1100 and upload and/or download data such as, for example, new workout routines and/or running routes. Any information downloaded during the log-in session can be subsequently downloaded to portable electronic processing device 900 after the log-in session is complete (e.g., just before a user's next workout session).

[0133] In an embodiment, portable electronic processing device 900 interacts with computer/web server 1100 using, for example, a universal mobile telecommunications system (UMTS) connection or a global system for mobile communications (GSM) connection. In this embodiment, at the end of a workout (e.g., after a stop workout command is input), data collected during a workout is transmitted (e.g., either automatically or on command) to computer/web server 1100 without having to log-on to computer 910. The UMTS and/or GSM connection can be used both to upload and download information from computer/web server 1100.

[0134] FIG. 11B is a diagram of portable electronic processing device 1000 interacting with computer/web server 1100 according to an embodiment of the present invention. As shown in FIG. 11B, portable electronic processing device 1000 interacts with computer 910, which interacts with computer/web server 1100 using network 1102. The interaction between portable electronic processing device 1000 and computer 910, and the interaction between computer 910 and computer/web server 1100 may occur at different times.

[0135] FIG. 12 is a diagram of an example portable electronic processing device 1200 interacting with various exercise machines according to an embodiment of the present invention. As shown in FIG. 12, in an embodiment, such exercise machines can include an exercise bike 1202, a rowing machine 1204, a stair climber 1206, an elliptical machine 1208, and/or a tread mill 1210.

[0136] Portable electronic processing device 1200 interacts with various exercise machines, for example, by receiving and storing data collected by the exercise machines. The data can include, for example, the distance run on the tread mill, the distance traveled on the exercise bike, or the distance rowed on the rowing machine. The data can also include, for example, the time spent exercising and/or the calories burnt while exercising. In embodiments, the exercise machines includes motion monitors such as, for example, one or more motion monitors similar to the ones described herein. These motion monitors are used to monitor parts of the exercise machines (e.g., pedal of an exercise bike and steps of a stair climbing machine) that move.

[0137] The data collected by the various exercise machines can be provided to portable electronic processing device 1200 using wireless communications or wired communications (e.g., by placing portable electronic processing device 1200 in a docking unit). In an embodiment, exercise routines for each of the various exercise machines, which are tailored to an individual's fitness level, can be provided/downloaded from computer/web server 1100 and loaded into portable electronic processing device 1200. These routines can then be provided to a particular exercise machine prior to a workout.

[0138] As described herein, embodiments of the portable electronic processing devices of the present invention include a sports operating mode. An embodiment of the sports operating mode, as well as exemplary display views for interacting with a portable electronic processing device in sports operating mode, are described below with reference to FIGS. 13-33.

[0139] FIG. 13 is a diagram of an example portable electronic processing device 1300 that includes a sports operating

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mode having virtual trainer functionality according to an embodiment of the present invention. Portable electronic processing device 1300 includes a display 1302 and display navigation buttons 1304a-d. An enter or select button 1306 is located in the middle of display navigation buttons 1304a-d.

[0140] As shown in FIG. 13, portable electronic processing device 1300 has a main display view 1310. Main display view 1310 includes a plurality of icons that can be selected, for example, using navigation buttons 1304a-d and select button 1306. Selecting an icon activates the functionality associated with the selected icon.

[0141] Main display view 1310 is shown in FIG. 13 as having at least four icons: a phonebook icon 1312, a trainer icon 1314, a files icon 1316, and a music icon 1318. Other icons are also contemplated and are included in embodiments of the present invention. These other icons include, for example, a telephone call log icon, a voice mail icon, a web search engine icon, a camera icon, a clock/alarm icon, a games icon, et cetera.

[0142] In embodiments, main display view 1310, as well as other display views described herein, include optional soft keys, for example, at the bottom of the display view. These soft keys (e.g., Select and/or Back) can be used to implement the functionality noted. The soft keys are selected, for example, using keys or buttons of portable electronic processing device 1300.

[0143] In an embodiment, selecting trainer icon 1314 brings up a trainer display view 1320. Trainer display view 1320 includes a banner display area 1322 and main display area 1324. Banner display area 1322 indicates the present routine being implemented by portable electronic processing device 1300 (e.g., the trainer routine). As shown in main display area 1324, the trainer routine includes several subroutines that can be selected, for example, using icons 1326a-e. In an embodiment, these subroutines include a workout routine, a music routine, a photos routine, a calendar routine, and a settings routine. Other routines are included in other embodiments. A start icon 1326f is used to start a workout.

[0144] In an embodiment, the icons of trainer display view 1320 rotate either clockwise or counter clockwise when a user presses a navigation button, and the icon at the bottom of the display view is the active icon. In another embodiment, the icons do not rotate in response to user inputs.

[0145] FIG. 14A is a diagram that illustrates workout features of a sports electronic training system according to an embodiment of the present invention. The workout features are selected, for example, by selecting the workout icon 1326a of display view 1320.

[0146] In an embodiment, selecting workout icon 1326a brings up a workout display view 1402. Display view 1402 presents to a user a plurality of previously created workouts such as, for example, a morning run workout, a lunch run workout, et cetera. Display view 1402 also presents a create run option in case the user wants to create a workout not available for selection. A checkmark 1404 indicates the selected or default workout. An arrow 1406 is used to scroll through the various options when there are more options than can be displayed at one time.

[0147] Selecting the morning run workout brings up a display view 1410. Display view 1410 displays the details of the morning run workout and enables a user, for example, to select another workout or to edit the time and/or intensity of the selected workout.

[0148] In an embodiment, the name of a presently selected workout (e.g., "morning run") appears in a workout name field 1412 of display view 1410. If the user wishes to select another workout, the user can do this by using arrows associated with field 1412 to scroll through various other workouts until a desired workout appears in field 1412. Once a desired workout appears in field 1412, the user can view and/or edit the time of the workout and/or the endurance of the workout. A user changes the time of the workout by modifying the time shown in a time field 1414. The time can be varied by typing in a desired time or by scrolling through various time options using arrows associated with time field 1414. A user changes the intensity of the workout be varying the intensity displayed in an intensity field 1416. The intensity can be changed for example using arrows associated with intensity field 1416. In an embodiment, selectable options for the various fields of display view 1410 are presented using dropdown box rather than scroll arrows.

[0149] In an embodiment, display view 1410 includes a trainer checkbox 1418. Checking this box enables audio feedback to be provided to a user during a workout. Removing the check from trainer checkbox 1418 disables the audio feedback.

[0150] Referring to FIG. 14A, at the bottom of display view 1410 is a display area 1420 that enables a user to select another subroutine of the trainer routine. As shown in FIG. 14A, the subroutine shown in display area 1420 is the music subroutine. If another routine is desired, the arrows in display area 1420 can be used to scroll through the other available subroutines such as, for example, the photos subroutine, the calendar subroutine and the settings subroutine.

[0151] Selecting the music icon in display area 1420 brings up a music display view 1430. Display view 1430 is used to select the music to be played during a workout. Playable music includes, for example, music stored in one or more play lists or radio music.

[0152] FIG. 14B is a table that illustrates example audio feedback provided to a user during a workout. The table illustrates example feedback that is appropriate, for example, for a 60 minute workout/run at a strength (e.g., yellow) level of intensity. As described herein, workouts can be performed at different intensity levels, and in an embodiment, these levels are associated with various colors to facilitate providing feedback to a user. In an embodiment, an easy workout is associated with a color such as green or blue, an intermediate intensity workout is associated with yellow,

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and a hard workout is associated with red. Other colors can also be used. One benefit of using different colors to represent different workout intensities is that colored bars can be used to display a workout. Accordingly, a bar used to represent a workout having different intensity periods would be displayed as a bar having different colored segments.

[0153] In embodiments, the virtual trainer functionality of the present invention can influence a workout program, session or routine in real time. For example, in a situation in which a heart rate monitor is being used to monitor an individual's heart rate during a workout, the virtual trainer will monitor the heart rate data for signs of overtraining and when an overtraining situation is identified, the virtual trainer will change the workout, for example, to an easier run. In embodiments of the present invention, data from other sensors (e.g., a hydration sensor, a temperature sensor, etc.) can also be monitored for signs of overtraining, and when overtraining is detected, the virtual trainer will modify the work appropriately.

[0154] FIG. 15A is a diagram that illustrates first example customizable parameter displays for a sports electronic training system according to an embodiment of the present invention. As illustrated by FIG. 15A, a user can select what performance parameters are displayed and/or provided to the user as feedback during a workout.

[0155] In operation, once a user starts a workout, the trainer routine provides feedback to the user. This feedback can be visual feedback, for example, displayed on display 1302 of portable electronic processing device 1300 and/or audio feedback provided to the user using headphone plugged into an audio jack of portable electronic processing device 1300. The visual feedback can be continuously displayed and updated during the workout. The audio feedback is provided, for example, when a user taps portable electronic processing device 1300 twice.

[0156] As shown in FIG. 15A, a first example display 1502 shows an elapsed time since the start of the workout (e.g., 7 minutes and 42 seconds), a heart rate (e.g., 184 beats per minute), and a total distance run since the beginning of the workout (e.g., 1.6 km). As shown in example display 1504, if the user is not wearing a motion sensor on a shoe, the feedback display will not show a total distance run. Instead, it may display, for example, the text "Not Found" in place of a total distance run to indicate to the user that portable electronic processing device 1300 is not in communication with a motion sensor. As shown in example display 1506, if the user is not wearing a heart rate monitor, the feedback display will not show a total number of heart beats per minute value. Instead, it may display the text "Not Found" in place of a heart rate to indicate to the user that portable electronic processing device 1300 is not in communication with a heart rate monitor.

[0157] In embodiments, as illustrated by example display 1508, a user can change the feedback that is displayed, for example, by selecting a display icon and using arrow keys 1510 associated with the selected display icon to scroll through various optional display parameters and pick a desired parameter for display. In one embodiment, the parameters available for display include time, heart rate distance, calories, pace and/or stride rate. In other embodiments, other parameters are available.

[0158] FIG. 15B is a diagram that illustrates second example customizable parameter displays for a sports electronic training system according to an embodiment of the present invention. As illustrated by FIG. 15B, the second example parameter displays include in the top one-third of the display an elapsed time value. In the bottom two-thirds of the display area, a workout performance parameter goal is displayed such as, for example, a stride rate goal, a pace goal, a heart rate goal, or a distance goal. In an embodiment, a user can cycle through which goal is displayed by pressing a button on the portable electronic processing device.

[0159] Example display 1522 displays for a user elapsed time and a stride rate performance parameter goal. As illustrated in FIG. 15B, the stride rate goal for the depicted example workout is 180 steps per minute. A runner can determine whether he or she is meeting the workout goal by monitoring three indicators 1524, 1526, and 1528. If the runner is meeting the stride rate goal (e.g., the runner is meeting the goal within a selected number of steps per minute) during a workout, the middle indicator 1526 is illuminated. If the runner is exceeding the stride rate goal by more than a selected number of steps per minute (e.g., 5 steps per minute), the top indicator 1524 is illuminated as an indication to the runner to decrease the stride rate. If the runner is below the stride rate goal by more than a selected number of steps per minute (e.g., 5 steps per minute), the bottom indicator 1528 is illuminated as an indication to the runner to increase the stride rate.

[0160] In one embodiment, a user is provided with stride rate training feedback in the form of beeps in headphones worn by the user. The beeps correspond, for example, to the stride rate goal, and the user adjusts his or her stride rate to match the beeps. The beeps can be provided, for example, only when a change in stride rate is required (e.g., when the runner is running below or above a particular stride rate goal).Example display 1530 displays for a user elapsed time and a workout pace goal. The pace goal for the depicted example workout is 7 minute and 30 seconds per mile. A runner can determine whether he or she is meeting the workout goal by monitoring the three indicators 1524, 1526, and 1528. As above, if the runner is meeting the pace goal during a workout, the middle indicator 1526 is illuminated. If the runner is exceeding the pace goal, the top indicator 1524 is illuminated as an indication to the runner to decrease the pace. If the runner is below the pace goal, the bottom indicator 1528 is illuminated as an indication to the runner to increase the pace.

[0161] Example display 1532 displays for a user elapsed time and a workout heart rate goal. The heart rate goal for

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the depicted example workout is 175 beats per minute. A runner can determine whether he or she is meeting the workout goal by monitoring the three indicators 1524, 1526, and 1528. As above, if the runner is meeting the heart rate goal during a workout, the middle indicator 1526 is illuminated. If the runner is exceeding the heart rate goal, the top indicator 1524 is illuminated. If the runner is below the heart rate goal, the bottom indicator 1528 is illuminated.

[0162] Example display 1534 displays for a user elapsed time and a workout distance goal. The elapsed time is depicted in the top one-third of display 1534. The distance goal is depicted in the bottom two-thirds of display 1534. In an embodiment, the distance goal is shown as a pie chart, which is filled-in in proportion to how much of the distance goal has been achieved. For example, if the runner has completed 25% of the distance goal, than one-quarter of the pie chart is filled-in as shown in FIG. 15B. A similar display can be used to depict completion, for example, of a calories goal.

[0163] FIG. 15C is a diagram that illustrates third example customizable parameter displays for a sports electronic training system according to an embodiment of the present invention. As illustrated by FIG. 15C, the third example parameter displays include in the top one-third of the display an elapsed time value. In the bottom two-thirds of the display area, a workout performance parameter goal is displayed such as, for example, a stride rate goal, a pace goal, a heart rate goal, or a calorie goal. In an embodiment, a user can cycle through which goal is displayed by pressing a button on the portable electronic processing device.

[0164] Example display 1542 displays for a user elapsed time and a stride rate performance parameter goal. As illustrated in FIG. 15C, the stride rate goal for the depicted example workout is 180 steps per minute. A runner can determine whether he or she is meeting the workout goal by monitoring two indicators 1544 and 1546. If the runner is exceeding the stride rate goal by more than a selected number of steps per minute (e.g., 5 steps per minute), the top indicator 1544 is illuminated as an indication to the runner to decrease the stride rate. If the runner is below the stride rate goal by more than a selected number of steps per minute (e.g., 5 steps per minute), the bottom indicator 1546 is illuminated as an indication to the runner to increase the stride rate. If the runner is meeting the stride rate goal (e.g., the runner is meeting the goal within a selected number of steps per minute) during a workout, neither indicator is illuminated.

[0165] Example display 1548 displays for a user elapsed time and a workout pace goal. The pace goal for the depicted example workout is 7 minute and 30 seconds per mile. A runner can determine whether he or she is meeting the workout goal by monitoring the two indicators 1544 and 1546 next to the pace goal. As above, if the runner is exceeding the pace goal, the top indicator 1544 is illuminated as an indication to the runner to decrease the pace. If the runner is below the pace goal, the bottom indicator 1546 is illuminated as an indication to the runner to increase the pace.

[0166] Example display 1550 displays for a user elapsed time and a workout heart rate goal. The heart rate goal for the depicted example workout is 175 beats per minute. A runner can determine whether he or she is meeting the workout goal by monitoring the two indicators 1544 and 1546. As above, if the runner is exceeding the heart rate goal, the top indicator 1544 is illuminated. If the runner is below the heart rate goal, the bottom indicator 1546 is illuminated.

[0167] Example display 1552 displays for a user elapsed time and a workout calories goal. The elapsed time is depicted in the top one-third of display 1552. The calories goal is depicted in the bottom two-thirds of display 1552. In an embodiment, the calories goal is shown as a pie chart, which is filled-in in proportion to how many of the desired calories have been burned so far during the workout. For example, if the runner has burned calories equal to 25% of the calories goal, than one-quarter of the pie chart is filled-in as shown in FIG. 15C. A similar display can be used to depict completion, for example, of a distance goal.

[0168] FIG. 15D is a diagram that illustrates fourth example customizable parameter displays for a sports electronic training system according to an embodiment of the present invention. As illustrated by FIG. 15D, the fourth example parameter displays include in the top one-third of the display an elapsed time value. In the bottom two-thirds of the display area, a workout performance parameter goal is displayed such as, for example, a stride rate goal, a pace goal, a heart rate goal, or a distance goal. In an embodiment, a user can cycle through which goal is displayed by pressing a button on the portable electronic processing device.

[0169] Example display 1562 displays for a user elapsed time and whether a workout stride rate performance parameter goal is being met. As illustrated in FIG. 15D, a runner can determine whether he or she is meeting the workout goal by monitoring three indicators 1564, 1566, and 1568. If the runner is meeting the stride rate goal (e.g., the runner is meeting the goal within a selected number of steps per minute) during a workout, the middle indicator 1566 is illuminated. If the runner is exceeding the stride rate goal by more than a selected number of steps per minute (e.g., 5 steps per minute), the right indicator 1568 is illuminated as an indication to the runner to decrease the stride rate. If the runner is below the stride rate goal by more than a selected number of steps per minute (e.g., 5 steps per minute), the left indicator 1564 is illuminated as an indication to the runner to increase the stride rate.

[0170] Example display 1570 displays for a user elapsed time and a workout pace goal. A runner can determine whether he or she is meeting the workout pace goal by monitoring the three indicators 1564, 1566, and 1568 in a manner similar to that described above.

[0171] Example display 1572 displays for a user elapsed time and a workout heart rate goal. A runner can determine whether he or she is meeting the workout heart rate goal by monitoring the three indicators 1564, 1566, and 1588. As

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above, if the runner is meeting the heart rate goal during a workout, the middle indicator 1566 is illuminated. If the runner is exceeding the heart rate goal, the right indicator 1568 is illuminated. If the runner is below the heart rate goal, the left indicator 1564 is illuminated.

[0172] Example display 1574 displays for a user elapsed time and a workout distance goal. The elapsed time is depicted in the top one-third of display 1574. The distance goal is depicted in the bottom two-thirds of display 1574. In an embodiment, the distance goal is shown as a pie chart, which is filled-in in proportion to how much of the distance goal has been achieved. For example, if the runner has completed 25% of the distance goal, than one-quarter of the pie chart is filled-in as shown in FIG. 15D. A similar display can be used to depict completion, for example, of a calories goal.

[0173] In one embodiment, a sports training system according to the present invention includes glasses. The glasses have color indications located within the field of view of the wearer that provide feedback to the wearer (e.g., a runner) about performance. For example, in one embodiment, three lights indicate zones of performance (e.g., on target performance, below target performance, and above target performance). In another embodiment, two colors indicate performance (e.g., below target performance and above target performance - no indicator light is used to indicate on target performance). The performance being monitored can relate, for example, to heart rate, stride rate, et cetera.

[0174] In an embodiment, a sports training system according to the present invention includes glasses that display text and/or graphical information (e.g., other than color indications) within the field of view of the wearer. This information provides feedback to the wearer, for example, about performance and/or navigation. In one embodiment, the graphical information includes, for example, navigation arrows that indicate to a runner which way the runner should run.

[0175] FIGS. 15E-F illustrate two tables (Table 1A and Table 1B) that can be used to calculate the number of calories burned (in kcal/min) while exercising according to an embodiment of the present invention. As shown in the tables, the calories burned is a function of whether a person is walking or running, how fast the person is walking or running, and the person's body weight. In an embodiment, these tables are used as look-up tables implemented by software running on a portable electronic processing device according to the present invention. Other tables can also be used. Thus, the present invention is not limited to using these tables.

[0176] FIG. 15G illustrates a Table 2 that can be used to calculate the number of calories burned while exercising according to another embodiment of the present invention. In this embodiment, the calories burned calculation is based on an individual's weight and metabolic equivalent units (METS) (e.g., the number of calories used per minute based on activity). In this embodiment, the calories burned per hour, for example, by an individual are equal to the individual's weight in kilograms multiplied by the appropriate METS valued from Table 2.

[0177] As shown in Table 2, in an embodiment, the METS value used to calculate calories burned is selected, for example, using an individual's fitness level (e.g., beginner, intermediate, or advanced) and/or a workout intensity (e.g., energy, endurance, strength, power, or leg strength) or percent heart rate. The criteria used to select a METS value in a particular embodiment may vary depending on how the calorie calculator is implement, for example, in software running on a portable electronic processing device. In an embodiment, if an individual has taken a fitness test and is working out using web created workouts, for example, the calories burned are calculated based on fitness level and workout intensity. If the individual creates a custom workout using the portable electronic processing device, the calorie calculator automatically defaults to using advanced heart rate ranges and METS values are selected independently of the individual's fitness level.

[0178] FIGS. 16-18 are diagrams that illustrate one method for creating a workout using a sports electronic training system according to an embodiment of the present invention. As shown in FIG. 16, the method begins by selecting the create run entry of workout display view 1402. In an embodiment, selecting the create run entry brings up a goal display view 1602. Display view 1602 list several workout goals such as, for example, time, distance, pace, calories, stride rate, et cetera. If a user selects a time goal, the selection brings up a time display view 1604 that list various times. A user can select one of the listed times, or the user can enter a time. In an embodiment, after the user selects or enters a time, the user is presented with an intensity display view 1606 that lists various workout intensity options. As shown in FIG. 16, in an embodiment, the intensity workout options are energy, endurance, strength, power, and none. Energy is the least strenuous intensity option and power is the most strenuous intensity option.

[0179] As shown in FIG. 17, if the user selects a distance goal at display view 1602, a display view 1702 is presented to the user, which lists various distances for selection. The user can select one of the presented distances or enter another distance. As shown in FIG. 18, if the user selects a pace goal at display view 1602, a display view 1802 is presented to the user, which includes a units field 1804 and a pace field 1806. The user can select a desired unit (e.g., min/km) and a desired pace (e.g., 4:30) using arrows associated with each field. The user can also enter a desired pace. In an embodiment, as shown in FIG. 18, after the user has made all of the selections for a workout, the user is presented with a soft key save option in display area 1808.

[0180] In an embodiment, display views similar to the ones described herein are provided to the user if the user selects a calories goal or a stride rate goal. The edit run entry of display view 1402 brings up a list of previously created workouts, which the user can select and edit.

[0181] FIG. 19 is a diagram that illustrates music features of a sports electronic training system according to an

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embodiment of the present invention. In an embodiment, if a user selects music icon 1326b at trainer display view 1320, a music display view 1430 appears. Display view 1430 lists a plurality of music options that the user can select. These options include, for example, tempo songs, a radio, music play lists, motivational songs, recently played songs, most played songs, an artists list, an albums list, et cetera.

[0182] If the user selects the tempo entry at display view 1430, a display view 1902 appears. Display view 1902 lists several groups of songs having a tempo matched to a particular workout intensity. These intensities are energy, endurance, strength, and power. The user can also make an automatic selection, which will change the tempo of the music being played, for example, to match a user's stride rate, heart rate, or an intensity index based on a combination of these and/or other performance parameters.

[0183] If the user selects the radio entry at display view 1430, a display view 1904 appears. Display view 1904 includes a radio reception indication bar 1906, a frequency tuning field 1908, and a display area 1910 that lists recently played radio frequencies. In an embodiment, the user tunes the radio to a desired frequency by entering a desired frequency, by using tuning arrows associated with frequency tuning field 1908, or by highlighting and selecting a frequency in display area 1910.

[0184] In embodiments, the radio is both an AM radio and an FM radio. Either the AM or FM radio is selected using a soft key located in a display area 1912.

[0185] If the user selects the play lists entry at display view 1430, a display view 1920 appears. At display view 1920, the user can select a previously compiled play list from among a variety of play lists. If there are more play lists than can be shown on the display, an arrow is used to scroll through the various play lists.

[0186] Selecting one of the other music options at display view 1430 brings up other display views, similar to the ones described herein, which enables the user to make appropriate music selections.

[0187] FIG. 20 is a diagram that illustrates photo features of a sports electronic training system according to an embodiment of the present invention. If a user selects the photos icon 1326c at display view 1320, a photos display view 2002 appears. Display view 2002 presents a list of photos taken with a camera that is integrated, for example, into portable electronic processing device 1300 (e.g., a cell phone camera). The list of photos includes a name for each photo and a date that each photo was taken.

[0188] In an embodiment, the user selects a particular photo 2004 by highlighting the associated photo entry in display view 2002, for example, using navigation buttons and pressing an enter or select button. The selected photo 2004 is then displayed along with its name and an options soft key in an area 2005 of the display.

[0189] Selecting the options soft key in display area 2005 brings up a display view 2006. Display view 2006 lists a variety of things that the user can do with photo 2004. For example, the user can display a full screen view of photo 2004, the user can assign photo 2004 to a particular workout, or the user can delete photo 2004. In embodiments, other options are also available. These options can include, for example, changing the zoom level of the photo and/or performing other image processing operations.

[0190] If the user selects the assign to a workout option at display view 2006, a display view 2008 appears. Display view 2008 lists various workouts stored, for example, in a memory of portable electronic processing device 1300. To assign photo 2004 to one of the listed workouts, the user scrolls through the list of workouts and selects a particular workout. Selecting the workout assigns photo 2004 to the workout. Once the photo is assigned to the workout, an icon appears next to the name of the workout to indicate that there is at least one photo associated with the workout.

[0191] FIG. 21 is a diagram that illustrates calendar features of a sports electronic training system according to an embodiment of the present invention. As shown in FIG. 21, if a user selects the calendar icon 1326d at display view 1320, a calendar display view 2102 appears. Calendar display view 2102 presents the user with a view of a calendar and a date field 2104 at the top of the calendar. The user can select a particular date, for example, by using arrows associated with date field 2104 to change the displayed date, or by highlighting a particular date on the calendar using navigation buttons and pressing on a select or enter button.

[0192] Selecting a particular date at display view 2102 brings up an options display view 2106. In an embodiment, display view 2106 permits a user, for example, to view workout(s) associated with the selected date, assign a workout to the selected date, or delete a saved workout for the selected date. In an embodiment, the user can also retrieve a list of workouts at display view 2106. Selecting the workout list option at display view 2106 brings up a display view 2108, which lists workouts saved in a memory of the portable electronic processing device.

[0193] In an embodiment, as shown in FIG. 22, if the user selects the assign workout option at display view 2106, a display view 2202 appears. Display view 2202 includes a field 2204 that lists a workout name, a repeat checkbox 2206, days of the week checkboxes 2208, and a repeat until date field 2210.

[0194] Display view 2202 is used to assign particular workouts to future dates. For example, to assign a workout titled lunch run, a user uses the arrows associated with field 2204 to scroll through various workouts until lunch run appears in field 2204. If the selected workout is to be assigned to multiple days, the repeat checkbox 2206 is check. This will cause the selected workout to be assigned to the days of the week checked using checkboxes 2208, for example, from the date shown in display view 2106 until the date entered into repeat until date field 2210.

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[0195] If the user wishes to see the goals of the workout shown in field 2204 at display view 2202, the user can press an enter or select button to bring up display view 2220. Display view 2220 displays the name of the workout in a field 2222, and the goals of the workout in a field 2224 and a field 2226. As shown in FIG. 22, the goals for the lunch run are to run for 30 minutes at an endurance intensity. Arrows associated with fields 2224 and 2226 can be used to change the goals for the workout.

[0196] In an embodiment, the user can use arrows associated with field 2222 to scroll through other workouts and see the goals for the workouts. For example, if the user uses the arrows associated with field 2222 to scroll to an intervals workout, display view 2230 appears. Display view 2230 includes fields 2232, 2234, 2236 and a visual indicator of the workout 2238. Field 2232 displays the name of the selected workout. Fields 2234 and 2236 display the goals of the workout. For example, as shown in FIG. 22, the goals for the intervals workout are to run 5 km at two different workout intensities. The two intensities are alternated every minute for the entire 5 km. Both the distance goal and the interval times can be changed at display view 2230 using, for example, the arrows associated with fields 2234 and 2236.

[0197] As shown in FIG. 23, if a user selects the view workout option at display view 2106, a display view 2302 appears. Display view 2302 shows the workout assigned to a selected date and, if the workout has been completed, a soft key in display area 2303 that can be used to view the results of the workout.

[0198] Selecting the view results soft key at display view 2302 brings up a display view 2304. Display view 2304 displays the results for a selected workout (e.g., a workout completed on 3 JUN 2006). In an embodiment, the workout results include the duration of the workout, the distance traveled during the workout, an average heart rate for the workout, a maximum heart rate for the workout, an average pace for the workout, the calories burnt during the workout, and an average stride rate for the workout. Other values can also be displayed, and in an embodiment are user selectable.

[0199] FIG. 24 is a diagram that illustrates the selection of settings for a portable electronic processing device according to an embodiment of the present invention. As shown in FIG. 24, if a user selects settings icon 1326e at display view 1320, a settings display view 2402 appears. Settings display view 2402 includes several options that a user can select, for example, by using navigation buttons to highlight a desired option and then pressing an enter or select button. When the units option 2404 is selected, an units display view 2406 appears.

[0200] Units display view 2406 includes a distance field 2408 and a weight field 2410. In an embodiment, the selectable distance units includes miles and kilometers. The desired distance unit can be selected using arrows associated with distance field 2408. The selectable weight units include pounds and kilograms. The desired weight unit can be selected using arrows associated with weight field 2410.

[0201] FIG. 25 is a diagram that illustrates one method for inputting and updating personal data for a sports electronic training system according to an embodiment of the present invention. As shown in FIG. 25, if a user selects the personal data option at display view 2402, a personal data display view 2502 appears. In an embodiment, personal data display view 2502 includes the following data fields: a gender field 2504, a date of birth field 2506, a weight field 2508, a rest heart rate field 2510, and a maximum heart rate field 2512. The user enters data into each of these fields as appropriate.

[0202] In an embodiment, some of the fields are populated automatically, for example, by a heart rate monitor in communications with the portable electronic processing device during an assessment session or workout. A soft key in display area 2514 can be used to start the assessment session. In one embodiment, the data in weight field 2508 is communicated to the portable electronic processing device by a weight scale in wireless communications with the portable electronic processing device.

[0203] In embodiments, the personal data display view includes additional data fields such as, for example, a weight field, a height field, and/or a body mass index (BMI) field or a percent body fat field. In an embodiment, a BMI value or percent body fat value is generated for each workout and stored together with other workout information. This allows a user, for example, to display and track BMI or percent body fat values and work towards a BMI or percent body fat goal.

[0204] In an embodiment, a percent body fat value is generated at the beginning of each workout using heart rate monitor 700. The percent body fat value can be obtained by having the user hold heart rate monitor 700 before putting it on to obtain a hand-to-hand impedance measurement. In another embodiment, the percent body fat value is obtain while the user is wearing heart rate monitor 700. In still another embodiment, the percent body value is generated using a foot-to-foot impedance measurement, which can be obtained, for example, by having the user stand on the sensors of heart rate monitor 700, a weight scale having built in sensors that can measure foot-to-foot impedance, or some other object such as, for example, a door mat having sensors that can measure foot-to-foot impedance and/or a persons weight. In one embodiment, the weight, BMI and/or percent body fat fields of the personal data display view are automatically updated with information from the weight scale or other object.

[0205] In embodiments, the personal data stored in the portable electronic processing device is password protected. Thus, when a user selects the personal data option at display view 2402, a display view 2520 appears. Display view 2520 includes a password field 2522. In order to gain assess to display view 2502, a user must enter a proper password into password field 2522.

[0206] FIG. 26 is a diagram that illustrates one method for assessing a fitness level with a sports electronic training system according to an embodiment of the present invention. The assessment begins, for example, when a user of a

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portable electronic processing device, such as device 1300, selects an assess fitness key.

[0207] As shown in FIG. 26, in an embodiment, a user is presented with a display view 2602 at the beginning of a new fitness assessment. Display view 2602 displays a saved fitness number and an associated fitness level for the user, if they exist. Display view 2602 also displays a prompt to start the new fitness assessment.

[0208] When the user selects the start new assessment option, a display view 2604 appears.

[0209] Display view 2604 instructs the user to complete, for example, 1.6 km as quickly as possible and to tap the portable electronic processing device twice after completing the 1.6 km. In an embodiment, these directions are also provided to the user orally using a speaker or headphones attached to a headphone jack of the portable electronic processing device.

[0210] At the end of the new assessment, data relating to the assessment are presented on a display view 2606. The presented data include personal data for the user such as the user's gender, age and weight. This data is typically obtained from the user using a personal data display view 2502. Data collected during the assessment such as, for example, the time it took the user to complete 1.6 km, the user's maximum heart rate during the assessment, and the user's heart rate 1 minute after completing the 1.6 km are also shown. The data is used to calculate a new fitness number and fitness level for the user. The new fitness number and fitness level are included in display view 2606. Soft keys at the bottom of display view 2606 can be used to either save the data associated with the new assessment or to cancel the data without saving it.

[0211] In an embodiment, the fitness number (F) for a male user is calculated using equation 5 below:

$$F = 132.853 - 0.0769W - 0.3877A + 6.315 - 3.2649T - 0.1565(MHR/1.065) - 10 + 0.1(MHR/1.065 - HR1) \quad \text{EQ. 5}$$

where W equals weight in pounds; A equals age in years; T equals time in minutes; MHR equals maximum heart rate during assessment in beats per minute; and HR1 equals heart rate 1 minute after the user completed the 1.6 km in beats per minute.

[0212] In an embodiment, the fitness number (F) for a female user is calculated using equation 6 below:

$$F = 132.853 - 0.0769W - 0.3877A - 3.2649T - 0.1565(MHR/1.065) - 15 + 0.1(MHR/1.065 - HR1) \quad \text{EQ. 6}$$

where W equals weight in pounds; A equals age in years; T equals time in minutes; MHR equals maximum heart rate during assessment in beats per minute; and HR1 equals heart rate 1 minute after the user completed the 1.6 km in beats per minute.

[0213] In one embodiment, the present invention analyzes each workout completed by the user and automatically uses the workout data to update the user's fitness level and fitness number rather than wait for the user to elect to perform a new fitness assessment.

[0214] FIG. 27 is a diagram of an example Fitness Level table used to determine a fitness level according to an embodiment of the present invention. To determine a fitness level, one first determines whether the person for whom the fitness level is being determined is a male or a female. Next, one looks up the calculated fitness number for the individual in the row corresponding to the age of the individual. The fitness level is then read from the column in which the fitness number is located. For example, using the Fitness Level table, a 25 year old male having a calculated fitness number of 57 is assessed as having a fitness level of intermediate (Int) 2. A 37 year old female having a calculated fitness number of 30 is assessed as having a fitness level of beginner (Begin) 1.

[0215] In one embodiment, a fitness level for an individual is determined by asking the individual a series of questions. These questions are as follows:

1. Do you run, exercise or play sports on a regular basis?
2. Do you walk a total of at least 30 minutes a day?
3. How many days a week do you run, exercise or play sports?
4. About how long do you run, exercise or play sports on each day?

[0216] Based on the answers to these questions, a fitness level is assigned to the individual.

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[0217] For example, in an embodiment, a user is asked question 1. If the user answers no to question 1, the user is asked question 2. If the user answers no to question 1 and no to question 2, the user is assessed to have a fitness level of beginner 1. If the user answers no to question 1 and yes to question 2, the user is assessed to have a fitness level of beginner 2.

[0218] In an embodiment, if a user answer yes to question 1, the user is asked questions 3 and 4. The responses to questions 3 and 4 are used to determine a fitness level for the user. For example, if the user indicates that he exercises three days per week, for about 45 minutes each day, these two responses would be combined to determine that the user exercise for a total of 135 minutes per week. The total time spent running, exercising or playing sports each week is then compared to the times in the fitness table below to determine a fitness level for the individual. For the example of 135 minutes per week, the user would be assessed a fitness level of intermediate 3.

Fitness Level	Begin 1	Begin 2	Int 1	Int 2	Int 3	Adv
Minutes spent running, exercising or playing sports per week	≤40	≤60	≤100	≤130	≤160	>160

Fitness Level Assessment Table

[0219] As described herein, in embodiments of the present invention, the assessed fitness level of an individual is used to develop a workout/exercise plan tailored to the fitness level of the individual and aimed at assisting the individual to achieve one or more specific fitness or exercise goals.

[0220] FIG. 28 is a diagram that illustrates component identification features of a sports electronic training system according to an embodiment of the present invention.

[0221] As shown in FIG. 28, if a user selects the components option at display view 2402, a components display view 2802 appears.

[0222] Display view 2802 includes a motion monitor field 2804, a heart rate monitor field 2806, and a watch field 2808. These fields are used to store the unique serial number identification values transmitted by components of a sports electronic training system according to the present invention. The stored serial number identification values are used by the portable electronic processing device to determine whether a received message is to be stored and processed or to be ignored. The display view can also include other fields that are used to store serial number identification values transmitted by other components of the sports electronic training system described herein.

[0223] As described above, in an embodiment, each component of sports electronic training system 100 communicates with a portable electronic processing device such as, for example, device 300 by periodically transmitting a message to the device that includes both a device type identification value and a unique serial number identification value. The device type identification value identifies a particular component, for example, as a motion monitor, a heart rate monitor or a watch. Knowing the device type enables the portable electronic processing device, for example, to decode message data. Accordingly, the portable electronic processing device knows to decode data from a heart rate monitor as heart beats per minute and to decode data from a motion monitor, for example, as average velocity, distance traveled, pace, et cetera. The unique serial number identification value transmitted by a component enables the portable electronic processing device to identify whether a received message is from a component belonging to the same WPAN as the portable electronic processing device or whether the received message belongs, for example, to a WPAN of another nearby runner.

[0224] As shown in FIG. 28, the stored serial number identification value for the motion monitor is 124425. This value can be manually entered by a user, or it can be automatically detected and stored by the portable electronic processing device. In FIG. 28, field 2806 is shown displaying the text searching to indicate that the portable electronic processing device is in the process of trying to locate a nearby heart rate monitor and associate it to the WPAN. If a heart rate monitor is not found within a particular period of time, the user is presented with a display view 2810. This display view queries the user as to whether the search for a heart rate monitor should be repeated or discontinued. The user input to the query is made by using soft keys located in display area 2812.

[0225] Field 2808 of display view 2802 displays the text none to indicate that the portable electronic processing device should not look for a watch nor associate with a watch. A user might enter none in field 2808, for example, if the user has not yet purchased a sports watch. This would enable the portable electronic processing device to forgo trying to associate with a watch each time the portable electronic processing device is switched to sport operating mode.

[0226] FIG. 29 is a diagram that illustrates setting telephone features of a sports electronic training system according to an embodiment of the present invention. In embodiments of the present invention, in which the portable electronic processing device is a mobile phone, selecting the telephone option at display view 2402 brings up display view 2902. Display view 2902 includes two fields 2904 and 2906. If a user wishes to receive telephone calls while the mobile phone is in sports operating mode, the user enters yes in field 2904. If the user does not wish to receive telephone calls, the

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user enters no in field 2904. If the user wishes to receive telephone calls when the mobile phone is in sports operating mode, field 2906 is used to set the ring tone for the mobile phone. This ring tone is the ring tone for the mobile phone when the mobile phone is in sports operating mode.

[0227] FIGS. 30-32 are diagrams that illustrate setting virtual trainer features of a sports electronic training system according to an embodiment of the present invention. As shown in FIG. 30, if a user selects the trainer option at display view 2402, a trainer display view 3002 appears.

[0228] Display view 3002 includes three options: a voice option, a feedback interval option, and a feedback content option. Selecting the voice option brings up a display view 3004. In an embodiment, display view 3004 includes a plurality of checkboxes that are used to select a language for the virtual trainer. If a user selects the checkbox for English, for example, the virtual trainer will provide feedback to a user in English. After a language selection is made, a user is presented with a display view 3006. Display view 3006 is used to select, for example, the voice quality for the virtual trainer. In an embodiment, a user has a choice of a male voice, a female voice, and the voices, for example, of famous people such as sports stars. In an embodiment, other voices (e.g., voices of famous actors, etc.) can be downloaded from the computer/web server and used for the virtual trainer.

[0229] If a user selects the feedback interval option at display view 3002, a display view 3102 appears, as illustrated in FIG. 31. Display view 3102 is used to select when audio feedback is provided to a user. In embodiments, the available intervals include, for example, between songs, at every milestone, and no feedback. If the user selects the option to receive feedback at every milestone, the user is presented with display views that permit the user to select miles stones. Display view 3104, for example, permits a user to select distance milestones. Other display views permit the user to select other milestones such as time milestones. In an embodiment, a user can receive feedback at anytime, for example, by tapping the portable electronic processing device a selected number of times, or by pressing a switch on the headphone cords, or by pressing a blind access button on the portable electronic processing device. In an embodiment, feedback is requested by voice control using, for example, a microphone built into the portable electronic processing device. In one embodiment, each time the user states feedback, or another word or phrase, immediate audible feedback is provided to the user.

[0230] If a user selects the feedback content option at display view 3002, a display view 3202 appears, as illustrated in FIG. 32. Display view 3202 is used to select what feedback is provided to the user at each feedback interval. In an embodiment, display view 3202 includes a plurality of checkboxes, wherein each checkbox is associated with a particular performance parameter. The user selects the feedback content by marking one or more of the available checkboxes.

[0231] A table that illustrates example audio feedback provided to a user in accordance with an embodiment of the present invention is provided in FIG. 14B. In embodiments, the feedback examples provided in the table are modified to provide feedback in accordance with the feedback content selected by a user, for example, using display view 3202.

[0232] In one embodiment, the virtual trainer analyzes the effectiveness of feedback provided to a user (e.g., whether the feedback is motivating a runner to improve performance) and is able to modify its personality (e.g., one or more of the trainer settings described herein) over time to provide more effective feedback to the user. This self-adapting feature of the present invention enables the virtual trainer to maximize the effectiveness of training feedback provided by the virtual trainer.

[0233] As shown in FIG. 33, in an embodiment, the portable electronic processing device can operate as a pedometer. If a user selects the pedometer option at display view 2402, a pedometer display view 3302 appears. The information for the pedometer can come, for example, from a motion monitor 104 or an accelerometer or other sensor integrated into the portable electronic processing device.

[0234] In an embodiment, display view 3302 includes a checkbox that permits a user to select whether a step counter is to be displayed on the portable electronic processing device's wallpaper or main display view. Display view 3302 also includes a step counter field 3308 and a step counter reset time field 3306. The reset time entered in field 3306 is the time at which the step counter will be reset to zero. In an embodiment, the reset time can be manually entered by a user, or it can be entered, for example, using arrows associated with field 3306.

[0235] Display view 3310 is an example main display view for one embodiment of a portable electronic processing device according to the present invention (e.g., a mobile phone embodiment). Display view 3310 is shown displaying a pedometer step counter field 3308.

[0236] In an embodiment of the present invention, an accelerometer mounted, for example, on a wristband or in a watch is used to measure daily activity level for an individual. The wristband or watchband changes color to indicate to the wearer whether the wearer is meeting an activity goal for day. In an embodiment, the color of the wristband or watchband changes color as an indication to the wearer that the wearer should increase his or her activity level (e.g., the wearer should use stairs instead of taking an elevator).

[0237] FIGS. 34-36 are diagrams that illustrate music features of a sports electronic training system according to an embodiment of the present invention. In an embodiment, a user can log into a music program running on a computer/web server as illustrated in FIG. 11A. When the user logs in, the user is presented with a display view such as, for example, display view 3402 in FIG. 34.

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[0238] Display view 3402 enables a user to select music to be played on a portable electronic processing device according to the present invention during a workout. The music can be selected based on and/or matched to particular stride rates and ranges of stride rates. As described herein, stride rate is a measure of the number of steps an individual completes, for example, in one minute. Maintaining a constant stride rate when running, for example, is important to efficient running. Individuals vary their running speed by the energy they put into their stride. The rhythm of a runner's run can be enhanced and guided by selecting and playing music matched to a particular stride rate.

[0239] As shown in FIG. 34, display view 3402 includes a viewing area 3406 and 3408. Viewing area 3406 is used by a user to locate and retrieve music based on stride rate. Viewing area 3408 is used by a user to select stride rates and stride rate ranges, and to match music to the selected stride rates and stride rate ranges.

[0240] In an embodiment, as shown in FIG. 34, viewing area 3408 includes a stride rates bar 3410 and six stride rate matching tabs 3412a-f. Also located in viewing area 3410 is a match button 3414. In order to locate and match music to particular stride rates, a user moves the stride rate matching tabs 3412 to establish five stride rate ranges. In FIG. 34, the stride rate matching tabs have been positioned to form stride rate ranges of 60-95 steps per minute, 95-115 steps per minute, 115-150 steps per minute, 150-170 steps per minute, and 170-210 steps per minute. After the stride rate matching tabs are set, the user activates a music matching function, for example, by clicking on match button 3414 with a computer mouse. The music matching function searches through a music library or music database and places, for example, music files or pointers to music files (e.g., MP3 music files) in folders located in viewing area 3406 of display view 3402. To retrieve the music, the user goes to the files in viewing area 3402 and downloads the files to a portable electronic processing device according to the present invention.

[0241] In an embodiment, the music matching function analyzes music files stored in a music library and determines a beats per minute value for each music file. The beats per minute value for a music file is stored with a music file, for example, in a header field. The music matching function compares the beats per minute value for music files with stride rate values and, if there is a match, the music file, or a pointer thereto, is placed in an appropriate stride music file. In an embodiment, the music function searches music files stored, for example, on the user's home computer to identify music files having a particular beats per minute value. In another embodiment, the music function searches commercial music libraries, for example, located on web servers operated by music vendors, and the user is able to purchase music files at the completion of the matching process.

[0242] In embodiments of the present invention, the music matching function matches music to stride rates such that the beats per minute value of the music file is a ratio of the stride rate value. For example, the music beat may match every second footstep or every third footstep of a runner, as illustrated in FIG. 36, rather than simply match the beat to every footstep.

[0243] Referring to FIG. 34, after the music matching has been performed, the user is able to retrieve and download the matched music from the stride music files located in view area 3406 of display view 3402. In an embodiment, some or all of the music files may already be downloaded, in which case only the play list (e.g., play list commands) and any needed music files are downloaded.

[0244] If the user wishes to change one or more of the stride rate matching tabs, for example, to locate a broader variety of music for a particular stride rate range, the user can readjust the one or more stride rate matching tabs as desired and activate the music matching function again by clicking on match button 3414. In an embodiment, the music matching function determines the minimal amount of searching and matching necessary to accommodate the adjustments made by the user, and it only performs this minimal amount of searching and matching in order to save processing time. In an embodiment, the stride rate matching tabs can be set in a way to have a stride rate range which is limited to one particular stride rate.

[0245] FIG. 35 is a diagram that further illustrates display view 3402 according to an embodiment of the present invention. As illustrated in FIG. 35, when a user starts to move one of the stride rate matching tabs (e.g., tab 3412d), a list of music matched to the stride rate displayed on the tab (e.g., 150) is displayed in viewing area 3408. The music list 3420 shown in FIG. 35 includes four songs matched to a stride rate of 150 steps per minute. The song by artist Taylor is matched to every second step, while the song by artist White is matched to every third step. The other two songs are matched to every footstep. An arrow 3422 at the bottom of music list 3420 is used to scroll through additional songs matched to a stride rate of 150 steps per minute. In an embodiment, clicking on match button 3414 reactivates the music matching function, and the music matching function performs any additional searching and/or matching necessary to accommodate adjustments made by the user to the stride rate matching tabs 3412.

[0246] FIGS. 37-40 are diagrams that further illustrate virtual training features of a sports electronic training system according to an embodiment of the present invention. As described herein, a portable electronic processing device such as, for example, device 1300 can share data and information with programs running, for example, on a computer/web server. This ability to share data and information enhances the functionality of the present invention.

[0247] FIG. 37 is a diagram that illustrates a performance schedule display view 3700 for a training program running on a computer/web server. In an embodiment, the training program assists individuals in developing exercise programs appropriate for their individual fitness levels and their specific fitness or exercise goals. The training program enables

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individuals to store, retrieve and exchange data and information relevant to their individual fitness.

[0248] As shown in FIG. 37, display view 3700 includes a header display area 3702, a main display area 3704, and a footer display area 3706. Header display area 3702 includes links to other display views such as, for example, a performance snapshot display view 4000 (see FIG. 40) and a performance stats display view 3800 (see FIG. 38). A user can bring up a desired display view, for example, by clicking on one of the links provided using a computer input pointing device (e.g., a computer mouse). In an embodiment, header display area 3702 also displays a user's stored fitness level and fitness number/fitness score as well as performance values for the user's last stored workout.

[0249] Main display area 3704 includes a calendar that depicts a user's workout schedule. The calendar view is user selectable so that the user can view workouts, for example, for a selected month, for a selected week, or for a selected day. As shown in FIG. 37, each workout can be identified by a workout name and/or a bar that depicts the intensity of the workout.

[0250] In an embodiment, the calendar view includes both planned workouts and completed workouts. If a user wishes to view a particular workout, the user can bring up a detailed display view for the workout, for example, by clicking on the workout using a computer input pointing device. Navigation controls 3708 enable a user to change, for example, the calendar year and month displayed.

[0251] Footer display 3706 includes links to additional display views such as, for example, a goals display view, a workouts display view, a challenges display view, a music display view, a products display view, a fitness display view and/or a community display view.

[0252] In an embodiment, the goals display view displays an individual's planned workouts, the number of planned workouts completed, and the number of planned workouts remaining to be completed. The display view also provides indication(s) about whether the individual is meeting the specified goals for the completed workouts. An example of the type of information that is provided is shown in display area 4006 of FIG. 40. The goals display view also includes features to permit the user to change goals and set new goals.

[0253] The workouts display view displays, in an embodiment, all of the various information relating to workouts created by a user. This information is described above, for example, with references to FIGS. 13-33. In an embodiment, the workouts display view presents details about workouts graphically as illustrated, for example, in display 3808 of FIG. 38.

[0254] The challenges display view displays, in an embodiment, information relating to challenges such as on-line virtual races, et cetera. The challenges enable a user to compete against himself or herself (e.g., ghost running), against family and friends and/or against anyone else, anywhere in the world, having access, for example, to the Internet. In an embodiment, the challenges allow for the calculation and use of handicap scores that allow individuals at different performance levels to compete against one another. In an embodiment, the display view enables the user to create, view, and join challenges, and to view the results of completed challenges.

[0255] The music display view displays, in an embodiment, information about music, the user's play lists, et cetera. In an embodiment, it enables the user to select and download music to a portable electronic processing device such as, for example, device 1300. Example music display views are described above with reference, for example, to FIGS. 34-36.

[0256] The products display view displays, in an embodiment, information about the various components and products that make up a sports electronic training system according to embodiments of the present invention. In an embodiment, it includes articles relating to various features of products (e.g., product reviews, brochures, data sheets, user manuals, et cetera) as well as information about how to obtain products (e.g., on-line ordering information). This information aids a user in selection of products that are best suited to the user's needs and desires. In an embodiment, the products display view also includes an ability to send and receive technical support messages relating to various products that make up a sports electronic training system according to embodiments of the present invention.

[0257] In one embodiment, a user can elect to share information stored on the computer/web server with various entities, which enables the elected entities to provide information about various products to the user. In an embodiment, the products display view is customizable so that it displays only information elected to be received by the user.

[0258] The fitness display view displays, in an embodiment, fitness information such as, for example, health and nutritional information. In an embodiment, the fitness display view includes information about various sports in which a user might engage such as, for example, running, soccer, basketball, et cetera. In an embodiment, the fitness display view is customizable so that it displays information elected to be received by the user.

[0259] The community display view displays, in an embodiment, information about, and links to, various on-line communities. For example, in an embodiment, the community display view provides information about and links to an on-line running community that hosts runner databases, running calculators, upcoming running events, running club links, et cetera. The community view display also can include information about and links to other on-line communities relating to other sports. In an embodiment, the community display view is customizable so that it displays information elected to be received by the user.

[0260] In an embodiment, the fitness level and/or fitness number displayed in header display area 3702 is used to determine information content provided to user, for example, when the user selects the products display view and/or the fitness display view.

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[0261] FIG. 38 is a diagram that illustrates a performance stats display view 3800 for the training program. Display view 3800 is similar to display view 3700 with regards to the information displayed in header display area 3802 and in footer display area 3806.

[0262] In an embodiment, display view 3800 includes a workout display 3808 in main display area 3804. Workout display 3808 displays both the workout goals for a selected workout and workout stats for the selected workout, if the workout has been completed. The workout goals are depicted by workout time and intensity boxes 3809a-e. In an embodiment, the intensity of each workout box 3809 corresponds to a particular heart beats per minute target range, as shown in area 3810 of display area 3804. The workout stats are depicted by line 3811. In an embodiment, the workout shown in display area 3804 can be changed using the calendar and navigation buttons located in display area 3812.

[0263] As shown in FIG. 38, a movable caret 3807 is located in display area 3804. Moving display caret 3807 so that it corresponds to a particular moment during a completed workout brings up a display balloon 3902 (see FIG. 39) that displays performance parameters for the particular moment. In an embodiment, the displayed performance parameters include heart rate, pace, stride rate, calories, distance, and time.

[0264] FIG. 40 is a diagram that illustrates a performance snapshot display view 4000 for the training program. Display view 4000 is similar to display view 3700 with regards to the information displayed in header display area 4002 and in footer display area 4008.

[0265] In an embodiment, display view 4000 displays stats for the last workout completed on a calendar page located in display area 4004. Also shown on calendar page(s) in display area 4004 is information about upcoming planned workouts. In an embodiment, a window is also provided that enables a user to manage music play lists.

[0266] In one embodiment, display view 4000 includes a goal tracker display in a display area 4006. The goal tracker display displays an individual's planned workouts, the number of planned workouts completed, and the number of planned workouts remaining to be completed. The goal tracker display provides indication(s) about whether the individual is meeting the specified goals for the completed workouts. In one embodiment, an individual is periodically prompted to input and/or update personal information (e.g., weight) to determine whether the individual is meeting specific fitness goals (e.g., a weight loss goal).

[0267] In one embodiment, the trainer program downloads software to a portable electronic processing device when the device is synchronized to the trainer program.

[0268] This software prompts a user (e.g., a runner) to answer specific questions during a workout such as, for example, how the user is feeling (e.g., tired, legs hurt, etc.). The answers to the questions are uploaded when the device is resynchronized to the trainer program, and the answers are correlated to measured performance/body parameters and used to provide individual training feedback to the user (e.g., feedback relating to speed, distance, gait, etc.). In an embodiment, the answers are transferred to a professional trainer (i.e., a person) who reviews and analyses the answers and provides professional feedback to the user (e.g., by e-mail, text message, telephone call, etc.)

[0269] In an embodiment, the trainer program periodically sends positive feedback (e.g., outside of a workout period) to motivate an individual and to encourage the individual to progress to a next fitness level. The feedback can be provided to the individual by sending the individual a mobile phone text message, an e-mail at work, et cetera.

[0270] In embodiments of the present invention, the display views associated with various features of the present invention such as, for example, the trainer program and the portable electronic processing devices described herein can be configured by a user to display desired information in a format chosen by the user. Accordingly, the present invention is not limited to the example display views presented above.

[0271] In embodiments, the sports electronic training system, and applications thereof, described herein have features that are beneficial to many different industries. For example, the data collected, processed and stored by the present invention can be used by the fitness industry, the health/medical industry, the insurance industry, et cetera. Accordingly, the present invention should not be limited to any particular industry such as, for example, the sports industry.

[0272] FIG. 41 is a diagram that illustrates intelligent sport balls having accelerometers or motion monitors. In embodiments, the sports balls communicate with a portable electronic processing device 4101 according to an embodiment of the present invention. The sport balls include, for example, a soccer ball 4102, a baseball 4104, a tennis ball 4106, a golf ball 4108, a basketball 4110, and a football 4112.

[0273] In an embodiment, an accelerometer, a sensor, or a motion monitor is included in each of the sport balls to measure, for example, how far and how fast the sport ball travels when it is kicked, hit and/or thrown. As used herein, the term sensor means a device that can include a storage (e.g., memory) and a processor. This information is communicated wirelessly to portable electronic processing device 4101 and displayed on a display. In embodiments, other miniature sensors such as, for example, a pressure sensor, an altimeter, a magnetic field sensor, et cetera, are included in the sport balls to collect additional information that is transmitted to portable electronic processing device 4101 for display. This information is used to determine, for example, how much force was applied to kick, hit and/or throw the sport ball, how high the sport ball went when it was kicked, hit and/or thrown, whether the sport ball crossed a goal line, et cetera. Other parameters about a ball that can be determined and displayed include the ball's spin, air time, arc, et cetera. In embodiments, the accelerometer, motion monitor and/or other sensors are mounted or located, for example,

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within the ball, in the center of the ball (e.g., using a mounting or suspension system), or in an outer surface of the ball. In an embodiment, the accelerometer is formed using multiple accelerometers arranged, for example, so that they create a plane.

[0274] In an embodiment, a sport ball such as, for example, a soccer ball according to the present invention contains circuitry for communicating with nearby devices and for storing data received from nearby devices. For example, in the case of a soccer ball, each player wears shoes having identification devices (e.g., identification chips, radio-frequency identification (RFID) tags, etc.) that transmit a unique identification value to the ball each time one of the player's shoes comes into contact with the ball. Similarly, each goaltender or goalkeeper wears gloves having identification devices that transmit a unique identification value to the ball each time one of the goal tender's gloves comes into contact with the ball. In this way, the ball receives and stores data during a training session or a game that can be downloaded and reviewed/analyzed after the training session or the game. The data stored by the ball is a record, for example, of when and how often each player came into contact with the ball.

[0275] In addition to storing data, for example, about when and how often each player came into contact with the ball during a training session or a game, the ball can also store information in the case of the soccer ball, for example, regarding how hard a player kicked the ball, how far the ball was kicked by a player, how much spin a player imparted to the ball when the ball was kicked, the arc of the ball, how many times the ball was passed, how many time the ball was thrown, et cetera. In this way, the data stored by the ball is a more complete record of the training session or game, and the additional data can be downloaded and review/analyzed, for example, after the training session or game.

[0276] In embodiments, a sport ball of the present invention is used independently of other devices described herein. For example, there is no requirement for any data to be transmitted to the sport ball by another device such as a motion monitor attached to a soccer boot. There is also no requirement for the sport ball to interact with a portable electronic processing device such as, for example, a mobile phone, an MP3 music file player, or a PDA. In embodiments, the ball includes memory that stores data (e.g., data about how hard the ball was kicked, how far the ball traveled, how fast the ball traveled, how much spin was imparted to the ball, how many times the ball was passed, how many time the ball was thrown, etc.) collected by the ball's sensor(s)/monitor(s). This data can be downloaded to a computer, for example, when the ball is not being used. In an embodiment, the data is downloaded and stored on a web server that is compatible with the various other sports electronic training system features described herein.

[0277] In an embodiment, when a sport ball changes motion, for example, due to a kick, a sensor or motion monitor in the sport ball generates a response signal. In an embodiment, the algorithm(s) used by the sport ball to generate values described herein (e.g., how hard the ball was kicked, how far the ball will travel, the arc of the ball, et cetera) are chosen so that the values can be generated shortly after a player contacts the ball. For example, an algorithm used to determine how far a soccer ball will travel after being kicked is preferably based on an impact force and an initial trajectory of the ball (e.g., determined using a tri-axial accelerometer or a plurality of accelerometers) rather than a flight time of the ball. In this way, how far the ball will travel is known before the ball travels, for example, more than some nominal distance.

[0278] In an embodiment, in addition to using a soccer ball, for example, to record data about a training session or game, each player can wear sensors/motion monitors that record data about the player. For example, a motion monitor in a player's shoe(s) can monitor movement of the player about the playing field and receive data from the soccer ball each time the player comes into contact with the ball. In an embodiment, the motion monitor keeps track, for example, of the player's forward, sideways, and backward running distance and speed. In addition, the motion monitor receives data from the ball during the training session or game regarding how many times the player came into contact with the ball, how hard the player kicked the ball, how far the ball was kicked by the player, how much spin the player imparted to the ball when the ball was kicked, the arc of the ball, et cetera. This data can be generated by the ball and transmitted to a motion monitor in the player's shoe, for example, before the ball is beyond the transmission range of the ball's transceiver circuitry. In an embodiment, the recorded/stored data about a player is downloaded and review/analyzed after the training session or game.

[0279] In an embodiment, sensors/motion monitors worn by or associated with a soccer player, for example, may be used to determine one or more of the values described herein with regard to the soccer ball and vice versa. Thus, the present invention is not limited to having a particular value described herein be generated only by a sport ball or only by sensors/motion monitor worn by or associated with, for example, a soccer player.

[0280] In embodiments, a sport ball according to the present invention transmits data such as, for example, how hard the ball was kicked, how far the ball will/has traveled, the arc of the ball, et cetera to a watch or other portable electronic processing device according to the present invention. This information can then be viewed in real time or near real time, for example, on the watch display. The information can also be downloaded from the watch or other portable electronic processing device and stored on a web server that is compatible with the various other sports electronic training system features described herein.

[0281] In an embodiment, when the only acceleration vector acting on a sport ball is the gravity vector, the ball is considered to be at rest, and the time period for collecting and processing data for the ball (e.g., relating to a particular

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kick, hit and/or throw) can be reset.

[0282] In embodiments, the information from the sensor(s) in the sport balls can be received by any portable electronic processing device compatible with an embodiment of a sports training system described herein.

[0283] FIG. 42 is a diagram that illustrates a multi-sensor monitor 4200 according to an embodiment of the present invention. Multi-sensor monitor 4200 includes a processor 4202, memory 4204, a heart rate sensor 4206, a transceiver 4208, an antenna 4210, a battery 4212, and a plurality of sensors 4214.

[0284] Processor 4202 is a conventional processor such as, for example, a microcontroller capable of implementing application programs stored in memory 4204. Processor 4202 is coupled to memory 4204, heart rate sensor 4206, transceiver 4208, and the plurality of sensors 4212.

[0285] Memory 4204 is used to store application program instructions and data. In an embodiment, memory 4204 stores programs, for example, used to generate performance data from data output by heart rate sensor 4206 and the plurality of sensors 4214. In an embodiment, memory 4204 includes both read only memory and random access memory.

[0286] In an embodiment, heart rate sensor 4206 is an electronic sensor that detects heart beats. This data is provided to processor 4202 and used to determine a heart beat rate (e.g., number of beats per minute).

[0287] Transceiver 4208 is a low-power transceiver used to communicate with other components of a sports electronic training system according to embodiments of the present invention. In an embodiment, transceiver 4208 operates in an unlicensed frequency band such as 2.4 GHz. Transceiver 4208 is coupled to an antenna 4210.

[0288] Battery 4212 is used to provide power to operate the various components of multi-sensor monitor 4200. In an embodiment, battery 4212 is a non-rechargeable battery that must be periodically replaced. Battery 4212 can also be a rechargeable battery.

[0289] Sensors 4214 are sensors that measure parameters associated with the performance of an individual. Such sensors include, for example, temperature sensors, hydration/moisture sensors, salination sensors, ionization/deionization sensors, oxygen sensors, motion sensors/accelerometers, altimeters, et cetera.

[0290] In an embodiment, multi-sensor monitor 4200 is built into sports clothing and used to measure parameters for an individual engaged in a sporting event. The sporting event can include, for example, a track and field event such as a race, or a team sport such as a soccer game, a basketball game, et cetera. Information collected by multi-sensor monitor 4200 is transmitted wirelessly, for example, to a monitoring device that displays the information to a coach or other individual tasked with monitoring the performance of one or more individuals. When the information collected from an individual indicates that an individual participating in a team sport is not performing at an expected performance level and needs a rest period, the individual can be taken out of the game for a rest. In an embodiment, information from sensors such as, for example, hydration/moisture, ionization/deionization and/or saltation sensors are used to determine and recommend special drinks or special food to the individual (e.g., to be consumed during a long term workout such as a marathon or soccer game, or after the workout).

[0291] In an embodiment, multi-sensor monitor 4200 is used with intelligent clothing to control the clothing. For example, in one embodiment, multi-sensor monitor 4200 operates controls that activate heating and/or ventilating feature of clothes. These features can include turning on and off heaters, and inflating or deflating air bladders within the clothing to allow, for example, more or less ventilation. In an embodiment, sensors of multi-sensor monitor 4200 detect and use the presence of moisture, or a lack of moisture, as an indicator to determine whether more or less ventilation is demanded. In an embodiment, temperature sensors on the inside and the outside of a garment are used to determine a temperature difference, which together with other information such as, for example, weather information are used to influence and/or control the ventilation/heating properties of the garment.

[0292] In an embodiment, a portable electronic processing device according to the present invention is used to control the compression of a garment (e.g., which is important in swimming to increase blood flow) and/or to control the support/stability function of a garment (e.g., using integrated support elements such as thermoplastic urethane bands). In an embodiment, a portable electronic processing device according to the present invention is used to control various parameters of an article of footwear. This includes, for example, cushioning, stability, the closure system, active or passive ventilation, traction properties, pronation/supination control, intelligent ribs on soccer boots, et cetera.

[0293] In an embodiment, garments worn by an athlete, for example, contain integrated sensors to detect movement of the athlete's upper body and posture of the body. The output of these sensors are used to provide feedback to the athlete, for example, regarding how to change body movement and/or posture in a sport like golf, gymnastics or figure skating, where upper body movement and posture are important. For example, the feedback provided to a golfer would let the golfer know how upper body movement is changing or not changing during swings.

[0294] In an embodiment, sensors are placed and/or built into a shoe to measure, for example, a runner's running form and gait cycle (e.g., sensors are placed and/or built into the heel, midsole, and toe of the shoe). Additional sensors/motion monitors can also be placed on the runner's knee and hip, for example, to obtain more information about the runner's running form. The information collected by the sensors/motion monitors is analyzed by the virtual trainer of the present invention and used to provide feedback to the runner regarding how the runner can improve his or her running form and/or gait cycle. In an embodiment, sensors/motion monitors worn by a runner are used to determine running

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biomechanics. This is accomplished, for example, by analyzing the outputs of the sensors/motion monitors worn on various parts of a runners body to determine the runner's rotational and translational movements/accelerations.

[0295] In one embodiment, retailers are provided with advanced sensor products and/or equipment described herein, which they rent and/or provide to individuals to evaluate the individuals. The evaluation results are then used, for example, by the retailers to sell products (e.g., shoes) to the individuals that are tailored to their personal needs (e.g., shoe properties that match a runner's running form).

[0296] FIG. 43 is a diagram that illustrates using components of the present invention to monitor a sports player 4302 and a sport ball 4304. Sports player 4302 is wearing sports clothing that includes a built in multi-sensor monitor 4200. Monitor 4200 collects information about sports player 4302 and transmits this information to a device that displays the information on a display 4306. Sport ball 4304 also includes one or more monitors, as described above. Information collected by these monitors is transmitted to one or more devices and displayed on a display, such as for example display 4306.

[0297] In an embodiment, the information displayed for sports player 4302 includes heart rate information, hydration information, temperature information, motion information, et cetera. In one embodiment, information collected by the sensors of multi-sensor monitor 4200 is combined to produce a fatigue/performance index value. The index value can be monitored to indicate at what level sports player 4302 is performing or capable of performing. The fatigue/performance index value can be monitored over time and compared to the sports player's actual performance in games to determine how well sport player 4302 is capable of performing for a given range of fatigue/performance index values.

[0298] In one embodiment, the present invention is used to monitor the performance of a boxer. Monitors in the gloves of the boxer, for example, measure the boxer's punching speed and power. Motion monitors can also be used to track and record data about the boxer's hand movements and form, and training feedback can be provided to the boxer based on an analyzes of the recorded data.

[0299] In one embodiment, the present invention is used to monitor the performance of a swimmer. Motion monitors, for example, on an arm and/or leg of the swimmer monitor the number of strokes performed by the swimmer, and the swimmer's speed, laps, swimming form; pace, et cetera. Goggles with color indications provide feedback to the swimmer about performance. For example, in one embodiment, three lights indicate zones of performance (e.g., on target performance, below target performance, and above target performance). In another embodiment, two colors indicate performance (below target performance and above target performance - no indicator light is used to indicate on target performance).

[0300] In one embodiment, one or more sensors such as, for example, a miniature pressure altitude sensor are used to monitor and to measure jumps, leaps, et cetera, of an individual. This information can be combined with other information described herein and analyzed to provide training feedback to the individual.

[0301] In an embodiment, information transmitted for sports players participating in a game can be encrypted so that only authorized individuals can receive and display the information.

[0302] As illustrated by FIGS. 44 and 45, in embodiments of the present invention, components of the sports electronic training system described herein are used to interact with electronic games. In an embodiment, illustrated by FIG. 44, an individual uses the sports electronic training system components described herein, for example, to gain credits and/or reward points for exercising that can be downloaded to an electronic game (e.g., to build up the health, fitness, and strength of an avatar or digitally created character). In another embodiment, illustrated by FIG. 45, an individual uses the sports electronic training system components described herein, for example, to interact directly with an electronic game.

[0303] FIG. 44 illustrates an individual 4400 using a display 4402 and a gaming device 4404 to play an electronic game. The game includes an avatar or digitally created character 4406. As used herein, the term digitally created character is broader than the term avatar. As used herein, the term digitally created character means any computer game character or electronic personality, for example, to include what is commonly referred to in the computer gaming art as an avatar. In order for the avatar or digitally created character to build up, for example, health, fitness, and strength, and thereby make the game more interesting and/or appealing to individual 4400, individual 4400 must collect health, fitness, and strength points by exercising. The individual collects these points by using various components of the sports electronic training system described herein to monitor and record his exercise. After an exercise workout, individual 4400 can download points, for example, from a portable electronic processing device according to the present invention to the electronic game.

[0304] In an embodiment, information that can be used to effect the avatar or digitally created character is gathered, for example, by playing in a real soccer game or performing other real physical activities and storing the information in a memory. The information is then brought back and downloaded to a gaming device or electronic game, for example, either wirelessly or using a docking station. The downloaded information is then used to effect, for example, the strength, power, health, et cetera of the avatar or digitally created character. In one embodiment, the information is gathered, stored, and brought back using a sport ball according to the present invention. In an embodiment, the information can be downloaded and stored on a web server that is compatible with the various other sports electronic training system

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features described herein, and retrieved from the web server for use with an electronic game.

[0305] In an embodiment, the more individual 4400 exercises using components such as, for example, motion monitor (s) and/or a heart rate monitor according to the present invention to monitor and record the exercise, the more health, fitness, and strength points individual 4400 earns for use with the electronic game. Because the health, fitness and/or strength points earned are proportional to the amount of exercise performed by individual 4400, individual 4400 is motivated to exercise and to be physically active.

[0306] In an embodiment, the virtual trainer of the present invention provides feedback to individual 4400 while individual 4400 is exercising. The feedback encourages and/or helps the individual increase and/or maximize the number of health, fitness and/or strength points that are earned.

[0307] FIG. 45 illustrates an embodiment of the present invention in which an individual 4500 uses various components of the sports electronic training system described herein to directly interact in real time with an electronic game. As illustrated by FIG. 45, individual 4500 is running in place in order to control movement of an avatar or digitally created character 4506. In embodiments, the activity level of individual 4500 effects the individual's game score.

[0308] In an embodiment, the electronic game is played using a television 4502 and a gaming console 4504. Movement of the avatar or digitally created character 4506 is influenced based on the movement of individual 4500, which is monitored in an embodiment using the sensors/motion monitors and/or one or more portable electronic processing devices of the present invention described herein. The components of the sports electronic training system used by individual 4500 communicate, either directly or through a portable electronic processing device, with gaming console 4504. In an embodiment, the portable electronic processing device communicates with gaming console 4504 either wirelessly or by using a docking port.

[0309] In an embodiment, wearable sensors (e.g., other than ones that monitor movement of the feet of individual 4500) are used to capture movement of individual 4500. In an embodiment, these wearable sensors are integrated, for example, into garments and/or joint sleeves worn by individual 4500 while playing the electronic game. In embodiments, performance data or a combination of physiologic and performance data are used within a game.

[0310] In embodiments of the present invention, an electronic game or at least a session thereof is played/displayed on one of the many sports electronic training system displays described herein (e.g., on a display of a portable electronic processing device, on the inside lenses of glasses, on a display integrated into a garment sleeve, et cetera). Earphones and/or a speaker of a portable electronic processing device are used to provide audio for the electronic game. As such, the game is not required to be played, for example, exclusively in a computer room or in a living room of a house or an apartment.

[0311] The present invention has been described above by way of exemplary embodiments. Accordingly, the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalences.

[0312] Further preferred embodiments of the invention are mentioned as follows:

1. A sports electronic training system, comprising:

    a motion monitor; and
    a portable electronic processing device in wireless communications with the motion monitor,

wherein the portable electronic processing device includes a virtual trainer program that assesses a fitness level of an individual and provides training feedback during a workout.

2. The system as described under number 1, wherein the motion monitor includes an accelerometer.

3. The system as described under number 1, wherein the portable electronic processing device is a mobile telephone.

4. The system as described under number 1, further comprising a watch in wireless communications with the portable electronic processing device.

5. The system as described under number 1, further comprising a heart rate monitor in wireless communications with the portable electronic processing device.

6. The system as described under number 5, wherein the heart rate monitor is attached to a chest strap that includes sensors for determining percent body fat.

7. The system as described under number 5, wherein the heart rate monitor uses blood flow to determine a heart rate.

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8. The system as described under number 1, wherein the portable electronic processing device plays music matched to a stride rate.

9. The system as described under number 1, wherein the motion monitor includes a winged-battery cap.

10. The system as described under number 1, further comprising:

a sport ball that includes a motion monitor in wireless communications with the portable electronic processing device.

11. A method of providing training feedback to an individual, comprising:

(1) monitoring foot movement of the individual during a workout with an accelerometer;

(2) calculating a performance parameter based on the monitoring in (1);

(3) transmitting the performance parameter to a portable electronic processing device;

(4) comparing the performance parameter to a performance goal stored by the portable electronic processing device; and

(5) providing feedback to the individual if the performance parameter differs from the performance goal.

12. The method as described under number 11, wherein (2) comprises calculating a stride rate.

13. The method as described under number 11, wherein (2) comprises calculating a pace.

14. The method as described under number 11, wherein (2) comprises
determining a maximum acceleration value during a stride of the individual, and
calculating the performance parameter based on the maximum acceleration value.

15. The method as described under number 11, wherein (2) comprises
determining a minimum acceleration value during a stride of the individual, and
calculating the performance parameter based on the minimum acceleration value.

16. The method as described under number 11, wherein (4) comprises comparing the performance parameter to a performance goal that is based on an assessed fitness level for the individual.

17. The method as described under number 11, wherein (4) comprises comparing the performance parameter to a performance goal that changes during the workout.

18. The method as described under number 11, wherein (5) comprises providing visual feedback to the user.

19. The method as described under number 11, wherein (5) comprises providing audio feedback to the user.

20. The method as described under number 11, further comprising:

(6) determining a heart rate for the individual;

(7) comparing the heart rate to a heart rate goal stored by the portable electronic processing device; and

(8) providing feedback to the individual if the heart rate differs from the heart rate goal.

21. The method as described under number 11, further comprising:

(6) asking the individual questions during the workout; and

(7) providing feedback to the individual based on answers to the questions asked in (6).

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22. A sports electronic training system, comprising:

a heart rate monitor; and
a portable electronic processing device in wireless communications with the heart rate monitor,

wherein the portable electronic processing device includes a virtual trainer program that assesses a fitness level of an individual and provides training feedback during a workout.

23. The system as described under number 22, wherein the portable electronic processing device is a mobile telephone.

24. The system as described under number 22, wherein the portable electronic processing device is an MP3 music file player.

25. The system as described under number 22, further comprising a watch in wireless communications with the portable electronic processing device.

26. The system as described under number 25, wherein the watch is used to provide biofeedback.

27. The system as described under number 26, wherein the biofeedback comprises pressure pulsations.

28. The system as described under number 22, wherein the heart rate monitor is attached to a chest strap that includes sensors for determining percent body fat

29. A method of providing training feedback to an individual, comprising:

(1) monitoring movement of the individual during a workout with a plurality of accelerometers;

(2) calculating information about the movement of the individual based on the monitoring in (1);

(3) comparing the information calculated in (2) to information stored by a portable electronic processing device; and

(4) providing feedback to the individual based on the comparison in (3).

30. The method as described under number 29, wherein (1) comprises monitoring movement of the individual's feet.

31. The method as described under number 29, wherein (1) comprises monitoring movement of the individual's legs.

32. The method as described under number 29, wherein (1) comprises monitoring movement of the individual's wrists.

33. The method as described under number 29, wherein (1) comprises monitoring movement of the individual's arms.

34. The method as described under number 29, wherein (2) comprises calculating running biomechanics information.

35. The method as described under number 29, wherein (2) comprises calculating rotational acceleration values.

36. The method as described under number 29, wherein (2) comprises calculating translational acceleration values.

37. The method as described under number 29, wherein (3) comprises comparing the information after completion of the workout.

38. The method as described under number 29, further comprising:

(5) asking the individual questions during the workout; and

(6) providing feedback to the individual based on answers to the questions asked in (5).

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Claims

1. A sports electronic training system, comprising:

    a motion monitor; and
    a portable electronic processing device in wireless communications with the motion monitor,

    wherein the portable electronic processing device includes a virtual trainer program that assesses a fitness level of an individual and provides training feedback during a workout.

2. The system of claim 1, wherein the motion monitor includes an accelerometer.

3. The system of claim 1, wherein the portable electronic processing device is a mobile telephone.

4. The system of claim 1, further comprising a watch in wireless communications with the portable electronic processing device.

5. The system of claim 1, further comprising a heart rate monitor in wireless communications with the portable electronic processing device.

6. The system of claim 5, wherein the heart rate monitor is attached to a chest strap that includes sensors for determining percent body fat.

7. The system of claim 5, wherein the heart rate monitor uses blood flow to determine a heart rate.

8. The system of claim 1, wherein the portable electronic processing device plays music matched to a stride rate.

9. The system of claim 1, further comprising:

    a sport ball that includes a motion monitor in wireless communications with the portable electronic processing device.

10. A method of providing training feedback to an individual, comprising:

    (1) monitoring foot movement of the individual during a workout with an accelerometer;
    (2) calculating a performance parameter based on the monitoring in (1);
    (3) transmitting the performance parameter to a portable electronic processing device;
    (4) comparing the performance parameter to a performance goal stored by the portable electronic processing device; and
    (5) providing feedback to the individual if the performance parameter differs from the performance goal.

11. The method of claim 10, wherein (2) comprises
    determining a maximum acceleration value during a stride of the individual, and
    calculating the performance parameter based on the maximum acceleration value.

12. The method of claim 10, wherein (2) comprises
    determining a minimum acceleration value during a stride of the individual, and
    calculating the performance parameter based on the minimum acceleration value.

13. The method of claim 10, wherein (4) comprises comparing the performance parameter to a performance goal that is based on an assessed fitness level for the individual.

14. The method of claim 10, wherein (4) comprises comparing the performance parameter to a performance goal that changes during the workout.

15. The method of claim 10, further comprising:

    (6) asking the individual questions during the workout; and

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(7) providing feedback to the individual based on answers to the questions asked in (6).

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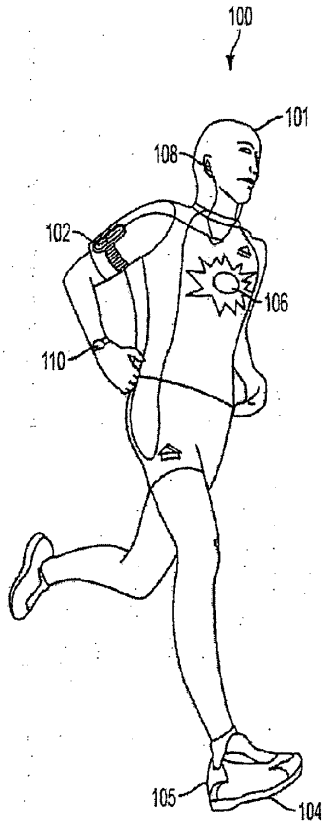


FIG. 1

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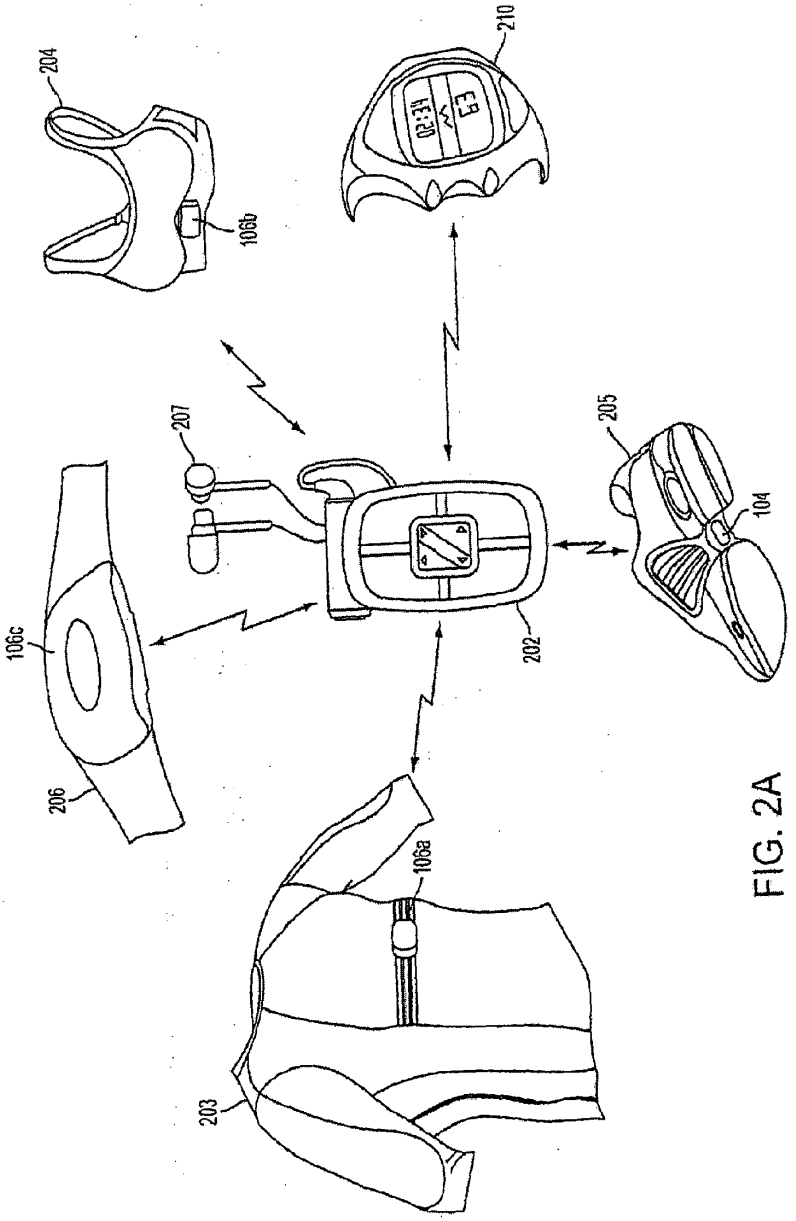


FIG. 2A

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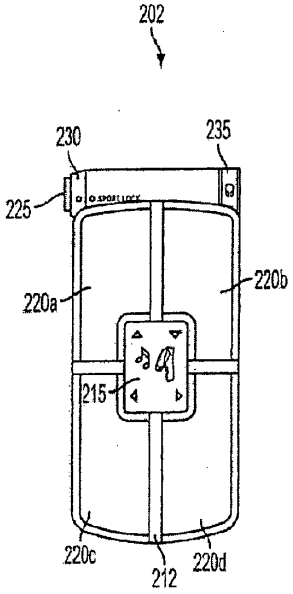


FIG. 2B

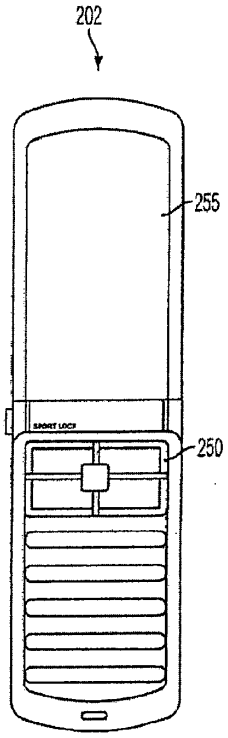


FIG. 2C

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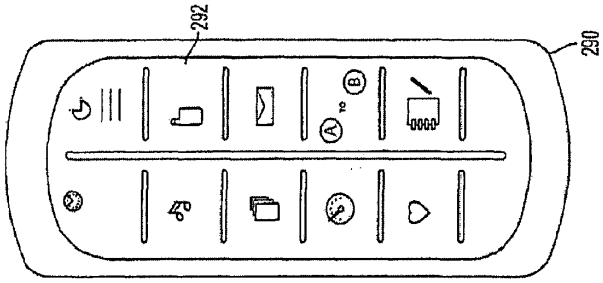


FIG. 2F

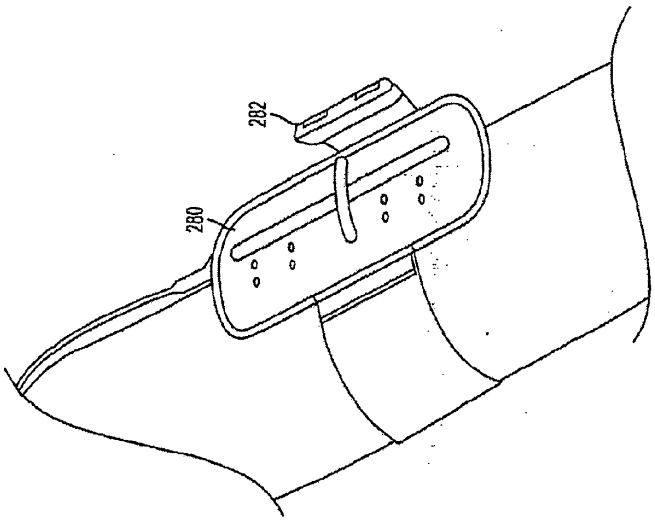


FIG. 2E

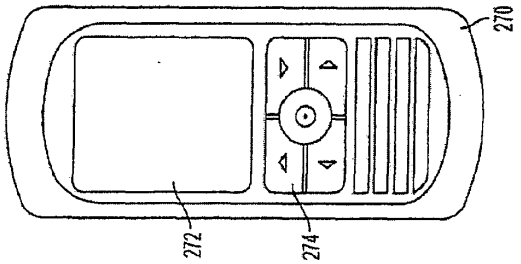


FIG. 2D

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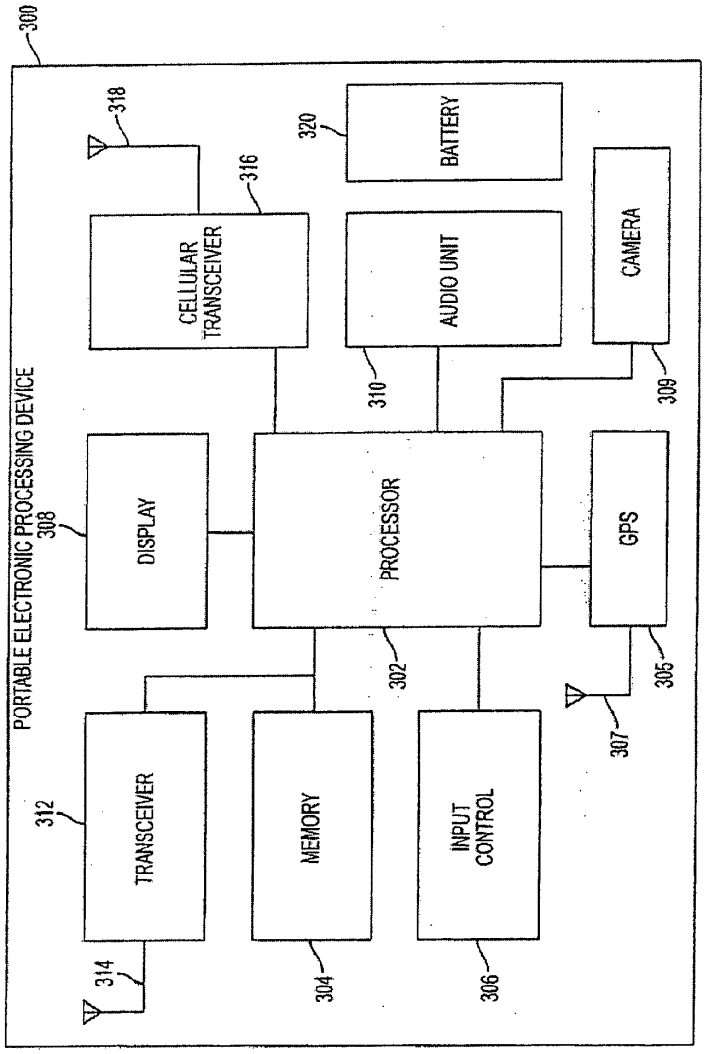


FIG. 3A

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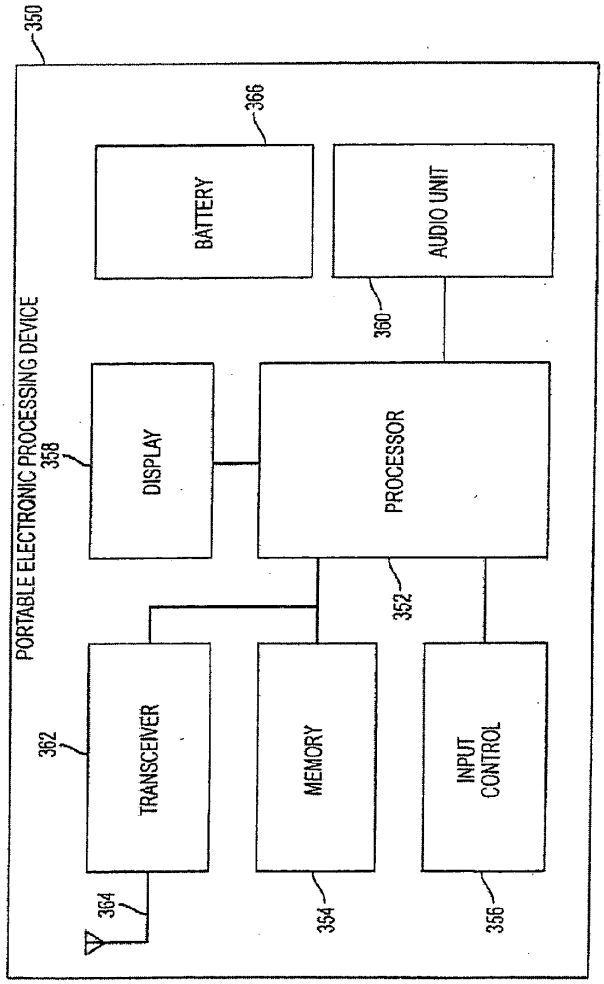


FIG. 3B

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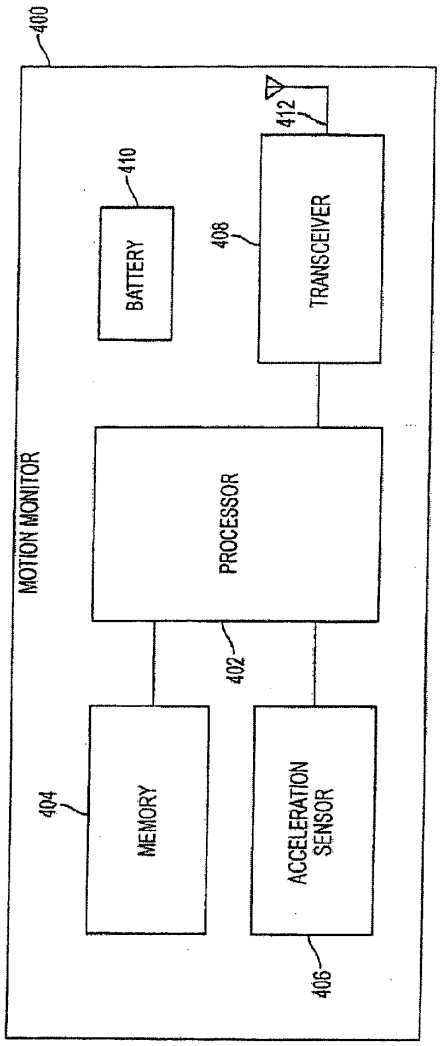


FIG. 4A

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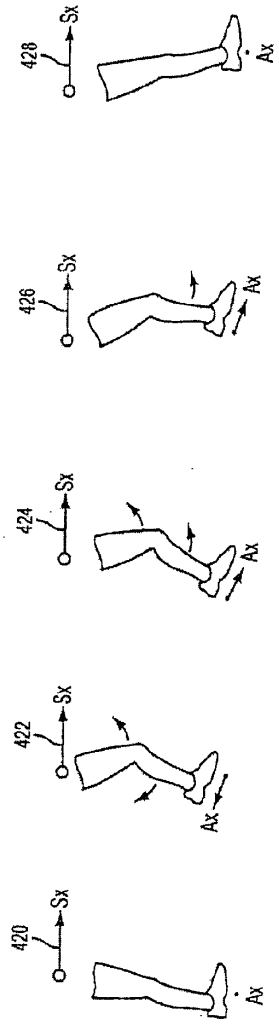


FIG. 4B

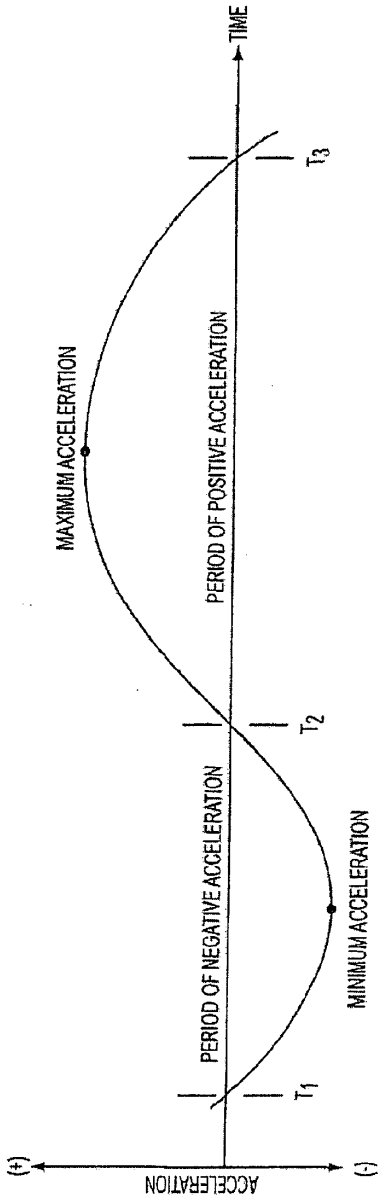


FIG. 4C

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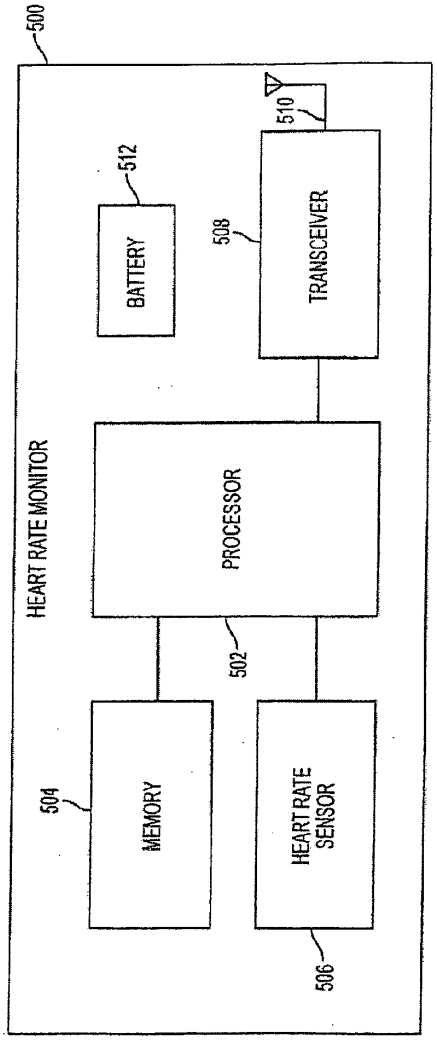


FIG. 5

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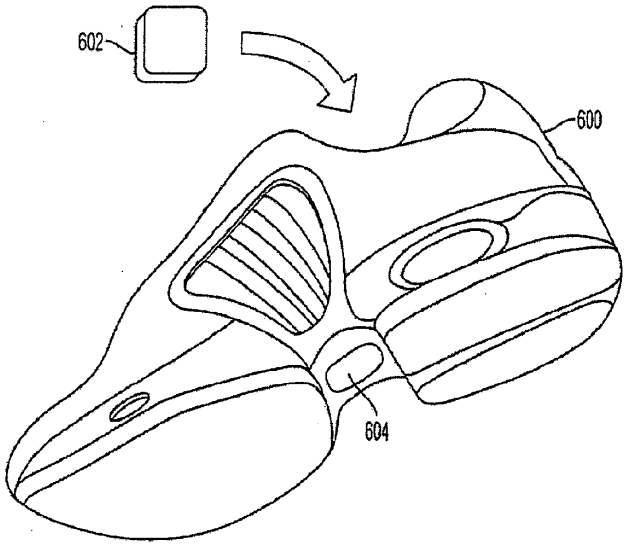


FIG. 6A

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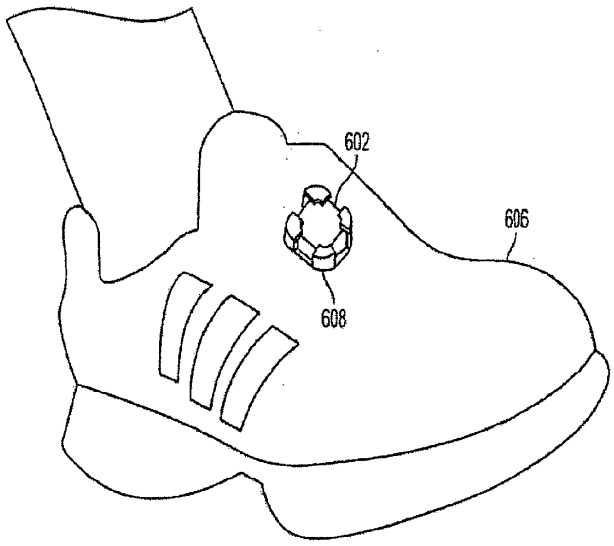


FIG. 6B

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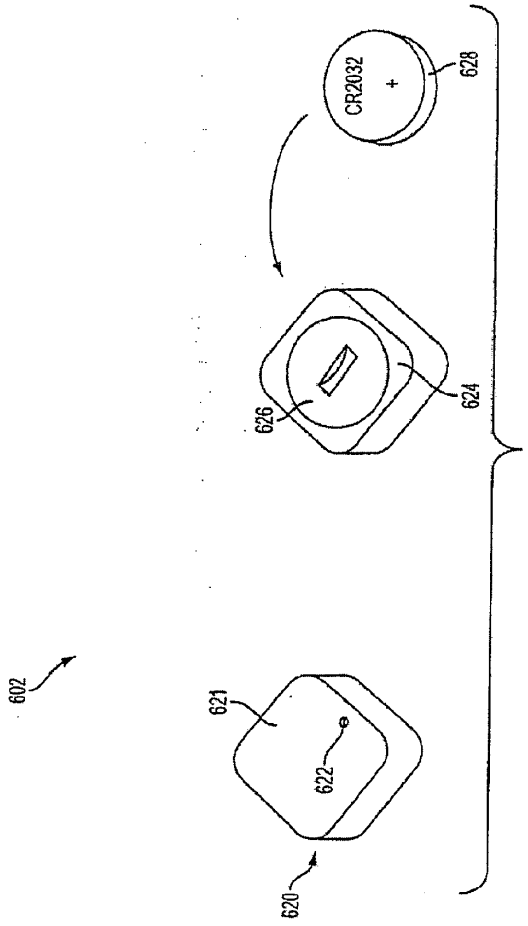


FIG. 6C

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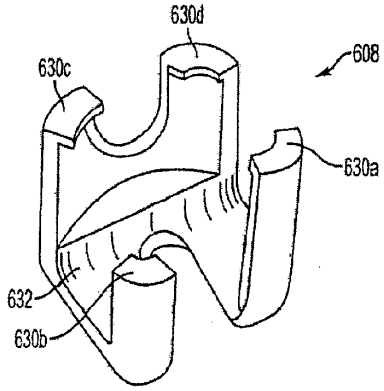


FIG. 6D

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AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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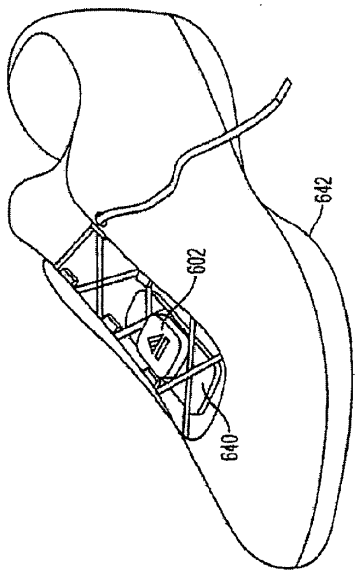


FIG. 6F

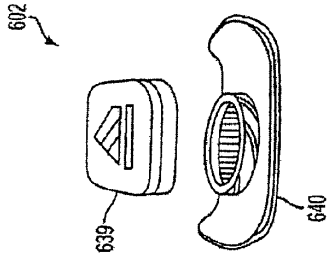


FIG. 6E

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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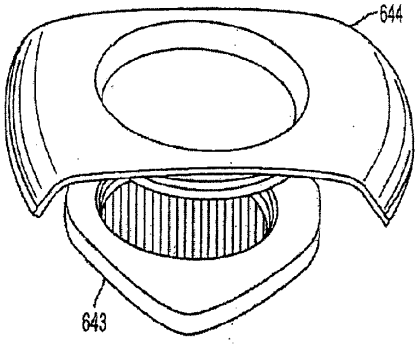


FIG. 6G

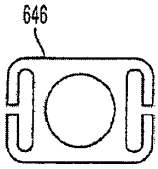


FIG. 6I

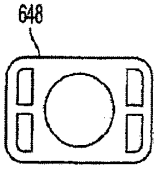


FIG. 6J

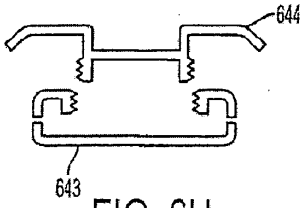


FIG. 6H

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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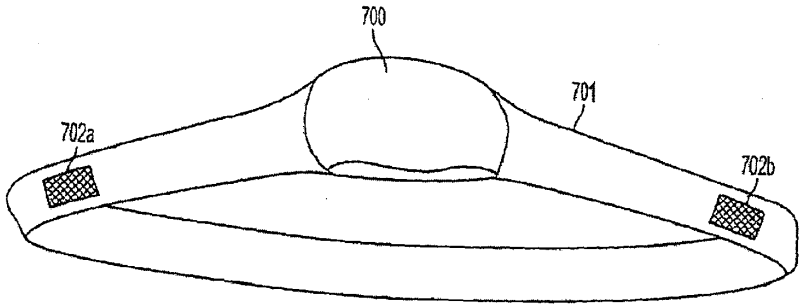


FIG. 7

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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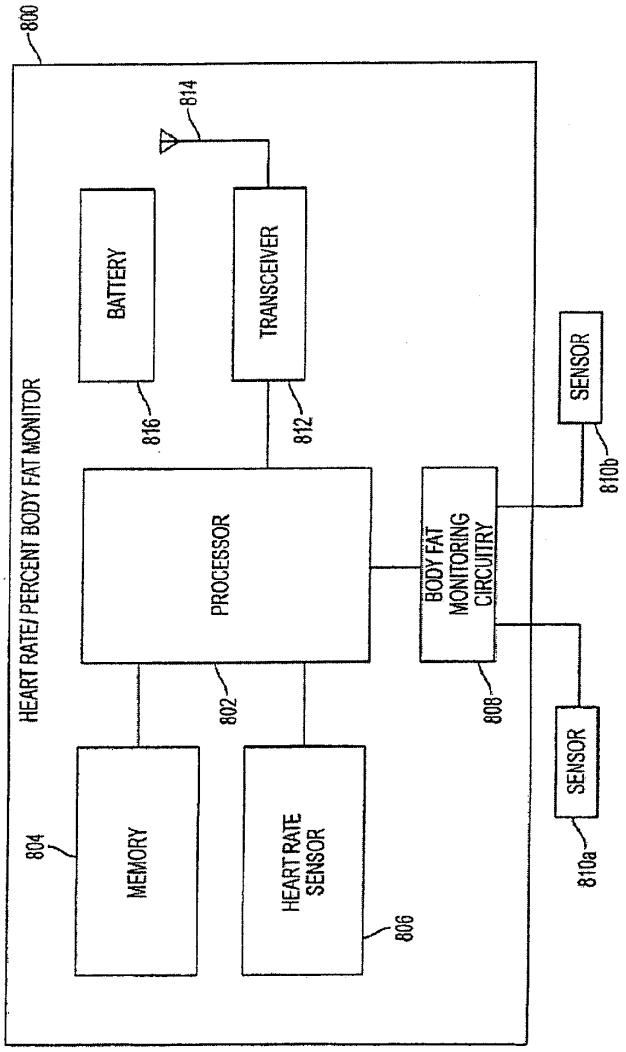


FIG. 8

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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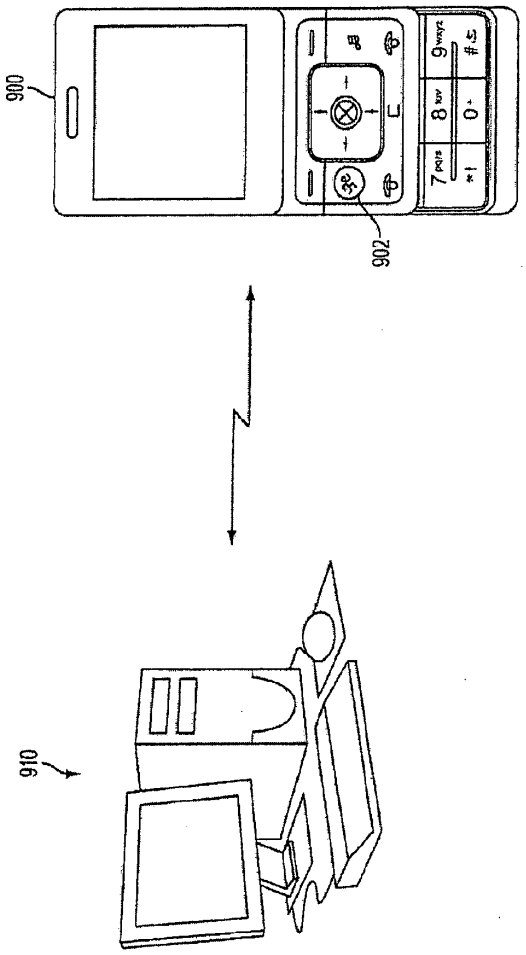


FIG. 9

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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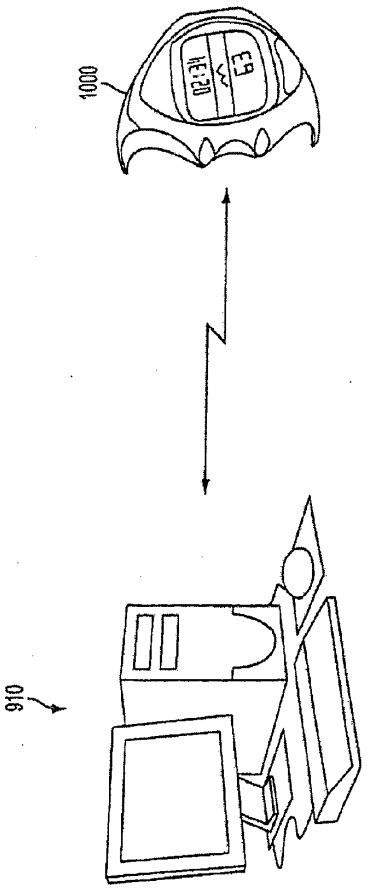


FIG. 10

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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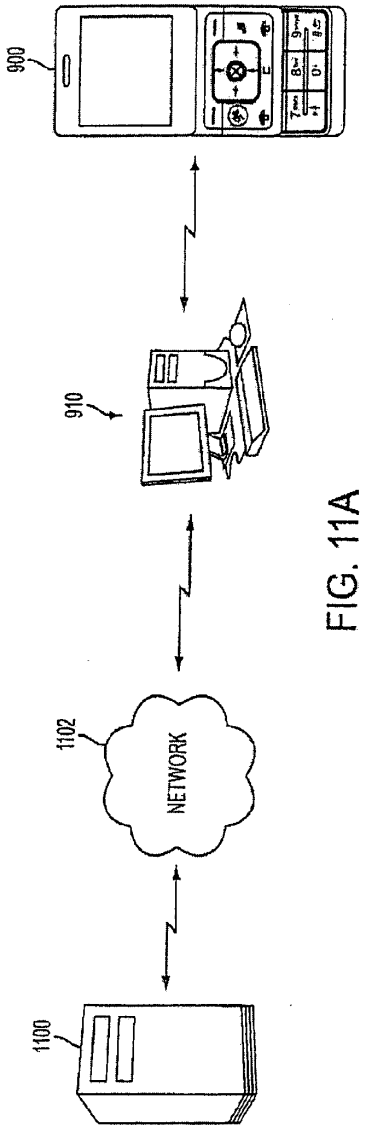


FIG. 11A

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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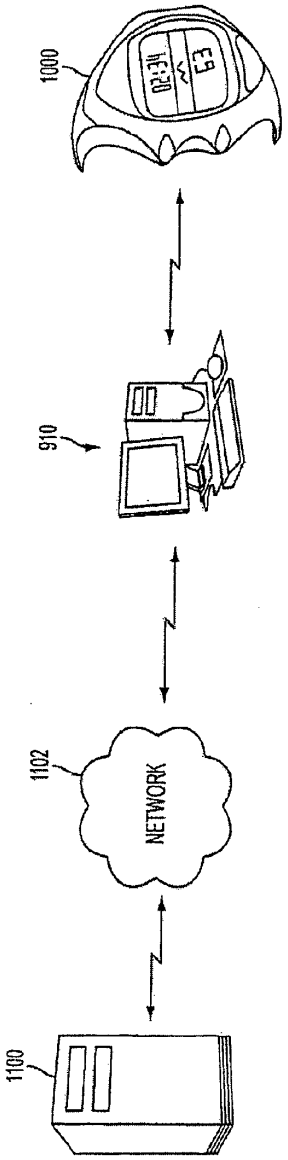
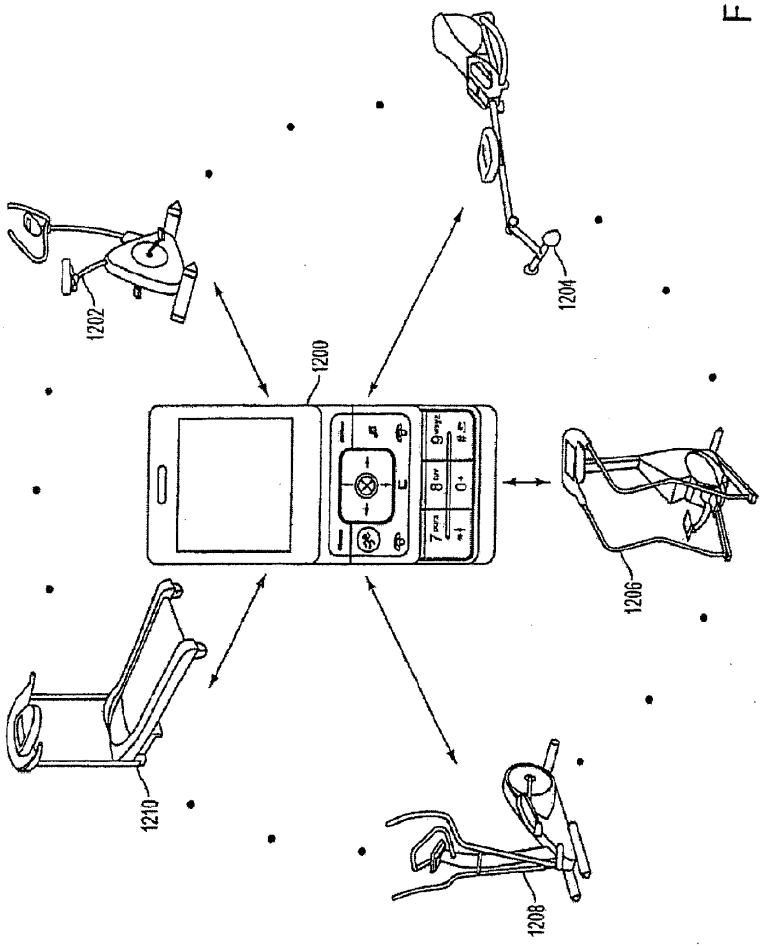


FIG. 11B

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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FIG. 12



AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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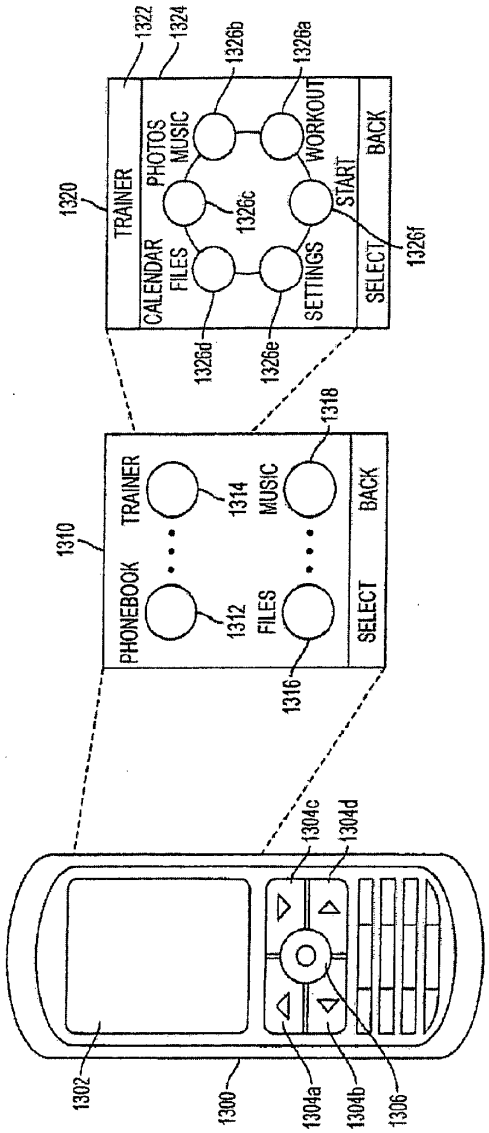


FIG. 13

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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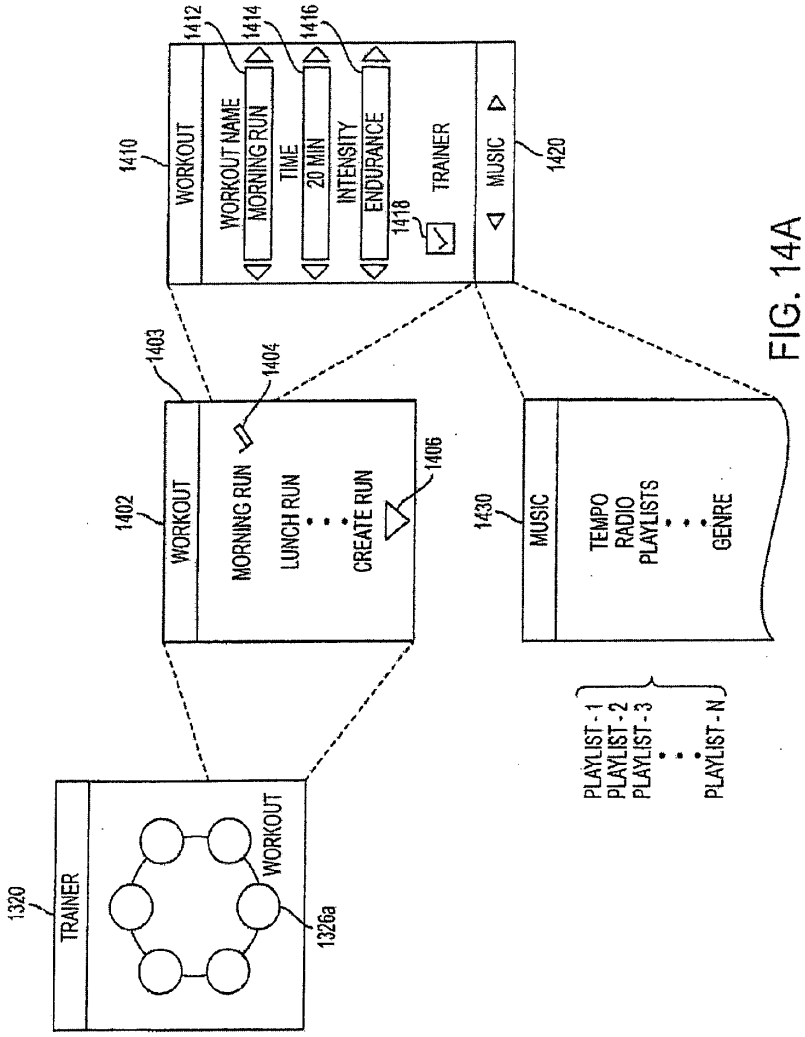


FIG. 14A

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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EXAMPLE NARRATION TABLE

TRIGGER POINT	ACTION	EXAMPLE FEEDBACK		
		EXAMPLE 1	EXAMPLE 2	EXAMPLE 3
START BUTTON	START WORKOUT	BEGIN WORKOUT LET'S GET STARTED	BEGIN WORKOUT LET'S GET STARTED	BEGIN WORKOUT LET'S GET STARTED
	SPEED UP TO STRENGTH ZONE	ACCELERATE TO STRENGTH ZONE SPEED UP TO STRENGTH ZONE	ACCELERATE TO YELLOW ZONE SPEED UP TO YELLOW ZONE	ACCELERATE TO __ BPM SPEED UP TO __ BPM
	ENTERING STRENGTH ZONE	ENTERING STRENGTH ZONE	ENTERING YELLOW ZONE	APPROACHING __ BPM
	ZONE ACHIEVED	STRENGTH ZONE ACHIEVED STRENGTH ZONE	YELLOW ZONE ACHIEVED YELLOW ZONE	__ BPM ACHIEVED __ BPM
HEART RATE LOW 5 BEATS BELOW TARGET ZONE REPEAT EVERY 3 MINUTES IF STILL NOT IN ZONE REPEAT IF WAS IN ZONE AND WENT BELOW AGAIN	INCREASE HEART RATE	ACCELERATE TO STRENGTH ZONE SPEED UP TO STRENGTH ZONE	ACCELERATE TO YELLOW ZONE SPEED UP TO YELLOW ZONE	ACCELERATE TO __ BPM SPEED UP TO __ BPM
HEART RATE HIGH 5 BEATS ABOVE TARGET ZONE REPEAT EVERY 3 MINUTES IF STILL NOT IN ZONE REPEAT IF WAS IN ZONE AND WENT ABOVE AGAIN	DECREASE HEART RATE	EASE BACK TO STRENGTH ZONE SLOW DOWN TO STRENGTH ZONE	SLOW DOWN TO YELLOW ZONE EASE BACK TO YELLOW ZONE	SLOW DOWN TO __ BPM
HEART RATE MIDPOINT OF RANGE REACHED	MAINTAIN HEART RATE	MAINTAIN STRENGTH ZONE STRENGTH ZONE STRENGTH ZONE ACHIEVED MAINTAIN STRENGTH ZONE FOR __ MAINTAIN SPEED FOR __	YELLOW ZONE ACHIEVED YELLOW ZONE MAINTAIN YELLOW ZONE FOR __	__ BPM ACHIEVED __ BPM

TO FIG. 14B-2

FIG. 14B-1

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
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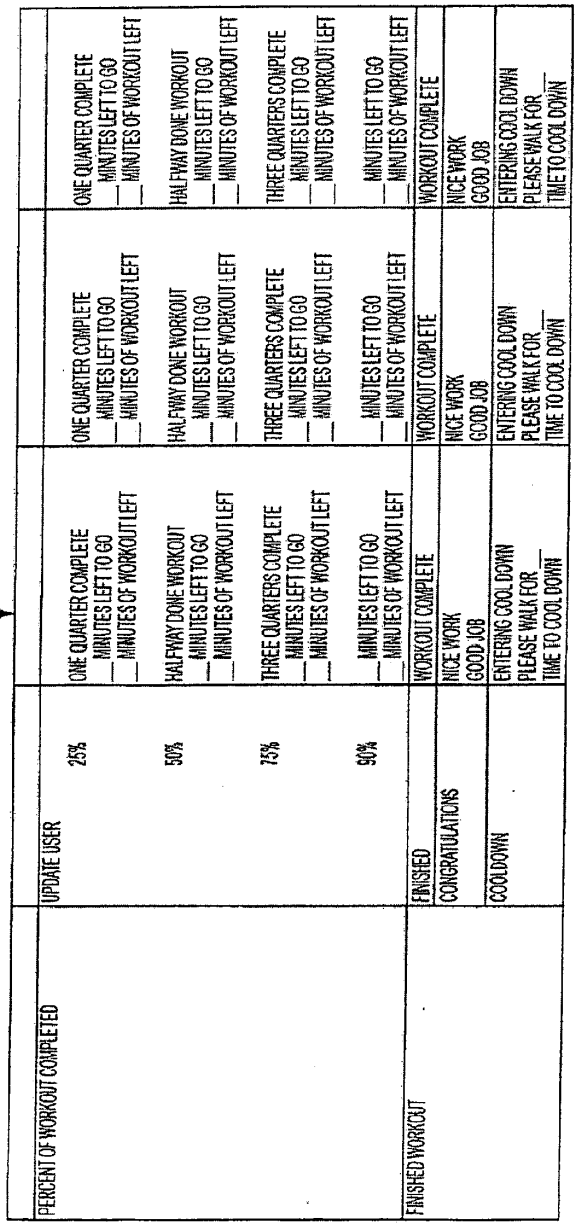


FIG. 14B-2

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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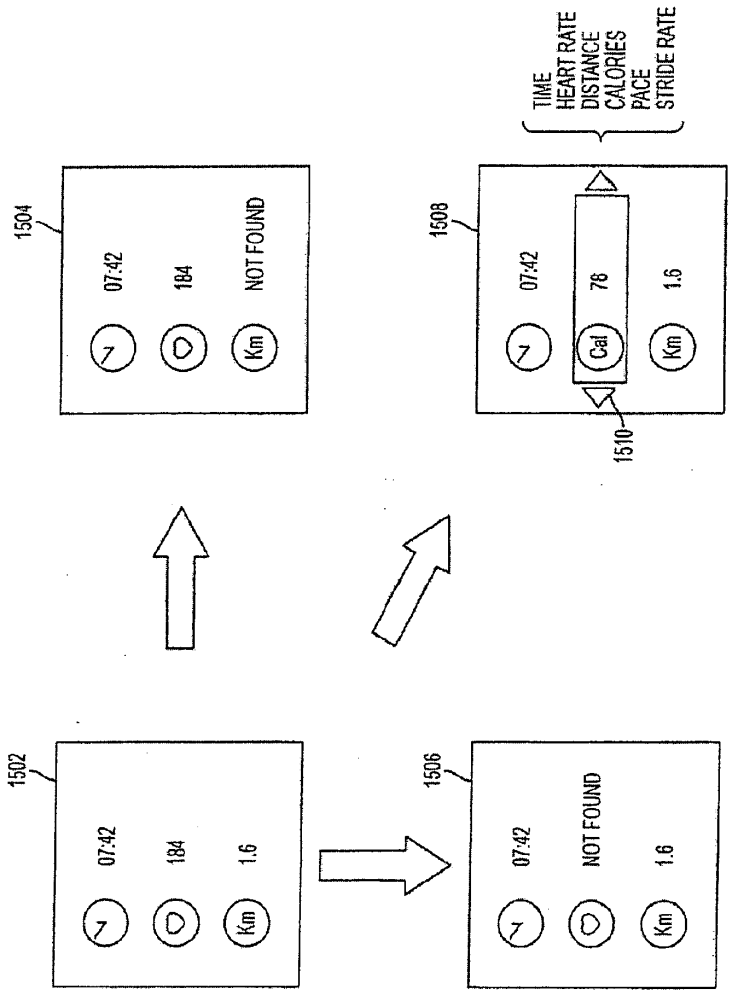


FIG. 15A

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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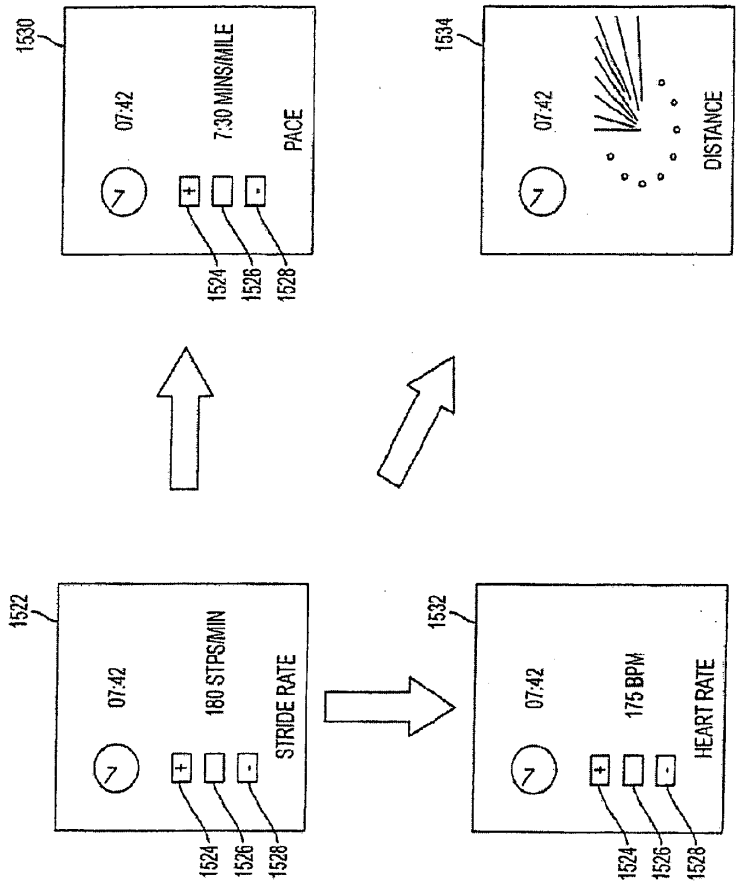


FIG. 15B

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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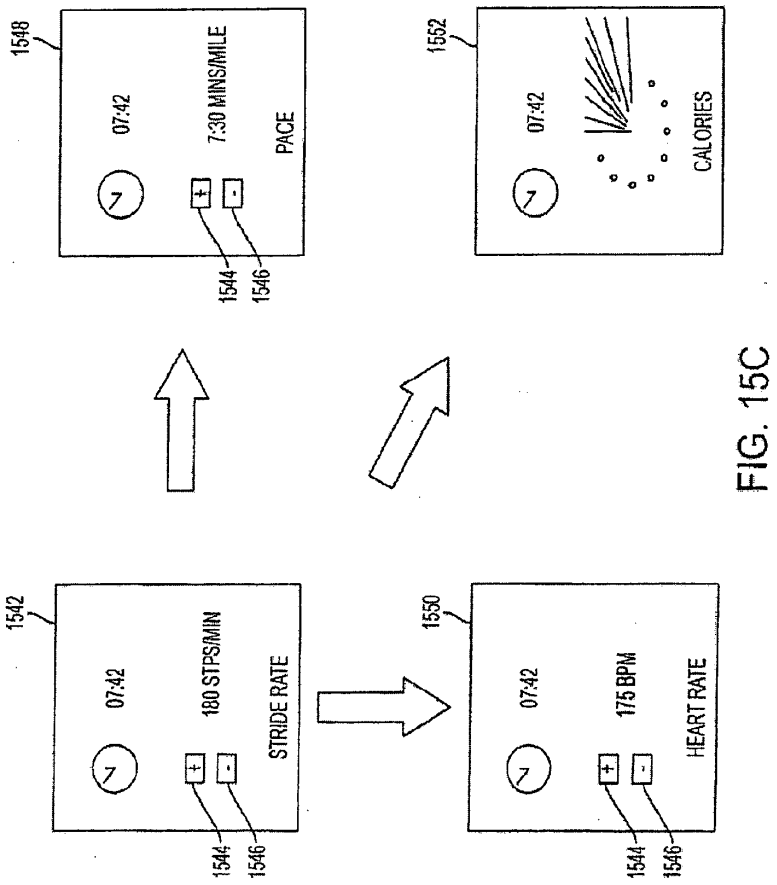


FIG. 15C

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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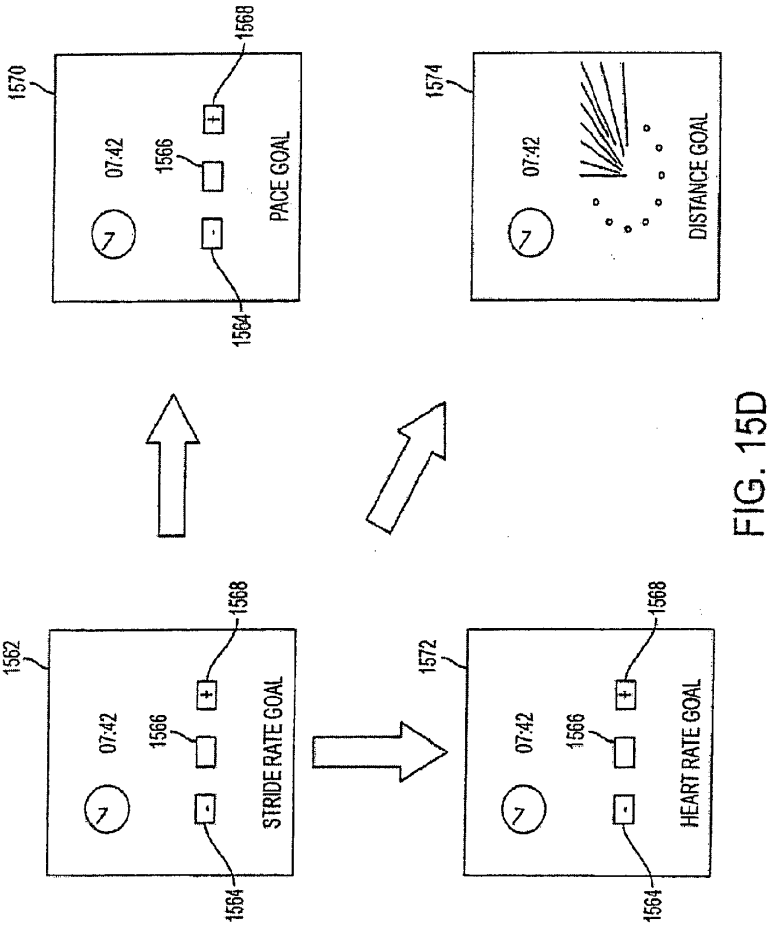


FIG. 15D

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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TABLE 1A - CALORIES BURNED BY WALKING/RUNNING (IN KCAL/MIN)(BASED ON BODY WEIGHT)

		BODY WEIGHT											
		Kg	50	53	56	59	62	68	71	74	77	80	86
		LBS	110	117	123	130	137	150	157	163	170	176	190
WALKING:	2.0 MPH		2.2	2.3	2.5	2.6	2.7	3	3.1	3.2	3.4	3.5	3.8
	3.0 MPH		3.1	3.2	3.4	3.6	3.8	4.2	4.3	4.5	4.7	4.9	5.3
	4.0 MPH		4.5	3.7	3.9	4.1	4.3	4.8	5	5.2	5.4	5.6	6
RUNNING:	5.0 MPH (12 MIN/MILE PACE)		7	7.4	7.8	8.3	8.7	9.5	9.9	10.4	10.8	11.2	12
	6.0 MPH (10 MIN/MILE PACE)		8.8	9.3	9.8	10.3	10.9	11.9	12.4	13	13.5	14	15.1
	7.0 MPH (8.5 MIN/MILE PACE)		10.1	10.7	11.3	11.9	12.5	13.7	14.3	14.9	15.5	16.1	17.3
	8.0 MPH (7.5 MIN/MILE PACE)		11.8	12.5	13.2	13.9	14.6	16.1	16.8	17.5	18.2	18.9	20.3
	9.0 MPH (6.5 MIN/MILE PACE)		13.1	13.9	14.7	15.5	16.3	17.9	18.6	19.4	20.2	21	22.6
	10 MPH (6 MIN/MILE PACE)		14	14.8	15.7	16.5	17.4	19	19.9	20.7	21.6	22.4	24.1
	10.9 MPH (5.5 MIN/MILE PACE)		15.8	16.7	17.6	18.6	19.5	21.4	22.4	23.3	24.3	25.2	27.1

FIG. 15E

AliveCor Exhibit 1002
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TABLE 1B - CALORIES BURNED BY WALKING/RUNNING (IN KCAL/MIN)(BASED ON BODY WEIGHT)

		BODY WEIGHT										
		Kg	89	92	95	98	101	104	107	110	113	116	119
		LBS	196	203	209	216	223	229	236	243	249	256	262
WALKING:	2.0 MPH		3.9	4	4.2	4.3	4.4	4.6	4.7	4.8	4.9	5.1	5.2
	3.0 MPH		5.5	5.6	5.8	6	6.2	6.4	6.6	6.7	6.9	7.1	7.3
	4.0 MPH		6.2	6.4	6.7	6.9	7.1	7.3	7.5	7.7	7.9	8.1	8.3
RUNNING:	5.0 MPH (12 MIN/MILE PACE)		12.5	12.9	13.3	13.7	14.1	14.6	15	15.4	15.8	16.2	16.7
	6.0 MPH (10 MIN/MILE PACE)		15.6	16.1	16.6	17.2	17.7	18.2	18.7	19.3	19.8	20.3	20.8
	7.0 MPH (8.5 MIN/MILE PACE)		17.9	18.5	19.1	19.7	20.3	20.9	21.5	22.1	22.7	23.3	23.9
	8.0 MPH (7.5 MIN/MILE PACE)		21	21.7	22.4	23.2	23.9	24.6	25.3	26	26.7	27.4	28.1
	9.0 MPH (6 MIN/MILE PACE)		23.4	24.2	24.9	25.7	26.5	27.3	28.1	28.9	29.7	30.5	31.2
	10 MPH (6 MIN/MILE PACE)		24.9	25.8	26.6	27.4	28.3	29.1	30	30.8	31.6	32.5	33.3
	10.9 MPH (5.5 MIN/MILE PACE)		28	29	29.9	30.9	31.8	32.8	33.7	34.7	35.6	36.5	37.5

FIG. 15F

AliveCor Exhibit 1002
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TABLE 2

	ORIGINAL METS RANGE	AVERAGE METS	%HR
BEGINNER	3.3-5.0	4.15	60-70
ENERGY	4.2	4.2	60-70
RECOVERY AFTER FREE RUN	5.0-8.0	6.5	71-80
ENDURANCE	8	8	LESS THAN 90%
FREE RUN			
INTERMEDIATE			
ENERGY	7-9	8	65-75
ENDURANCE	10-12	11	75-85
STRENGTH	12-16	14	86-92
LEG STRENGTH	15	15	LESS THAN 90%
ADVANCED			
ENERGY	7-10	8.5	65-75
ENDURANCE	11-12	11.5	80-85
STRENGTH	12-14.5	13.25	85-90
POWER	15-18	16.5	90-95
LEG STRENGTH	15	15	LESS THAN 90%

FIG. 15G

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
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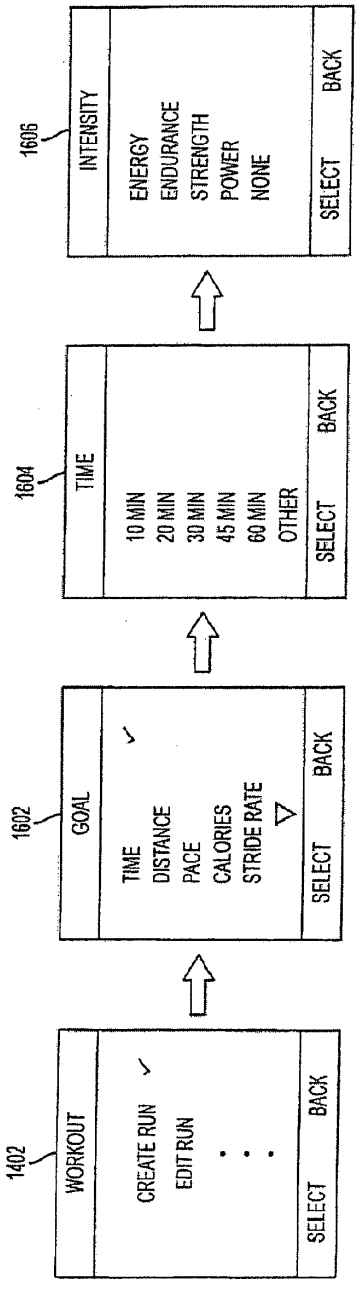


FIG. 16

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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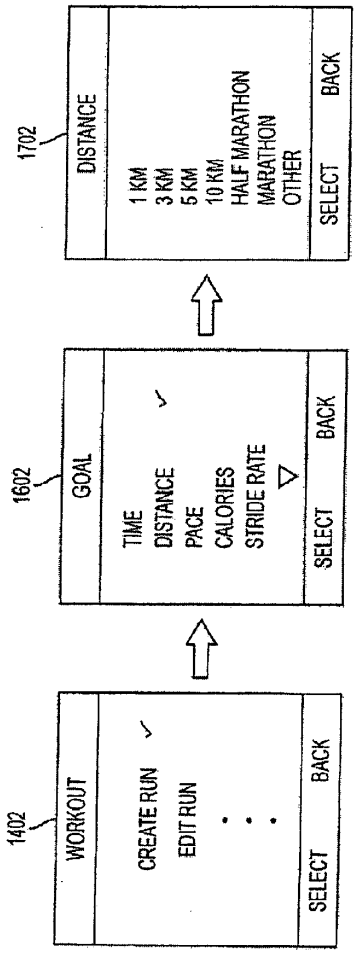


FIG. 17

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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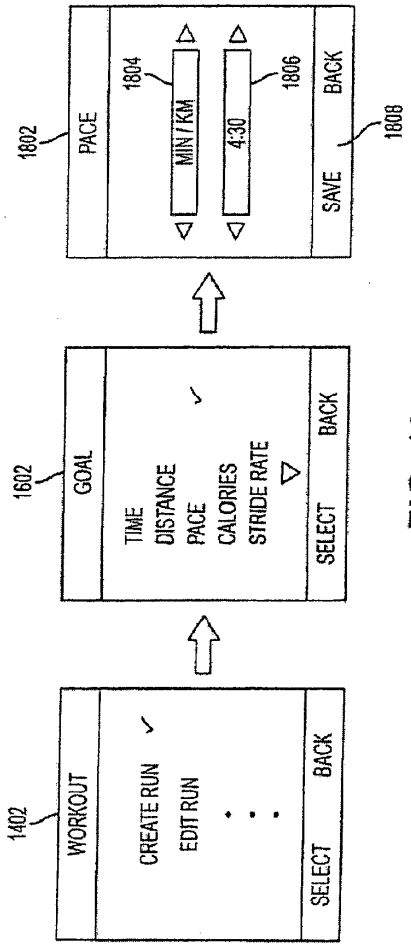


FIG. 18

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
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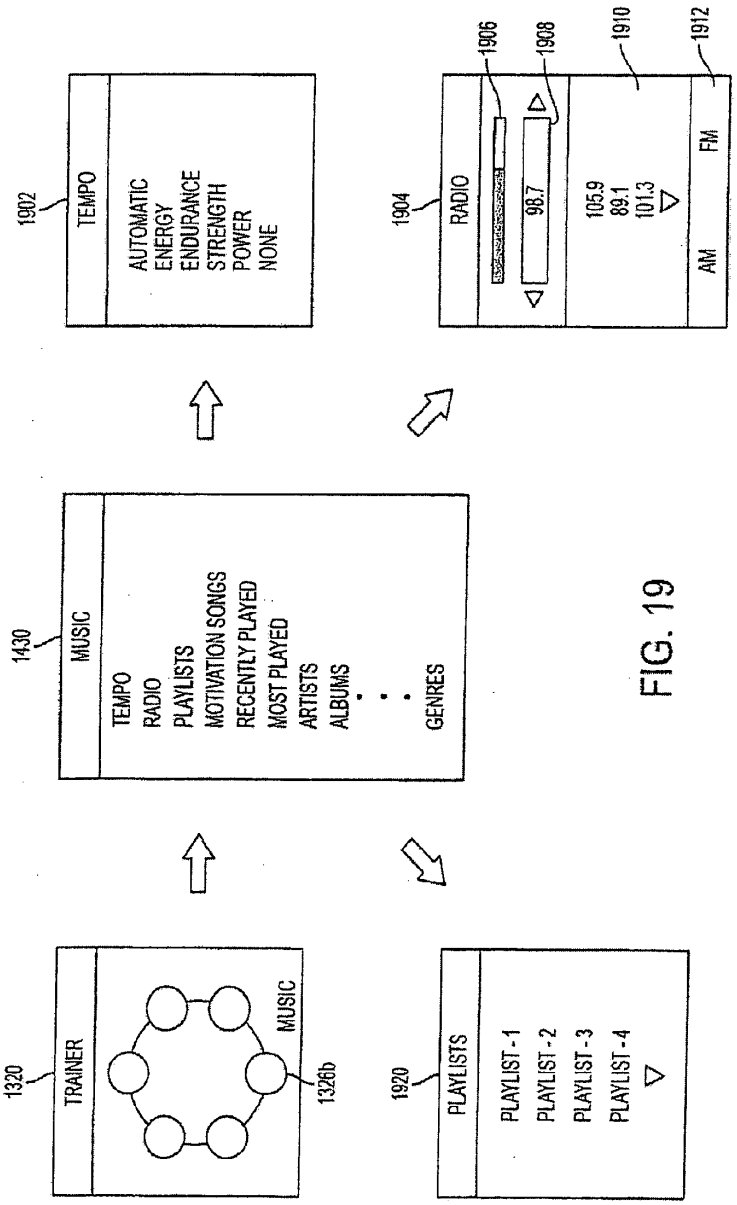


FIG. 19

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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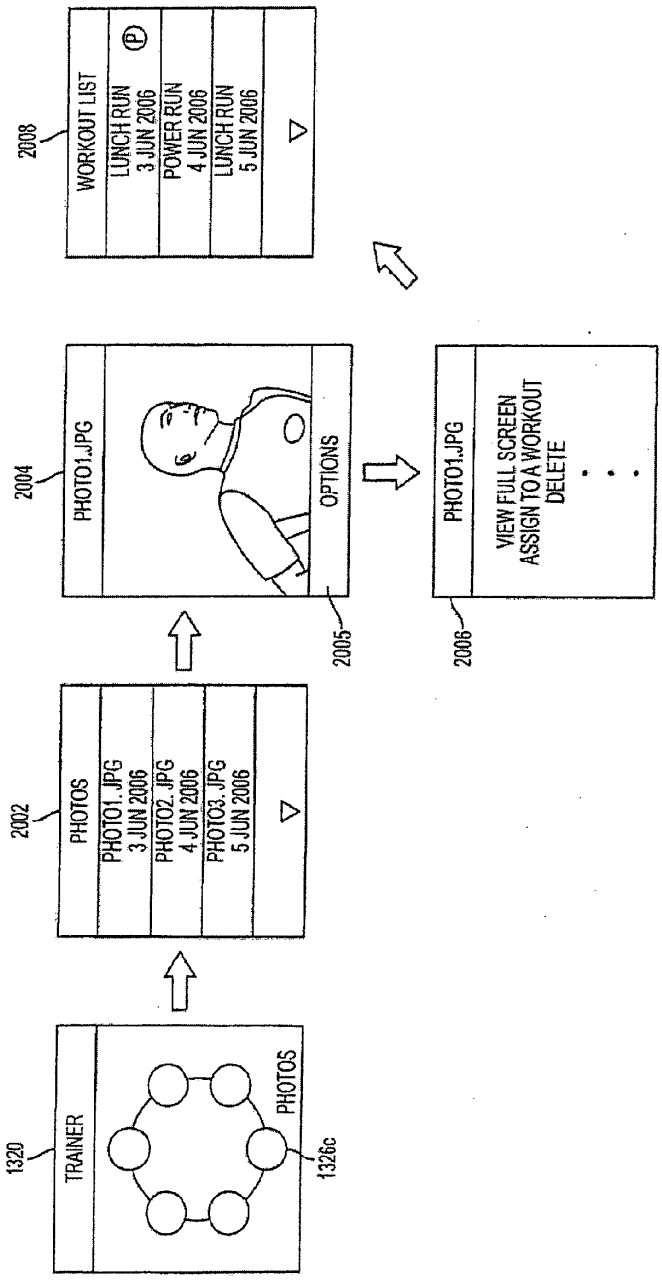


FIG. 20

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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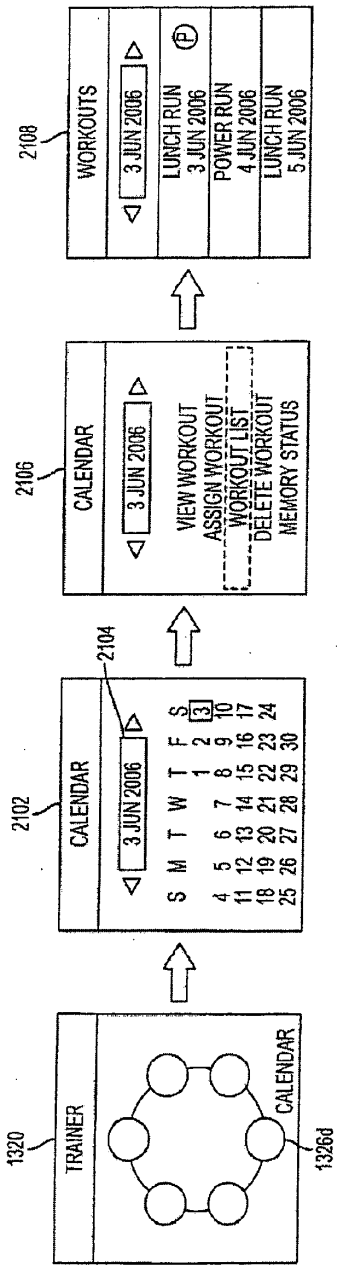


FIG. 21

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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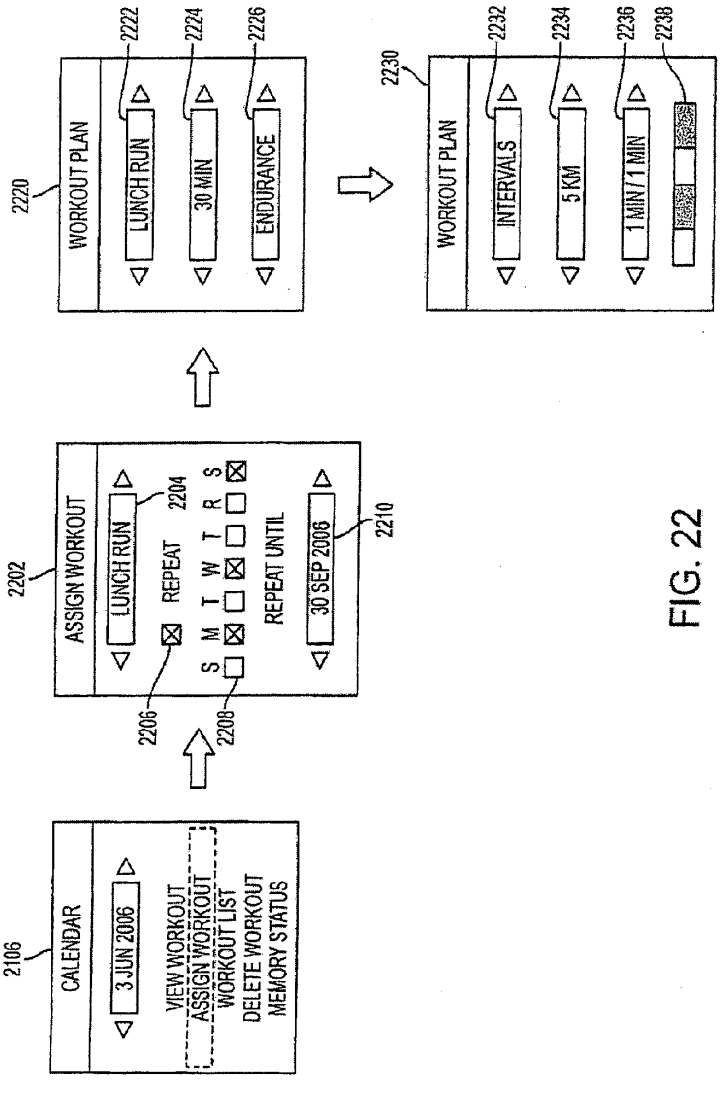


FIG. 22

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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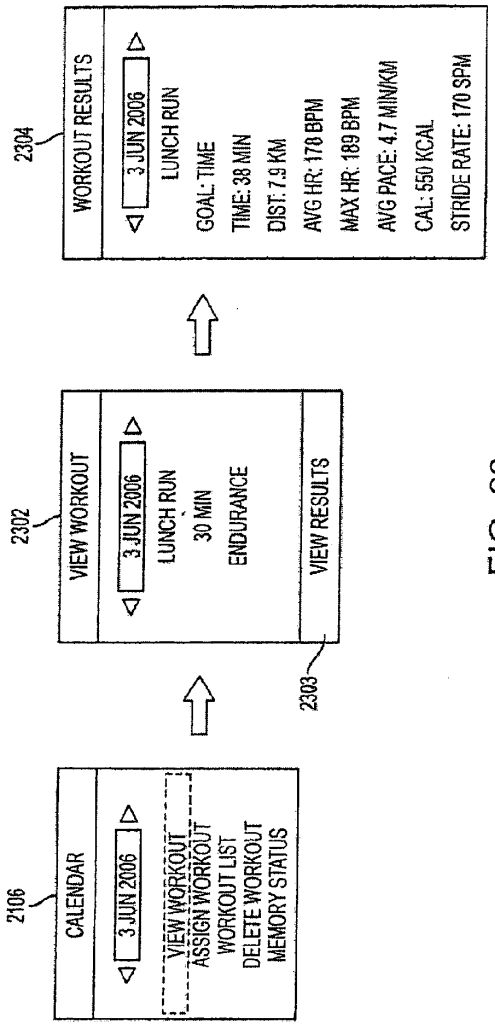


FIG. 23

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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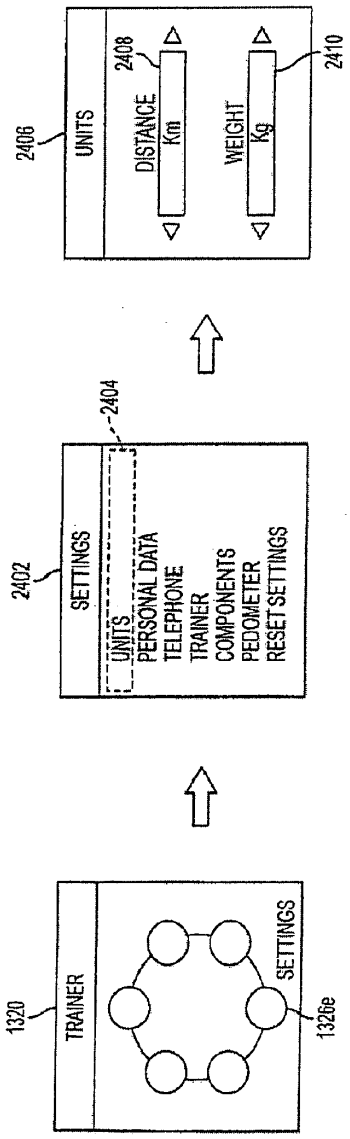


FIG. 24

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
IPR2023-01434, U.S. Patent No. 10,270,898
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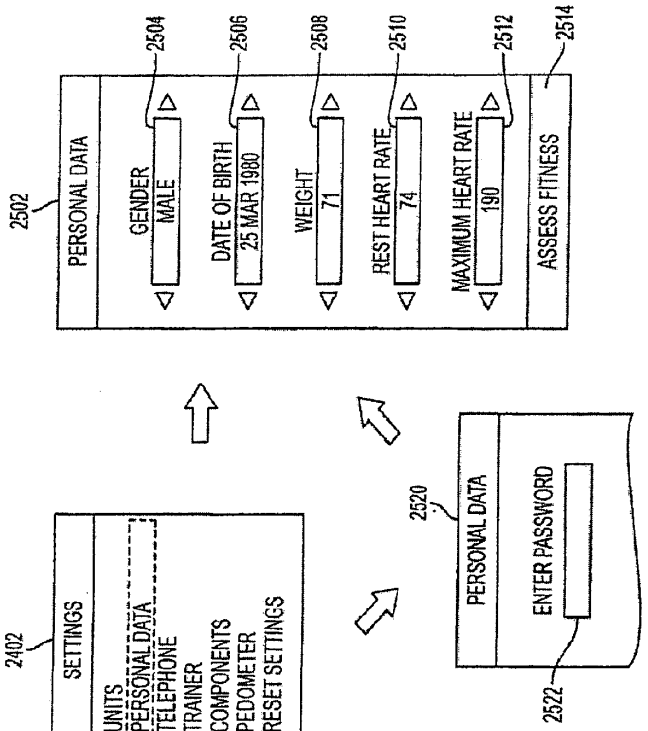


FIG. 25

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
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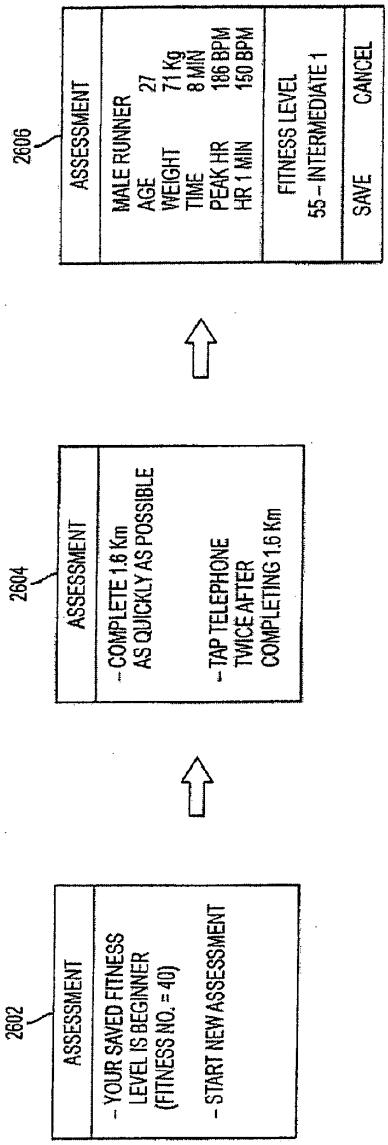


FIG. 26

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
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FITNESS LEVEL						
AGE	BEGIN 1	BEGIN 2	INT 1	INT 2	INT 3	ADVAN
MALES						
20-24	< 43	44-50	51-58	59-63	64-68	69+
25-29	< 42	43-48	49-55	56-60	61-65	66+
30-34	< 40	41-45	46-53	54-57	58-62	63+
35-39	< 38	39-43	44-50	51-55	56-60	61+
40-44	< 35	36-41	42-48	49-52	53-57	58+
45-49	< 34	35-39	40-45	46-49	50-54	55+
50-54	< 32	33-36	37-43	44-47	48-52	53+
55-59	< 30	31-34	35-41	42-45	46-49	50+
60-65	< 28	29-32	33-38	39-42	43-46	47+
FEMALES						
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25-29	< 35	36-40	41-44	45-49	50-55	56+
30-34	< 33	34-37	38-42	43-46	47-52	53+
35-39	< 31	32-35	36-40	41-44	45-50	51+
40-44	< 29	30-33	34-37	38-41	42-47	48+
45-49	< 27	28-31	32-35	36-38	39-44	45+
50-54	< 25	26-29	30-32	33-36	37-42	43+
55-59	< 23	24-27	28-30	31-33	34-39	40+
60-65	< 21	22-24	25-27	28-30	31-36	37+

FIG. 27

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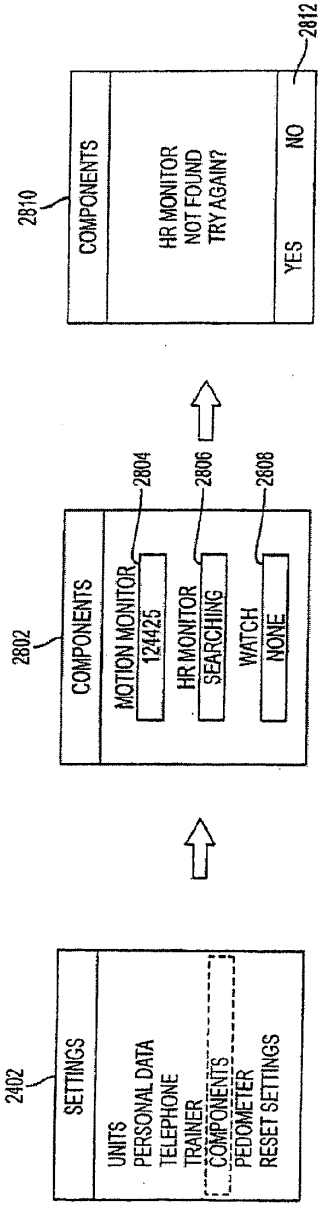


FIG. 28

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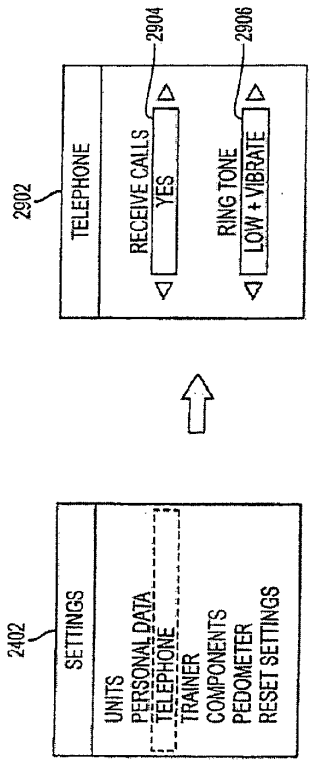


FIG. 29

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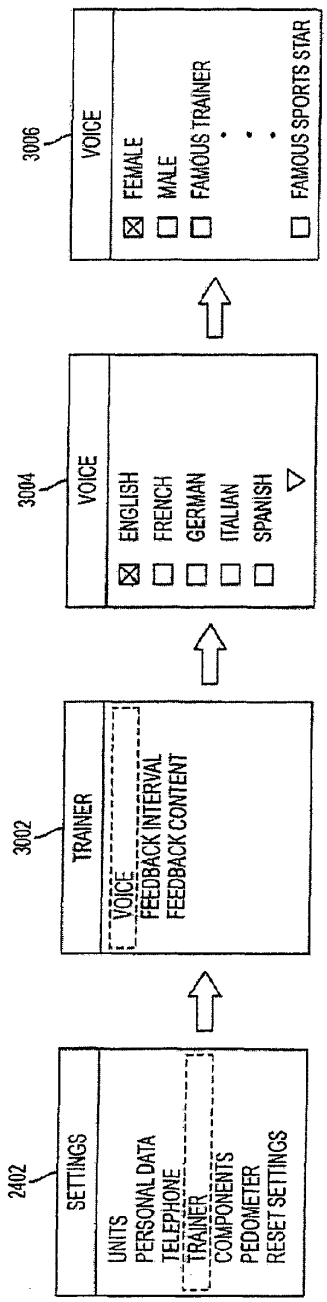


FIG. 30

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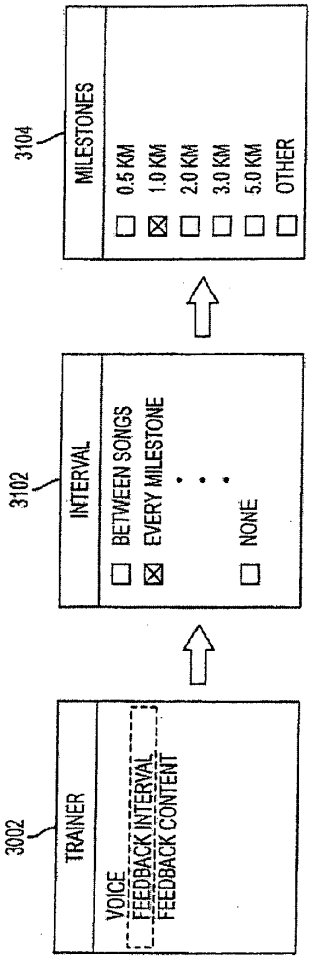


FIG. 31

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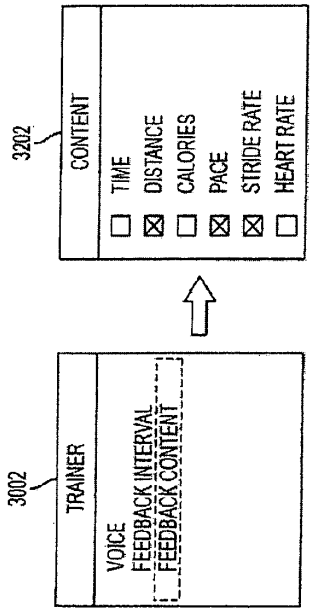


FIG. 32

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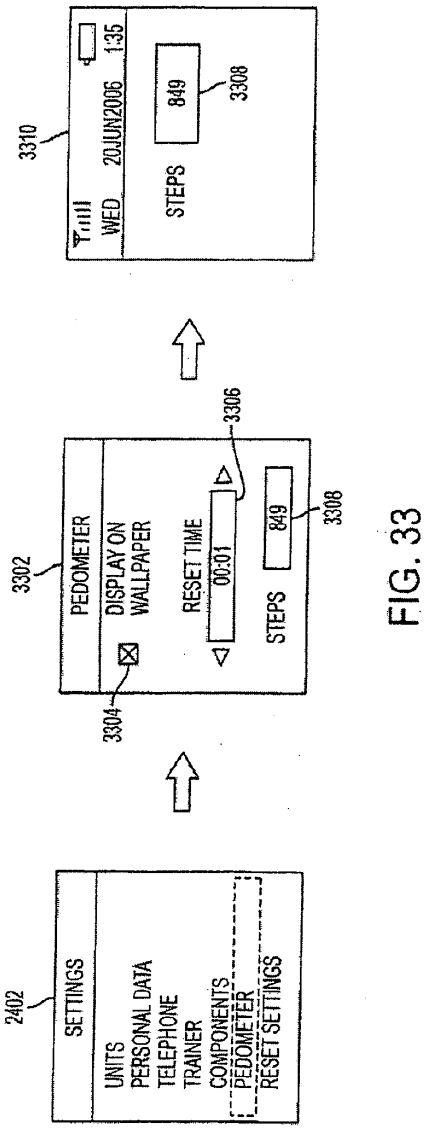


FIG. 33

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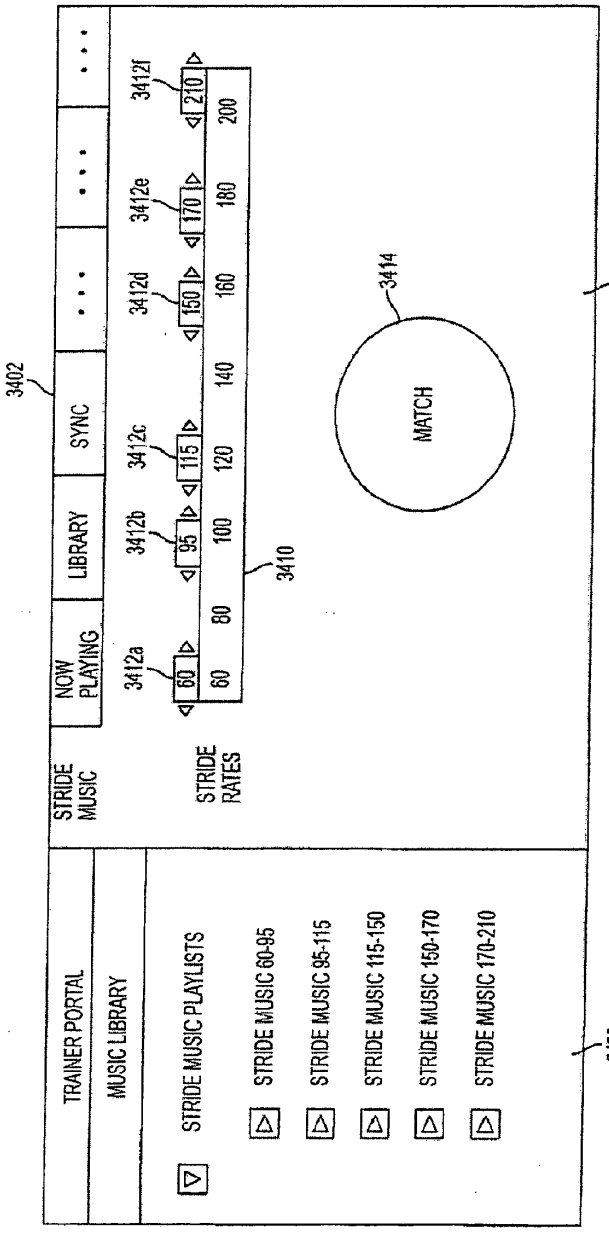


FIG. 34

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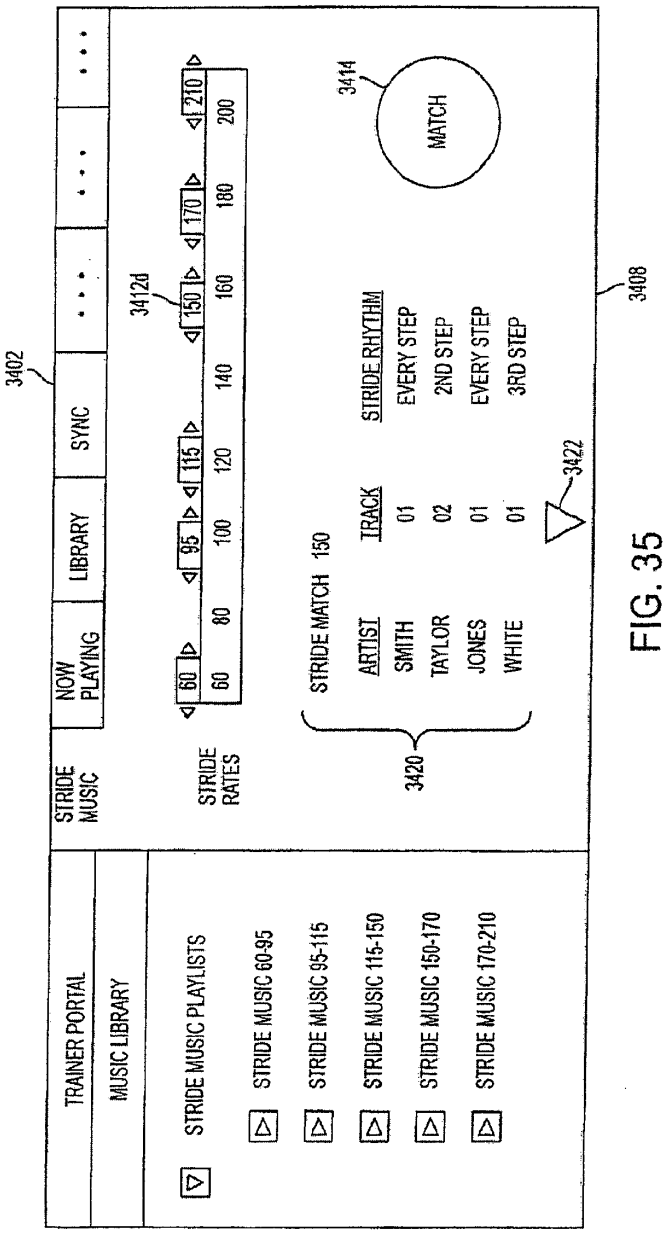


FIG. 35

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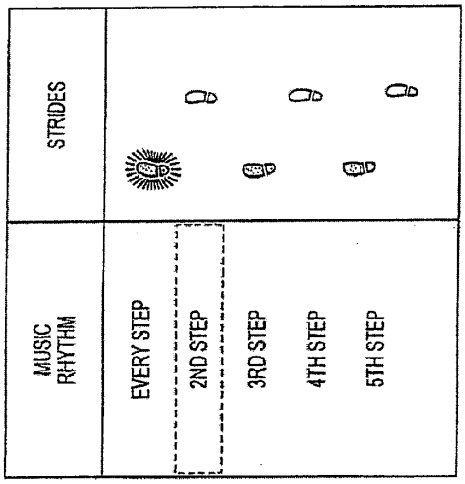


FIG. 36

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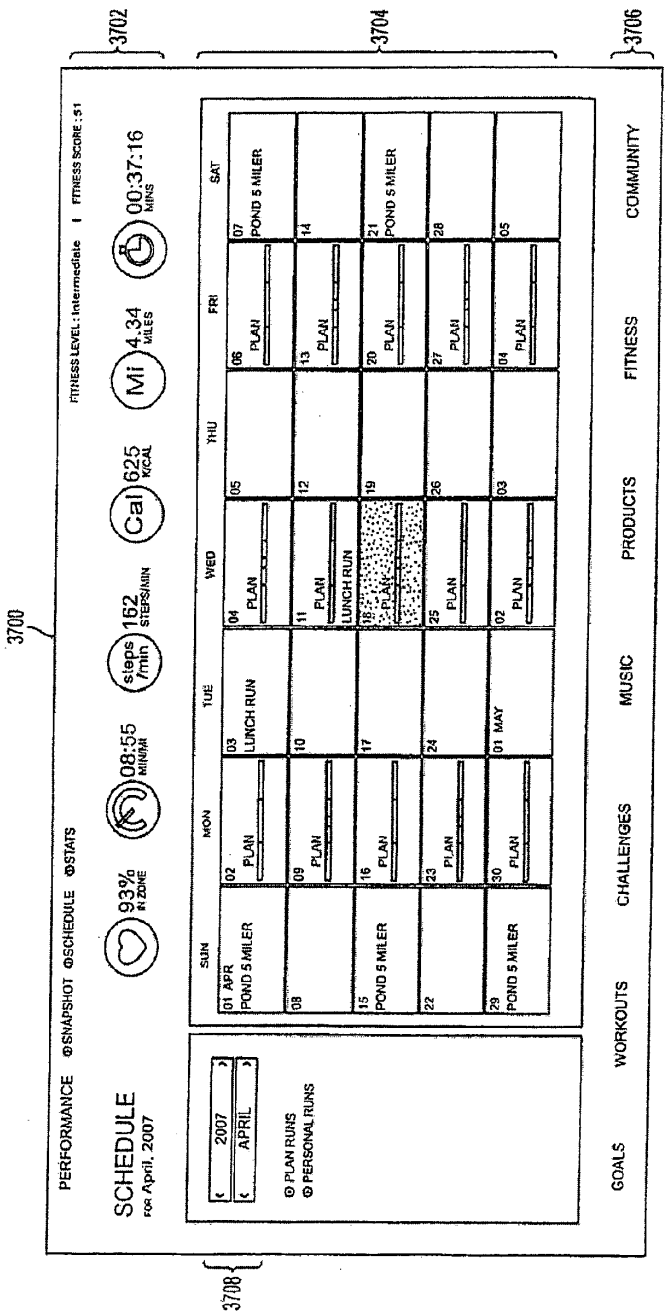


FIG. 37

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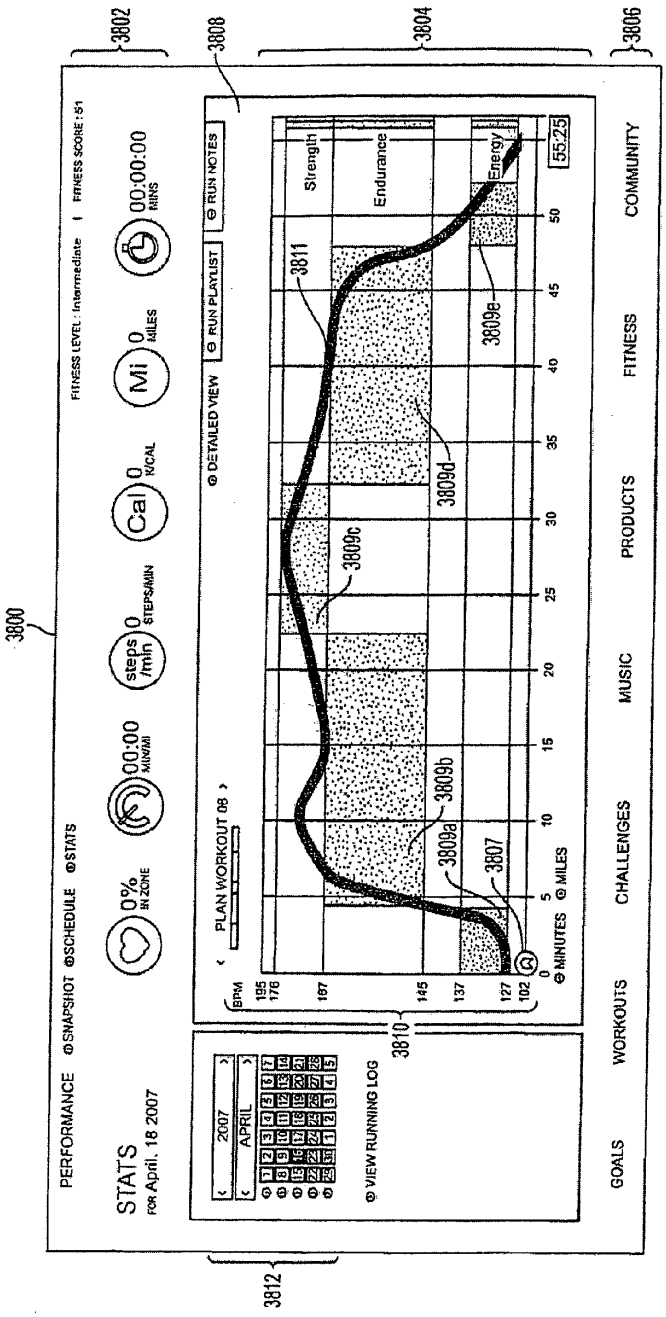


FIG. 38

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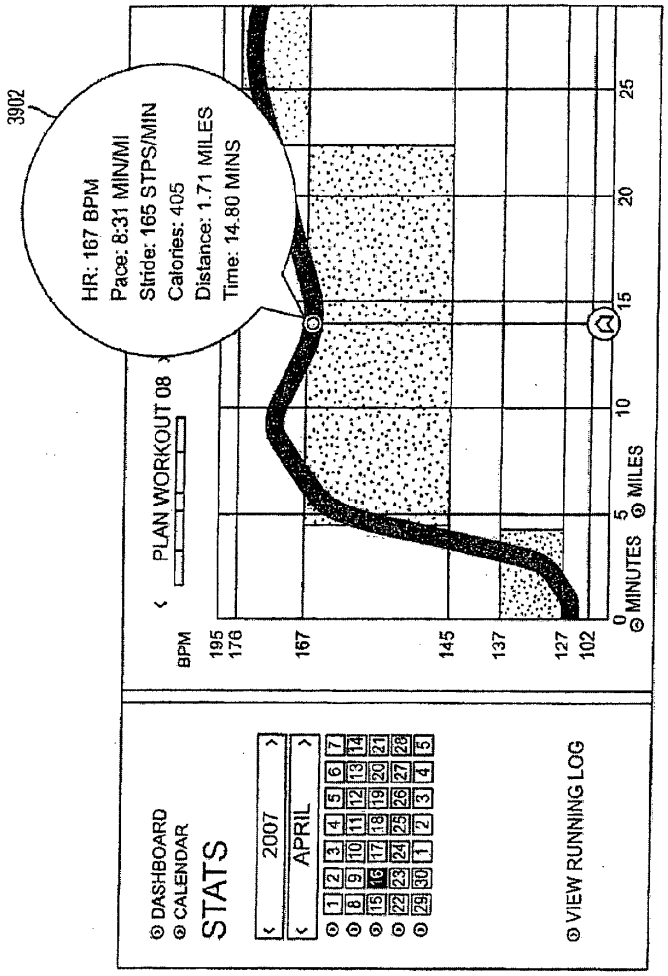


FIG. 39

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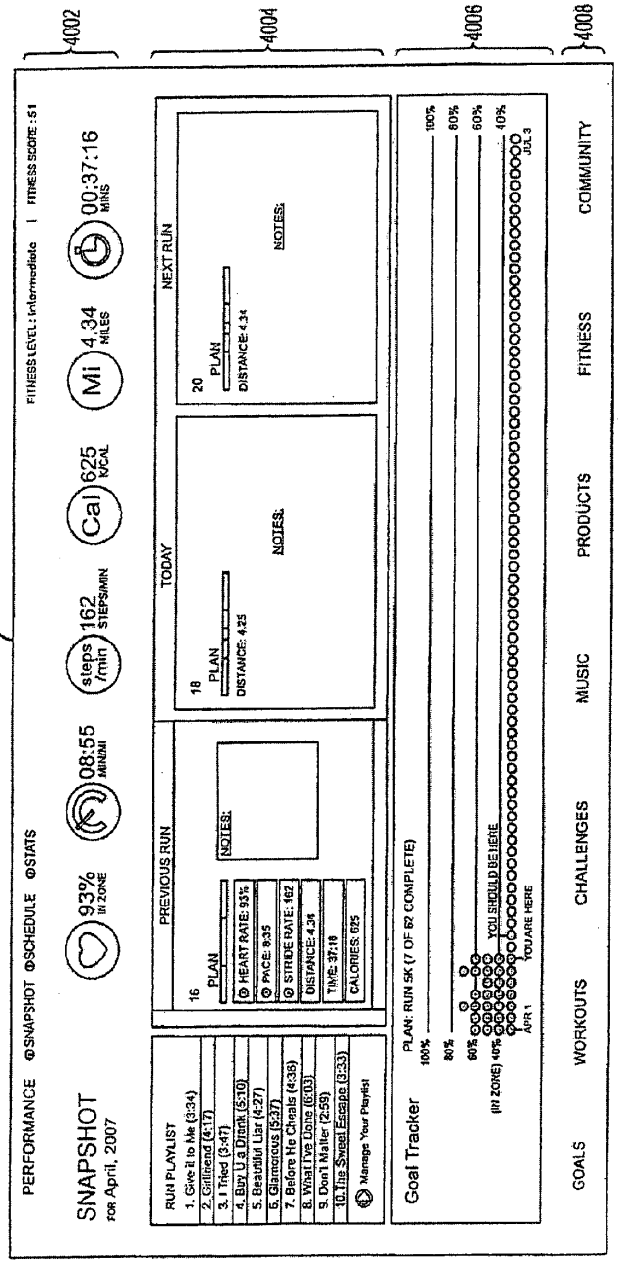


FIG. 40

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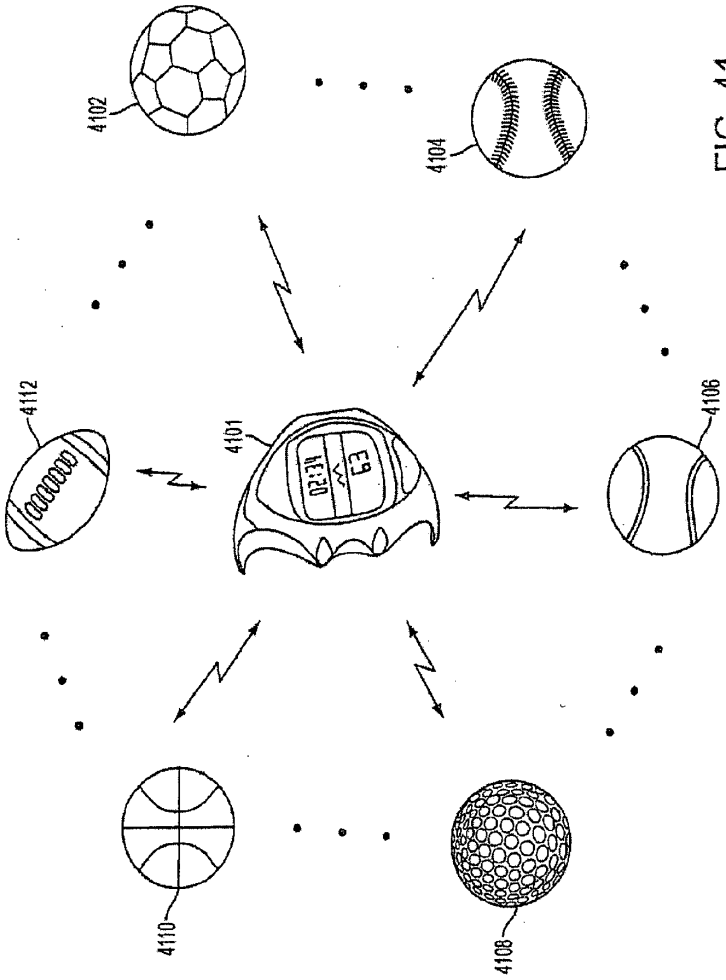


FIG. 41

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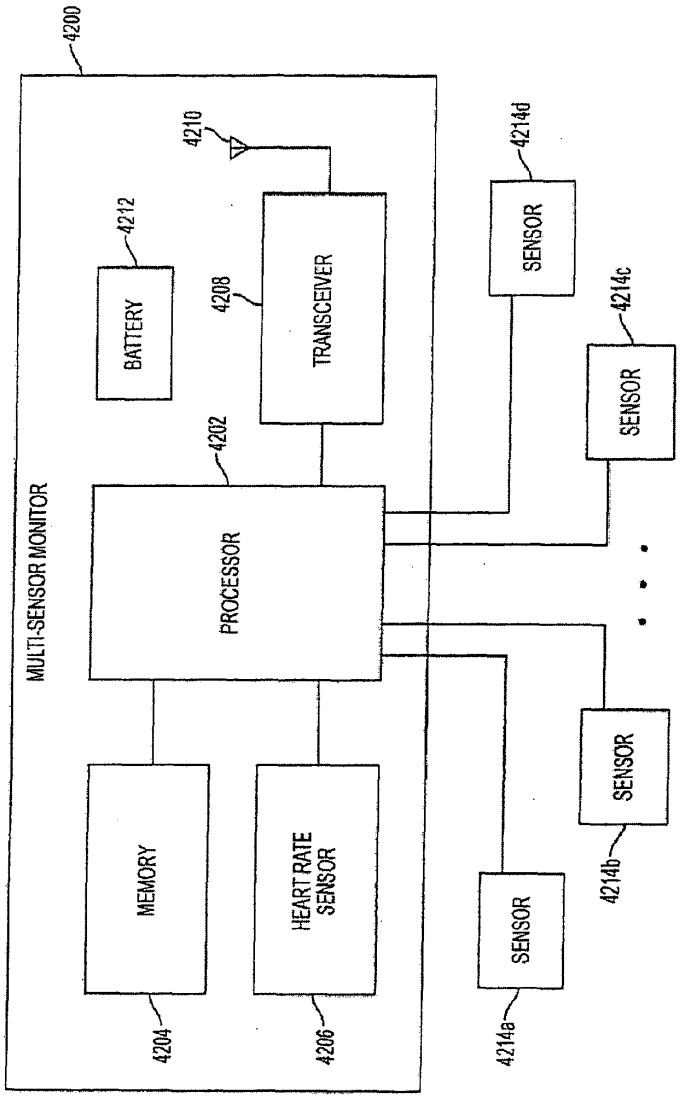


FIG. 42

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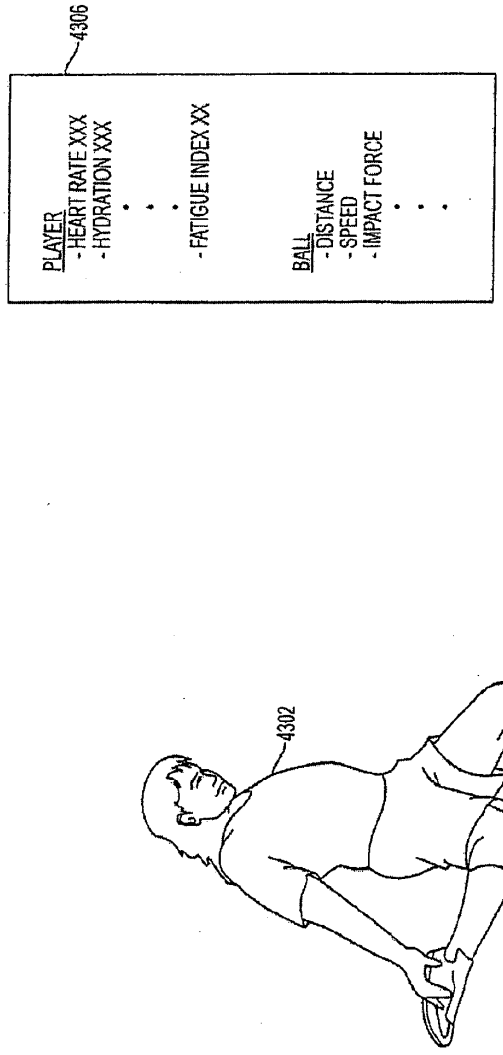


FIG. 43

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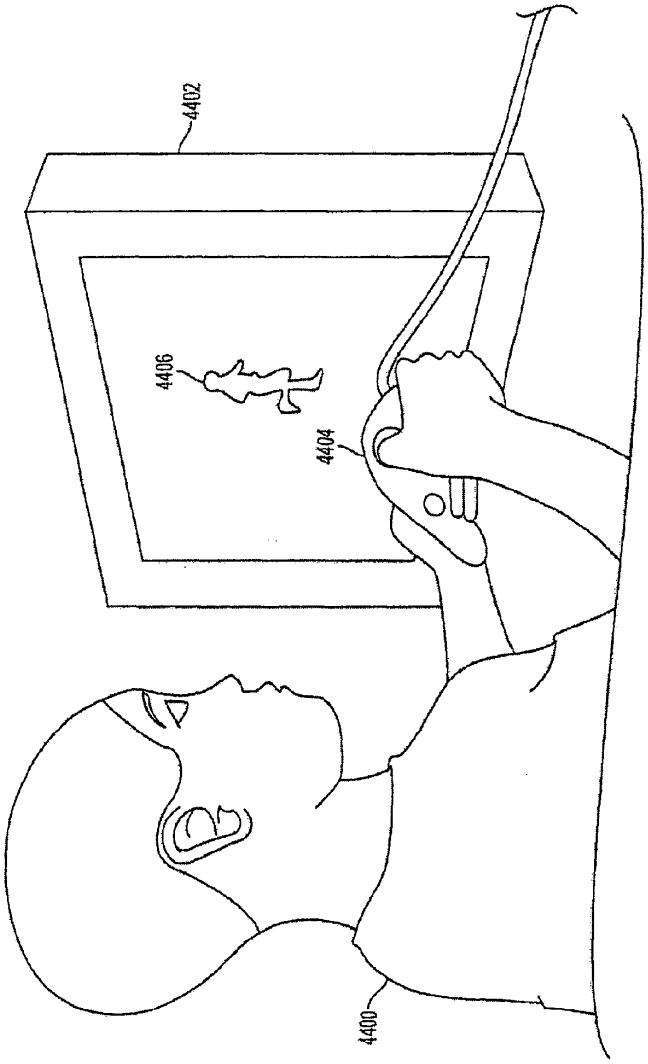


FIG. 44

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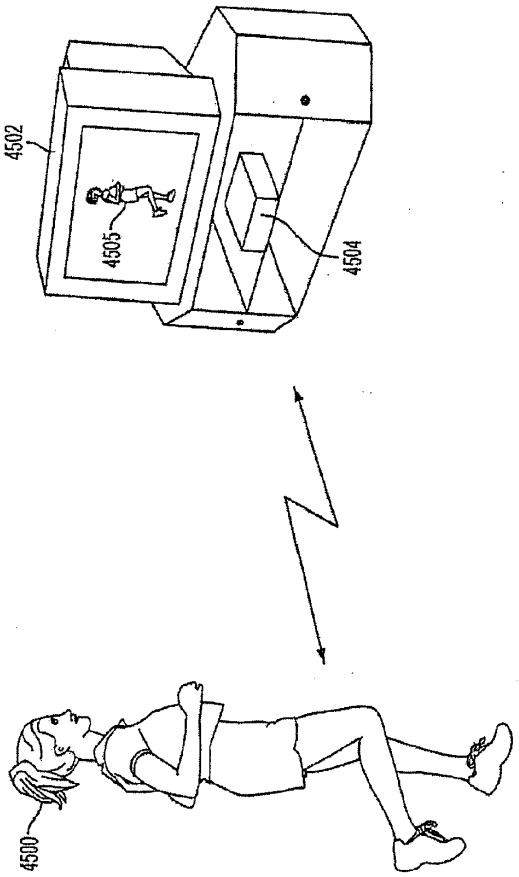


FIG. 45

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 720642001640	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2013/073195	International filing date *(day/month/year)* 04 December 2013 (04.12.2013)	Priority date *(day/month/year)*
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant APPLE INC		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 07 June 2016 (07.06.2016)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Kihwan Moon e-mail: pt01.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2013/073195	04.12.2013	

International Patent Classification (IPC) or both national classification and IPC
INV. G06Q50/22 G06Q50/24

Applicant
PEARL CAPITAL DEVELOPMENTS LLC

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Laub, Christoph Telephone No. +49 89 2399-2809

Form PCT/ISA/237 (Cover Sheet) (July 2009)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

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

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

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-28
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-28
Industrial applicability (IA)	Yes:	Claims	1-28
	No:	Claims	

2. Citations and explanations

see separate sheet

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Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: US 2013/262155 A1 (HINKAMP THOMAS J [US]) 3 October 2013 (2013-10-03)

D2: WO 99/41682 A2 (SOUTHERN RES INST [US]; DEAN ALAN HOYT [US]; JOHNSON DAVID WAYNE [US];) 19 August 1999 (1999-08-19)

D3: US 2011/137678 A1 (WILLIAMS MICHAEL C [US]) 9 June 2011 (2011-06-09)

1 **Background**

The present application relates to the field of aggregation and sharing of wellness data.

(cf. application, p. 1)

2 **Rule 39.1 (iii) PCT and the EPO procedure concerning administrative methods and methods of doing business**

Notice from the European Patent Office dated 1 October 2007 (OJ 11/2007, p. 592 f.) concerning business methods PCT:

2.1 *The EPO wishes to remind applicants that pursuant to Rule 39.1(iii) PCT it will not carry out an international search on an application to the extent that its subject matter relates to no more than a method of doing business, in the absence of any apparent technical character. The same holds for purely administrative methods implemented on a common place computer.*

2.2 *In cases where the claimed subject matter involves technical means the EPO will issue a search report. Where the employed technical means are so conventional that they were widely available and no documentary evidence is considered required because of their notoriety, no document will be cited in the search report. A statement will be inserted in the search report indicating that these technical means are considered to be so commonplace that no citation is considered necessary.*

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2.3 Should the application comprise an aggregation of business/administrative features which qualify under item 2.1 and technical features which would require a search, the technical character and problem will be evaluated taking into account the technical features.

3 **Independent claim 1**

It is claimed

3.1 A computer-implemented method comprising:

causing a display of an aggregated view of a plurality of types of wellness data, wherein the aggregated view comprises a plurality of partitions, each partition of the plurality of partitions associated with a type of the plurality of types of wellness data;

Assessment of the examiner - Taking into account the provisions concerning mixed type claims mentioned above under item 2 the following content of claim 1 is relevant for substantive patentability feature analysis according to the PCT: *A computer-implemented method comprising: causing a display to show cognitive information separated into a plurality of partitions;*

3.2 receiving a selection of a partition of the plurality of partitions; and

3.3 causing a display of an expanded view of the selected partition of the plurality of partitions.

Assessment of the examiner - Taking into account the provisions concerning mixed type claims mentioned above under item 2 the following content of claim 1 is relevant for substantive patentability feature analysis according to the PCT: *modifying the view of the selected partition of the plurality of partitions.*

4 Independent Claim 12

A computer-implemented method comprising:

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causing, on a device, a display of a plurality of partitions, wherein each partition of the plurality of partitions is associated with a type of wellness data of a plurality of types of wellness data;

in response to detecting a change in an orientation of the device, selecting a subset of the plurality of partitions; and

causing a display of the selected subset of the plurality of partitions.

5 Independent Claim 17

A computer-implemented method comprising:

causing a display of a first plurality of partitions associated with a first user, wherein each partition of the first plurality of partitions is associated with a type of wellness data of the first user; and

in response to receiving a request to view a second plurality of partitions associated with a second user, causing a display of a second plurality of partitions associated with a second user, wherein each partition of the second plurality of partitions is associated with a type of wellness data of the second user.

6 Independent claim 21

A computer-implemented method comprising:

causing a display of a first plurality of partitions associated with a first user, wherein each partition of the first plurality of partitions is associated with a type of wellness data of the first user; and

in response to receiving a request to view a second plurality of partitions associated with a second user, causing a display of a second plurality of partitions associated with a second user, wherein each partition of the second plurality of partitions is associated with a type of wellness data of the second user.

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7 Independent claim 24

A computer-implemented method comprising:

receiving, from a first user, a request to access wellness data associated with a second user;

transmitting, to the second user, a request to authorize the first user to access the wellness data associated with the second user; and

in response to receiving an authorization from the second user, transmitting the wellness data associated with the second user to the first user.

Articles 33(3) PCT

The application comprises a mixture of technical and non-technical features. Accordingly, a distinction has to be made in line with the provisions given under items 2.2 and 2.3.

8 **Inventive step assessment of claim 1**

The application primarily relates to the administration of cognitive data and to the mere display and formatting of cognitive information.

8.1 The concerned steps define merely features of an administrative and/or cognitive quality and consequently do not define any technical features: the mere idea of partitioned presentation of medical diagnosis data is not technical. Neither are technical considerations involved when implementing these steps on a notoriously known server client environment. When regarded on its own, those process features define merely an administration process which constitutes subject-matter in the sense of Rule 39.1 (iii) PCT.

8.2 The process is carried out on a notoriously known and accordingly programmed smartphone or similar device in connection with a server/ database system.

Thus, claim 1 comprises a mixture of non-technical, business aspects and technical aspects.

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8.3 **Document D1 is considered the closest prior art**

D1 equally discloses all of the technically relevant features of claim 1 as discussed under item 3:

Feature 3.1

cf. Fig. 3

Feature 3.2

cf. Fig. 3

Feature 3.3

cf. Fig. 4, paragraph 112

8.3.1 **The problem to be solved** is therefore to

causing a display of an aggregated view of a plurality of types of wellness data, wherein the aggregated view comprises a plurality of partitions, each partition of the plurality of partitions associated with a type of the plurality of types of wellness data;

causing a display of an expanded view of the selected partition of the plurality of partitions.

As already explained under item 8.1, the underlying considerations related to the mere display of cognitive information are not regarded technical. It would therefore be a matter of non-inventive activity for the skilled person to program the server client environment according to D1 in order to solve the identified problem. Claim 1 therefore does not satisfy the requirements of Article 33(3) PCT.

8.4 **Independent Claims 12, 17, 21, 24, 27 and 28**

The objections according to item 8 equally apply mutatis mutandis to the methods, the computer readable medium and to the system according to independent claims 12, 17, 21, 24, 27 and 28.

9 **Dependent Claims**

9.1 The additional features of dependent claims 2, 5, 7, 16, 20, 22, 23, 25 define further aspects of the non-technical administrative process.

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Administrative considerations related to the display of cognitive health related dat, when regarded on its own, define merely a process which constitutes subject-matter in the sense of Rule 39.1 (iii) PCT. These features do not contribute to the technical solution of an objective technical problem and are therefore not relevant for the assessment of inventive step.

9.2 The additional features of dependent claims 3, 4, 6, 9-11, 15,18, 19 relate to the mere display of cognitive information by means of notoriously known technical devices.

Cognitive considerations related to the display of information, when regarded on its own, define merely a process which constitutes subject-matter in the sense of Rule 39.1 (iii) PCT. These features do not contribute to the technical solution of an objective technical problem and are therefore not relevant for the assessment of inventive step.

9.3 The remaining dependent claims refer to trivial technical features such as the use of sensors to detect information without providing any technical information with respect to the sensing technology. These features do not provide any synergetic technical functionality with the claimed embodiment.

Consequently, the same objections apply as for independent claims 1, 12, 17, 21 and 24.

10 **Disclosure in the description**

The examiner cannot derive any technical effect which may be achieved by the distinguishing features beyond the mere automation of a non-technical administrative process. The person skilled in the art of data processing would implement this non-technical process in a straightforward manner using merely well known data processing techniques. Consequently, the subject-matter does not fulfill the requirement of inventive step (Article 33(3) PCT).

The steps constituting the non-technical process cannot be seen to make any contribution, either independently or in combination with other features, to the solution of a technical problem and are thus not relevant for assessing inventive step (see Official Journal 11/2007, p. 592).

It is noted that if it was intended to automate the business process on a commonplace data processing system, the person skilled in the art of data processing would implement this in a straightforward manner using merely commonly known data processing techniques.

AliveCor Exhibit 1002
AliveCor, Inc. v. Apple Inc.
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PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:
Ho, Brian B.
MORRISON & FOERSTER LLP
425 Market Street
San Francisco, CA 94105-2482
ETATS-UNIS D'AMERIQUE

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

(PCT Rule 44.1)

Applicant's or agent's file reference 106842127040	Date of mailing *(day/month/year)* 9 May 2016 (09-05-2016)
International application No. PCT/US2015/047282	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
Applicant APPLE INC.	International filing date *(day/month/year)* 27 August 2015 (27-08-2015)

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

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

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

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

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

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

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

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

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

4. **Reminders**

   The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

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

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

   Within **19 months from the priority date, the applicant may request that a supplementary international search be carried out** by a different International Searching Authority that offers this service (Rule 45*bis*.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	Authorized officer SOLIMAN, Ahmed Tel: +31 (0)70 340-4135

Form PCT/ISA/220 (July 2014)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
106842127040		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2015/047282	27 August 2015 (27-08-2015)	2 September 2014 (02-09-2014)
Applicant		
APPLE INC.		

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

This international search report consists of a total of 7 sheets.

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

1. **Basis of the report**
   a. With regard to the **language,** the international search was carried out on the basis of:
      [X] the international application in the language in which it was filed
      [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

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

3. [X] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**
   a. the figure of the **drawings** to be published with the abstract is Figure No. 41
      [X] as suggested by the applicant
      [ ] as selected by this Authority, because the applicant failed to suggest a figure
      [ ] as selected by this Authority, because this figure better characterizes the invention
   b. [ ] none of the figures is to be published with the abstract

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