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(54) Image navigation in a mobile station

Bildnavigation in einer mobilen Station

Navigation d'images dans une station mobile

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WO-A1-01/43473
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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates generally to a mobile station and, more particularly, to image navigation in a mobile station.

2. Description of the Related Art

[0002] A mobile station may serve as a portable entertainment system by including a multi-function camera and a high resolution display unit. Meanwhile, other developments such as those related to battery technologies, have enabled production of more compact and lightweight mobile stations. Thus, although a high resolution display unit is provided, because of the compact size of the mobile station, a user may be unable to view an entire image, such as a map or webpage.

[0003] To address this problem, various methods use virtual images to navigate a larger image by controlling the mobile station. One such method uses a tilt sensor to sense tilt of the mobile station with respect to an X axis and a Y axis. A processor uses the X and Y tilt values to move an image on the display unit. The image is moved with a fixed gravity acceleration value. Therefore, the image is moved in proportion to the degree that the mobile station is tilted by the user, regardless of which application is running or how much detail the image contains. Thus, because the image is moved at a fixed rate regardless of what application (e.g., a map application or a game application) is running, the movement of the image may be awkward for the user.

[0004] US 2002/021278 A1 discloses an apparatus using multiple sensors in a device with a display. At least one sensor signal is generated from a sensor in the device. One or more context values are then generated from the sensor signal. The context values indicate how the device is situated relative to one or more objects. At least one of the context values is then used to control the operation of one or more aspects of the device.

[0005] GB 2 378 878 A discloses a handheld display device comprising a liquid-crystal display screen, a processor, a local memory, an input port and first and second sensors. Image data received from a remote source is transferred to the processor by means of the data port. The processor outputs the image data to the screen, with the updating of the image being controlled by signals generated by the first and second sensors. Movement of the device in a substantially vertical plane is detected by sensor, which causes the processor to update the image in a zooming effect, depending on the direction of movement. A tilting movement of the device causes the processor to update the image in a scrolling effect, the direction of scrolling corresponding to the direction of tilt.

[0006] WO 01/43473 A1 discloses a data processor unit to be held in one hand and to be oriented in different positions in space including a display screen viewable by the user and a microcontroller having two orthogonally-mounted, solid-state, micromachined tilt meters for measuring the tilts of the X and Y axes of the screen with respect to a gravity for controlling the display on the screen in accordance with the measure tilt.

SUMMARY OF THE INVENTION

[0007] Accordingly, the present invention is directed to image navigation in a mobile station that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0008] An object of the present invention is to provide for image navigation in a mobile station. The image navigation may use motion of a virtual image on a display to enable navigation of the image.

[0009] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0010] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, in one embodiment, a mobile station according to claim 1 is provided.

[0011] The image navigation apparatus may further comprise a display unit operatively coupled to the processing unit, adapted to show movement of the displayed image according to the tilt sensed by the tilt sensor. The tilt of the mobile station may comprise at least one of a tilt degree and a tilt direction. The processing unit may be further adapted to output a reference voltage value to the tilt sensor based on the information related to the distance between the reference point and the target point on the displayed image, and wherein the tilt sensor is further adapted to sense the tilt of the mobile station based on the reference voltage value. The tilt degree may be determined by an orientation angle of the reference point to the target point.

[0012] The image navigation apparatus may further comprise a voltage distributing unit operatively coupled to the processing unit, adapted to output a reference voltage to the tilt sensor based on the information related to the distance between the reference point and the target point on the displayed image. The tilt sensor may be further adapted to sense the tilt of the mobile station based on the reference voltage value. The reference point may be a central point on the displayed image before movement. The target point may be a central point on the displayed image after movement according to the tilt of the mobile station.

[0013] In another embodiment, a mobile station having

an image navigation apparatus comprises a transceiver adapted to transmit and receive wireless communications, and a user interface operatively coupled to the transceiver, adapted to enable a user to control mobile station functions. The mobile station also comprises a tilt sensor unit adapted to sense a tilt of the mobile station based on information related to a distance between a reference point and a target point on a displayed image. The mobile station also comprises a processing unit operatively coupled to the transceiver and the tilt sensor, adapted to move the displayed image according to the tilt sensed by the tilt sensor.

[0014] In yet another embodiment, an image navigation method for a mobile station according to claim 6 is provided. The method may also comprise moving the displayed image according to the sensed tilt.

[0015] The method may further comprise displaying movement of the displayed image according to the sensed tilt. The method may further comprise outputting a reference voltage value based on the information related to the distance between the reference point and the target point on the displayed image and sensing the tilt of the mobile station based on the reference voltage value. The sensing of the tilt may further comprise processing information related to an orientation angle of the reference point to the target point.

[0016] The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings. It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

Figure 1 is a block diagram illustrating an image navigation apparatus, according to an embodiment of the present invention.

Figure 2 is a flow diagram illustrating an image navigation method, according to an embodiment of the present invention.

Figure 3 is a block diagram of a mobile station having an image navigation apparatus, according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0019] The term 'mobile station' encompasses mobile phones, handsets, PDAs (personal digital assistants), and computers, as well as any other devices with wireless communication capabilities. Image navigation in a mobile station is described below. The image navigation may use motion of a virtual image on a display to enable navigation of the image.

[0020] Figure 1 is a block diagram illustrating an image navigation apparatus (e.g., virtual image motion apparatus) 100, according to an embodiment of the present invention.

[0021] Referring to Figure 1, the virtual image motion apparatus 100 includes a processing unit 120 to read a direction of a reference point and a target point of an image displayed on a display unit 110. The processing unit 120 also calculates an angle and a distance between the reference point and the target point. The virtual image motion apparatus 100 also includes a voltage distributing unit 130 to distribute a voltage (e.g., a switched voltage) based on a calculation result from the processing unit 120. The virtual image motion apparatus 100 also includes a tilt sensor unit 140 to measure a tilt of a mobile station using the distributed voltage from the voltage distributing unit 130 as a reference voltage. The virtual image motion apparatus 100 also includes a display unit 110 to display a moving image according to the tilt sensed by the tilt sensor unit 140.

[0022] The processing unit 120 reads a direction of a reference point of an image displayed on the display unit 110, and also reads a direction of a target point to reach from the current image. The processing unit 120 then calculates an angle and a distance between the reference point and the target point.

The target point may be generated according to an application (e.g., software application). The reference point and target point may differ according to an application being used in the mobile station.

[0023] For example, a user plays an archery game using the mobile station. For the game, a position at which an archery bow is located may become the reference point and a mark to be hit by an arrow may become the target point.

[0024] The processing unit 120 may change the reference voltage of the tilt sensor unit 140 via the voltage distributing unit 130 according to the calculated result. Alternatively, the processing unit 120 may directly adjust the reference voltage of the tilt sensor unit 140. As such, the voltage distributing unit 130 may not be required. A change to the reference voltage causes a corresponding

change to the value of the gravity acceleration (g). The tilt sensor unit 140 senses tilt of the mobile station and transmits a sensed tilt value to the processing unit 120. Upon receiving the sensed tilt value from the tilt sensor unit 140, the processing unit 120 moves the image displayed on the display unit 110 according to the direction and degree of the tilt.

[0025] Figure 2 is a flow diagram illustrating an image navigation method (e.g., virtual image motion method), according to an embodiment of the present invention.

[0026] Referring to Figure 2, the mobile station reads coordinate values of a reference point and a target point on an image displayed on the display unit and calculates an angle and a distance between the reference point and the target point (step S210). The mobile station then feeds back the calculated value as a reference voltage (step S220). As such, the mobile station may feed back the reference voltage through the voltage distributing unit 130 or by directly controlling a voltage. After feedback of the reference voltage is completed, the mobile station senses tilt of the mobile station using the feedback reference voltage (step S230) and moves the image displayed on the display unit according to the sensed tilt (step S240).

[0027] Figure 3 is a block diagram of a mobile station 300 having an image navigation apparatus, according to an embodiment of the present invention. The mobile station 300 may be used in conjunction with the methods described herein.

[0028] Referring to Figure 3, the mobile station 300 includes a transceiver 310, adapted to transmit and receive wireless communications. The mobile station also includes a user interface 320 operatively coupled to the transceiver 310, adapted to enable a user to control mobile station functions. The mobile station 300 also includes the tilt sensor unit 140, the display unit 110, and the processing unit 120. The mobile station 300 may also include the voltage distributing unit 130.

[0029] In one embodiment, an image navigation apparatus in a mobile station comprises a tilt sensor unit adapted to sense a tilt of the mobile station based on information related to a distance between a reference point and a target point on a displayed image. The image navigation apparatus also comprises a processing unit operatively coupled to the tilt sensor, adapted to move the displayed image according to the tilt sensed by the tilt sensor.

[0030] The image navigation apparatus may further comprise a display unit operatively coupled to the processing unit, adapted to show movement of the displayed image according to the tilt sensed by the tilt sensor. The tilt of the mobile station may comprise at least one of a tilt degree and a tilt direction. The processing unit may be further adapted to output a reference voltage value to the tilt sensor based on the information related to the distance between the reference point and the target point on the displayed image, and wherein the tilt sensor is further adapted to sense the tilt of the mobile station based on the reference voltage value. The tilt degree may be determined by an orientation angle of the reference point to the target point.

[0031] The image navigation apparatus may further comprise a voltage distributing unit operatively coupled to the processing unit, adapted to output a reference voltage to the tilt sensor based on the information related to the distance between the reference point and the target point on the displayed image. The tilt sensor may be further adapted to sense the tilt of the mobile station based on the reference voltage value. The reference point may be a central point on the displayed image before movement. The target point may be a central point on the displayed image after movement according to the tilt of the mobile station.

[0032] In another embodiment, a mobile station having an image navigation apparatus comprises a transceiver adapted to transmit and receive wireless communications, and a user interface operatively coupled to the transceiver, adapted to enable a user to control mobile station functions. The mobile station also comprises a tilt sensor unit adapted to sense a tilt of the mobile station based on information related to a distance between a reference point and a target point on a displayed image. The mobile station also comprises a processing unit operatively coupled to the transceiver and the tilt sensor, adapted to move the displayed image according to the tilt sensed by the tilt sensor.

[0033] In yet another embodiment, an image navigation method for a mobile station comprises sensing a tilt of the mobile station based on information related to a distance between a reference point and a target point on a displayed image. The method also comprises moving the displayed image according to the sensed tilt.

[0034] The method may further comprise displaying movement of the displayed image according to the sensed tilt. The may further comprises outputting a reference voltage value based on the information related to the distance between the reference point and the target point on the displayed image and sensing the tilt of the mobile station based on the reference voltage value. The sensing of the tilt may further comprise processing information related to an orientation angle of the reference point to the target point.

[0035] In the present invention, a distance and an angle between a reference point and a target point of an image displayed on the display unit of the mobile station are determined. A reference voltage is provided as feedback from the determination, and a tilt of the mobile station is measured based on the feedback reference voltage. Accordingly, an image displayed on the mobile station may be searched. A sensitivity degree may be adjusted according to a mobile station application, or other parameter, to optimize movement of a virtual image.

[0036] It will be apparent to those skilled in the art that various modifications and variations may be made in the present invention without departing from the scope of the appended claims.

Claims

1. A mobile station (300) having an image navigation apparatus (100), the mobile station (300) comprising:

   a display unit (110) configured to display an image related to one of a plurality of applications, wherein the one of the plurality of applications is a game having a reference point and a target point; and
   a tilt sensor unit (140) adapted to sense a tilt of the mobile station (300);

   characterized in that the mobile station (300) further comprises:

   a processing unit (120) operatively coupled to the tilt sensor, adapted to read coordinates of the reference point and the target point on the image displayed on the display unit (110) to calculate an angle and a distance between the target point and the reference point; and
   a voltage distributing unit (130) operatively coupled to the processing unit (120) and adapted to distribute a voltage to the tilt sensor unit (140), the voltage distributing unit (130) generating a reference voltage for adjusting a sensitivity degree of the one of the plurality of applications to optimize movement of the displayed image based on the calculated angle and distance, and wherein the reference point is a position at which an object of the game is located and the target point is a position at which a mark to be hit is located or to which the object is to be moved.

2. The mobile station (300) of claim 1, wherein the tilt of the mobile station (300) comprises at least one of a tilt degree and a tilt direction.

3. The mobile station (300) of claim 2, wherein the tilt degree is determined by an orientation angle of the reference point to the target point.

4. The mobile station (300) of claim 1, wherein the tilt sensor unit (140) is configured to sense a tilt of the mobile station (300) by using the reference voltage.

5. The mobile station (300) of claim 1, wherein different reference points and target points are set for each of the plurality of applications.

6. An image navigation method for a mobile station (300), the method comprising:
   displaying an image related to one of a plurality of applications, wherein the one of the plurality of applications is a game having a reference point and a target point;

   characterized in that the method further comprises:

   reading coordinates of the reference point and the target point on the displayed image;
   calculating an angle and a distance between the reference point and the target point based upon the coordinates of the reference point and the target point;
   generating a new reference voltage for adjusting a sensitivity degree of the one of the plurality of applications to optimize movement of the displayed image based on the calculated angle and distance;
   sensing a tilt of the mobile station (300) by using the generated reference voltage; and
   moving an object located at the reference point on the displayed image to the target point according to the sensed tilt,
   wherein the reference point is a position at which the object of the game is located and the target point is a position at which a mark to be hit is located or to which the object is to be moved.

7. The image navigation method of claim 6, wherein the sensing of the tilt further comprises:
   processing information related to an orientation angle of the reference point to the target point.

8. The navigation method of claim 6, wherein a sensitivity degree is adjusted according to a mobile station application to optimize movement of the displayed image.

9. The navigation method of claim 6, wherein the tilt of the mobile station (300) comprises at least one of a tilt degree and a tilt direction.

10. The navigation method of claim 9, wherein the tilt degree is determined by an orientation angle of the reference point to the target point.

11. The navigation method of claim 6, wherein different reference points and target points are set for each of the plurality of applications.

Patentansprüche

1. Mobilstation (300) mit einem Bildnavigationsgerät (100), wobei die Mobilstation (300) umfasst:

   eine Anzeigeeinheit (110), die konfiguriert ist, um ein Bild bezüglich einer von einer Mehrzahl von Anwendungen anzuzeigen, wobei die eine der Mehrzahl von Anwendungen ein Spiel ist, das einen Referenzpunkt und einen Zielpunkt aufweist; und
   eine Neigungssensoreinheit (140), die geeignet

ist, um eine Neigung der Mobilstation (300) abzutasten;
dadurch gekennzeichnet, dass die Mobilstation (300) ferner umfasst:

eine Verarbeitungseinheit (120), die betriebsfähig mit dem Neigungssensor gekoppelt ist und geeignet ist, um die Koordinaten des Referenzpunktes und des Zielpunktes in dem Bild, das an der Anzeigeeinheit (110) angezeigt wird, zu lesen, um einen Winkel und einen Abstand zwischen dem Zielpunkt und dem Referenzpunkt zu berechnen; und eine Spannungsverteilungseinheit (130), die mit der Verarbeitungseinheit (120) betriebsfähig gekoppelt ist und geeignet ist, um eine Spannung an die Neigungssensoreinheit (140) zu verteilen, wobei die Spannungsverteilungseinheit (130) eine Referenzspannung erzeugt, um einen Empfindlichkeitsgrad der einen von der Mehrzahl von Anwendungen anzupassen, um die Bewegung des angezeigten Bildes basierend auf dem berechneten Winkel und dem Abstand zu optimieren, und
wobei der Referenzpunkt eine Position ist, in der sich ein Objekt des Spiels befindet, und der Zielpunkt eine Position ist, in der sich ein zu treffendes Ziel befindet, oder in die das Objekt zu bewegen ist.

2. Mobilstation (300) nach Anspruch 1, wobei die Neigung der Mobilstation (300) mindestens eines von einem Neigungsgrad und einer Neigungsrichtung umfasst.

3. Mobilstation (300) nach Anspruch 2, wobei der Neigungsgrad durch einen Orientierungswinkel des Referenzpunktes zum Zielpunkt bestimmt wird.

4. Mobilstation (300) nach Anspruch 1, wobei die Neigungssensoreinheit (140) konfiguriert ist, um eine Neigung der Mobilstation (300) unter Verwendung der Referenzspannung abzutasten.

5. Mobilstation (300) nach Anspruch 1, wobei verschiedene Referenzpunkte und Zielpunkte für jede von der Mehrzahl von Anwendungen eingestellt sind.

6. Bildnavigationsverfahren für eine Mobilstation (300), wobei das Verfahren umfasst:

Anzeigen eines Bildes bezüglich einer von einer Mehrzahl von Anwendungen, wobei die eine von der Mehrzahl von Anwendungen ein Spiel ist, das einen Referenzpunkt und einen Zielpunkt aufweist;
dadurch gekennzeichnet, dass das Verfahren ferner umfasst:

Lesen der Koordinaten des Referenzpunktes und des Zielpunktes in dem angezeigten Bild;
Berechnen eines Winkels und eines Abstands zwischen dem Referenzpunkt und dem Zielpunkt basierend auf den Koordinaten des Referenzpunktes und des Zielpunktes;
Erzeugen einer neuen Referenzspannung zum Anpassen eines Empfindlichkeitsgrades der einen von der Mehrzahl von Anwendungen, um die Bewegung des angezeigten Bildes basierend auf dem berechneten Winkel und dem Abstand zu optimieren;
Abtasten einer Neigung der Mobilstation (300) unter Verwendung der erzeugten Referenzspannung; und
Bewegen eines Objekts, das sich an dem Referenzpunkt in dem angezeigten Bild befindet, zu dem Zielpunkt gemäß der erfassten Neigung,
wobei der Referenzpunkt eine Position ist, in der sich das Objekt des Spiels befindet, und der Zielpunkt eine Position ist, in der sich ein zu treffendes Ziel befindet oder in die das Objekt zu bewegen ist.

7. Bildnavigationsverfahren nach Anspruch 6, wobei das Abtasten der Neigung ferner umfasst:
Verarbeiten einer Information bezüglich eines Orientierungswinkels des Referenzpunktes zum Zielpunkt.

8. Navigationsverfahren nach Anspruch 6, wobei ein Empfindlichkeitsgrad gemäß einer Mobilstationsanwendung angepasst wird, um die Bewegung des angezeigten Bildes zu optimieren.

9. Navigationsverfahren nach Anspruch 6, wobei die Neigung der Mobilstation (300) mindestens eines von einem Neigungsgrad und einer Neigungsrichtung umfasst.

10. Navigationsverfahren nach Anspruch 9, wobei der Neigungsgrad durch einen Orientierungswinkel des Referenzpunktes zum Zielpunkt bestimmt wird.

11. Navigationsverfahren nach Anspruch 6, wobei verschiedene Referenzpunkte und Zielpunkte für jede der Mehrzahl von Anwendungen eingestellt werden.

Revendications

1. Station mobile (300) ayant un appareil de navigation dans une image (100), la station mobile (300)

comprenant :

une unité d'affichage (110) configurée pour afficher une image associée à une application parmi une pluralité d'applications, ladite application parmi la pluralité d'applications étant un jeu ayant un point de référence et un point cible ; et une unité de capteur d'inclinaison (140) conçue pour détecter une inclinaison de la station mobile (300) ;

caractérisée par le fait que la station mobile (300) comprend en outre :

une unité de traitement (120) couplée de manière fonctionnelle au capteur d'inclinaison, conçue pour lire les coordonnées du point de référence et du point cible sur l'image affichée sur l'unité d'affichage (110) pour calculer un angle et une distance entre le point cible et le point de référence ; et
une unité de distribution de tension (130) couplée de manière fonctionnelle à l'unité de traitement (120) et conçue pour distribuer une tension à l'unité de capteur d'inclinaison (140), l'unité de distribution de tension (130) générant une tension de référence pour ajuster un degré de sensibilité de ladite application parmi la pluralité d'applications pour optimiser le déplacement de l'image affichée sur la base de l'angle et de la distance calculés, et
le point de référence étant une position à laquelle un objet du jeu est situé et le point cible étant une position à laquelle une marque à atteindre est située ou vers laquelle l'objet doit être déplacé.

2. Station mobile (300) selon la revendication 1, dans laquelle l'inclinaison de la station mobile (300) comprend au moins l'un parmi un degré d'inclinaison et une direction d'inclinaison.

3. Station mobile (300) selon la revendication 2, dans laquelle le degré d'inclinaison est déterminé par un angle d'orientation du point de référence par rapport au point cible.

4. Station mobile (300) selon la revendication 1, dans laquelle l'unité de capteur d'inclinaison (140) est configurée pour détecter une inclinaison de la station mobile (300) par utilisation de la tension de référence.

5. Station mobile (300) selon la revendication 1, dans laquelle différents points de référence et différents points cibles sont définis pour chacune de la pluralité d'applications.

6. Procédé de navigation dans une image pour une station mobile (300), le procédé comprenant :

afficher une image associée à une application parmi une pluralité d'applications, ladite application parmi la pluralité d'applications étant un jeu ayant un point de référence et un point cible ;

caractérisé par le fait que le procédé comprend en outre :

lire les coordonnées du point de référence et du point cible sur l'image affichée ;
calculer un angle et une distance entre le point de référence et le point cible sur la base des coordonnées du point de référence et du point cible ;
générer une nouvelle tension de référence pour ajuster un degré de sensibilité de ladite application parmi la pluralité d'applications pour optimiser le déplacement de l'image affichée sur la base de l'angle et de la distance calculés ;
détecter une inclinaison de la station mobile (300) par utilisation de la tension de référence générée ; et
déplacer un objet situé au niveau du point de référence sur l'image affichée vers le point cible selon l'inclinaison détectée,
le point de référence étant une position à laquelle l'objet du jeu est situé et le point cible étant une position à laquelle une marque à atteindre est située ou vers laquelle l'objet doit être déplacé.

7. Procédé de navigation dans une image selon la revendication 6, dans lequel la détection de l'inclinaison comprend en outre :
traiter des informations associées à un angle d'orientation du point de référence par rapport au point cible.

8. Procédé de navigation selon la revendication 6, dans lequel un degré de sensibilité est ajusté selon une application de station mobile pour optimiser le déplacement de l'image affichée.

9. Procédé de navigation selon la revendication 6, dans lequel l'inclinaison de la station mobile (300) comprend au moins l'un parmi un degré d'inclinaison et une direction d'inclinaison.

10. Procédé de navigation selon la revendication 9, dans lequel le degré d'inclinaison est déterminé par un angle d'orientation du point de référence par rapport au point cible.

11. Procédé de navigation selon la revendication 6, dans lequel différents points de référence et différents points cibles sont définis pour chacune de la pluralité

d'applications.

FIG. 1

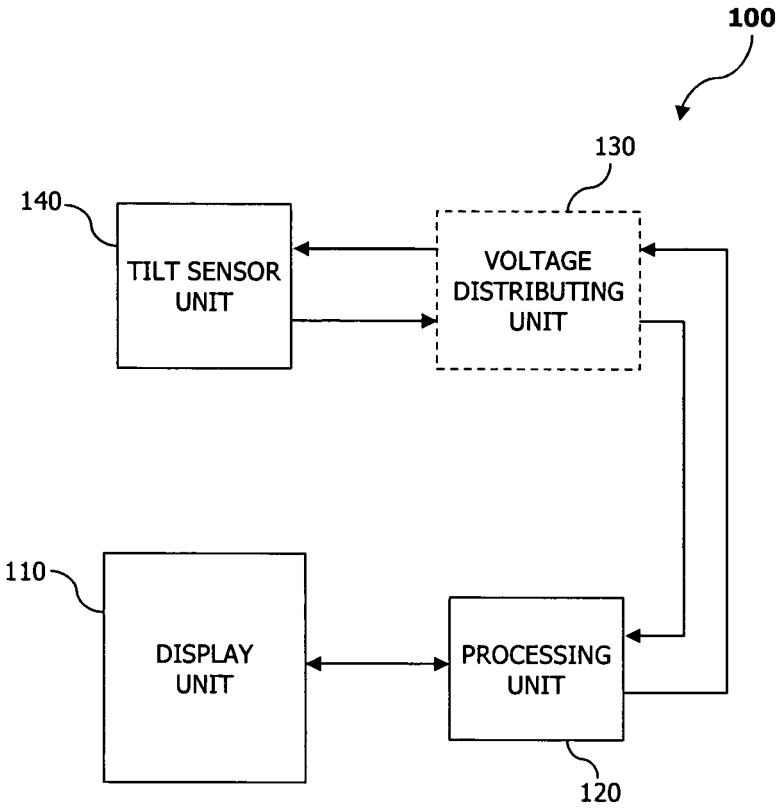

100
130
140
TILT SENSOR UNIT
VOLTAGE DISTRIBUTING UNIT
110
DISPLAY UNIT
PROCESSING UNIT
120

FIG. 2

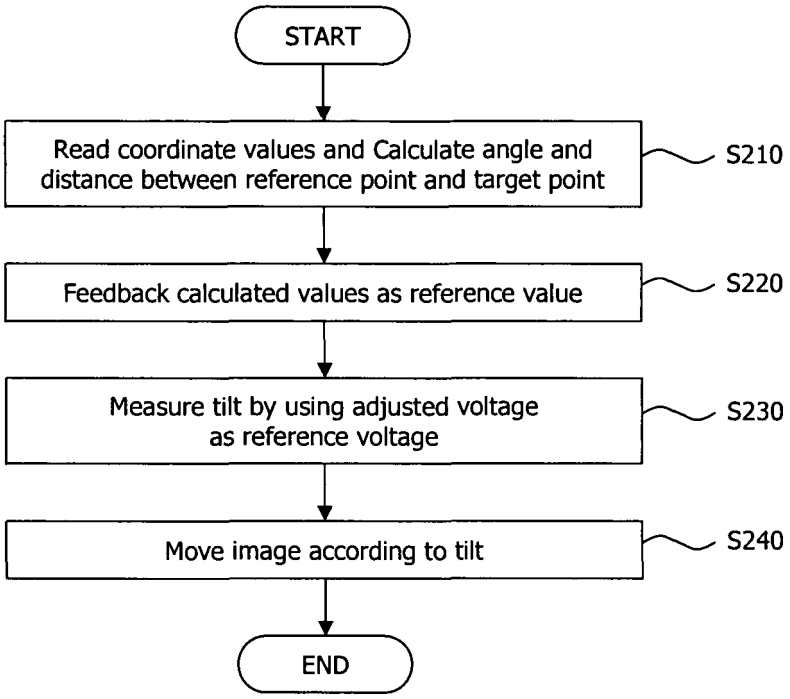
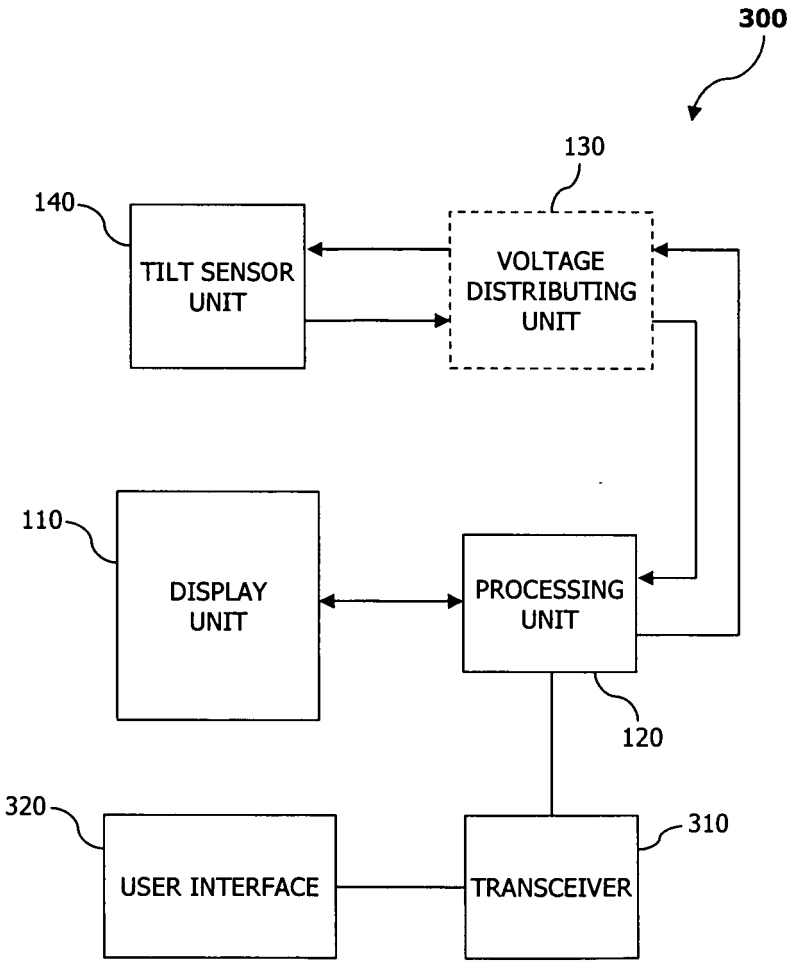

START
Read coordinate values and Calculate angle and distance between reference point and target point
S210
Feedback calculated values as reference value
S220
Measure tilt by using adjusted voltage as reference voltage
S230
Move image according to tilt
S240
END

FIG. 3


300
130
140
TILT SENSOR UNIT
VOLTAGE DISTRIBUTING UNIT
110
DISPLAY UNIT
PROCESSING UNIT
120
320
USER INTERFACE
TRANSCEIVER
310

REFERENCES CITED IN THE DESCRIPTION

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- WO 0143473 A1 **[0006]**