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(54) **COMBINING FIRST AND SECOND IMAGE DATA OF AN OBJECT**

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(57) **ABSTRACT**

The invention relates to a method of combining first and second image data of an object (3), wherein the first image data of the object (3) are repeatedly generated by an ultrasound detector (1), wherein the second image data of the object (3) are generated separately, for example the second image data have been recorded earlier by a computer tomography, a magnetic resonance or a positron emission tomography imaging device, wherein the first image data are transferred from the ultrasound detector (1) to a combination device (5) and wherein the combination device (5) is adapted to combine the first and second image data of the object (3).

Geometry data is transferred in addition to the first image data from the ultrasound detector (1) to the combination device (5), wherein the geometry data comprise information for establishing a link between the geometry of the first image data and the geometry of the second image data.
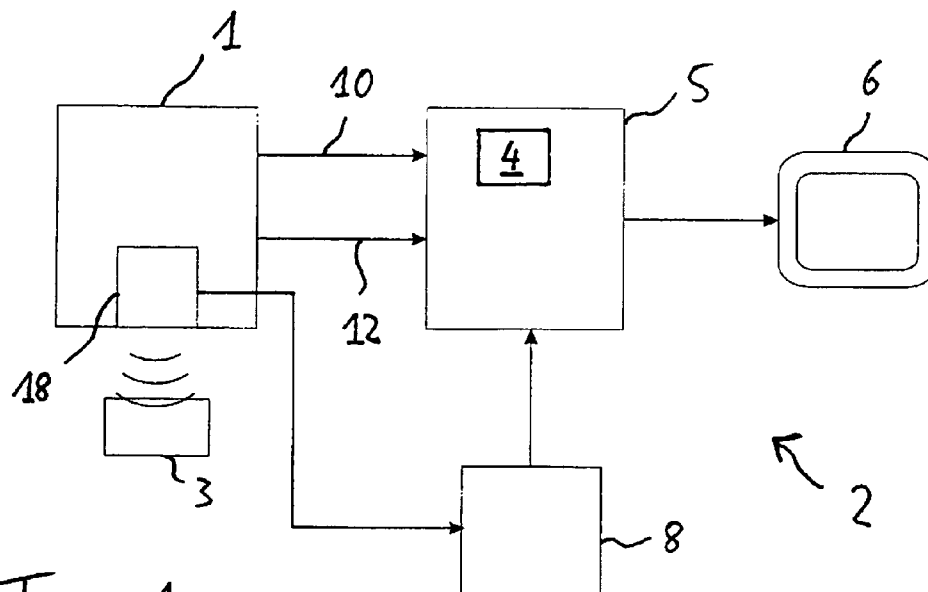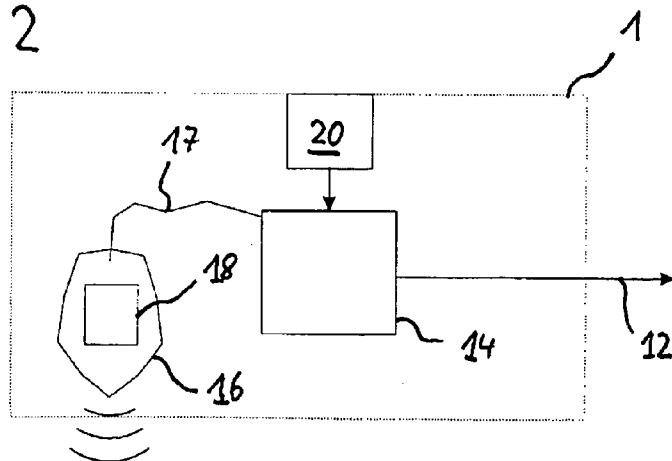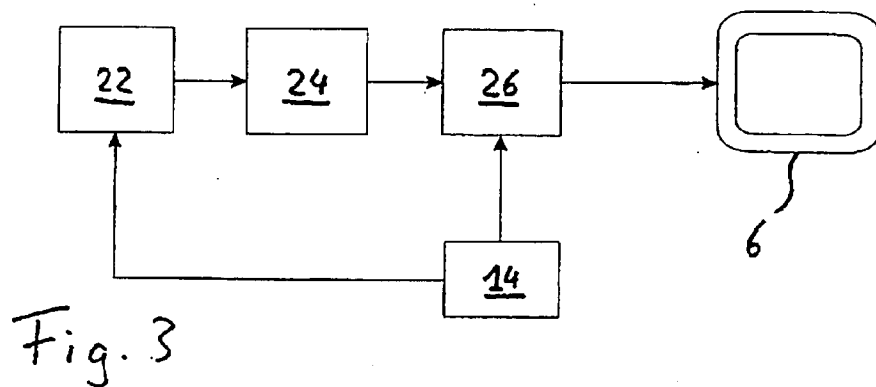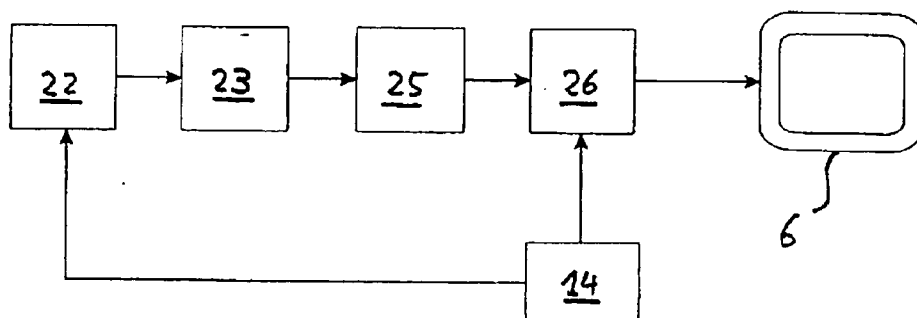
Fig. 1

Fig. 2

Fig. 3

Fig. 4

S1

S2

S3

S4

S5
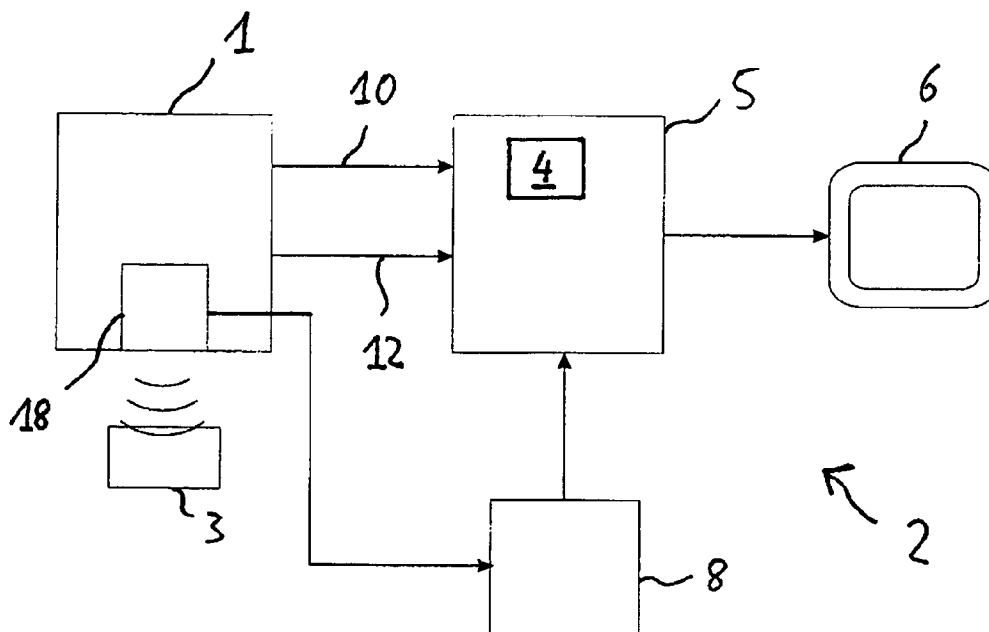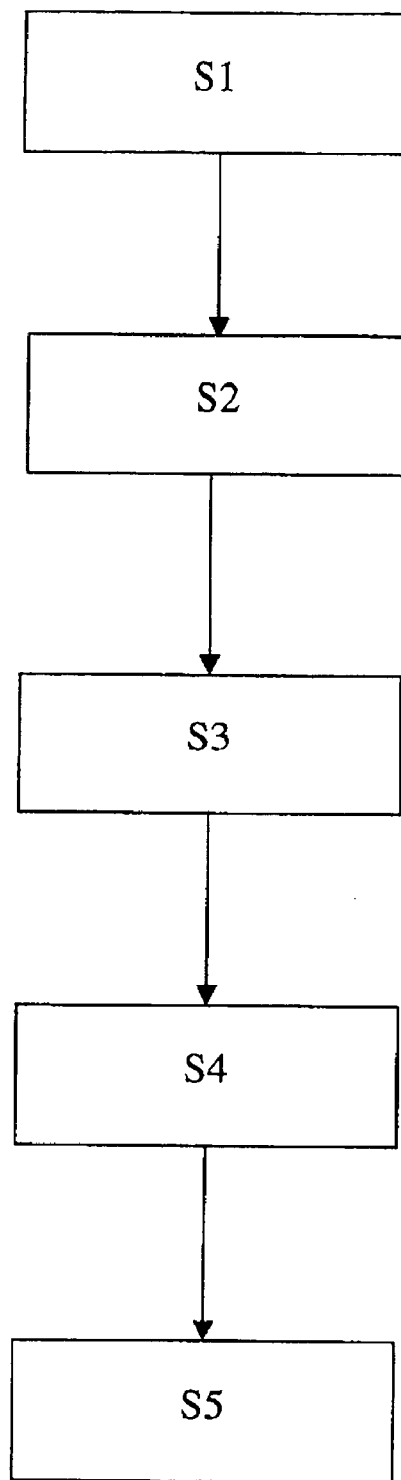
Fig. 5

COMBINING FIRST AND SECOND IMAGE DATA OF AN OBJECT

BACKGROUND OF THE INVENTION

[0001] The invention relates to an apparatus and a method for/of combining first and second image data of an object. An ultrasound (US) detector repeatedly generates the first image data of the object and the second image data of the object are generated separately. In the apparatus, means for storing and/or receiving the second image data of the object (such as an image data storage and/or an interface) are provided. For example, the second image data may have been recorded earlier by a computer tomography (CT), a magnetic resonance (MR), a positron emission tomography (PET), an X-ray and/or a three-dimensional (3D) US imaging device. In particular, any 3D image information can be used as the second image data. A combination device combines the first and second image data of the object. The combined image data may be displayed in separate areas of a screen and/or may be superimposed on a screen. More particularly, the invention may be applied in the field of stereographic diagnosis concerning human or animal bodies, but also concerning material research and/or material examination.

[0002] Ultrasound detectors are comparatively easy to handle and are able to deliver image information quasi-continuously and, approximately, in real-time. However, in many applications, other imaging technologies (such as the ones mentioned above) provide better results. Therefore, it has been proposed earlier to combine image information of better quality, which has been recorded earlier, with real-time ultrasound image information.

[0003] In the scientific publication of Pagoulatos et al.: "Interactive 3-D Registration of Ultrasound and Magnetic Resonance Images Based on a Magnetic Position Sensor", published in IEEE TRANSACTIONS ON INFORMATION TECHNOLOGY IN BIOMEDICINE, VOL. 3, NO. 4, December 1999, describes an apparatus of the type mentioned above. It is proposed in the publication to use an MR imaging device and to register the imaging object relative to the MR imaging device. The term "register" means that the geometry of the object and the coordinate system of the MR imaging device are brought into a defined relation. The apparatus comprises a position sensor, which is firmly coupled to an ultrasound probe. Using the position sensor and due to the fact that its relative position to the ultrasound probe does not vary, it is possible to track the position and the orientation of the ultrasound probe. However, it is necessary to calibrate the position sensor relative to the ultrasound probe and to register the imaging object relative to the coordinate system of the ultrasound probe. As a result, the MR imaging information and the ultrasound imaging information can be combined.

[0004] Using systems of the type described before, it is possible to display MR image information of the same orientation and/or scaled in the same manner as the most recent US image. In other words: it can be simulated that the MR image is recorded in real-time, provided that the image data processing is fast enough.

[0005] However, the various calibration and registration procedures are time-consuming and need to be performed with care in order to obtain good results. For example, the position of a set of landmarks on the surface of the object and/or anatomical markers (in case of a human or animal body) is to be detected during registration.

[0006] Furthermore, modern US systems enable the user to vary the penetration depth of the US image in the object and/or to change the ultrasound probe. As a consequence, the calibration of the position sensor relative to the ultrasound probe and the registration of the imaging object relative to the coordinate system of the ultrasound probe are no longer valid.

[0007] There are prior art ultrasound devices with pre-calibrated pixel sizes wherein the pixel size can be varied by the user. However, only step-like increases or decreases of the pixel size (or of a spatial dimension of the ultrasound image) can be performed with these prior art devices.

[0008] U.S. Pat. No. 6,546,279 B1 discloses a method and an arrangement for locating, vectoring and inserting a needle-like medical device toward and into a targeted patient anatomic feature while the patient is being imaged with multi-modality medical imaging equipment. In the second embodiment of the document at least a portion of the patient is imaged with a first imaging technique (such as computed tomography) to provide a first set of imaging data, which has a fixed frame of reference. Ultrasound imaging data is obtained. The ultrasound imaging data is not fixed relative to the fixed frame of reference. Position data is determined for the ultrasound device. Using the determined position data and the ultrasound imaging data, a converted set of imaging data is provided which is referenced to the fixed frame of reference.

[0009] The publication "sensor fusion for surgical applications" by Jim Leonhard (15th Annual AESS/IEEE Dayton Section Symposium. Sensing the world: Analog sensors and systems across the spectrum (Cat. No.98EX178), pages 37-44, XP002253643, New York, N.Y., USA, IEEE, USA) discloses a surgical navigation system which combines preoperate 3d imagery and intra-operate localisation to register a patient.

[0010] U.S. Pat. No. 2002/0128550 A1 discloses a diagnostic imaging system. Magnetic resonance image and ultrasound images are registered in a common reference frame.

[0011] It is an object of the present invention to provide an apparatus and a method of the type indicated above, which allow lessening the effects of the disadvantages mentioned before, which facilitate the handling by the user and which allow using a greater variety of features of the ultrasound system without loosing time for calibration and/or registration. In particular, it is desirable to adjust the settings of the ultrasound system and/or to change the ultrasound probe and to continue with the ultrasound imaging process without interruption.

SUMMARY OF THE INVENTION

[0012] A method is provided of combining first and second image data of an object, wherein the first image data of the object are repeatedly generated by an ultrasound detector, wherein the second image data of the object are generated separately, wherein the first image data are transferred from the ultrasound detector to a combination device and wherein the combination device is adapted to combine the first and second image data of the object. Geometry data is

transferred in addition to the first image data from the ultrasound detector to the combination device.

[0013] In particular, the geometry data comprise information for establishing a link between the geometry of the first image data and the geometry of the second image data.

[0014] Preferably, the geometry data are transferred directly from the ultrasound detector to the combination device, e.g. via an additional cable which connects the detects and the device.

[0015] Further, an apparatus is provided for combining first and second image data of an object, the apparatus comprising an ultrasound detector for repeatedly generating the first image data of the object; means for storing and/or receiving the second image data of the object; a combination device which is adapted to combine the first and second image data of the object; and an image data connection from the ultrasound detector to the combination device for transferring the first image data. The ultrasound detector is connected to the combination device by a geometry data connection, wherein the geometry data connection, the ultrasound detector and the combination device are adapted to transfer geometry data additionally to the first image data from the ultrasound detector to the combination device.

[0016] The geometry data may, for example, comprise information for establishing a link between the geometry of the first image data and the geometry of the second image data. The "link" (or, in other words, a processable relation between the first and the second image data) allows, for example, the determination of an overlapping region of a first image represented by the first image data and of a second image represented by the second image data. According to a preferred application, the combination device continuously displays a first image of the object corresponding to the repeatedly generated first image data and continuously displays a second image of the object corresponding to the second image data, wherein the orientation and/or scaling of at least a part of the object is identical in the first and in the second image. In particular, the second image data may be displayed, as if the second image data have repeatedly been recorded instead of or in addition to the first image data.

[0017] As a consequence of the fact that the geometry data are available to the combination device, the effort for re-calibrating the ultrasound detector relative to a tracking sensor (if any) and/or for re-registering the object relative to the coordinate system of the ultrasound detector can be reduced or eliminated.

[0018] The geometry data may comprise one or more than one of the following type of information. In particular, any combination and/or aggregation of the following type of information can be included in the geometry data:

[0019] a) information concerning at least one spatial dimension of an image unit of the first image data, in particular of a pixel (preferably separately for different directions of a coordinate system);

[0020] b) information concerning an image position of at least a part of an image, which is represented by the first image data, relative to a reference point of the ultrasound detector or relative to a reference point or reference object in the ultrasound image. This information is particularly useful, if a user can

adjust a zoom factor of the ultrasound image. For example, this information comprises a distance in image units (e.g. pixels). In combination with the scaling information of item a), the distance may be defined in cm or another unit of length;

[0021] c) information concerning an orientation of the ultrasound image relative to a reference point or a reference object of the ultrasound detector (in particular an ultrasound probe of the detector). For example, this information may comprise the orientation of at least one axis of a coordinate system of the ultrasound image;

[0022] d) information concerning a region or an area, which is actually covered by an ultrasound image that is represented by the first image data; and

[0023] e) information concerning a detector position of the ultrasound detector relative to a position sensor for determining a location and/or an orientation of the ultrasound detector. Instead of or in addition to a position sensor, a signal source may be coupled to the ultrasound probe, wherein the signal can be evaluated in order to determine the position of the probe. For example, such information may be collected once in advance and may be saved individually for each ultrasound probe, which can be connected to the ultrasound system/device. In this case, it is sufficient during operation to transfer simply an identification signal, which enables to identify the probe that is used. The combination device can select the respective geometry information using the identification information. In a specific embodiment, the information concerning the relative position, which is transferred or saved, may be a calibration matrix.

[0024] Preferably, all of these types of information are transferred from the ultrasound detector to the combination device.

[0025] Since information concerning at least one spatial dimension of an image unit of the first image data (e. g. the pixel size) can be transferred from the ultrasound device to the combination device, according to one embodiment of the present invention, the user can choose the spatial dimension within the respective range of the ultrasound device. Consequently, a continuously adjustable pixel size can be implemented in the ultrasound device.

[0026] The information concerning an image position relative to a reference point of the ultrasound detector facilitates the combination of the two different types of image data and makes it possible to adjust the position of the ultrasound image, for example by using a control knob provided at the ultrasound probe.

[0027] The information concerning an orientation of the ultrasound image relative to a reference point of the ultrasound detector enable the user to change the orientation by operating a control element at the ultrasound probe.

[0028] Similarly to the information concerning the pixel size, the information concerning a region or an area, which is actually covered by an ultrasound image facilitates the combination of the ultrasound image data with the other image data.

[0029] According to a preferred embodiment at least a part of the geometry data is repeatedly transferred to the combination device, in particular every time when the first image data are generated and/or when the first image data are transferred to the ultrasound detector. The geometry data may be transferred on request and/or without request from the combination device and/or from another part or unit (for example of a central control unit) of the apparatus.

[0030] There are further possibilities to use the additional data connection between the ultrasound detector and the combination device, or to use a further data connection. For example, a mode and/or a user setting of the ultrasound detector may be transferred from the ultrasound detector to the combination device, on request or without request of the combination device or another unit of the apparatus. E.g. a colour of the ultrasound image to be used in displaying the ultrasound image, a repetition frequency of the ultrasound image generation (for example in order to give an indication to the user, if the frequency is too low) and/or information representing the object may be transferred.

[0031] If the ultrasound detector comprises a control unit for controlling an image data generation of the ultrasound detector, the control unit may be adapted to generate at least a part of the geometry data. For example, the control unit can adjust a penetration depth of the ultrasound image, using a velocity value of the ultrasound waves in the object, by setting a time limit for detection of US echo signals. In this case, the control unit can calculate the penetration depth and can transfer information about the penetration depth to the combination device. Further, the width of an image recording area of an ultrasound probe may be available to the control unit for control purposes and the control unit can transfer this information to the combination device.

[0032] In a preferred embodiment of the apparatus the image data connection is adapted to directly transfer the first image data in a digital format from the ultrasound detector to the combination device. This saves time for transferring the first image data and reduces costs and effort of the apparatus. Furthermore, the ultrasound detector, the combination device and (optionally) further parts or units of an imaging system may be integrated in one and the same device. For example, several or all of the units of such a device may be connected to a data bus system for transferring data.

[0033] Generally, the image data connection and/or the geometry data connection may be realised by a data bus (e.g. USB or FireWire, IEEE 1394) and/or may be part of a data network. Preferably, the embodiment of the connection or connections shall allow displaying a first image (represented by the first image data) and a second image (represented by the second image data) approximately in real-time of the generation of the first image data, for example within less than 100 ms after the generation. Ultrasound is particularly useful in order to generate the first image data, since the generation process can be performed with high repetition frequency (quasi-continuously). The corresponding data connection and the following data processing should not delay the displaying in way, which can be noticed by the user.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] In the following, examples and possible further features of the invention are described by way of reference to the accompanied drawing. The embodiment shown in the FIGS. 1 to 3 and 5 represent the currently known best mode of the invention. However, the invention is not limited to the features described in the following description. The figures of the drawing schematically show:

[0035] FIG. 1 an arrangement 2 comprising an apparatus for combining ultrasound image data with a second type of data, e.g. CT image data;

[0036] FIG. 2 a more detailed view of the ultrasound detector shown in FIG. 1;

[0037] FIG. 3 a first example of an arrangement of components, which contribute to a processing of the ultrasound image data;

[0038] FIG. 4 a second example of an arrangement of components, which contribute to a processing of the ultrasound image data;

[0039] FIG. 5 a flow-chart of processing image data.

DETAILED DESCRIPTION

[0040] Images of an object 3 (shown in FIG. 1) are to be displayed on a screen 6. An ultrasound detector 1 generates first image data of the object 3 and transfers the first image data to a combination device 5 via an image data connection 10. The combination device 5 comprises a data storage 4, which contains second image data that have previously been generated by a separate device (not shown in FIG. 1). The combination device 5 is adapted to combine the first and second image data and to display them on a screen 6, which is connected to the combination device 5. For example, the first and second image data may be displayed separately on a split screen or may be superimposed. In any case, it is preferred that a first image, which is generated using the first image data, and a second image, which is generated using the second image data, precisely show at least partially the same area or region of the object 3 in the same orientation (angle of view) and scaling (dimensions).

[0041] The ultrasound detector 1 and the combination device 5 are connected to each other by an additional data connection 12 for transferring geometry data from the ultrasound detector 1 to the combination device 5. In particular, the geometry data connection 12 may be connected (as shown in FIG. 2). to a control unit 14 of the ultrasound detector 1.

[0042] In practice, the data connections 10, 12 may be realised by separate data connection links or by the same data connection link. For example, a "link" may comprise a connection line, a plurality of connection lines and/or a digital data bus or bus system.

[0043] An ultrasound probe 16 (FIG. 2) of the ultrasound detector 1 is firmly coupled to a position sensor 18 of a tracking system. The determination of the orientation and the location of such a position sensor and, thereby, of the ultrasound probe is known in the art (see the above-cited publication of Pagoulatos et al.). For example, magnetic and/or optical (e.g. infrared) signals may be used by the tracking system. The position sensor 18 is connected to a tracking system control unit 8 and the control unit 8 is connected to the combination device 5. During operation of the arrangement 2, the control unit 8 repeatedly or quasi-continuously transfers information concerning the position

and concerning the orientation of the ultrasound probe **16** to the combination unit **5**. Alternatively, this information may be transferred from the US detector to the combination device. I.e. this information might be at least partially included in the geometry data, which are transferred.

[0044] As shown in **FIG. 2**, the ultrasound device **1** may, for example, comprise an ultrasound probe **16**, which is connected to the ultrasound control unit **14** via a flexible cord **17** for transferring echo signals to the control unit **14**. On the other hand, the control unit **14** transfers control signals to the ultrasound probe via the cord **17**. Also, it is possible that at least a part of the geometry information is transferred from the ultrasound probe **16** to the control unit **14** and/or that at least a part of the geometry information generated by the control unit **14** is based on and/or derived from information, which is transferred from the ultrasound probe **16** to the control unit **14**. For example, the ultrasound probe **16** may be replaced and, therefore, transfers information concerning its identity to the combination device **5**. In the combination device **5**, in an additional unit of the arrangement **2**, and/or in the combination device **5**, information concerning the relative position and/or orientation of the specific ultrasound probe **16** relative to the position sensor **18** may be saved. For example, the ultrasound probe **16** may comprise a clip for attaching the position sensor **18**. Therefore, it is possible to precisely position and orientate the position sensor **18** relative to the ultrasound probe **16** and to determine as well as to save the respective geometry data in advance. After replacement of the ultrasound probe **16**, the identity information and the saved geometry information can be combined. As a consequence, it is not necessary to re-calibrate the arrangement consisting of the ultrasound detector **1** and the position sensor **18**.

[0045] An input unit **20** is connected to the ultrasound control unit **14**, for example for inputting settings of the ultrasound detector, such as a penetration depth or range of the ultrasound image. Further, the user may change the orientation of the ultrasound image via the input unit **20**.

[0046] According to a preferred embodiment of the invention, the ultrasound image data are generated from analog signals in a unit **22** of the ultrasound detector. The unit **22** may, for example, be controlled by the control unit **14** (as shown in the figure), be a part of the control unit **14** or be realised by a combination of the ultrasound probe **16** and the control unit **14**. The unit **22** is connected to an A/D-converter **24**, which converts the analog image signal to a digital image signal. The A/D-converter **24** is connected to an image data processing unit **26**, which is also connected to the control unit **14** or to an alternative unit of the ultrasound detector that transfers geometry information to the image data processing unit **26**. Thus, the image data processing unit **26** can combine the geometry information with the image data and/or can transferred both information/data to a further unit (not shown in **FIG. 3**). For example, the image data processing unit **26** may be identical to or part of the combination device **5**. In this case, the image data processing unit **26** also combines the first and second image information and the unit **26** may be connected to a screen **6** (as shown in the figure).

[0047] The embodiment of **FIG. 3** is of particular advantage, if the ultrasound detector and the combination device are integrated in one device.

[0048] In an alternative arrangement, the ultrasound detector may directly generate digital image data, without conversion from analog to digital.

[0049] An alternative arrangement is shown in **FIG. 4**. The same reference numeral denote units or devices having the same or a corresponding function. A D/A-converter **23** converts the digital image signal received via a connection from the unit **22** or from a corresponding unit to an analog image signal, for example to a signal in standard video format. An A/D-converter **25** that may be part of the combination device (e.g. a video capture card) is connected to the unit **23**. The unit **25** converts the analog signal to a digital signal, e.g. in pixel format. Then, the unit **26** processes the digital signal.

[0050] An example of processing and combining ultrasound image information is described in the following with reference to **FIG. 5**.

[0051] In step S1, geometry information concerning the scaling of the ultrasound image information are combined with the ultrasound image information. For example, the ultrasound image data contains information concerning the intensity of image units (e.g. pixels) before step S1, but no information concerning the dimension of the image units. The dimensional information is added by performing step S1.

[0052] In step S2, calibration information concerning the relative position of the ultrasound detector to the position sensor is added and/or combined with the information resulting from step S1. The calibration information may comprise as well information concerning the orientation of the ultrasound image, which may be changed by the user. As a result, it is now possible to identify the orientation and location of specific areas of the ultrasound image.

[0053] In step S3, the geometry information concerning the registration of the object within the coordinate system of the ultrasound system or the tracking system is added.

[0054] In step S4, the ultrasound image data resulting from step S3 can be combined with the second image data.

[0055] In practice, at least some of the processing operations of steps S1 to S4 may be realised by performing a polygon scanline method, which is described for example in the book "Computer Graphics. Principles and Practice." by James D. Foley, Andries VanDam, Steven K. Feiner, published by Addison-Wesley, Boston, U.S.A. The combination device **5** shown in **FIG. 1** may perform the data processing, for example.

[0056] For example, it is first calculated whether an overlapping region of the respective images exists. If this is the case, the corresponding overlapping region of the second image data is read out from the data storage and is prepared for displaying (step S5). The corresponding data of the second image data are processed before displaying so that the second image, which is based on the second image data, can be displayed in the same orientation and scaling as the ultrasound image.

[0057] The procedure described before is preferred, if the ultrasound image is two-dimensional. For 3D-ultrasound image information it is as well possible, to choose the orientation (i.e. the angle of the view) of the ultrasound image to be shown, in particular to adapt the orientation

according to other criteria. In any case, it is possible to adapt the scaling of the ultrasound image before displaying. Instead of, or additionally to displaying, the combined first and second image information may be processed in another way. For example, they can be stored and/or evaluated in a different manner.

1. An apparatus for combining first and second image data of an object, comprising:

an ultrasound detector for repeatedly generating first image data of the object;

a combination device;

at least one data connection;

structure configured for at least one of storing and receiving second image data of the object;

wherein said combination device is adapted to combine said first image data and said second image data;

wherein said at least one data connection is designed to transfer from said ultrasound detector to said combination device at least said geometry data;

wherein said geometry data comprise data defining at least one of the following:

a) information concerning at least one spatial dimension of an image unit of the first image data,

b) information concerning an image position of at least a part of an image, which is represented by the first image data, relative to a reference point of the ultrasound detector or relative to a reference point or reference object in the ultrasound image;

c) information concerning an orientation of the ultrasound image relative to a reference point or a reference object of the ultrasound detector; and

d) information concerning a region or an area, which is actually covered by an ultrasound image that is represented by the first image data.

2. The apparatus of claim 1 wherein said at least one data connection is designed to transfer from said ultrasound detector to said combination device said first image data and said geometry data.

3. The apparatus of claim 1 wherein said at least one data connection comprises a first data connection which is designed to transfer from said ultrasound detector to said combination device said geometry data and a second data connection which is designed to transfer from said ultrasound detector to said combination device said first image data.

4. The apparatus of claim 1 wherein said at least one data connection is adapted to directly transfer said first image data in a digital format from said ultrasound detector to the combination device.

5. The apparatus of claim 1 wherein said ultrasound detector comprises a control unit for controlling an image data generation of said ultrasound detector and wherein said control unit is adapted to generate at least a part of said geometry data.

6. The apparatus of claim 1 wherein said geometry data comprises data defining information concerning at least one spatial dimension of a pixel of the first image data.

7. The apparatus of claim 1 wherein said second image data comprises at least one of image data generated by a computer tomography, a magnetic resonance, a positron emission tomography an X-ray and a three-dimensional ultrasound imaging device.

8. The apparatus of claim 1 wherein said geometry data comprise data defining information concerning at least one spatial dimension of an image unit of said first image data.

9. The apparatus of claim 1 wherein said geometry data comprise data defining information concerning at least an image position of at least a part of an image, which is represented by the first image data relative to a reference point of the ultrasound detector or relative to a reference point or reference object in the ultrasound image.

10. The apparatus of claim 1 wherein said geometry data comprise data defining information concerning at least an orientation of the ultrasound image relative to a reference point or a reference object of the ultrasound detector.

11. The apparatus of claim 1 wherein said geometry data comprise data defining information concerning at least a region or an area which is actually covered by an ultrasound image that is represented by said first image data.

12. The apparatus of claim 1 wherein said first image data is derived from said ultrasound detector.

13. The apparatus of claim 1 wherein said second image data is derived from a second detector other than said ultrasound detector.

14. The apparatus of claim 13 wherein said second detector is not an ultrasound detector.

15. A method of making an apparatus for combining first and second image data of an object, comprising:

providing an ultrasound detector for repeatedly generating first image data of the object;

providing a combination device;

providing at least one data connection;

providing structure configured for at least one of storing and receiving second image data of the object;

wherein said second image data of the object comprises at least one of image data generated by a computer tomography, a magnetic resonance, a positron emission tomography, and an X-ray imaging device;

wherein said combination device is adapted to combine said first image data and said second image data;

wherein said at least one data connection is designed to transfer from said ultrasound detector to said combination device at least said geometry data;

wherein said geometry data comprise data defining at least one of the following:

a) information concerning at least one spatial dimension of an image unit of the first image data;

b) information concerning an image position of at least a part of an image, which is represented by the first image data, relative to a reference point of the ultrasound detector or relative to a reference point or reference object in the ultrasound image;

c) information concerning an orientation of the ultrasound image relative to a reference point or a reference object of the ultrasound detector; and

d) information concerning a region or an area, which is actually covered by an ultrasound image that is represented by the first image data.

16. The method of claim 15 wherein said at least one data connection is designed to transfer from said ultrasound detector to said combination device said first image data and said geometry data.

17. The method of claim 15 wherein said at least one data connection comprises a first data connection designed to transfer from said ultrasound detector to said combination device said geometry data and a second data connection designed to transfer from said ultrasound detector to said combination device said first image data.

18. The method of claim 15 wherein said geometry data comprise data defining information concerning at least one spatial dimension of an image unit of said first image data.

19. The method of claim 15 wherein said geometry data comprise data defining information concerning at least an image position of at least a part of an image, which is represented by the first image data relative to a reference point of the ultrasound detector or relative to a reference point or reference object in the ultrasound image.

20. The method of claim 15 wherein said geometry data comprise data defining information concerning at least an orientation of the ultrasound image relative to a reference point or a reference object of the ultrasound detector.

21. The method of claim 15 wherein said geometry data comprise data defining information concerning at least a region or an area which is actually covered by an ultrasound image that is represented by said first image data.

22. The method of claim 15 wherein said first image data is derived from said ultrasound detector.

23. The method of claim 15 wherein said second image data is derived from a second detector other than said ultrasound detector.

24. The method of claim 23 wherein said second detector is not an ultrasound detector.

25. A method of using an apparatus for combining first and second image data of an object, comprising:

repeatedly generating first image data of the object using an ultrasound detector;

at least one of storing and receiving second image data of the object;

combining said first image data and said second image data using a combination device;

transferring from said ultrasound detector to said combination device said first image data and geometry data using at least one data connection;

wherein said geometry data comprise data defining at least one of the following:

a) information concerning at least one spatial dimension of an image unit of the first image data;

b) information concerning an image position of at least a part of an image, which is represented by the first image data, relative to a reference point of the ultrasound detector or relative to a reference point or reference object in the ultrasound image; and

c) information concerning an orientation of the ultrasound image relative to a reference point or a reference object of the ultrasound detector; and

d) information concerning a region or an area, which is actually covered by an ultrasound image that is represented by the first image data.

26. The method of claim 25 wherein said second image data comprises at least one of image data generated by a computer tomography, a magnetic resonance, a positron emission tomography, an X-ray and a three-dimensional ultrasound imaging device.

27. The method of claim 25 wherein said geometry data comprise information concerning a detector position of the ultrasound detector relative to at least one of a position sensor and a signal source, for determining at least one of a location and an orientation of said ultrasonic detector.

28. The method of claim 25 wherein said geometry data are at least one of generated by and transferred from a control unit of the ultrasound detector and wherein the control unit is adapted to control an image data generation of the ultrasound detector.

29. The method of claim 25 wherein the combination device continuously displays a first image of the object corresponding to the repeatedly generated first image data and continuously displays a second image of the object corresponding to the second image data, wherein at least one of the orientation and scaling of at least a part of the object is identical in the first and in the second image.

30. The method of claim 25 wherein at least a part of the geometry data is repeatedly transferred to the combination device.

31. The method of claim 25 wherein said geometry data comprise data defining information concerning at least one spatial dimension of an image unit of said first image data.

32. The method of claim 25 wherein said geometry data comprise data defining information concerning at least an image position of at least a part of an image, which is represented by the first image data relative to a reference point of the ultrasound detector or relative to a reference point or reference object in the ultrasound image.

33. The method of claim 25 wherein said geometry data comprise data defining information concerning at least an orientation of the ultrasound image relative to a reference point or a reference object of the ultrasound detector.

34. The method of claim 25 wherein said geometry data comprise data defining information concerning at least a region or an area which is actually covered by an ultrasound image that is represented by said first image data.

35. The method of claim 25 wherein said at least one data connection comprises a first data connection designed to transfer from said ultrasound detector to said combination device said geometry data and a second data connection designed to transfer from said ultrasound detector to said combination device said first image data.

36. The method of claim 25 wherein said first image data is derived from said ultrasound detector.

37. The method of claim 25 wherein said second image data is derived from a second detector other than said ultrasound detector.

38. The method of claim 37 wherein said second detector is not an ultrasound detector.

39. A method of combining first and second image data of an object, comprising:

repeatedly generating first image data of the object using an ultrasound detector;

at least one of storing and receiving second image data of the object;

combining said first image data and said second image data using geometry data;

wherein said geometry data comprise data defining at least one of the following:

a) information concerning at least one spatial dimension of an image unit of the first image data;

b) information concerning an image position of at least a part of an image, which is represented by the first image data, relative to a reference point of the ultrasound detector or relative to a reference point or reference object in the ultrasound image; and

c) information concerning an orientation of the ultrasound image relative to a reference point or a reference object of the ultrasound detector; and

d) information concerning a region or an area, which is actually covered by an ultrasound image that is represented by the first image data.

40. The method of claim 39 wherein said second image data comprises at least one of image data generated by a computer tomography, a magnetic resonance, a positron emission tomography, an X-ray and a three-dimensional ultrasound imaging device.

41. The method of claim 39 wherein the geometry data comprise data defining information concerning a detector position of the ultrasound detector relative to at least one of a position sensor and a signal source, for determining at least one of a location and an orientation of the ultrasound detector.

42. The method of claim 39 wherein the geometry data are at least one of generated by and transferred from a control unit of the ultrasound detector and wherein the control unit is adapted to control an image data generation of the ultrasound detector.

43. The method of claim 39 wherein the combination device continuously displays a first image of the object corresponding to the repeatedly generated first image data and continuously displays a second image of the object corresponding to the second image data, wherein the at least one of the orientation and scaling of at least a part of the object is identical in the first and in the second image.

44. The method of claim 39 wherein at least a part of the geometry data is repeatedly transferred to the combination device.

45. The method of claim 39 wherein said geometry data comprise data defining information concerning at least one spatial dimension of an image unit of said first image data.

46. The method of claim 39 wherein said geometry data comprise data defining information concerning at least an image position of at least a part of an image, which is represented by the first image data relative to a reference point of the ultrasound detector or relative to a reference point or reference object in the ultrasound image.

47. The method of claim 39 wherein said geometry data comprise data defining information concerning at least an orientation of the ultrasound image relative to a reference point or a reference object of the ultrasound detector.

48. The method of claim 39 wherein said geometry data comprise data defining information concerning at least a region or an area which is actually covered by an ultrasound image that is represented by said first image data.

49. The method of claim 39 wherein said first image data is derived from said ultrasound detector.

50. The method of claim 39 wherein said second image data is derived from a second detector other than said ultrasound detector.

51. The method of claim 50 wherein said second detector is not an ultrasound detector.

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