(19) **United States**

(12) **Patent Application Publication** (10) Pub. No.: **US 2008/0091106 A1**
KIM et al. (43) **Pub. Date:** **Apr. 17, 2008**

(54) **ULTRASOUND SYSTEM FOR FUSING AN ULTRASOUND IMAGE AND AN EXTERNAL MEDICAL IMAGE**

(75) Inventors: **Cheol An KIM**, Seoul (KR); **Seong Chul Shin**, Seoul (KR)

Correspondence Address:
**OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.**
**1940 DUKE STREET**
**ALEXANDRIA, VA 22314 (US)**

(73) Assignee: **Medison Co., Ltd.**, Hongchun-gun (KR)

**Publication Classification**

(57) **ABSTRACT**

There is provided an ultrasound system, which includes: a probe configured to be placed upon the target object and transmit ultrasound signals to the target object and receive ultrasound echo signals reflected from the target object, said target object including a lesion; a position information providing unit configured to provide position information of the probe on the target object; an external medical image signal providing unit configured to receive external medical image signals of the target object from an external imaging device; a user input unit configured to receive position information of the lesion in the external medical image from a user; an image processing unit configured to form an ultrasound image based on the ultrasound echo signals, form the external image based on the external image signals and form a fusion image of the ultrasound image and the external image based on the position information of the probe and the position information of the lesion; and a display unit configured to display the ultrasound image, the external image and the fusion image.
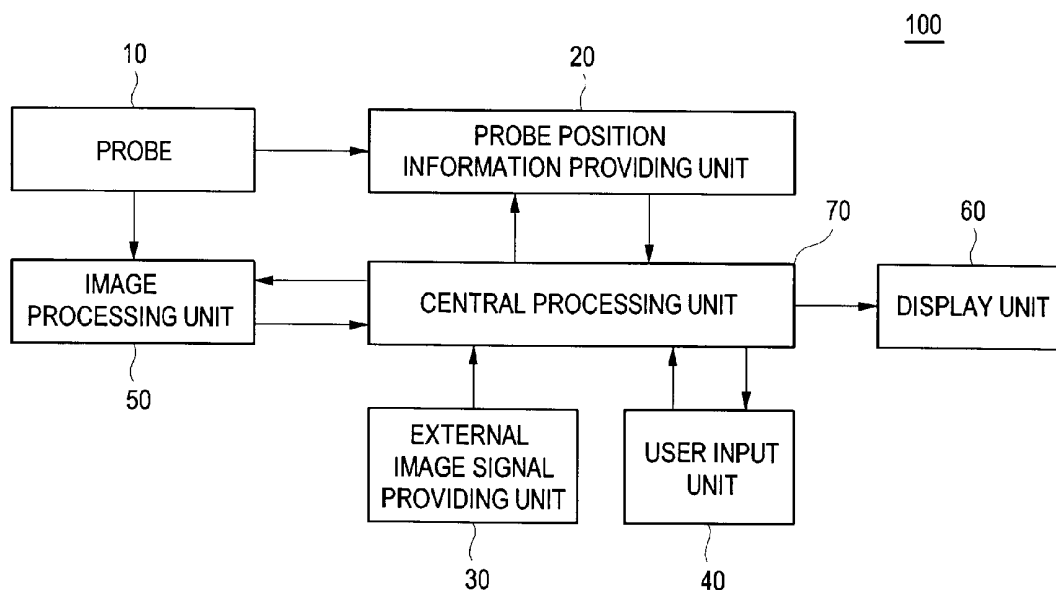
100

FIG. 1

100

PROBE POSITION
INFORMATION PROVIDING UNIT    20

PROBE    10

CENTRAL PROCESSING UNIT    70

USER INPUT
UNIT    40

EXTERNAL
IMAGE SIGNAL
PROVIDING UNIT    30

IMAGE
PROCESSING UNIT    50

DISPLAY UNIT    60

# FIG. 2



POSITION MARKER

TARGET OBJECT

LESION
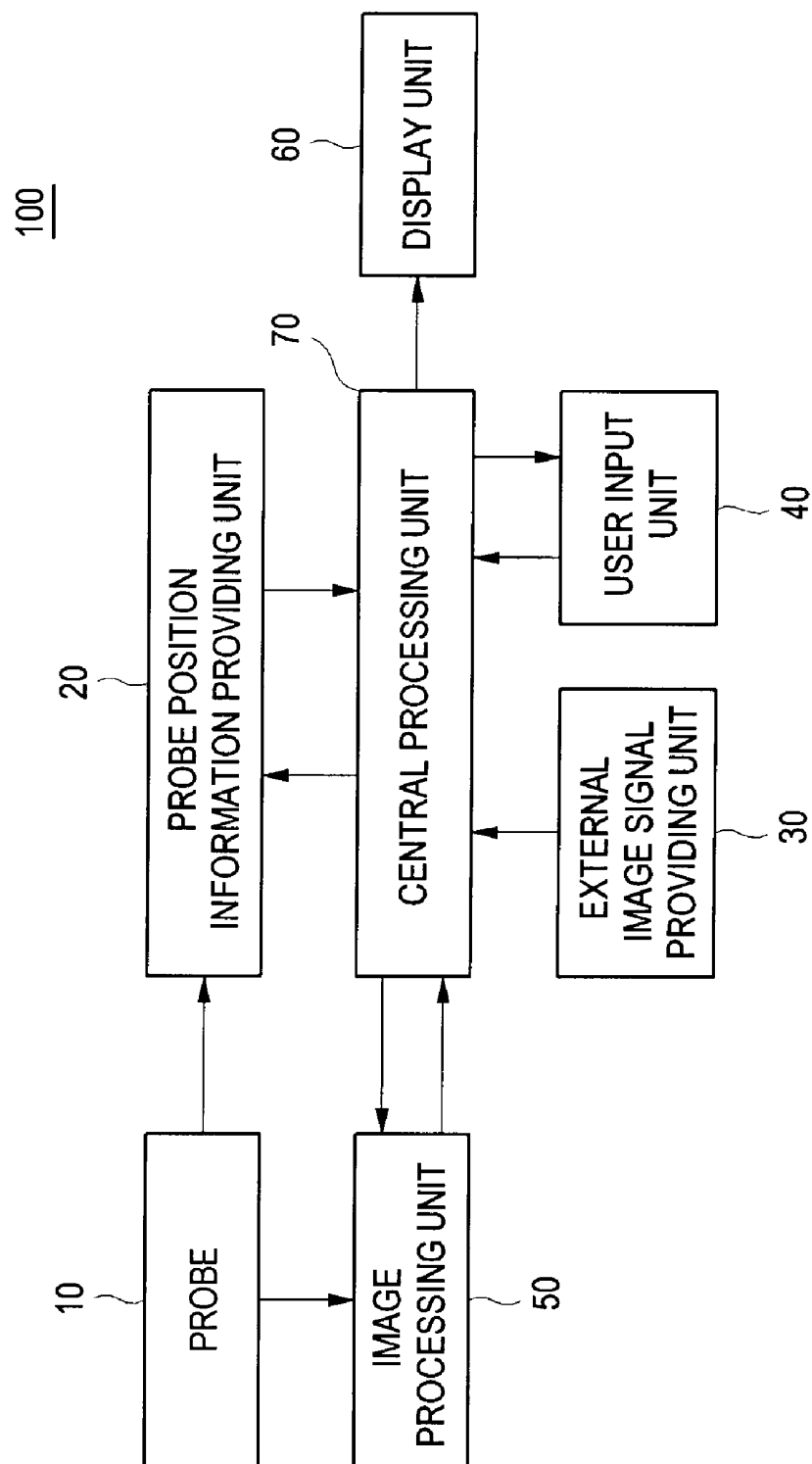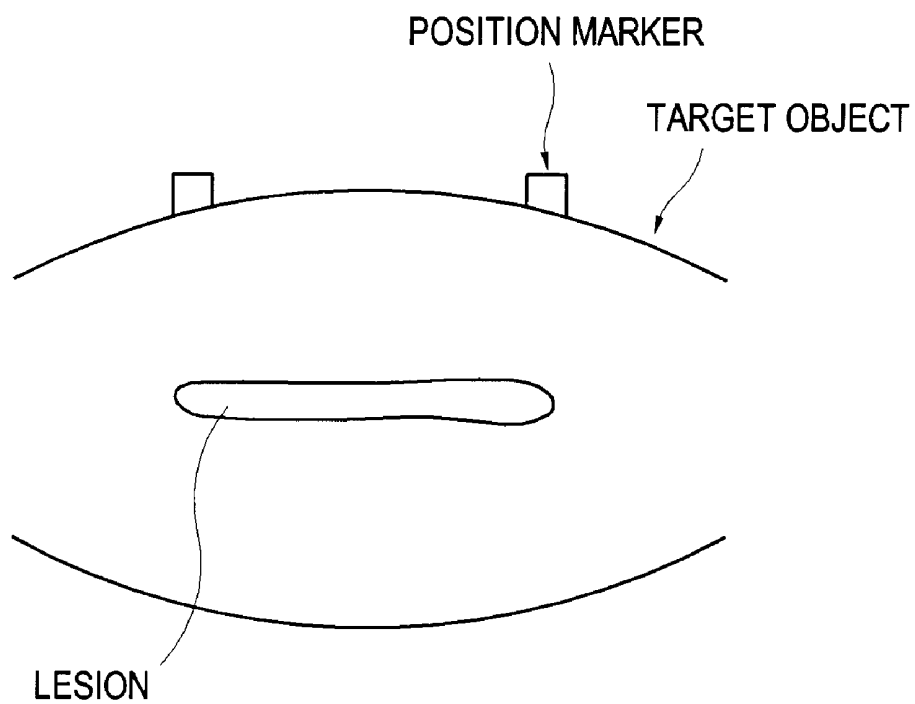
FIG. 3

FIG. 4

FIG. 5

FIG. 6

130

SECOND WARNING UNIT 62

FIRST WARNING UNIT 61

DISPLAY UNIT 60

STORING UNIT 90

MEDICAL NEEDLE POSITION INFORMATION PROVIDING UNIT 80

PROBE POSITION INFORMATION PROVIDING UNIT 20

CENTRAL PROCESSING UNIT 70
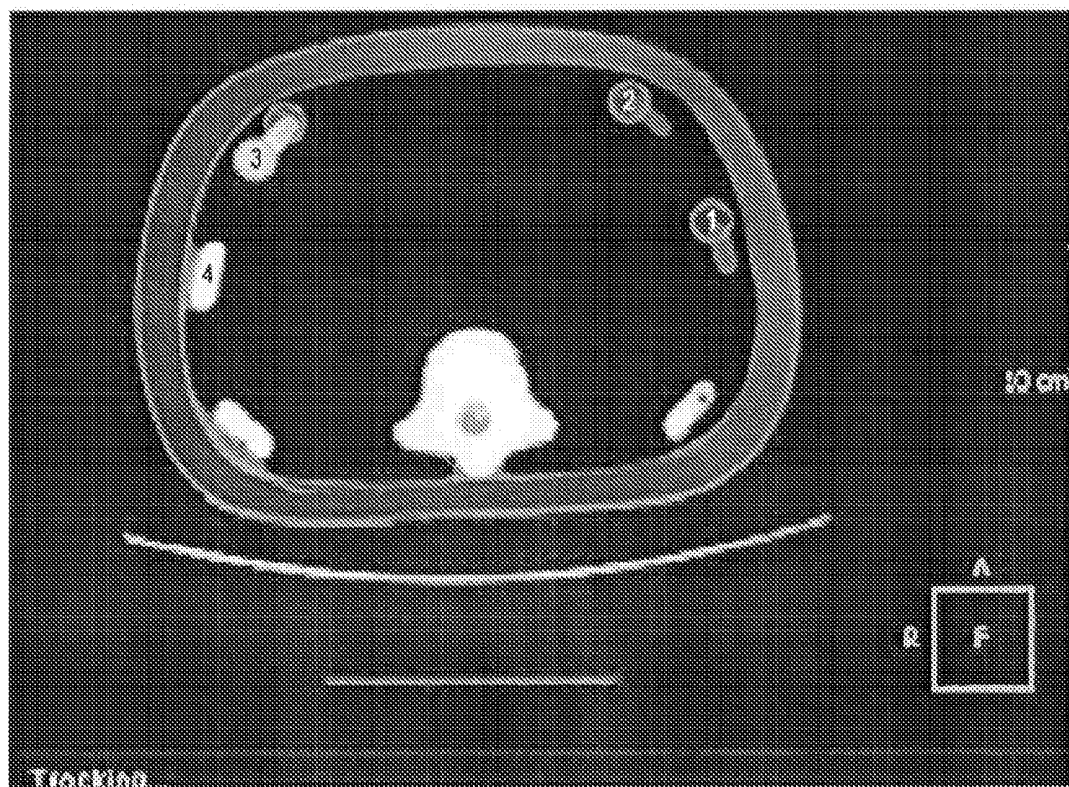
USER INPUT UNIT 40
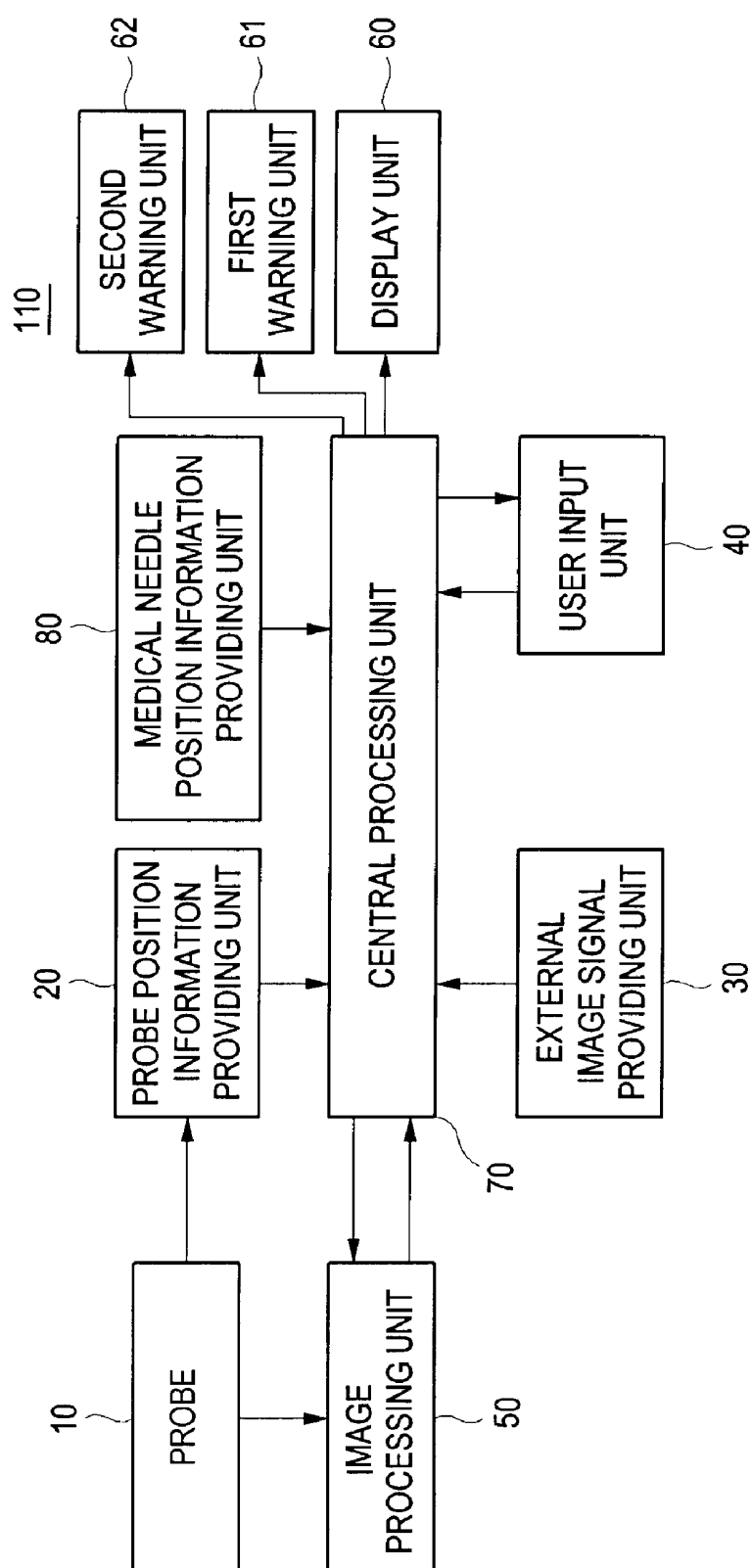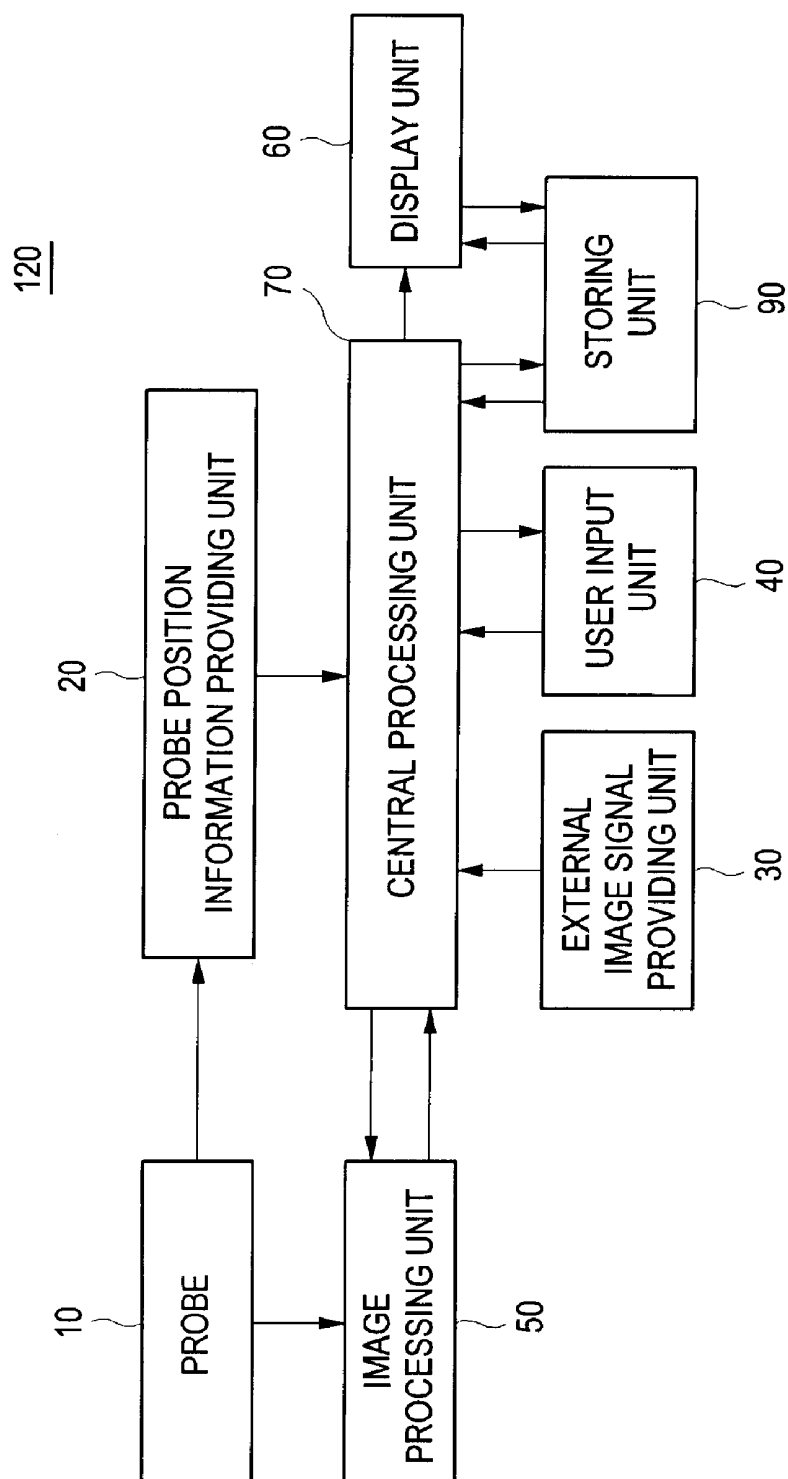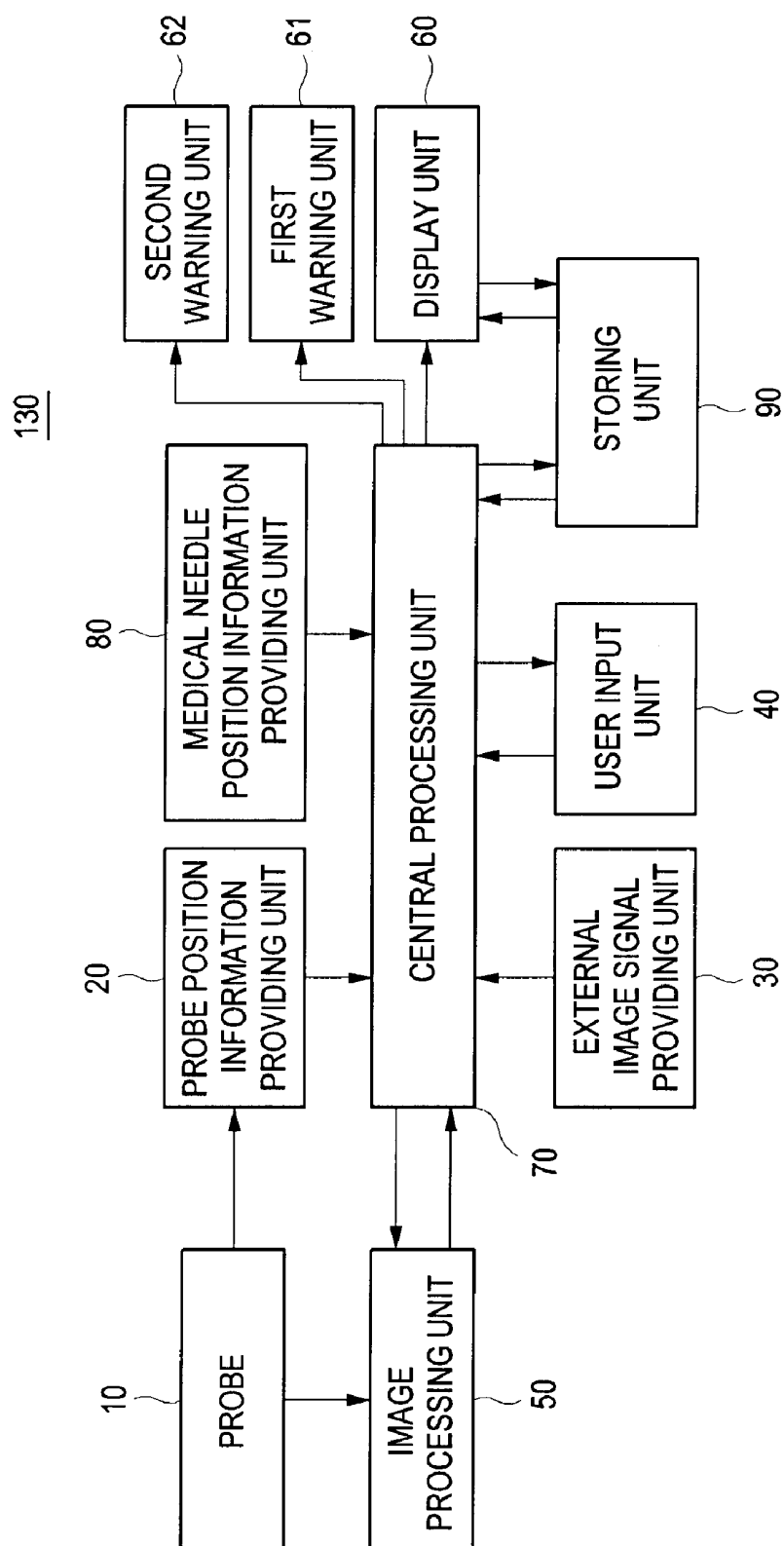
EXTERNAL IMAGE SIGNAL PROVIDING UNIT 30

PROBE 10

IMAGE PROCESSING UNIT 50

FIG. 7



FIG. 8

FIG. 9



FIG. 10

FIG. 11

# ULTRASOUND SYSTEM FOR FUSING AN ULTRASOUND IMAGE AND AN EXTERNAL MEDICAL IMAGE

[0001] The present application claims priority from Korean Patent Application No. 10-2006-100910 filed on Oct. 17, 2006, the entire subject matter of which is incorporated herein by reference.

## BACKGROUND

[0002] 1. Field

[0003] The present invention generally relates to ultrasound diagnostic systems, and more particularly to an ultrasound system for displaying a medical needle in a fusion image of an ultrasound image and an external medical image.

[0004] 2. Background

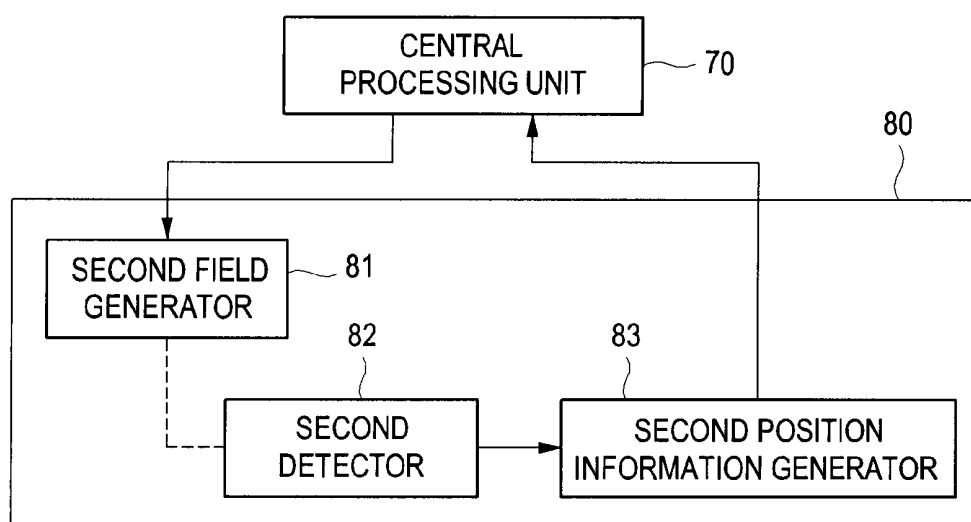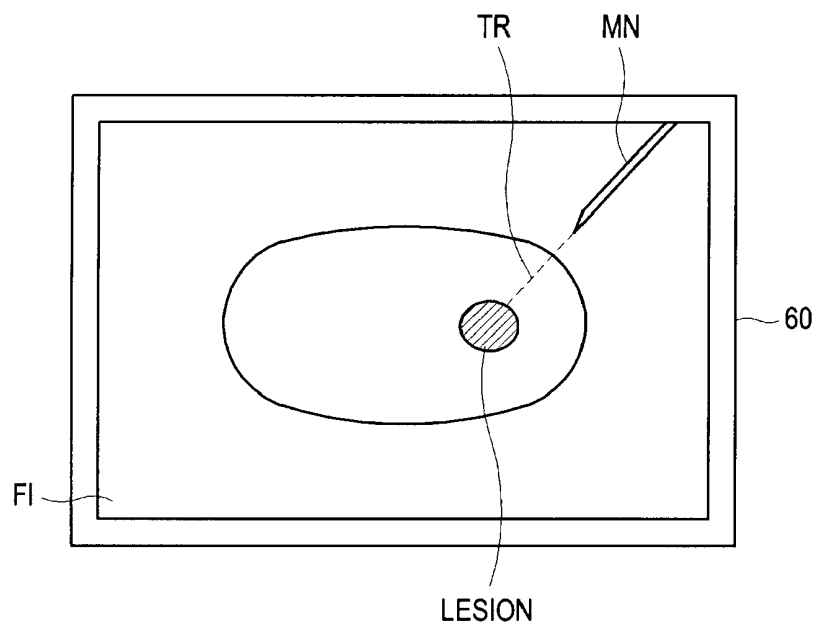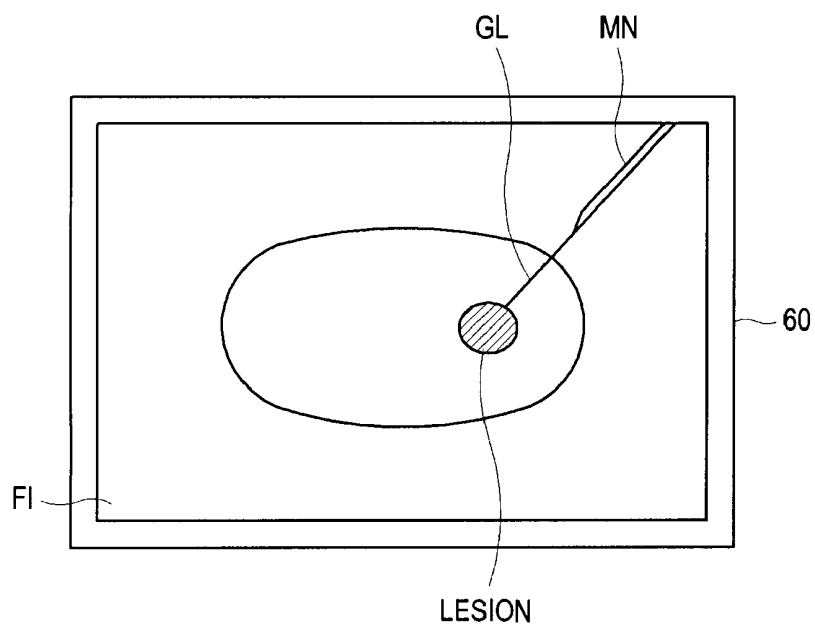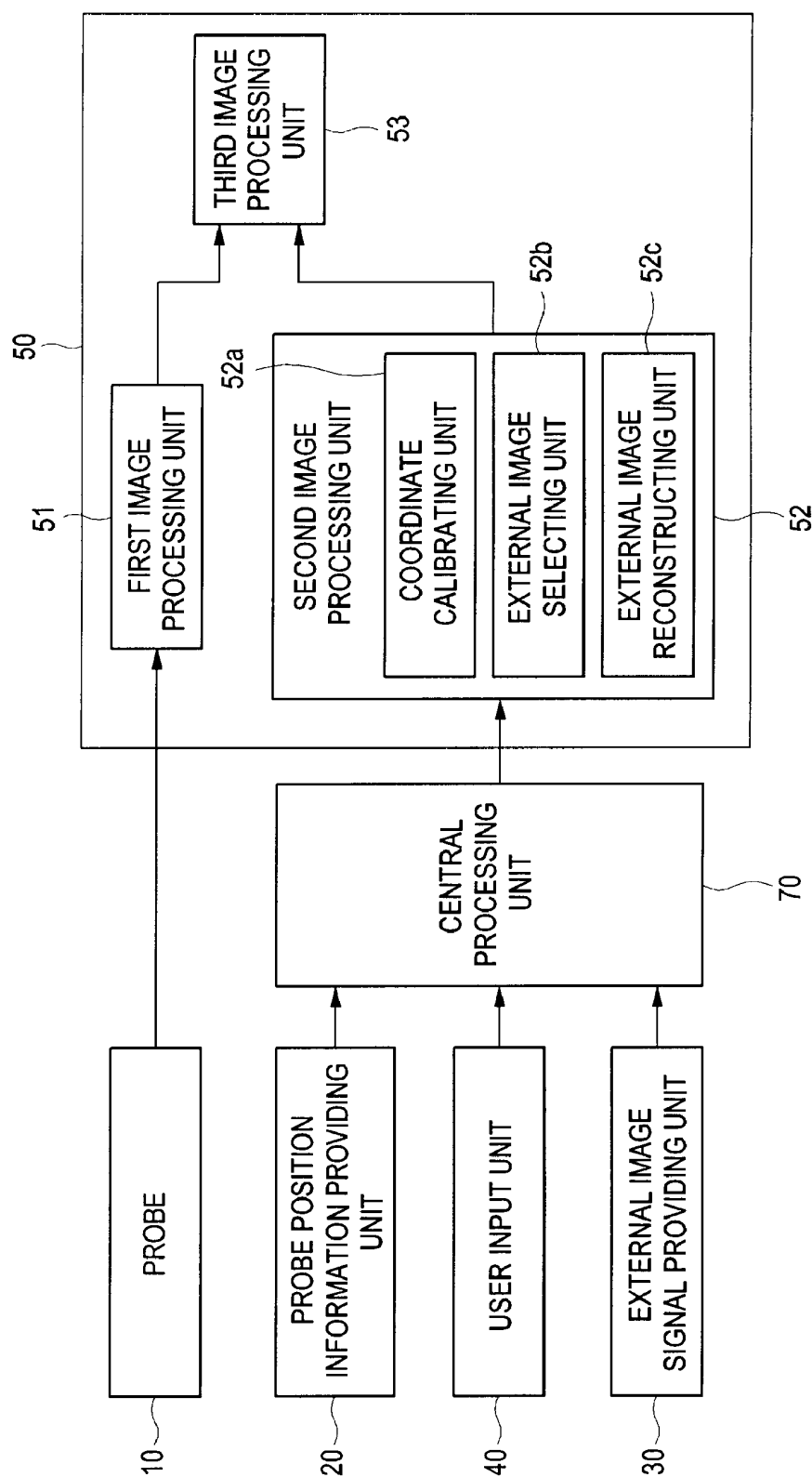[0005] Surgical treatment using a medical needle such as ablator or biopsy has recently become popular due to relatively small incisions made in such a procedure. The surgical treatment is performed by inserting the medical needle into an internal region of a human body while referring to an internal image of the human body. Such surgical treatment, which is performed while observing internal organs of the human body with aid of a diagnostic imaging system, is referred to as an interventional treatment. The interventional treatment is performed by directing the medical needle to the lesion to be treated or examined through a skin with reference to images during the treatment. The images are acquired by employing a computerized tomography (CT) scanner generally used in a radiology department or a magnetic resonance imaging (MRI) system. Compared to a normal surgical treatment requiring relatively wide incisions to open the lesion, the interventional treatment has the advantages of low costs and obtaining effective operation results. This is because general anesthesia is not necessary for the interventional treatment and patients are subjected to less pain while benefiting from rapid recovery.

[0006] However, it is difficult to obtain such images in real time by using the CT scanner or the MRI system. Especially, when the interventional treatment is performed by using the CT scanner, both the patient and the operator are exposed to radiation for quite a long time. In contrast, when the interventional treatment is performed by using an ultrasound diagnostic system, the images can be obtained in real time while not affecting the human body. However, there is a problem in that it is difficult to accurately recognize the lesion in the ultrasound image obtained by using the ultrasound diagnostic system.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Arrangements and embodiments may be described in detail with reference to the following drawings in which like reference numerals refer to like elements and wherein:

[0008] FIG. 1 is a block diagram showing an ultrasound system constructed according to one embodiment of the present invention;

[0009] FIG. 2 is schematic diagram showing an example of an external image of a target object attaching a position marker;

[0010] FIG. 3 is a photo for explaining designation of lesion positions on an external image;

[0011] FIGS. 4 to 6 are block diagrams showing ultrasound systems constructed according to embodiments of the present invention;

[0012] FIG. 7 is a block diagram showing a probe position information providing unit in accordance with one embodiment of the present invention;

[0013] FIG. 8 is a block diagram showing a medical needle position information providing unit in accordance with one embodiment of the present invention;

[0014] FIG. 9 is a schematic diagram for explaining a guide line input by a user in accordance with one embodiment of the present invention;

[0015] FIG. 10 is a schematic diagram showing a guide line formed between a lesion and a medical needle; and

[0016] FIG. 11 is a block diagram showing an image processing unit in the ultrasound system in accordance with one embodiment of the present invention.

## DETAILED DESCRIPTION

[0017] FIG. 1 is a block diagram showing an ultrasound system constructed according to one embodiment of the present invention. As shown in FIG. 1, the ultrasound system 100 includes a probe 10, a probe position information providing unit 20, an external image signal providing unit 30, a user input unit 40, an image processing unit 50, a display unit 60 and a central processing unit 70. The probe transmits ultrasound signals to a target object and receives ultrasound signals reflected from a lesion and a medical needle in the target object. The probe position information providing unit 20 provides position information of the probe on the target object. The position information of the probe includes information upon a direction of an ultrasound beam transmitted into the target object.

[0018] The external image signal providing unit 30 provides external image signals acquired from the external image device. The external image signals may be provided from a computerized tomography (CT) scanner, a magnetic resonance imaging (MRI) system or a positron emission tomography (PET) scanner. An external image formed based on the external image signals may show a target object and a medical needle inserted into the target object. The external image signals may be provided in a digital imaging communication format such as the digital imaging communication in medicine (DICOM) standard format. Also, the external image shows a lesion in the target object and a lesion position marker. For example, the external image is acquired while at least one lesion position marker is attached on a surface of the target object as shown in FIG. 2. The position marker may be any type of substances, which are capable of distinguishing from the target object in the CT, MRI or PET image.

[0019] The user input unit 40 may be a mouse, a keyboard, a track ball or the like. The user input unit 40 receives position information of the lesion in the external image from a user. Further, the user input 40 receives a selection of fusion conditions of the ultrasound image and the external image.

[0020]  The image processing unit 50 forms an ultrasound image based on the ultrasound echo signals and a fusion image of the ultrasound image and the external image based on the position information of the probe and the position information of the lesion. As mentioned above, if the fusion condition is inputted through the user input unit 40, then the image processing unit 50 forms the fusion image by reflecting the inputted fusion condition.

[0021]  The display unit 60 displays at least one image of the ultrasound image and the fusion image formed in the image processing unit and the external image. The display unit 60 may also display at least two images of the ultrasound image, the external image and the fusion image in parallel.

[0022]  The central processing unit 70 controls operations of the probe position information providing unit 20, the external image signal providing unit 30, the user input unit 40, the image processing unit 50 and the display unit 60. The central processing unit 70 may control input/output of the probe position information and the external image signals. The central processing unit 70 may further control input/output of the lesion position information between the image processing unit 50 and each of the probe position information providing unit 20, the external image signal providing unit 30 and the user input unit 40. The central processing unit 70 may process information or signals according to necessity.

[0023]  Hereinafter, a method for designating the lesion positions by the user will be described in detail with reference to FIG. 3. As shown in FIG. 3, while the external image showing the lesions and the lesion position markers is displayed on the display unit 60, the user designates positions of the lesions through mouse clicks or the like. The symbols 1, 2, 3 and 4 indicate the positions of 4 lesions designated on the external image through the mouse clicks by the user. In order to obtain a 3-dimensional position of a specific lesion, it is preferable that three or more positions of the specific lesion are designated in at least two external images containing the corresponding lesion. The position of the lesion, which is designated through the user input unit 40, that is, coordinates of the pixels corresponding to the lesion are inputted to the central processing unit 70.

[0024]  FIG. 4 is a block diagram showing an ultrasound system 110 in accordance with another embodiment of the present invention. The ultrasound system 110 further includes a medical needle position information providing unit 80 in addition to the elements of the ultrasound system 100 shown in FIG. 1. The medical needle position information providing unit 80 provides position information of a medical needle, which is inserted into the target object. The medical needle may be a biopsy needle or an ablator needle.

[0025]  The central processing unit 70 in the ultrasound system 110 controls input/output of information between the display unit 60 and the medical needle position information providing unit 80. Further, central processing unit 70 processes the position information of the medical needle according to the necessity. The display unit 60 displays the position of the medical needle on the fusion image under the control of the central processing unit 70.

[0026]  FIG. 5 is a block diagram showing an ultrasound system 120 in accordance with further another embodiment of the present invention. The ultrasound system 120 further includes a storing unit 90 in addition to elements of the ultrasound system 110. FIG. 6 is a block diagram showing an ultrasound system 130 in accordance with still another embodiment of the present invention. The ultrasound system 130 further includes a storing unit 90 in addition to elements of the ultrasound system 110 shown in FIG. 4. The storing unit 90 in the ultrasound systems 120 and 130 stores the fusion image formed in the image processing unit 50.

[0027]  The user input unit 40 in each of the ultrasound systems 120 and 130, which are shown in FIGS. 5 and 6, receives a display screen save request from the user. The central processing unit 70 in each of the ultrasound systems 120 and 130 captures a screen, which is currently displayed on the display unit 60, in response to the display screen save request inputted from the user input 40 and stores the captured screen in the storing unit 90.

[0028]  The central processing unit 70 in each of the ultrasound systems 110 and 130 computes a distance between the lesion and the medical needle based on the position information of the lesion inputted from the user input 40 and the position information of the medical needle inputted from the medical needle position information providing unit 80. The display unit 60 in each of the ultrasound systems 110 and 130 displays the distance between the lesion and the medical needle on the fusion image.

[0029]  Referring to FIG. 7, the probe position information providing unit 20 in each of the ultrasound systems 100 to 130, which are shown in FIGS. 1, 4 and 6, includes a first field generator 21, a first detector 22 and a first position information generator 23. The first field generator 21 generates an electromagnetic field for tracking the position of the probe. The first position detector 22 may be mounted on a surface of the probe or built in the probe. The first position detector 22 generates a first detection signal in response to the electromagnetic field generated from the field generator 21. The position information generator 23 generates position information of the probe based on the first detection signal. The position detector 22 may be embodied with a coil sensor.

[0030]  Referring to FIG. 8, the medical needle position information providing unit 80 in each of the ultrasound systems 110 and 130, includes a second field generator 81, a second detector 82 and a second position information generator 83, which is similar to the probe position information providing unit 20. The second field generator 81 generates an electromagnetic field, which may have a wavelength being capable of distinguishable from the electromagnetic field from the first field generator 21, for tracking the position of the medical needle. The second position detector 82 may be mounted on a surface of the medical needle or built in the medical needle. The second position detector 82 generates a second detection signal in response to the electromagnetic field generated from the second field generator 81. The position information generator 83 generates position information of the medical needle based on the second detection signal.

[0031]  The probe position information providing unit 20 and the medical position information providing unit 80 in each of the ultrasound systems 110 and 130, may be embodied with a single position information providing unit. The position information providing unit may include a filed

generator, a first detector, a second detector, a first position information generator and a second position information generator. The field generator generates an electromagnetic field for tracking the position of the probe and the position of the medical needle. The first position detector generates a first detection signal in response to the electromagnetic field. The second position detector generates a second detection signal in response to the electromagnetic field. The first position information generator generates position information of the probe based on the first detection signal. The second position information generator generates position information of the medical needle based on the second detection signal.

[0032] The user input unit **40** in each of the ultrasound systems **100** to **130**, receives guide line information from the user. The central processing unit **70** in each of the ultrasound systems **100** to **130** generates position information of the guide line based on a trace TR of a cursor movable by the user with the mouse or the like or a plurality of points designated by the user with the mouse or the like on the fusion image. The display unit **60** displays the guide line GL on the fusion image FI based on the position information of the guide line GL.

[0033] The central processing unit **70** in each of ultrasound systems **110** to **130**, may form position information of the guide line based on the position information of the lesion and the position information of the medical needle. The display unit **60** displays the fusion image inputted from the image processing unit **50** and the guide line on the fusion image based on the position information of the guide line.

[0034] The central processing unit **70** in each of ultrasound systems **110** to **130** compares the position information of the guide line and the position information of the medical needle to determine whether the medical needle deviates from the guide line. In such a case, each of the ultrasound systems **110** and **130** further includes a first warning unit **61** for notifying deviation of the medical needle under the control of the central processing unit **80**. The first warning unit **61** may warn the deviation of the medical needle with sound or light.

[0035] The central processing unit **70** in each of the ultrasound systems **110** and **130**, determines the time, at which the medical needle reaches the lesion, based on the position information of the lesion and the position information of the medical needle. In such a case, each of the ultrasound systems **110** and **130** further includes a second warning unit **62** for notifying the arrival of the medical needle at the lesion under the control of the central processing unit **80**. The second warning unit **62** may warn the arrival of the medical needle with sound or light. The first warning unit **61** and the second warning unit **62** may be embodied with one warning unit.

[0036] The image processing in each of the ultrasound systems **100** to **130** includes a first image processor **51**, a second image processor **52** and a second image processor **53** as shown in FIG. **10**. The first image processor **51** forms the ultrasound images based on the ultrasound echo signals inputted to the probe **10**. The ultrasound images may include 2-dimensional ultrasound images, 3-dimensional ultrasound images and slice images. The second image processor **52** matches the coordinates of the external image with the coordinates representing probe positions based on the posi-

tion information of the lesion in the external image inputted from the user and the position information of the probe, which is generated in the probe position information generating unit **20** so as to reconstruct the external image. The external image may be reconstructed to a 2-dimensional image, a 3-dimensional image or a slice image. The third image processor **53** fuses the ultrasound image and the reconstructed external image received from the first and second image processors **51** and **52**, respectively. For example, a fused 2-dimensional image by be formed by fusing the 2-dimensional ultrasound image and the 2-dimensional external image or a fused slice image may be formed by fusing the ultrasound slice image and the external slice image. The third image processor **53** in each of the ultrasound systems **110** and **130** forms the fusion image, in which the position of the medical needle is indicated, based on the position information of the medical needle. In such a case, the display unit **60** displays the fusion image, in which the position of the medical needle is indicated, under the control of the central processing unit **70**.

[0037] As shown in FIG. **11**, the second image processor **52** includes a coordinate calibration unit **52***a*, an external image selection unit **52***b* and an external image reconstruction unit **52***c*. The coordinate calibration unit **52***a* calibrates coordinates of the lesion in the external image, which has different coordinates from coordinates of the ultrasound image. That is, the coordinate calibration unit **52***a* performs calibration upon origins in different coordinate systems including a coordinate system representing the external image such as the CT image, the MRI image or the PET image and a coordinate system representing the position of the probe, e.g., a global magnetic tracker coordinate system. For this calibration, the coordinate calibration unit **52***a* generates the coordinates of the lesion in the ultrasound image based on the position information of the probe inputted from the probe position information providing unit **20**. The coordinate calibration unit **52***a* calibrates the coordinates of the lesion in the external image, which are inputted through the user input unit **40**, based on the coordinates of the lesion in the ultrasound image. In case that the position of the lesion is designated by 4 points on each of two more external images, the coordinates of the lesion may be calibrated by using a 4-point matching method.

[0038] If the position of the lesion in the external image is expressed as position vectors g1, g2, g3 and g4, and the position of the lesion in the ultrasound image is expressed as position vectors v1, v2, v3 and v4, then the position vectors v1, v2, v3 and v4 may be considered as vectors obtained by applying a transform matrix M to the position vectors g1, g2, g3 and g4 as the following equation (1).

$$[v1 v2 v3 v4] = M[g1 g2 g3 g4] \tag{1}$$

[0039] The transform matrix M is defined as the following equation (2).

$$M = [v1 v2 v3 v4][g1 g2 g3 g4]^{-1} \tag{2}$$

[0040] As mentioned above, the coordinate calibration unit **52***a* applies the transform matrix M to the coordinates of the external image, thereby matching the coordinates of the external image with the coordinates of the ultrasound image.

[0041] The external image selection unit **52***b* selects an image, which is most similar to the ultrasound image among

external images provided from external image signal providing unit **30**, based on the coordinate calibration result.

[0042] The external image reconstruction unit **52c** reconstructs the selected external image based on the coordinate calibration result. Thereafter, the reconstructed image may be rendered.

[0043] It is preferable that the ultrasound image and the external image may be fused in a voxel unit. The third image processor **53** may perform a minimum value-based fusing process, a maximum value-based fusing process or a weighted value-based fusing process according to the fusion condition inputted through the user input unit **40**. A fusion voxel value Vf defined by a voxel value Vmc of the external image and a voxel value Vus of the ultrasound image according to the minimum value-based fusing process, the maximum value-based fusing process and the weighted value-based fusing process may be represented as the following equations (3), (4) and (5), respectively.

$$V_f(x,y,z) = \text{Min}(V_{mc}(x,y,z), V_{us}(x,y,z)) \quad (3)$$

[0044] $$V_f(x,y,z) = \text{Max}(V_{mc}(x,y,z), V_{us}(x,y,z)) \quad (4)$$

$$V_f(x,y,z) = \alpha \times (V_{mc}(x,y,z), (1-\alpha) \times V_{us}(x,y,z)) \quad (5)$$

[0045] In the equation (5), $\alpha$ represents a weight value.

[0046] As mentioned above, since the fusion image of the ultrasound image and the external image is displayed in accordance with the present invention, the lesion in the target object can be more easily recognized. Therefore, it can provide convenience to an interventional ultrasound clinical application and reliability thereof can be improved.

[0047] An embodiment may be achieved in whole or in parts by the ultrasound system, including: a probe configured to be placed upon the target object and transmit ultrasound signals to the target object and receive ultrasound echo signals reflected from the target object, said target object including a lesion; a position information providing unit configured to provide position information of the probe on the target object; an external medical image signal providing unit configured to receive external medical image signals of the target object from an external imaging device; a user input unit configured to receive position information of the lesion in the external medical image from a user; an image processing unit configured to form an ultrasound image based on the ultrasound echo signals, form the external image based on the external image signals and form a fusion image of the ultrasound image and the external image based on the position information of the probe and the position information of the lesion; and a display unit configured to display the ultrasound image, the external image and the fusion image.

[0048] Any reference in this specification to "one embodiment,""an embodiment,""example embodiment," etc., means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the invention. The appearances of such phrases in various places in the specification are not necessarily all referring to the same embodiment. Further, when a particular feature, structure or characteristic is described in connection with any embodiment, it is submitted that it is within the purview of one skilled in the art to effect such feature, structure or characteristic in connection with other ones of the embodiments.

[0049] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, numerous variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

What is claimed is:

1. An ultrasound system, comprising:

a probe configured to be placed upon the target object and transmit ultrasound signals to the target object and receive ultrasound echo signals reflected from the target object, said target object including a lesion;

a position information providing unit configured to provide position information of the probe on the target object;

an external medical image signal providing unit configured to receive external medical image signals of the target object from an external imaging device;

a user input unit configured to receive position information of the lesion in the external medical image from a user;

an image processing unit configured to form an ultrasound image based on the ultrasound echo signals, form the external image based on the external image signals and form a fusion image of the ultrasound image and the external image based on the position information of the probe and the position information of the lesion; and

a display unit configured to display the ultrasound image, the external image and the fusion image.

2. The ultrasound system of claim 1, further comprising a central processing unit configured to control the probe position information providing unit, the external image signal providing unit, the user input unit, the image processing unit and the display unit.

3. The ultrasound system of claim 2, wherein the position information providing unit further provides position information of a medical needle inserted into the target object in the ultrasound image, and the display unit displays a position of the medical needle on the fusion image based on the position information of the medical needle under the control of the central processing unit.

4. The ultrasound system of claim 3, wherein central processing unit computes a distance between the lesion and the medical needle based on the position information of the lesion and the position information of the medical needle, and the display unit displays the distance between the lesion and the medical needle on the fusion image.

5. The ultrasound system of claim 3, further comprising a storing unit configured to store the ultrasound image, the external image, the fusion image and an image displayed on the display unit,

wherein the user input unit further receives a display screen save request from the user, the central processing unit captures a screen displayed on the display unit

in response to the display screen save request and the captured screen is stored in the storing unit.

6. The ultrasound system of claim 3, wherein the user input unit further receives a guide line from the user, the central processing unit generates position information of the guide line and the display unit displays the guide line on the fusion image based on the position information of the guide line.

7. The ultrasound system of claim 3, wherein the central processing unit forms a guide line based on the position information of the lesion and the position information of the medical needle, and the display unit displays the guide line on the fusion image based on the position information of the guide line.

8. The ultrasound system of claim 7, wherein the central processing unit determines deviation of the medical needle by comparing the position information of the guide line and the position information of the medical needle, and the ultrasound system further comprises a warning unit configured to warning the deviation of the medical needle.

9. The ultrasound system of claim 3, wherein the central processing unit determines an arrival time of the medical needle at the lesion based on the position information of the lesion and the position information of the medical needle.

10. The ultrasound system of claim 3, wherein the position information providing unit includes:

a first field generator for generating a first electromagnetic field to track the position of the probe;

a first detector mounted on or built in the probe for generating detection signals in response to the first electromagnetic field; and

a first position information generator for generating the position information of the probe.

11. The ultrasound system of claim 10, wherein the position information providing unit further includes:

a second field generator for generating a second electromagnetic field to track the position of the medical needle;

a second detector mounted on or built in the medical needle for generating detection signals in response to the second electromagnetic field; and

a second position information generator for generating the position information of the probe.

12. The ultrasound system of claim 11, wherein a wavelength of the first electromagnetic field is different from a wavelength of the second electromagnetic field.

13. The ultrasound system of claim 3, wherein the image processing unit includes:

a first image processor for forming the ultrasound images based on the ultrasound echo signals;

a second image processor for reconstructing the external images based on the position information of the probe and the position information of the lesion; and

a third image processor for fusing the ultrasound image and the external image received from the first image processor and the second image processor, respectively.

14. The ultrasound system of claim 13, wherein the second image processor includes:

a coordinate calibration unit for generating coordinates of the lesion in the ultrasound image based on the position information of the probe and calibrating coordinates of the lesion in the external image based on the coordinates of the lesion;

an external image selection unit for selecting one external image most similar to the ultrasound image among a plurality of external medical images based on the coordinate calibration result; and

an external image reconstruction unit for reconstructing the selected external image.

15. The ultrasound system of claim 3, wherein the external image signal providing unit provides the image signals obtained one of a computerized tomography scanner, a magnetic resonance imaging system and a positron emission tomography scanner.

16. The ultrasound system of claim 3, wherein the ultrasound echo signals and the position information of the medical needle are inputted in real time.

* * * * *

| 专利名称(译) | 用于融合超声图像和外部医学图像的超声系统 | | |
|---|---|---|---|
| 公开(公告)号 | US20080091106A1 | 公开(公告)日 | 2008-04-17 |
| 申请号 | US11/873100 | 申请日 | 2007-10-16 |
| 申请(专利权)人(译) | MEDISON CO．，LTD. | | |
| 当前申请(专利权)人(译) | MEDISON CO．，LTD. | | |
| [标]发明人 | KIM CHEOL AN<br>SHIN SEONG CHUL | | |
| 发明人 | KIM, CHEOL AN<br>SHIN, SEONG CHUL | | |
| IPC分类号 | A61B8/14 | | |
| CPC分类号 | A61B8/4416 A61B8/0833 A61B8/4245 | | |
| 优先权 | 1020060100910 2006-10-17 KR | | |
| 外部链接 | Espacenet    USPTO | | |

摘要(译)

提供一种超声系统，其包括：探针，被配置为放置在目标对象上并将超声信号发送到目标对象并接收从目标对象反射的超声回波信号，所述目标对象包括病变;位置信息提供单元，被配置为在目标对象上提供探针的位置信息;外部医学图像信号提供单元，被配置为从外部成像装置接收目标对象的外部医学图像信号;用户输入单元，被配置为从用户接收外部医学图像中的病变的位置信息;图像处理单元，被配置为基于超声回波信号形成超声图像，基于外部图像信号形成外部图像，并基于探头的位置信息形成超声图像和外部图像的融合图像。病变的位置信息;显示单元，被配置为显示超声图像，外部图像和融合图像。