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(54) **MEDICAL IMAGING SYSTEM AND METHOD CONTAINING ULTRASOUND DOCKING PORT**

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(52) **U.S. Cl.** **600/427**; 600/437

(58) **Field of Classification Search** 600/427, 600/437, 440; 378/163; 382/132
See application file for complete search history.

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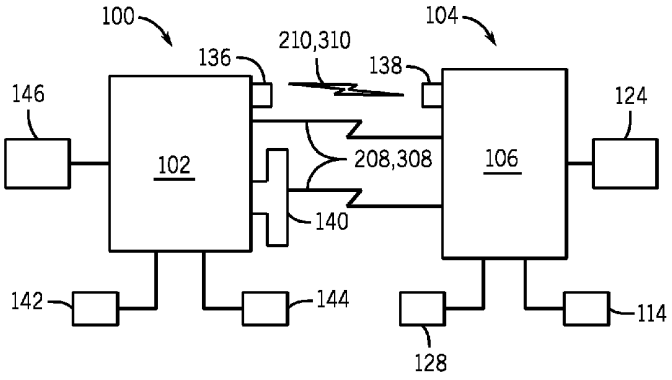
(57) **ABSTRACT**

An ultrasound medical imaging system and non-ultrasound medical imaging system are combined and communicate via a suitable docking port, which is supported by the non-ultrasound medical imaging system and configured to receive the ultrasound medical imaging system. The systems can communicate directly, indirectly, and/or wirelessly. Each can also be configured for cross-imaging in the other modality, displaying medical imagery from the other modality on respective and/or combined displays, and/or control by a user interface of the other and/or a common user interface. Registry between patient imagery is possible, and improved workflow is provided.

20 Claims, 5 Drawing Sheets



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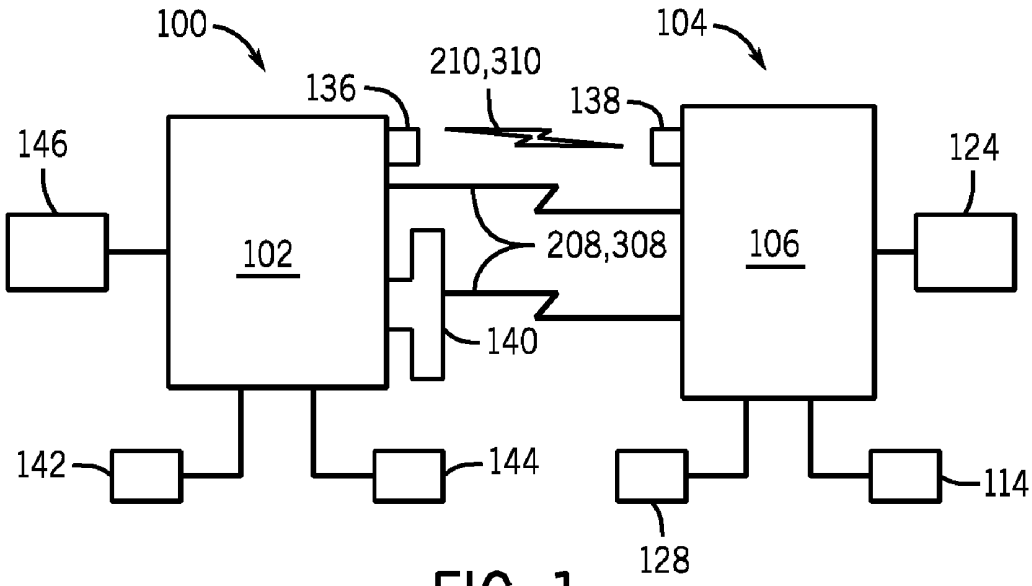
100
104
210,310
136
138
146
124
102
208,308
106
140
142
144
114
128

FIG. 1

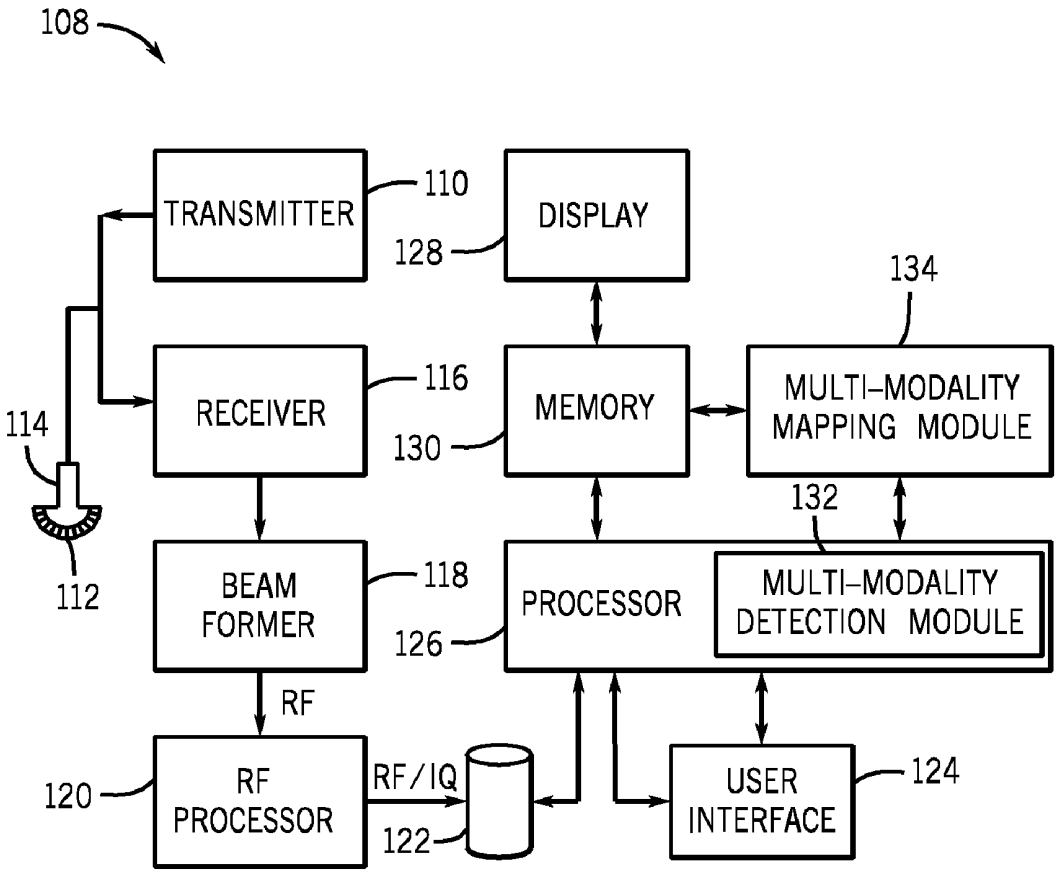
108
TRANSMITTER
110
DISPLAY
128
134
RECEIVER
116
MEMORY
MULTI-MODALITY MAPPING MODULE
114
130
132
112
BEAM FORMER
118
PROCESSOR
MULTI-MODALITY DETECTION MODULE
126
RF
120
RF PROCESSOR
RF/IQ
122
USER INTERFACE
124

FIG. 2

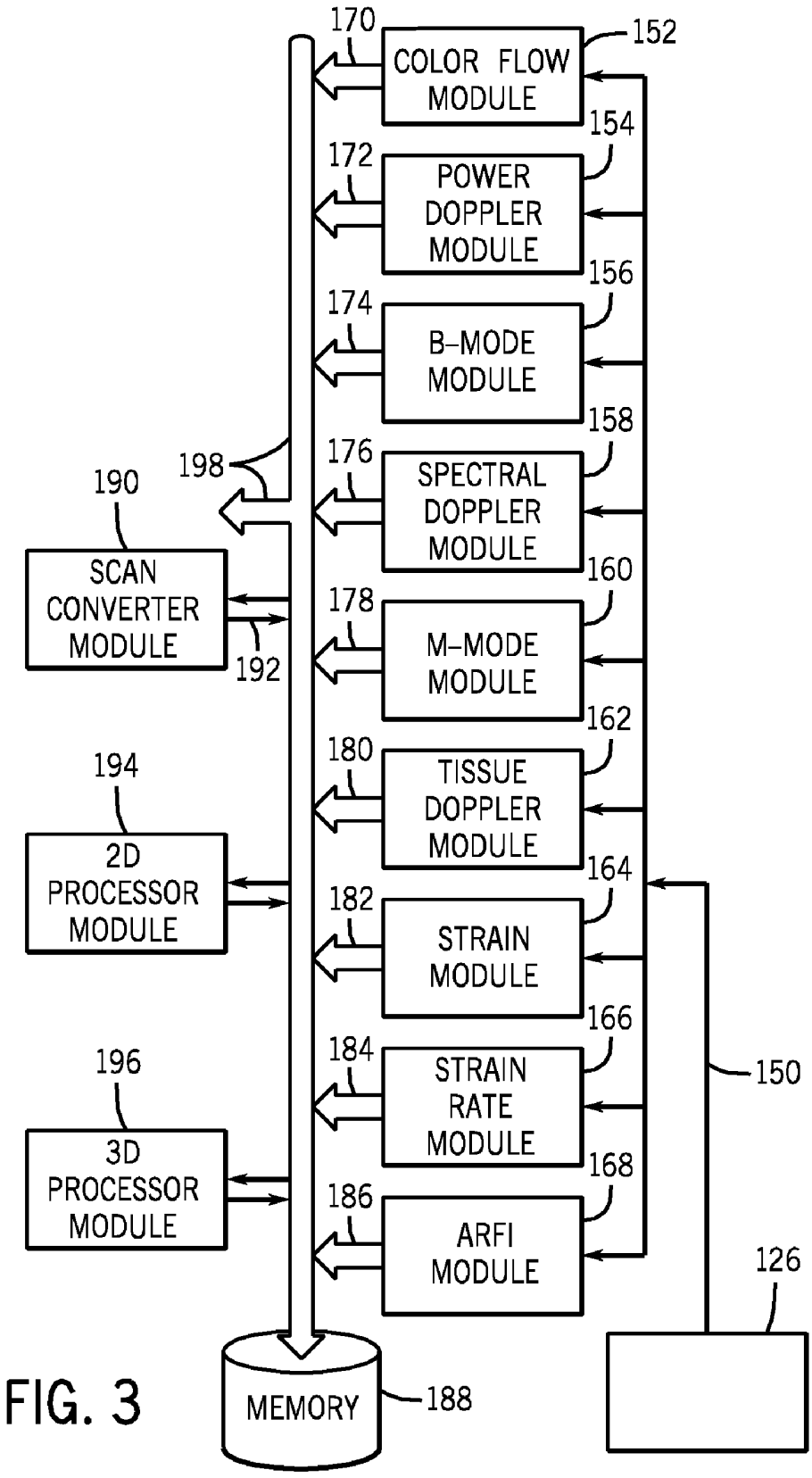
170
COLOR FLOW MODULE
152
154
172
POWER DOPPLER MODULE
156
174
B-MODE MODULE
158
198
176
SPECTRAL DOPPLER MODULE
190
160
SCAN CONVERTER MODULE
178
M-MODE MODULE
192
162
180
TISSUE DOPPLER MODULE
194
164
2D PROCESSOR MODULE
182
STRAIN MODULE
166
196
184
STRAIN RATE MODULE
150
3D PROCESSOR MODULE
168
186
ARFI MODULE
126
MEMORY
188

FIG. 3

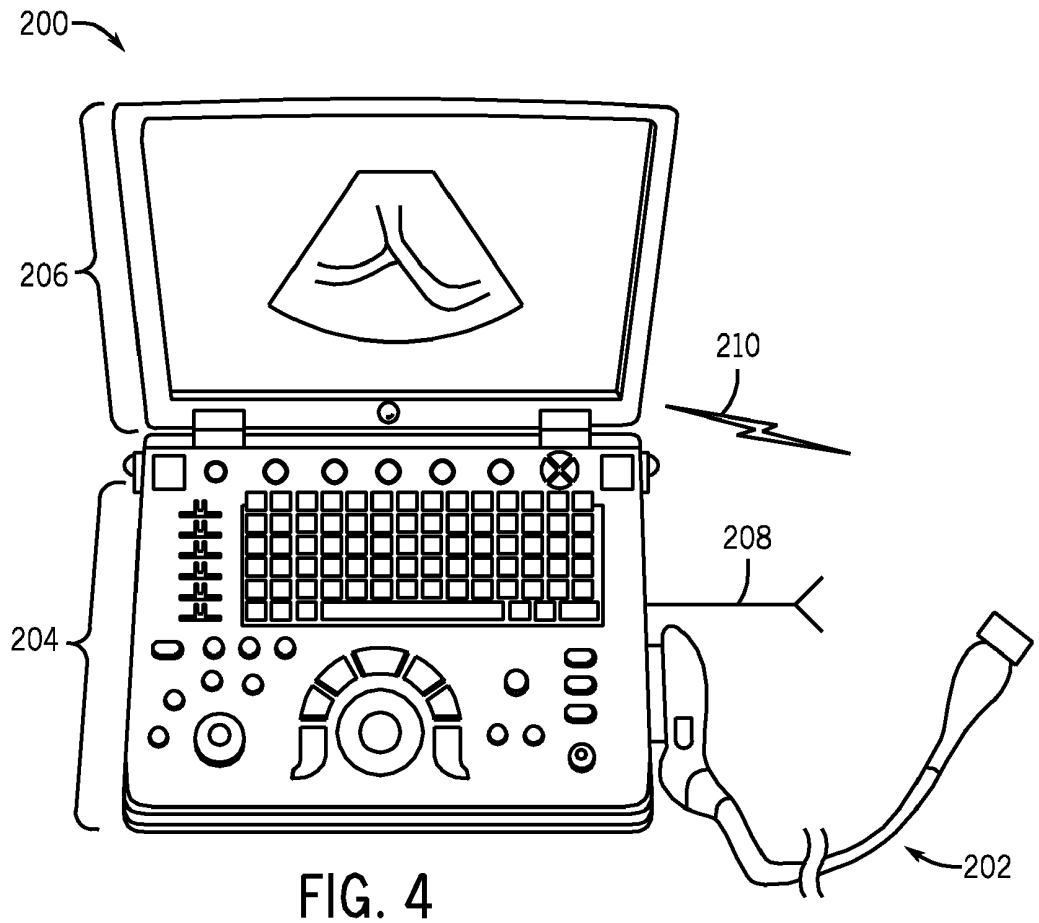

FIG. 4

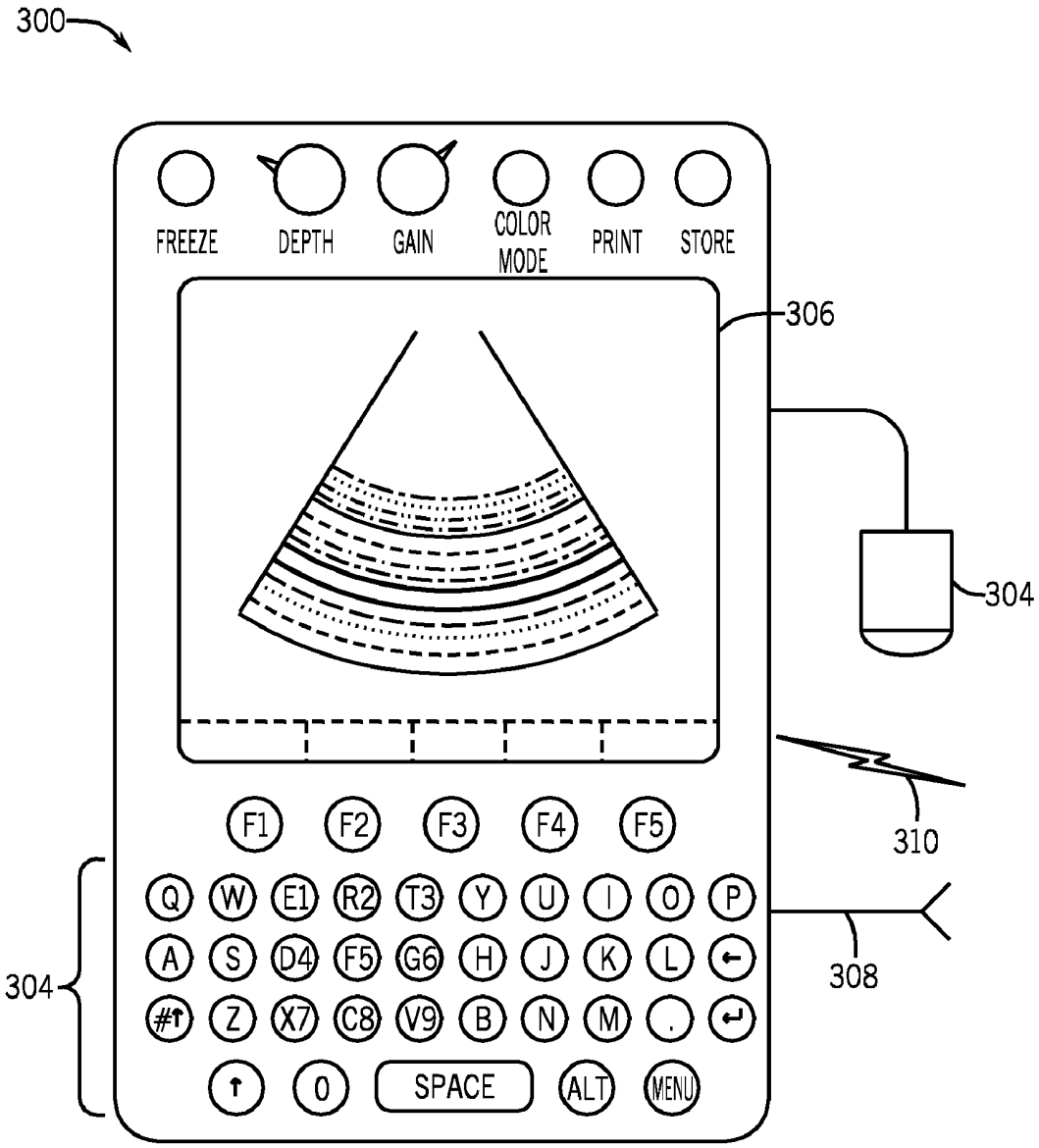
300
FREEZE
DEPTH
GAIN
COLOR MODE
PRINT
STORE
306
304
310
F1
F2
F3
F4
F5
Q W E1 R2 T3 Y U I O P
A S D4 F5 G6 H J K L
#↑ Z X7 C8 V9 B N M .
↑ 0 SPACE ALT MENU
304
308

FIG. 5

MEDICAL IMAGING SYSTEM AND METHOD CONTAINING ULTRASOUND DOCKING PORT

CROSS-REFERENCE(S) TO RELATED APPLICATION(S)

—

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

—

REFERENCE(S) TO MICROFICHE APPENDIX AND/OR COPYRIGHT PROTECTION

—

BACKGROUND

1. Field of Invention

In general, the inventive arrangements relate to medical imaging systems, and more specifically, to combining medical imaging systems, such as, for example, providing an ultrasound docking port on a non-ultrasound medical imaging system.

2. Description of Related Art

For illustrative, exemplary, representative, and non-limiting purposes, preferred embodiments of the inventive arrangements will be described in terms of medical imaging systems. For example, common medical imaging systems include medical equipment for radiology, functional imaging, molecular imaging, vascular imaging, fluoroscopy, angiography, mammography, neurology, oncology, radio pharmacology, x-ray, nuclear medicine (NM), magnetic resonance imaging (MRI), positron emission tomography (PET), computed tomography (CT), ultrasound, and/or the like. However, the inventive arrangements are not limited in these regards.

Now then, in multi-modality medical imaging systems, various imaging techniques can be combined to acquire patient images. For example, in a PET/CT imaging system, imaging from both modalities can be combined to enhance patient imagery. While one such system can capture functional imagery, the other can capture anatomical imagery, with each enhancing and/or complementing the other. However, most medical imaging systems are not well-equipped to readily accommodate additional modality imaging systems, and successful fusion thereof remains desirable—e.g., progress has been made in image registration between modalities, but little less.

Thus, continued progress remains desirable for combining many attributes of multi-modality medical imaging systems. For example, it remains desirable to provide many medical imaging systems with a convenient ultrasound docking port, particularly as ultrasound equipment and/or systems become more portable, ubiquitous, useful, and/or practical, as a desirable add-in to numerous other imaging modality applications.

SUMMARY

In various embodiments, multi-modality medical imaging systems and methods combine and/or fuse ultrasound medical imaging systems and non-ultrasound medical imaging systems, particularly via a docking port carried on, and/or otherwise supported by, the non-ultrasound medical imaging system so as to receive the ultrasound medical imaging system. The ultrasound medical imaging system and non-ultrasound medical imaging system can communicate directly, indirectly, and/or wirelessly.

When they are joined, each system can be configured for cross-imaging in the other modality. Each system can also be configured to display medical imagery from the other modality on respective and/or combined displays. Each system can also be configured to be controlled by a user interface on the other system and/or a common user interface. Registry between patient imagery is provided, as is improved workflow between the systems.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

A clear conception of the advantages and features constituting inventive arrangements, and of various construction and operational aspects of typical mechanisms provided by such arrangements, are readily apparent by referring to the following illustrative, exemplary, representative, and non-limiting figures, which form an integral part of this specification, in which like numerals generally designate the same elements in the several views, and in which:

FIG. **1** illustrates a block diagram of a medical imaging system configured in accordance with various embodiments of the inventive arrangements;

FIG. **2** illustrates a block diagram of an ultrasound system configured in accordance with various embodiments of the inventive arrangements;

FIG. **3** illustrates representative sub-routine modules for operating the ultrasound system of FIG. **2**;

FIG. **4** illustrates an embodiment of a light-weight portable ultrasound system configured in accordance with various embodiments of the inventive arrangements; and

FIG. **5** illustrates an embodiment of an ultra light-weight portable ultrasound system configured in accordance with various embodiments of the inventive arrangements.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the figures, preferred embodiments of the inventive arrangements will be described in terms of medical imaging systems. However, the inventive arrangements are not limited in this regard. For example, while variously described embodiments may provide ultrasound docking techniques in other imaging modality contexts, other applications are also hereby contemplated, including various other consumer, industrial, radiological, and inspection systems, and/or the like.

Now then, referring to FIG. **1**, a first medical imaging system **100** includes medical equipment **102** for an imaging modality, such radiology, functional imaging, molecular imaging, vascular imaging, fluoroscopy, angiography, mammography, neurology, oncology, radio pharmacology, x-ray, NM, MRI, PET, CT, and/or various combinations thereof, and this first medical imaging system **100** is not particularly configured for ultrasound imaging. In an x-ray based first medical imaging system **100**, for example, an x-ray source (not shown) and detector (not shown) operate together to form patient images. In any event, a second medical imaging system **104** also includes medical equipment **106** for an imaging modality, and this second medical imaging system **104** is particularly configured for ultrasound imaging.

Referring now to FIG. **2**, taken in conjunction with FIG. **1**, an ultrasound system **108** is depicted. More specifically, the

ultrasound system **108** includes a transmitter **10** that drives transducers **112** within an ultrasound probe **114** to emit ultrasonic signals into an object, such as a body (not shown). A variety of geometries may be used. For example, in operation, the ultrasound system **108** may acquire data sets by various techniques (e.g., freehand scanning, scanning using transducers **112** having position sensors, scanning using a 2D or matrix array, 3D scanning, real-time 3D scanning, volume scanning, 4D scanning, etc.), particularly by moving the transducers **112** along a linear and/or arcuate path while scanning a region of interest, which may be moved manually, mechanically, electronically, and/or by any various combinations thereof.

In any event, the transmitted ultrasonic signals are backscattered from the object, such as from blood cells or muscular tissue within a body, to produce echo signals that return to the transducers **112**. These echo signals are then received by a receiver **116** in communication with the transducers **112**. These echo signals are then passed from the receiver **116** to a beamformer **118**, which performs beamforming and outputs RF signal data therefrom. The RF signal data then passes from the beamformer **118** to an RF processor **120**. In an optional embodiment, the RF processor **120** may also include a complex demodulator (not shown) that demodulates the RF signal data to form IQ data pairs that represent the echo signals. Either the RF signal data or IQ data pairs are then routed from the RF processor **120** to a RF/IQ buffer **122** for temporary storage. A user interface **124** can also be used to control operation of the ultrasound system **108**, including, for example, controlling input of patient data, changing a scanning or display parameter, and/or the like.

Preferably, the ultrasound system **108** also includes a processor **126** to process the acquired ultrasound information (e.g., the RF signal data or IQ data pairs) from the RF/IQ buffer **122** and prepare frames of ultrasound information for display on a display **128**. Preferably, the processor **126** is configured to perform one or more processing operations according to selectable functions performed on the acquired ultrasound information. For example, the acquired ultrasound information can be processed in real-time during a scanning session as the echo signals are received; additionally, and/or alternatively, the acquired ultrasound information can also be stored temporarily in the RF/IQ buffer **122** (or other) during a scanning session, and then processed in other than real-time in a live or off-line operation.

In a preferred embodiment, the ultrasound system **108** continuously acquires ultrasound information at a frame rate in excess of, for example, fifty frames per second, which is approximately the perception rate of the human eye. Thus, the acquired ultrasound information can be displayed on the display **128** at a slower frame-rate. Accordingly, a memory **130** can be provided between the processor **126** and the display **128** for storing processed frames of the acquired ultrasound information that are not yet ready and/or needed for immediate display on the display **128**. In an exemplary embodiment, for example, the memory **130** is of sufficient capacity to store at least several seconds worth of processed frames of the acquired ultrasound information. Preferably, these frames of information are stored in a manner that facilitates their later retrieval according to an order and/or time and/or other of acquisition. In any event, the memory **130** may comprise any known data storage medium.

In addition, the processor **126** may also contain therewithin, and/or otherwise communicate with and/or control, a multi-modality detection module **132**, which may be implemented in hardware, software, and/or any combination(s) thereof. More specifically, the multi-modality detection module **132** can be configured to receive signals from the user interface **124** through the processor **126**, and it is particularly configured to recognize the presence and/or absence of the first medial imaging system **100**. Alternatively, and/or additionally, the multi-modality detection module **132** may also be contained within and/or supported by the first medical imaging system **100** as well, in which it is configured to recognize the presence and/or absence of the second medial imaging system **104**. It allows the medical imaging systems **100**, **104** to recognize the presence and/or absence of one another.

Preferably, the multi-modality detection module **132** is configured to transfer information to a multi-modality mapping module **134**, which is in communication with the memory **130** and/or remote therefrom. In any event, the multi-modality mapping module **134** may also be implemented in hardware, software, and/or any combination(s) thereof, and it may be implemented by the first medical imaging system **100** and/or second medical imaging system **104**. It allows the medical imaging systems **100**, **104** to map functions thereof based on received signals therefrom. The image detection and/or image mapping may change based on the state of the overall multi-modality medical imaging system—i.e., the first medical imaging system **100** and/or second medical imaging system **104**.

Referring now to FIG. **3**, an exemplary functional block diagram of the ultrasound system **108** of FIG. **2** is depicted. More specifically, the operation of the ultrasound system **108** is functionally illustrated as a conceptual collection of sub-module routines, although it may also be implemented in hardware, software, and/or any combination(s) thereof. For example, the sub-module routines of FIG. **3** may be implemented utilizing an off-the-shelf PC with i) a single processor, or ii) multiple processors with functional operations distributed between the processors, and/or otherwise. Alternatively, the sub-module routines may also be implemented utilizing a hybrid configuration, in which certain modular functions are implemented in hardware and other modular functions are implemented in software, etc.

In any event, operation of the sub-module routines is preferably controlled by the **126** processor and/or the like. More specifically, the sub-module routines **152-168** preferably perform mid-processor operations. For example, the processor **126** communicates ultrasound data **150** in one of several forms, such as IQ data pairs representing real and/or imaginary components associated with various data samples. The IQ data pairs can then be provided to one or more of a color flow module **152**, power Doppler module **154**, B-mode module **156**, spectral Doppler module **158**, and/or M-mode module **160**. Optionally, other modules may also be included, such as a tissue Doppler module **162**, strain module **164**, strain rate module **166**, and/or Acoustic Radiation Force Impulse (ARFI) module **168**. The tissue Doppler module **162**, strain module **164**, and strain rate module **166** may, for example, together define an echocardiographic (ECG) processing configuration.

Preferably, each of the sub-module routines **152-168** are configured to process the IQ data pairs in a corresponding manner to respectively generate, for example, color-flow data **170**, power Doppler data **172**, B-mode data **174**, spectral Doppler data **176**, M-mode data **178**, tissue Doppler data **180**, strain data **182**, strain rate data **184**, and/or ARFI data **186**, all of which may be stored in a memory **188**, such as the memory **130** of FIG. **2**, before subsequent processing. The data **170-186** may be stored, for example, as sets of vector data values,

where each set defines an individual ultrasound image frame. The vector data values can be organized, for example, based on a polar coordinate system.

In addition, a scan converter module **190** can access vector data values associated with an image frame and convert the vector data values into Cartesian coordinates to generate an ultrasound image frame **192**, particular formatted for display on the display **128** (see FIG. **2**). The ultrasound image frames **192** generated by the scan converter module **190** can also be provided back to the memory **188** for subsequent processing, such as by a 2D processor module **194** and/or a 3D processor module **196**, and/or the like, and they may be communicated over a bus **198** to a database (not shown) and/or to other processors (not shown) for additional and/or subsequent processing.

Referring now to FIG. **4**, an exemplary embodiment of a light-weight portable ultrasound system **200**, configured in accordance with various embodiments of the inventive arrangements, is shown. More specifically, the ultrasound system **108** of FIG. **2** is configured as the light-weight portable ultrasound system **200**, including a probe **202**, user interface **204**, and/or display **206**. As depicted, the display **206** is an integrated component of the light-weight portable ultrasound system **200**, although it may also be separate therefrom (not shown). Such a light-weight portable ultrasound system **200** is particularly well-suited to be carried under a person's arms, or in an approximately briefcase-sized carrying case, backpack, and/or the like. For example, it may be dimensioned similar to a laptop computer, and/or the like, such as being approximately 10 inches×14 inches and/or weighing approximately 10 pounds or less, such that it is easily portable by a user. In one embodiment, it communicates with other equipment, such as the first medical imaging system **100** (see FIG. **1**), using a direct connection **208**, such as a serial cable, parallel cable, USB port, and/or LAN line. In another embodiment, it communicates with other equipment, such as the first medical imaging system **100** (see FIG. **1**), using an indirect and/or wireless connection **210**.

Referring now to FIG. **5**, another exemplary embodiment of an ultra light-weight portable ultrasound system **300**, configured in accordance with various embodiments of the inventive arrangements, is shown. More specifically, the ultrasound system **108** of FIG. **2** is configured as the ultra light-weight portable ultrasound system **300**, including a probe (not shown), user interface **304**, and/or display **306**. As depicted, the display **306** is an integrated component of the ultra light-weight portable ultrasound system **300**, although it may also be separate therefrom (not shown). Such an ultra light-weight portable ultrasound system **300** is particularly well-suited to be carried in a person's hands, or in a pocket, belt clip, purse, and/or the like. For example, it may be dimensioned similar to a stethoscope, cell phone, palm computer, personal digital assistant (PDA), portable media player, iPOD by Apple Inc. of Cupertino, Calif., and/or the like, such as being approximately 2 inches×4 inches and/or weighing approximately 1 pound or less, such that it is easily portable by a user. In one embodiment, it communicates with other equipment, such as the first medical imaging system **100** (see FIG. **1**) using a direct connection **308**, such as a serial cable, parallel cable, USB port, and/or LAN line. In another embodiment, it communicates with other equipment, such as the first medical imaging system **100** (see FIG. **1**) using an indirect and/or wireless connection **310**.

Referring now back to FIG. **1**, the inventive arrangements can now be better illustrated and appreciated. More specifically, the first medical imaging system **100** (non-ultrasound) and second medical imaging system **104** (ultrasound) communicate with one another through a direct connection **208**, **308** and/or indirect and/or wireless connection **210**, **310**. Accordingly, physical and/or electrical connections are made between the first medical imaging system **100** and second medical imaging system **104**, which allow power and/or data signals and/or the like to be shared therebetween. Communications can be unidirectional and/or bidirectional, as well as employ multiple lines and/or channels, as needed and/or desired, and particularly configured, for example, to enhance throughput.

In an embodiment of direct communication, the first medical imaging system **100** is configured with a docking station **140** to physically receive the second medical imaging system **104**, thereby enabling transmissions therebetween. For example, with one suitable physical arrangement, the first medical imaging system **100** contains a receiving receptacle, such as, e.g., the docking station **140**, into which the second medical imaging system **104** is received. This particular arrangement allows securing and/or releasably securing the first medical imaging system **100** and second medical imaging system **104** together.

In an embodiment of indirect and/or wireless communication, the first medical imaging system **100** is configured with a first wireless transmitter and/or receiver **136**, and the second medical imaging system **104** is likewise configured with a second wireless transmitter and/or receiver **138**, thereby enabling transmissions therebetween.

As such, the first medical imaging system **100** can display medical imaging information therefrom on a display **142** in communication therewith, as can the second medical imaging system **104** display medical imaging information therefrom on its display **128** in communication therewith. As needed and/or desired, however, the first medical imaging system **100** can also display medical imaging information on the display **128** of the second medical imaging system **104**, as can the second medical imaging system **104** also display medical imaging information on the display **142** of the first medical imaging system **100**. These images can also be displayed thereon in any suitable fashion, and the displays **128**, **142** can also form and/or be a part of a singular and/or plural common display arrangement. In addition, one medical imaging system **100**, **104** can be used to determine a region of interest, for example, while the other medical imaging system **100**, **104** images thereabout.

In addition, as the second medical imaging system **104** includes an ultrasound probe **114** to emit ultrasonic signals into an object such as a body (not shown), so can the first medical imaging system **100** also contain an ultrasound probe **144**. Accordingly, the ultrasound probes **114**, **144** can either be fixed and/or docked to either the first medical imaging system **100** and/or second medical imaging system **104**. As such, ultrasound images can be gathered by either or both of the first medical imaging system **100** and/or second medical imaging system **104**, which can again be suitably displayed on the displays **128**, **142**. Processing power and/or other functionality can also be similarly shared therebetween the medical imaging systems **100**, **104**.

As such, the first medical imaging system **100** can operate and perform as an ultrasound imaging system, particularly when in communication with the second medical imaging system **104**. Of course, the second medical imaging system **104** can also operate and perform as an ultrasound imaging system, including when in communication in with the first medical imaging system **100**. Accordingly, the first medical imaging system **100** and second medical imaging system **104** are brought together and/or fused, both operationally and/or functionally.

In addition, when the first medical imaging system **100** operates in its traditional non-ultrasound imaging mode and the second medical imaging system **104** operates in its traditional ultrasound imaging mode, imagery therefrom can also be fused, including registering the imagery therebetween. In this context, registering imagery refers, for example, to bringing the geometries and/or coordinate systems of the imaged object together in a defined relationship, as between the first medical imaging system **100** and/or second medical imaging system **104**. Accordingly, ultrasound data can be merged with before or after acquired images from other imaging modalities, such as the first medical imaging system **100**, including both in real-time and/or delayed imagery. As such, imaging and/or other comparisons can be made while taking advantage of the respective strengths of each imaging modality. These comparisons can be either side-by-side on one or the other or both of the displays **128**, **142**, and/or by overlaying the images from the first medical imaging system **100** and/or second medical imaging system **104**. It can also be done in real-time and/or sometime afterwards.

In addition, as the second medical imaging system **104** includes a user interface **124** to interface therewith, the first medical imaging system **100** also includes a user interface **146** to interface therewith. In addition, the first medical imaging system **100** can be controlled by the user interface **124** of the second medical imaging system **104**, while the second medical imaging system **104** can also be controlled by the user interface **146** of the first medical imaging system **100**. In addition, the user interfaces **124**, **146** can also form and/or be a part of a singular and/or plural user interface. When the medical imaging systems **100**, **104** are connected, one of the user interfaces **124**, **146** and/or displays **128**, **142** can also control and/or dominate the other respective user interface **124**, **146** and/or displays **128**, **142**.

It can be noted, for example, that while providing and/or operating a separate first medical imaging system **100** and/or separate second medical imaging system **104** will ordinarily require multiple operators (not shown) and/or a single operator (not shown) to separately control each system **100**, **104** individually, this can result in, for example, medical errors due to incorrect or improper data input, delays when moving patients (not shown) between systems **100**, **104**, etc. However, with the inventive arrangements, on the other hand, these problems can be minimized and/or overcome. Exam time can be decreased, yet improved medical care is provided. A single work flow (and/or single work list for a single patient) is thereby provided across a multi-modality platform.

Since the first medical imaging system **100** and second medical imaging system **104** are in communication with one another through the direct connection **208**, **308** and/or indirect and/or wireless connection **210**, **310**, each system **100**, **104** preferably detects the other system **100**, **104** when they are working and/or functioning in tandem. For example, a manual operation on either the first medical imaging system **100** and/or second medical imaging system **104** could be used to determine the presence of the other system **100**, **104**, as well as could a periodic polling configuration, as needed and/or desired, as well as via the direct connection **208**, **308** through the docking station **140** and/or the like. Accordingly, the multi-modality detection module **132** and/or multi-modality mapping module **134** (see FIG. **2**) can be suitably invoked.

Automatic protocol configurations can also be generated based on system configurations, including, for example, the number, type, etc. of ultrasound probes **114**, **144** each system **100**, **104** is using. In addition, automatic synchronization of patient data and/or images from the first medical imaging system **100** and/or second medical imaging system **104** can also be provided, and multi-modality images can be gathered in a single patient examination from a single, combined imaging platform.

In accordance with all of the foregoing, technical effects include providing medical imaging systems and methods containing dedicated ultrasound docking ports. More specifically, ultrasound medical imaging systems and non-ultrasound medical imaging systems are combined and/or configured for communicating with one another via a docking port provided on, and/or otherwise supported by, the non-ultrasound medical imaging system, which is particularly outfitted and/or configured to receive the ultrasound medical imaging system. Medical patient workflows and/or imagery, in particular, are thereby enhanced.

Accordingly, it should be readily apparent that this specification describes illustrative, exemplary, representative, and non-limiting embodiments of the inventive arrangements. Accordingly, the scope of the inventive arrangements are not limited to any of these embodiments. Rather, various details and features of the embodiments were disclosed as required. Thus, many changes and modifications—as readily apparent to those skilled in these arts—are within the scope of the inventive arrangements without departing from the spirit hereof, and the inventive arrangements are inclusive thereof. Accordingly, to apprise the public of the scope and spirit of the inventive arrangements, the following claims are made:

What is claimed is:

1. A multi-modality medical imaging system, comprising:

an ultrasound medical imaging system configured for ultrasound imaging; and

a non-ultrasound medical imaging system configured for non-ultrasound imaging,

wherein the ultrasound medical imaging system and non-ultrasound medical imaging system are configured for communication with one another through a docking port supported by the non-ultrasound medical imaging system and configured to physically receive the ultrasound medical imaging system to releasably secure the ultrasound medical imaging system and the non-ultrasound medical imaging system together.

2. The medical imaging system of claim **1**, wherein the ultrasound medical imaging system and non-ultrasound medical imaging system are configured to communicate directly.

3. The medical imaging system of claim **1**, wherein the ultrasound medical imaging system and non-ultrasound medical imaging system are configured to communicate indirectly.

4. The medical imaging system of claim **1**, wherein the ultrasound medical imaging system and non-ultrasound medical imaging system are configured to communicate wirelessly.

5. The medical imaging system of claim **1**, wherein the non-ultrasound medical imaging system is configured for controlling ultrasound medical imaging using the ultrasound medical imaging system when in communication with the ultrasound medical imaging system.

6. The medical imaging system of claim **1**, wherein the ultrasound medical imaging system is configured for controlling non-ultrasound medical imaging using the non-ultrasound medical imaging system when in communication with the non-ultrasound medical imaging system.

7. The medical imaging system of claim **1**, wherein the ultrasound medical imaging system is portable and the dock-

ing port is configured as a receiving receptacle into which the ultrasound medical imaging system is received and releasably secured.

8. The medical imaging system of claim **1**, wherein the non-ultrasound medical imaging system includes an ultrasound probe.

9. The medical imaging system of claim **1**, wherein the ultrasound medical imaging system is configured for ultrasound medical imaging using a probe of the non-ultrasound medical imaging system.

10. The medical imaging system of claim **1**, wherein the non-ultrasound medical imaging system is configured for controlling ultrasound medical imaging using the ultrasound medical imaging system and a probe of the ultrasound medical imaging system.

11. The medical imaging system of claim **1**, wherein the ultrasound medical imaging system is configured to display images on a display of the non-ultrasound medical imaging system.

12. The medical imaging system of claim **1**, wherein the non-ultrasound medical imaging system is configured to display images on a display of the ultrasound medical imaging system.

13. The medical imaging system of claim **1**, wherein the ultrasound medical imaging system is configured to display images on a display of the non-ultrasound medical imaging system and the non-ultrasound medical imaging system is configured to display images on a display of the ultrasound medical imaging system.

14. The medical imaging system of claim **1**, wherein the ultrasound medical imaging system and non-ultrasound medical imaging system are configured to share a common display.

15. The medical imaging system of claim **1**, wherein imagery between the ultrasound medical imaging system and non-ultrasound medical imaging system is registered.

16. The medical imaging system of claim **1**, wherein the ultrasound medical imaging system is configured to be controlled by a user interface of the non-ultrasound medical imaging system.

17. The medical imaging system of claim **1**, wherein the non-ultrasound medical imaging system is configured to be controlled by a user interface of the ultrasound medical imaging system.

18. The medical imaging system of claim **1**, wherein the ultrasound medical imaging system and non-ultrasound medical imaging system are configured to be controlled by a common user interface.

19. The medical imaging system of claim **1**, wherein the ultrasound medical imaging system and non-ultrasound medical imaging system are configured to be controlled by a common user interface and share a common display.

20. A multi-modality medical imaging method, comprising:

providing an ultrasound medical imaging system configured for ultrasound imaging;

providing a non-ultrasound medical imaging system configured for non-ultrasound imaging and in communication with the ultrasound medical imaging system; and

joining the ultrasound medical imaging system and the non-ultrasound medical imaging system through a docking port supported by the non-ultrasound medical imaging system and configured to physically receive the ultrasound medical imaging system to releasably secure the ultrasound medical imaging system and the non-ultrasound medical imaging system together.

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专利名称(译)	包含超声对接端口的医学成像系统和方法		
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摘要(译)

超声医学成像系统和非超声医学成像系统被组合并通过合适的对接端口进行通信，该对接端口由非超声医学成像系统支持并且被配置为接收超声医学成像系统。系统可以直接，间接和/或无线地通信。每个还可以被配置用于在另一模态中交叉成像，在相应和/或组合显示器上显示来自其他模态的医学图像，和/或由另一个和/或公共用户界面的用户界面控制。可以在患者图像之间进行登记，并且提供改进的工作流程。