

A Kiosk For Telemedicine Services

Technical Field

The present disclosure relates to a kiosk for providing medical consultation service remotely to a patient by a medical practitioner. Particularly, multiple kiosks of the present disclosure can be interconnected to establish a network of telemedicine service where the kiosks within a city can be linked to support each other in patient load and/or medicine distribution.

Background

Providing timely services and attention to patients resided in remote area located far away from the cities remains a great challenge to our healthcare system. The difficulties can be arisen from different factors such as inabilities of the patient to reach the healthcare facilities in the cities owing to restriction in transportation available, the available specialist in specific field of medicine being located at a distance requiring long hour commute, etc. Therefore, effort has been put into developing system, apparatus and/or program which facilitate the delivery some sort of healthcare services regardless of the restriction posed in connection to distance capitalizing on the ubiquitous internet services. For instance, United States patent publication no. 2007255115 offers a method and an apparatus for providing remote diagnosis and treatment using a cellular telephone having a camera, a display, a speaker, a microphone and a diagnostic software embedded into the cellular phone. Further, United States patent publication no. 20040054760 discloses a telemedicine system for communicating medical information through one or more portable modules configured to collect medical information associate with a patient. Peifer et al. offers another telemedicine system in United States patent no. 5987519 about transmitting medical data including voice and video between a central monitoring station and a patient monitoring station. Also, Soliman discloses in United States patent no. 8279061 about a method for delivering telemedicine services.

Despite the abovementioned telemedicine systems may be able deliver the desired services as setting out, these systems lack the comprehensive interaction between the medical practitioner or doctor with the patient to acquire more reliable and thorough physiological information of

the patient to derive a more accurate diagnosis outcome. More importantly, the emotional state of the patient can be a crucial factor to be taken into consideration to conclude a diagnostic result. Emotion of the patient significantly affect the medical or physiological information acquired during any consultation session and the systems offered in the prior arts mentioned
5 above are falling short in this regard. Thus, there exists the need to have an apparatus, a system or a method in better catering telemedicine services addressing some of the flaws inherited in the earlier systems.

Summary

10 The present disclosure aims to provide a kiosk for providing telemedicine services in combination of multiple modules or components connected thereto. The disclosed kiosk comprises one and more diagnostic tools to be remotely controlled by the medical practitioner managing the consultation session to obtain accurate reading about the physiological and/or emotional data of the patient attending the consultation session.

15

Another object of the present disclosure is to offer a kiosk for telemedicine services capable of communicating with other similar or almost similar kiosks to share the patients load and/or distribution of the prescribed medicine so that as many patients as possible can receive the needed medical consultation and/or treatment.

20

Further object of the present disclosure is directed to a kiosk for telemedicine equipped with safety features which protect both privacy and safety of the patients using the disclosed kiosk. Particularly, the kiosk comprises an external enclosure encompassing almost all the components and/or surfaces accessible by the patients that a scheduled disinfection program is run in
25 between each consultation session to prevent spreading of infectious diseases through the use of the kiosk. The external enclosure only permits an authorized patient with or without one or more accompanying family members to enter for the consultation session.

More object of the present disclosure refers to a telemedicine kiosk capable of collecting health
30 care data within an area or district and upload the collected data to a backend server for further

analysis. For instance, any potential occurrence of epidemic or pandemic can be detected earlier and corresponding actions can be taken to curb the spread of the diseases.

One aspect of the present disclosure refers to a kiosk for providing telemedicine service from a medical practitioner through a practitioner terminal to an authorized patient during a consultation session. Preferably, the kiosk comprises a diagnostic module having one or more diagnostic tools for capturing physiological data of the patient; a communication module comprising a multimedia unit capable of displaying and capturing real-time video data, and a transmission unit for receiving data from a server and relaying the captured data to the server, the communication module being electrically connected to the diagnostic module to receive the captured physiological data, the real-time video displayed being a feed from the medical practitioner provided through the practitioner terminal; a data processing module for processing the data received from and the data to be relayed the server; and a control module to regulate operations of other modules. For reservation of the consultation session, the user may make an appointment through a user terminal.

For a number of embodiments, at least one of the diagnostic tools has at least one functionality managed by the medical practitioner remotely through the practitioner terminal to derive a diagnosis outcome.

For more embodiments, the kiosk may comprise an enclosure constructed to allow only the authorized patient to enter within the enclosure to access the diagnostic module and/or the communication module. Preferably, the enclosure comprises a first sensor and an entry openable to permit access into the enclosure upon receiving and verifying an authorized code and/or biometric information provided by the authorized patient through the first sensor.

To ensure hygiene of the kiosk or parts of the kiosk accessible by the patients, the disclosed kiosk may comprise a disinfection module configured to run a sterilization course towards the diagnostic module and/or the multimedia unit prior to beginning of each consultation session

and entrance of the of the authorized patient. Preferably, the disinfection module targets those parts exposed to the patient for the sterilization.

For some embodiments, the disinfection module comprises a second sensor configured to
5 detect presence of a human being within the enclosure. Particularly, the disinfection module
cancels or delays the scheduled sterilization course upon detecting presence of a human being
within the enclosure of the kiosk. Otherwise, the disinfection module runs the sterilization
course upon confirming presence of no human being within the enclosure through the second
sensor.

10

Still, in some embodiments, the disclosed kiosk further comprises a dispenser module having a
storage of a plurality of medicines being configured to dispense the authorized patient one or
more medicine prescribed by the medical practitioner at end of one consultation session.
Preferably, the dispenser module further comprises a third sensor to read on a prescription code
15 provided to the user and dispense one or more medicines to the authorized patient according
to the prescription code.

According to some embodiments, the prescription code is provided to the user terminal.
Alternatively, the prescription code or written prescription can be printed out through an output
20 module including a printer for the authorized patient to purchase from a pharmacy shop.

According to further embodiments, the disclosed kiosk may include an emotion module
configured to sense state of mind of the authorized patient through the multimedia unit and/or
the diagnostic module that the sensed state of mind is applied at least partly to derive the
25 diagnosis outcome.

In more embodiments, the communication module of the disclosed kiosk communicatively links
to a plurality of other telemedicine kiosks located remotely away. Through the linked
communication in between the kiosks, the control module is configured to direct the authorized
30 patient to obtain the prescribed medicine from one of other kiosks linked upon detecting

shortage of the prescribed medicine in the storage of the dispenser module and verifying availability of the prescribed medicine in the directed other kiosk through the communication module.

- 5 In accordance with several embodiments, the control module further determines the directed other kiosk being closest to a home address, an office address or an immediate location of the authorized patient.

For emergencies relating to public health issues or life-threatening situation towards the
10 authorized patients, the practitioner terminal comprises an emergency module operable by the medical practitioner to contact a facility to dispatch an ambulance to provide immediate medical support to the authorized patient located at the kiosk upon deriving the diagnosis outcome. Preferably, in some embodiments, the server or the control module is configured to find and contact the facility closest to the authorized patient with available ambulance to be dispatched
15 thereto.

In some embodiments, the disinfection module comprises a lockable compartment for keeping at least one of the diagnostic tools within for sterilization that the disinfection module prohibits accessibility of the diagnostic tool kept inside the lockable compartment during performance of
20 a sterilization procedure.

In more embodiments, the control module or the server is configured to send a reminder to the user terminal at a predetermined interval prior to beginning of the consultation session. Also, for several embodiments, the control module further comprises an exit switch activatable to
25 open the entrance after ending on the consultation session.

For some embodiments, the control module is configured to upload a report, a prescription, a medical certificate and/or a diagnosis outcome to a database connected to the server.

30 **Brief Description of the Drawings**

Fig. 1 show the general layout of a telemedicine system using at least one embodiment of the disclosed kiosk;

Fig. 2 is schematic diagrams illustrating (a) the arrangement of various modules in one embodiment of the disclosed kiosk interacting with the user terminal and the practitioner terminal, and (b) the detailed arrangement of various modules within one embodiment of the disclosed kiosk;

Fig. 3 is a perspective view of one embodiment of the disclosed kiosk without the external enclosure;

Fig. 4 is the front view of one embodiment of the kiosk;

Fig. 5 is a perspective view of the upper portion of the kiosk shown in Fig. 3;

Fig. 6 is a perspective view of the lower portion of the kiosk shown in Fig. 3;

Fig. 7 is a perspective view of one embodiment of the disclosed kiosk with external enclosure;

Fig. 8 is a perspective view of the upper portion of the external enclosure shown in Fig. 7;

Fig. 9 is a flowchart showing the manner which the disclosed kiosk manages entrance of an authorized patient into the enclosure for the consultation session;

Fig. 10 is a flowchart showing the manner which a consultation session starts and ends in one of the disclosed embodiments; and

Fig. 11 is a flowchart showing one possible manner of the disclosed kiosk to conclude a consultation session;

Detailed Description

Hereinafter, the disclosure shall be described according to the preferred embodiments and by referring to the accompanying description and drawings. However, it is to be understood that referring the description to the preferred embodiments of the disclosure and to the drawings is merely to facilitate discussion of the various disclosed embodiments and it is envisioned that those skilled in the art may devise various modifications without departing from the scope of the appended claim.

The term “authorized patient” used hereinafter, in some circumstances, may include one or more family members in addition to a patient appointed to a given consultation session attending the session for better communication and understanding about healthcare of the patient. Under certain circumstances, a nurse or general physician may enter the disclosed kiosk along with the authorized patient to perform some tasks during the consultation session.

The term “medical practitioner” used hereinafter may refer to at least one of a physician, a specialist of a given medical field, a nurse, a pharmacist, a physiotherapy and a nutritionist who is qualified to provide professional advices with respect to health being of the patient in addition to deriving a diagnosis outcome. More than one medical practitioner may attend a single consultation session as a combined effort to derive the diagnosis outcome, strategize a therapeutic course, or advise on means to improve health being of the subject.

The term “module” or “modules” used hereinafter can refer to any one or combination of software and hardware incorporated, interconnected

Fig. 1 illustrates a schematic layout of a telemedicine system (100) which the kiosk (200) disclosed in the present disclosure can be deployed to offer the telemedicine in a given area or neighborhood for those in need to immediate medical attention free from spending substantial time in commuting from one area to another area. The system (100) shown is composed of various modules to cater different functions and/or services for providing the telemedicine

services. More importantly, some of these modules may have partly incorporated or a similar copy embedded to the disclosed kiosk (200) to achieve the object set out above.

Referring to Fig. 2 to 4, the disclosed kiosk (200) for providing telemedicine service from a medical practitioner through a practitioner terminal (130) to an authorized patient during a consultation session comprises a diagnostic module (220) having one or more diagnostic tools (221) for capturing physiological data of the patient; a communication module (230) comprising a multimedia unit (231) capable of displaying and capturing real-time video data, and a transmission unit for receiving data from a server (140) and relaying the captured data to the server (140), the communication module (230) being electrically connected to the diagnostic module (220) to receive the captured physiological data, the real-time video displayed being a feed from the medical practitioner provided through the practitioner terminal (130); a data processing module (240) for processing the data received from and the data to be relayed the server (140); and a control module (210) to regulate operations of other modules. It is important to note that the consultation session is reserved through a user terminal (110).

The practitioner terminal (130) connected to the disclosed kiosk (200) can be any computing device such as desktop, laptop, smartphone, tablet computer, mobile pc, etc., which is capable of, but not limited to, controlling one or more diagnostic tools (221) using a diagnostic tool controlling module (131), recording and rendering visual-audio communication for the consultation session using a communication module (132), transmitting data through wired or wireless network, running different modules installed or incorporated thereto, connecting to different user and practitioner terminals (130) for communication, lodging urgent request for immediate medical attention to be provided to an authorized patient using an emergency module (134), etc..

Likewise, the user terminal (110) can be any computing device such as desktop, laptop, smartphone, tablet computer, mobile pc, etc., which is capable of connecting to and communicating with the telemedicine system (100) for, but not limited to, registering the user or patient to the telemedicine system (100) using a user registration module (111)

, reserving a consultation session through online appointment using an appointment and scheduling module (112), receiving information regarding the appointment, obtaining and/or displaying an entrance code for accessing the kiosk (200), receiving reminder about the appointment prior to the consultation session, receiving a prescription code and/or written
5 prescription and/or medical certificate using report and prescriptions report (114), making changes to the appointment once allowed by the system (100), making payment using an authorization module (113) etc. In some embodiments, the user terminal (110) may be placed in a local clinic or pharmacy shop of a given neighborhood that the patients can register and reserve an appointment thereby in case they have no accessibility to any smart devices or
10 internet services.

For some embodiments, the diagnostic module (220) embedded to the disclosed kiosk (200) is configured to, but not necessarily, acquire physiological information or data of the authorized patient through one or more diagnostic tools (221), calibrate the diagnostic tools (221) before
15 or after use of the diagnostic tools (221), detect defects or errors in at least one of the diagnostic tool (221) and subsequently report the detected error to the telemedicine system (100), and/or remind the patient to place the used diagnostic tools (221) to the designated storage before leaving upon detecting missing of the diagnostic tools (221). The diagnostic tools (221) usable in the disclosed kiosk (200) can be any one or combination of stadiometer (221a), weight machine
20 (221b), sphygmomanometer (221c), thermometer (221d), handheld body fat measuring device (221e), etc. Preferably, in some embodiments, the diagnostic tool (221) is specially designed and being integrated with multiple sensors and each of these sensors can be dedicated to acquiring one of many physiological information or data with respect to the authorized patient. The integrated form of the diagnostic tool (221) reduces the total number and physical footprint of
25 the tools to be stored and kept in the kiosk (200) thus facilitating storage of the tools thereto. By integrating several diagnostic tools (221) into a single device or body, the disclosed kiosk (200) facilitates the patient to locate the tools easily around the kiosk (200). In some embodiments, the multimedia unit (231) prompts the location of the diagnostic tools (221) to be used by showing the location and/or the appearance of the tool. Furthermore, control module (210) or
30 the diagnostic module (220) may be configured to sense removal of the diagnostic tool (221)

from its storage (246) and prompt the multimedia unit (231) to display a clip detailing the manner which the diagnostic tool (221) to be positioned and/or used in addition to the real-time verbal instruction given by the medical practitioner managing the consultation session. It is important to note that at least one of the diagnostic tools (221) has at least one functionality managed by the medical practitioner remotely through the practitioner terminal (130) using the diagnostic tool controlling module (131) to derive a diagnosis outcome. Particularly, the practitioner terminal (130) has a user interface different from the disclosed kiosk (200) that the user interface at the practitioner terminal (130) initiates a digital control panel via the diagnostic tool controlling module (131) upon switching on of a given diagnostic tool (221). Preferably, the control module (210) senses the activation of the diagnostic tool (221) and relay the status back to the practitioner terminal (130) via the communication module (230) prompting the initiation of the digital control panel shown in the display of the practitioner terminal (130) thus indirectly informing whether the activated tool is the correct tool to be used and/or status of the activated tool. On the digital control panel of the diagnostic tool controlling module (131), the parameters about the tool controllable or adjustable by through the practitioner terminal (130) will depend on the tool activated. For example, an otoscope or laryngoscope kept in the disclosed kiosk (200) for some embodiments may be equipped with camera and lighting source for real-time imaging an infection site of inside an ear of the authorized patient. The digital control panel at the practitioner terminal (130) shall allow the medical practitioner to adjust the brightness of the lighting source, beaming angle of the lighting source, viewing angle of the camera and/or sensitivity of the camera. Also, the medical practitioner may remotely control the initiation of a sphygmomanometer (221c) for measuring the blood pressure of the authorized patient. As mentioned earlier, a nurse or the like medical officer can be stationed around the kiosk (200) and being permitted to enter the consultation session for applying these diagnostic tools (221) towards the patient for physiological data collection in case the patient finds the utilization of the diagnostic tool (221) being too complicated to handle. Also, the diagnostic tools (221) may include a height measuring stadiometer (221a) and a weighting machine (221b) incorporated to the kiosk (200) as illustrated in Fig. 3 and 6.

The control module (210) employed in the disclosed kiosk (200) can be one or multiple computing processors with sufficient computing power or resources to manage other modules communicatively connected to it and run one or more programs installed for regulating operations of other connected modules to attain the desired functions of the disclosed kiosk (200). The control module (210) may be housed in the multimedia unit (231) to reduce the overall footprint of the various modules needed to establish the different functionalities of the disclosed kiosk (200). The control module (210) in some embodiments may be enabled to communicate and manage at least part of other modules remotely connecting to the kiosk (200) rather than physically placed around the kiosk (200) for providing the telemedicine services. Also, the control module is configured to upload a report, a prescription, a medical certificate and/or a diagnosis outcome to a database connected to the server (140) through the communication module (230). The mentioned documents may be received from the practitioner terminal (130) for the user reference through the multimedia unit (231) succeeded by uploading the relevant documents to the server (140) for documentation.

15

In other embodiments of the disclosed kiosk (200), multiple controller module (210) may be included that each of these controller modules is dedicated to control a group of components or devices to cater one or more preferred functions with respect to the telemedicine service offered as illustrated in Fig. 2b. For instance, the kiosk of such embodiments possesses a sensors controller (210a) to manage operation of all sensors installed for the disclosed kiosk (200) according to a set of predetermined process flows implemented through the main processor (500). Similarly, the main processor of the kiosk also drives the operation of various diagnostic tools or devices via the device controller module (210b). The sensors controller modules (210a) may be communicatively linked to the diagnosis and reporting module (290) of the disclosed kiosk in a way that the information obtained through the sensors can be furnished to the diagnosis and reporting module (290) to derive a diagnosis outcome to about diseased state of the authorized patient attending the consultation session. Again, all the data about obtained information, diagnosis outcome, video conferencing during the consultation session, etc. is forwarded to the communication module (230) before being uploaded to the cloud server (140).

30

As described in the setting forth, the communication module (230) equipped to the disclosed kiosk (200) serves to create a seamless communication between the authorized patient and the medical practitioner, who manages the consultation session through the practitioner terminal (130). In addition to that, the communication module (230) also establishes communication among various modules required for the operation of the disclosed kiosk (200) the modules, establishes communication among multiple kiosks (200) in a given neighborhood, establishes communication between the kiosk (200) with multiple servers (140), and ensures communication between the kiosk (200) and the practitioner terminal (130) remaining uninterrupted throughout each consultation session for data, communication and information transmission. One embodiment of the multimedia unit (231) mentioned above is illustrated in Fig. 3 to Fig. 5. Essentially, the multimedia unit (231) comprises at least one display unit or one main display unit (232) to present video, real-time or not, to the authorized patient attending the consultation session. The main display unit (232) is commonly required to facilitate the virtual face-to-face meeting between the medical practitioner and the authorized patient during the consultation session. The main display unit (232) is preferably, but not necessarily, touch-enabled to collect immediate responses and/or answers from the authorized patient if such needs are raised in the consultation session by interacting on a user interface provided on the main display unit (232). There are a second or even a third display unit (not shown) in more embodiments of the disclosed kiosk (200). Particularly, these auxiliary display units may remain in sleeping or inactivated mode unless one or more instruction video is required to be played for providing guidance to the authorized patient to handle a diagnostic tool (221) or additional information to improve health being of the authorized patient without disrupting the view on the main display unit (232). More preferably, the practitioner terminal (130) may be able to control the manner which these pre-recorded videos being shown to the authorized patient. For example, a specialist can pause the video at certain topic or chapter of the played video such that more verbal information can be given to emphasize the importance of the relevant topic. Apart from that, at least one camera (233) is equipped to the multimedia unit (231) to capture and generate video about the authorized patient and the relay the captured video to the server (140) then further to the practitioner terminal (130) for enabling real-time communication throughout the consultation session. The multimedia unit (231) preferably possesses speaker

(234) and microphone (not shown) or the device integrated with both speaker and mic to facilitate verbal communication during the consultation session. The communication module (230) may be configured to record at least one of audio and/or video file with respect to the virtual meeting between the authorized carried out in the consultation session. The recorded
5 video and/or audio files are further uploaded to a cloud storage or server (140) to be kept for a predetermined period in case any issue of dispute raised regarding to a particular consultation session.

Referring to the setting forth, the communication module (230) is electrically connected, either
10 directly or indirectly, to the diagnostic module (220) to receive the captured physiological data, and the real-time video displayed being a feed from the medical practitioner provided through the practitioner terminal (130). In some embodiments, the data may have to be processed to a format complying with the network and/or internet protocol such as transmission control protocol (TCP), hyper text transfer protocol (HTTP), hyper text transfer protocol secure (HTTPS),
15 file transfer protocol (FTP), user datagram protocol (UDP), etc. before the communication module (230) can actually transfer the data out of the kiosk (200). On the other hand, the data received by the kiosk (200) from the server (140) and/or the practitioner terminal (130) may also require conversion from the format complying with the network protocol to a video and/or audio file format playable on the multimedia unit (231). The acquired data and the received data
20 may be subjected to data compression and data decompression respectively as well before being uploaded to the server (140) and downloaded to the disclosed kiosk (200). A processing module (240) is preferably employed, in a number of embodiments, for performing various tasks to convert the acquired and received data. The processing module (240) can be a standalone module in the disclosed kiosk (200) or a submodule of the control module (210) according to the
25 configuration of different embodiments of the disclosed kiosk (200).

As can be seen in Fig. 3, several embodiments of the disclosed kiosk (200) further comprise an enclosure (270) constructed to allow only the authorized patient to enter within the enclosure (270) to access the diagnostic module (220) and/or the communication module (230). In more
30 specific, the enclosure (270) is an external wall (271) erected surrounding the various modules

of the disclosed kiosk (200) and an area with sufficient space for the authorized patient and/or at least one family member to be seated on a provided chair (227) within the enclosed area for the consultation session. More preferably, the external wall (271) is preferably constructed with a combination of sturdy and sound dampening materials such as fiber glass, neoprene rubber, viscoelastic frame, light weight metal alloy, aluminum, etc. to substantially protect privacy of the authorized patient by preventing the conversation about the consultation session from being eavesdropped outside of the enclosure (270). In accordance with more embodiments, at least part of external enclosure (270) is made transparent or translucent, such that condition within the enclosure (270) can be vaguely viewed from outside. The like feature allows the staff of the telemedicine system (100) to check upon the authorized patient from time to time outside of the enclosure (270) in case the authorized patient becomes unconscious after the consultation session inside the kiosk (200). The transparent or translucent part of the external wall (271) can be covered with blinds that only the staff of the telemedicine system (100) is permitted to adjust it to investigate the condition of the authorized patient seated within the encompassed area (275).

Like mentioned in the foregoing description, the external enclosure (270) comprises an entry or entrance which serves to manage and regulate admission into the enclosed area for using the communication module (230) and/or the diagnostic module (220) dedicated only for the authorized patient. A door (272), which can be foldably or slidably open, along with one or more sensors may be used in some embodiments of the disclosed kiosk (200) to manage accession into the area encompassed by the external enclosure (270). A motor controllable by the control module (210) may be mechanically associated to the door (272) for operation of opening and locking of the door (272) to manage accession of the various modules of the disclosed kiosk (200). Particularly, in some embodiments, the enclosure (270) comprises a first sensor (274) and an entry openable to permit access into the enclosure (270) upon receiving and verifying an authorized code and/or biometric information provided by the authorized patient through the first sensor (274). The first sensor (274) can be a code reader to detect and/or extra information from a code given to the authorized patient upon or after making appointment about a consultation session via the telemedicine system (100). The code can be any one or combination

of linear barcode and matrix barcode. The linear barcode can be a universal product code, plessey, modified Plessey, ITF-6, code 93, code 49, code 39, etc. For the matrix barcode, it can be Aztect code, quick response (QR) code, SPARQCode, etc. Alternatively, the code can be a combination of alphanumeric characters where the first sensor (274) may be omitted while the

5 authorized patients is required to input the alphanumeric code using a keyboard, digital or physical, located around the entry to gain access thereto. Once received the authorized code, the control module (210) connecting to the first sensor (274) verifies whether authorized code corresponds to the record kept in a database linked to the server (140). The control module (210), alone or in combination with the server (140), validates if the authorized code matches a

10 consultation session assigned to the time and date, which the authorized patient attempts to access the disclosed kiosk (200). The control module (210) shall grant access to the authorized patient upon verifying authenticity of the authorized code. Otherwise, the control module (210) notifies the patient that the authorized code is incorrect and denies accession into the encompassed area (275). It is worth noting that any attempt to access the enclosed area early

15 or later than the given time slot of a given consultation session will be rejected by the control module (210). In short, the authorized code only facilitates accession to the facilities or different modules of the disclosed kiosk (200) at a time and date specified by the telemedicine system (100) according to the appointment in record. In addition to the authorized code, a que code or number may be provided to the authorized patient for reference when queuing for the

20 consultation session outside of the external wall (271). Therefore, in some embodiments, a tertiary display unit (276) or LED sign board may be mounted on the external wall (271) around the entry showing the que number corresponding to the latest consultation session and the time remaining for the current session. The tertiary display unit (276) may also show few que numbers relating to the subsequent consultation sessions and corresponding time estimated for

25 each session to be ready. Referring further to Fig. 9, a process flow (310) illustrating one manner which the disclosed kiosk (200) employed to manage admission the authorized patient into the encompassed area (275). Particularly, it starts (311) with the que number of the authorized patient or the user of the disclosed kiosk (200) being called or notified (312) on the tertiary display unit (276). Upon subjecting the authorized code to the first sensor (274) for scanning

30 (313), the disclosed kiosk (200) validates (314) the authenticity of the given authorized code.

When the authorized code passes the validation step, the control module (210) opens (315) the door (272) then closes (316) the door (272) once the authorized patient has entered into the encompassed area (275) prior to the start of a consultation session to complete the entrance procedure or flow (317). There are situations which either the first sensor fails to read the code thus requesting the code to be rescanned (314a) or the control module redirect the flow to start (311) upon identifying the code scanned being ineligible for the appointed consultation session (314b). Alternatively, the first sensor (274) may be replaced with the tertiary display unit (276), which is placed around the entrance for the encompassed area (275), for displaying the authorized code for a given authorized user when his or her name, que number, Identification card number, etc. was called. The called authorized user may scan the authorized code displayed using the user terminal (110) or smart device that the scanned code along with other patient-related info pre-registered to the telemedicine system (100) will be relayed from the to the server (140) via an application installed on the smart device for verification. Once the verification completed, the control module (210) prompts the door (272) of the enclosure (270) to open for the authorized patient to access the kiosk (200). On the other hand, the authorized patient will be refused to enter the encompassed area (275) when the server (140) or the control module (210) fails to validate the information provided from the user terminal (110). In any event that the authorized code fails to pass the validation step, the disclosed kiosk (200) shall inform the authorized code given being invalid and, optionally, request the user to retry. Referring now to Fig. 10, the general flow (320) of the consultation session is illustrated. Preferably, the consultation starts (321) by sanitizing the authorized patient or the user of the disclosed kiosk (200). The sanitization can be done through a fogging disinfection machine installed around the entrance that disinfectant will be sprayed in the form of evaporative fog towards the authorized patient during entering into the encompassed area. The positive air pressure within the enclosure pushes the remaining of disinfectant fog out of the encompassed area (275) through the entrance. Once inside the encompassed area, the disclosed kiosk may sense presence of the authorized patient using one or more sensor. In some embodiments, the presence of the authorized patient is performed through detecting the weight of the authorized patient loaded on the seat (323). Upon detecting the presence of the authorized patient, the disclosed kiosk via the controller module (210) and the communication module (230) calls the medical practitioner

handling the consultation session and begins the consultation or tele-consultation session (324). At the consultation session, the medical practitioner provides guidance to the authorized patient with or without the assistance of other medical staffs of the tele-medicine system (100) to use the diagnostic tools (221). The diagnostic tools used are put back into the storage (246), which
5 may perform calibration and sanitization of the diagnostic tools after each use. The flow stops (328) after termination of the consultation session (327). On the other hand, a post-consultation session (330) may start (331) when the consultation session completed (332), the disclosed kiosk (200) shall receive any one or combination of medical report, medical certificate, prescription or prescription code, etc. from the practitioner terminal (130) as present in Fig. 10. The
10 authorized patient can opt to print (333) any one of the receive documents through the disclosed kiosk (200) and/or download to the user terminal (110) for record and reference. Before leaving the encompassed area (275), the disclosed kiosk may offer an option to procure the prescribed medicine (336) from the tele-medicine system. The flow (330) can advance further either processing the payment including the fee for the prescribed medicine procured
15 (336) or processing the payment of the consultation session free of charges about the prescribed medicine (337). Then, the authorized patient is prompt to make payment for using the telemedicine service preferably using any known cashless payment method (338) known in the art. The payment made via the cashless method shall require a validation step (339) through a third-party server. With the payment validated, user can try sanitizing their hands and prepare
20 to exit (340) the encompassed area (275) to end (341) the post-consultation session. For the authorized patient to exit the encompassed area (275) after ending of the consultation session, the control module (210) further comprises an exit switch activatable to open the entrance after ending on the consultation session. The authorized patient is required to press on the exit switch to unlock the door (272) in order to leave the encompassed area (275). It is important to note
25 that the exit switch may only become activatable after the medical practitioner confirms on completion of the consultation session.

For more embodiments, the control module (210) or the server (140) is configured to send a reminder to the user terminal (110) at a predetermined interval prior to beginning of the

consultation session. Specifically, the server (140) or the control module (210) sends a reminding notification preferably three days, two days and/or one day respectively

Pursuant to more embodiments, the disclosed kiosk (200) may comprise a disinfection module (250) configured to run a sterilization course towards the diagnostic module (220) and/or the multimedia unit (231) prior to beginning of each consultation session and entrance of the authorized patient. Considering that the authorized patient and/or family member attending each consultation session may bring infectious agents which can potentially contaminate the surface of the diagnostic tools (221) and/or multimedia unit (231) coming into contact with the infected authorized patient and/or family member, it is necessary to disinfect the area and the various modules encompassed by the enclosure (270) after completion of a consultation session to minimize the risk of the subsequent authorized patient from being infected by the undesired infectious agent. Preferably, the sterilization course may include sterilizing the encompassed area (275) and all other components kept therein using electromagnetic wave radiation and/or disinfectant agent to clear off any potential infectious agent and contaminants adhered on any surfaces contactable by the authorized patients. The electromagnetic radiation and/or disinfectant agent are administrated in each sterilization course at a predetermined period, dosage, and manner to yield the desired outcome of sterilization. For example, the disinfection module (250) may adjust the electromagnetic wave radiation period, based on input from the server (140) or the staff of the telemedicine system (100), to attain at least 90% of reduction rate towards various potential infectious agents. According to some embodiments, the disinfection module (250) comprises one or more UVC emitting lights (251) positioned within the encompassed area (275) particularly on the side of the external wall (271) facing the encompassed area (275). The UVC emitting lights (251) are positioned within the encompassed area (275) in a manner where the surface area to be sterilized or disinfected are preferably at optimal. Multiple UVC emitting lights (251) are installed to cover different angle for optimal illumination within the encompassed area (275) in view that some area may be shielded from the UVC illumination from one angle due to positioning of one or more modules in the encompassed area (275). For some embodiments, at least one of the UVC emitting lights (251) are made rotatable and/or moveable on a track installed on the external wall (271) that the UVC

emitting lights (251) rotates and/or moves around the encompassed area (275) for the emitted UVC radiation to reach preferably all available surfaces within the encompassed area (275) at a dosage level of 2,000 and 8,000 $\mu\text{W}\cdot\text{s}/\text{cm}^2$ towards the irradiated surface for eradicating 90% or more of the infectious agents potentially adhered to those contaminated surfaces. Since unnecessary UVC exposure may cause harm to the human body, it is crucial to ensure that no human subject is laid open to the UVC illumination emitted during the sterilization course. There are several measures taken by the disclosed kiosk (200) to avoid unwanted exposure of the UV illumination towards any human subjects. For instance, in some embodiments, the translucent or transparent parts on the external walls (271) are laminated with UV protective film to filter off the radiation from leaking out of the encompassed area (275) therethrough. For more embodiments, the disinfection module (250) further comprises a second sensor configured to detect presence of a human being within the enclosure (270). The second sensor can be a proximity sensor emitting an electromagnetic signal, such as infrared, according to a predetermined pattern and detecting any changes of the reflected signal acquired to identify presence of a human being within the enclosure (270) or the encompassed area (275). Alternatively, the second sensor can be a camera sensor assisted by an algorithm or software executed through the control module (210) to identify a human being from the video or image captured. Furthermore, in some embodiments, the disinfection module (250) runs the sterilization course upon confirming presence of no human being within the enclosure (270) through the second sensor. Otherwise, the sterilization course will not begin and a visual, audio and/or text notification may be sent through the communication module (230) to the staffs of the telemedicine system (100) requesting them to investigate the condition of the encompassed area (275). The disinfection module (250) may require, but not necessarily, a manual restart by the staff of the telemedicine system (100) after moving the detected human subject out from the encompassed area (275). The disclosed kiosk (200) may initiate the sterilization course again automatically after driving the human subject out from the encompassed area (275) without the need of manual restart in some other embodiments. It is crucial to note that any delay in the sterilization course can result in subsequent delay or postponement of the consultation sessions arranged thereafter. The disclosed kiosk (200) may be configured to refuse accession into the encompassed area (275) when the disinfection module (250) fails to run the sterilization course

as planned to minimize the risk of the authorized patients being potentially infected through the use of non-sterilized diagnostic tools (221) and/or multimedia unit (231). A manual restart of the sterilization course may be required before the disclosed kiosk (200) can resume its function to facilitate consultation session after the disinfection module (250) fails to initiate the sterilization course for whatever issues encountered. The disclosed kiosk (200) may introduce a buffering period in between each consultation session setting aside the time needed for the sterilization course in some embodiments. The buffering period allows the telemedicine system (100) to accommodate any delay caused by the disruption with respect to the sterilization course without substantially affecting the time appointed to the consultation session. The buffering period also provides additional time for maintenance services to be carried out for the disclosed kiosk (200) between consultation sessions in case needed when the buffering period is not used to accommodate delay relating to the disruption of the sterilization course.

Furthermore, the disinfection module (250) may comprise various components to create at least a substantially sterile environment in the encompassed area (275) where the consultation session being held. Referring to Fig. 5, the disclosed kiosk (200) comprises an air filter (252) disposed on the top of the external. The air filter is preferably a High Efficiency Particulate Air (HEPA) grade air filtering device which draw air out from the enclosure (270) and pump the drawn air through one or more HEPA filters then into the encompassed area (275) creating a positive air pressure therein. The air passed through the HEPA filter becomes substantially free of airborne particles greater than 0.3 microns. When door (272) of the entry opens, the positive air pressure ensures the filtered air rushes pass the entry substantially blocking admittance of any foreign particles into the encompassed area (275).

For several embodiments, the disinfection module (250) further comprises at least one lockable compartment for keeping at least one of the diagnostic tools (221) within for sterilization. As shown in Fig. 3 to 5, the compartment may be constructed onto the frame of the multimedia unit (231) that the one or more diagnostic tools (221) are housed therein when these diagnostic tools (221) are not in use. Alternatively, the authorized patient may be requested by the disclosed kiosk (200) to place the used diagnostic tools (221) into the sterilizing compartment or

storage (246) for a predetermined time before returning the used tools to their original storing spots. More importantly, the disinfection module (250) or the control module (210) prohibits accessibility of the kept diagnostic tool (221) during performance of sterilization procedure towards a diagnostic tool (221).

5

In accordance with some embodiments, the disclosed kiosk (200) is equipped with a dispenser module (280) having a storage of a plurality of medicines that the dispenser module (280) is fashioned to dispense the authorized patient one or more medicine prescribed by the medical practitioner at end of one consultation session. In more specific, the dispenser module (280) comprises dispensary apparatus having an outer casing and an internal storage magazine carrying multiple compartments for sorting and categorizing different medicines within. The storage magazine is fabricated with an outlet switchable between a locking position and an open position for dropping or releasing one or more prescribed medicines in connection to a written prescription or prescription code furnished to the vending machine-like device. For precisely dispensing the prescribed medicines to the authorized patient, the dispenser module (280) further comprises a third sensor to read on a prescription code provided to the user and dispense one or more medicines to the authorized patient according to the prescription code in some embodiments of the disclosed kiosk (200). The third sensor can be a camera, a scanner, a barcode reader, etc., which is able to extract information from the prescription code to identify the medicine to be dispensed out from the dispensary apparatus. In case the authorized patient wishes to purchase the prescribed medicines from a pharmacy shop rather than using the dispensary apparatus, a pharmacist can scan or read the information of the authorized code using a barcode reader or scanner that the scanned information shall direct the pharmacist to a webpage showing information about the authorized patient, the medicines prescribed, the medical practitioner responsible for the prescription, a digital stamp denoting authenticity of the prescription, etc. To ease the authorized patient to acquire the prescribed medicine, the prescription code is preferably provided or downloaded to the user terminal (110) such as smartphone, tablet, or laptop. The authorized patient can present the authorized code displayed on the user terminal (110) to the third sensor such that the dispensary machine can identify the prescribed medicine to be delivered. For those have no immediate access of smart devices as

30

user terminal (110), the disclosed kiosk (200) also comprises a printer (228) for the communication module (230). The authorized user can opt to directly print out the prescription code for subsequently picking up the prescribed medicine from the dispensary machine or a pharmacy shop. The printer (228) may also grant the authorize patient the option to print out
5 hardcopy of a medical certificate, invoice, referral letter, admission letter, etc.

In the situation where the prescribed medicines are not available at the telemedicine kiosk (200), the disclosed kiosk (200) may direct or guide the authorized patient to one of the other telemedicine kiosks (200) around the neighborhood to gain access of the prescribed medicine.
10 To realize the like feature, the communication module (230) of the disclosed kiosk (200), in a plurality of embodiments, are communicatively linked to a plurality of other telemedicine kiosks (200) located remotely away. Based on the location of the telemedicine kiosk (200) of the latest consultation session conducted, the control module (210) or the server (140) shall be able to compute the other closest telemedicine kiosk (200) with the available prescribed medicine for
15 the authorized patient. Moreover, in more embodiments, the information or data relating to the medicaments available in each telemedicine kiosk (200) is preferably counted and recorded by the control module (210) of the kiosk (200) followed by uploading the recorded information to the server (140) for sharing with other telemedicine kiosks (200) to overcome the issue relating to medicament shortage in a given kiosk (200). In brief, the control module (210) is
20 configured to direct the authorized patient to obtain the prescribed medicine from one of other kiosks (200) linked upon detecting shortage of the prescribed medicine in the storage of the dispenser module and verifying availability of the prescribed medicine in the directed other kiosk (200) through the communication module (230). In some embodiments, multiple locations about other telemedicine kiosk (200) with the available prescribed medicine are provided to the
25 authorized patients such that they can choose to visit the one most ideal for them. The location information of the other kiosk (200) including GPS data, address, and/or nearby landmark may be provided to the user terminal (110) for the reference of the authorized patients. According to some embodiments, the control module (210) or the server (140) communicatively connecting to the kiosk (200) chosen by the authorized patient to obtain the prescribed
30 medicine may allow the authorized patient to make a reservation of the prescribed medicine for

a period of time at the chosen kiosk (200). The reservation will only become invalid if the authorized patient fails to collect the reserved prescribed medicine before the expiry date and time informed. Nonetheless, the server (140) may prompt authorized user to collect the reserve medicine prior to the expiry. In further embodiments, the control module (210) further
5 determines the directed other kiosk (200) being closest to a home address, an office address or an immediate location of the authorized patient. Still, it is up to the authorized patient to decide which address to be used for computing the closest kiosk (200) for getting the prescribed medicine.

10 To improve the diagnosis outcome or conclusion derived, it is critical to take state of mind or psychological status of the authorized patient into consideration during the consultation session. For instance, it has been known that external stress factor can weaken immune system (100) of a human subject or accelerate advancement of cancer. Therefore, the disclosed kiosk (200) may comprise an emotion module (260), which can be a submodule of the diagnostic module (220)
15 in some embodiments, configured to sense state of mind of the authorized patient through the multimedia unit (231) and/or the diagnostic module (220) that the sensed state of mind is applied at least partly to derive the diagnosis outcome. In more specific, the emotion module (260) may deduce state of mind of the authorized patient utilizing physio psychological data collected from various diagnostic tools (221) available. In addition to that, questionnaire may be
20 present to the authorized patients requesting them to answer for grading their state of mind. The grading can be done by the medical practitioner participating the consultation session or the emotion module itself based upon the answer selected for the questionnaire. The emotion module may further sense state of mind of the authorized patients by way of identifying their facial expression, body language, psycholinguistic, etc. of the authorized patient. Upon
25 concluding on the state of mind of the authorized patient, the medical practitioner is free to decide whether to incorporate the deduce psychological profile as part of the diagnosis outcome or not.

Considering that the authorized patient may need immediate medical attention in view of the
30 derived diagnosis outcome, the medical practitioner presiding the consultation session thus

need to contact the nearest healthcare facility to dispatch an ambulance. The medical practitioner may have limited knowledge about the geographical location of the authorized patient and face difficulty to contact the nearest facility for help. As such, the practitioner terminal (130) may comprise an emergency module (134) operable by the medical practitioner

5 to contact a facility to dispatch an ambulance to provide immediate medical support to the authorized patient located at the kiosk (200) upon deriving the diagnosis outcome. In more specific, the emergency module (134) can be called upon from the practitioner terminal (130) providing an option for the medical practitioner to activate it. When the emergency module (134) becomes activated, the request for immediate medical attention will be relayed to the

10 control module (210) of the disclosed kiosk (200) where the authorized patient located. When the control module (210) receives the request, it computes and searches for the nearest healthcare facility with the available capacity to provide the immediate medical attention needed by the authorized patient. In short, the server (140) or the control module (210) of the disclosed kiosk (200) is configured to find and contact the facility closest to the authorized

15 patient with available ambulance to be dispatched thereto.

It is to be understood that the present disclosure may be embodied in other specific forms and is not limited to the sole embodiment described above. However, modification and equivalents of the disclosed concepts such as those which readily occur to one skilled in the art are intended

20 to be included within the scope of the claims which are appended thereto

Claims

1. A kiosk (200) for providing telemedicine service from a medical practitioner through a practitioner terminal (130) to an authorized patient during a consultation session comprising:
- 5 a diagnostic module (220) having one or more diagnostic tools (221) for capturing physiological data of the patient;
- a communication module (230) comprising a multimedia unit (231) capable of displaying and capturing real-time video data, and a transmission unit for receiving data from a server (140) and relaying the captured data to the server (140), the communication module (230) being
- 10 electrically connected to the diagnostic module (220) to receive the captured physiological data, the real-time video displayed being a feed from the medical practitioner provided through the practitioner terminal;
- a data processing module (240) for processing the data received from and the data to be relayed the server (140); and
- 15 a control module (210) to regulate operations of other modules,
- wherein the consultation session is reserved through a user terminal (110),
- wherein at least one of the diagnostic tools (231) has at least one functionality managed by the medical practitioner remotely through the practitioner terminal (130) to derive a diagnosis outcome.
- 20
2. The kiosk of claim 1, further comprising an enclosure (270) constructed to allow only the authorized patient to enter within the enclosure (270) to access the diagnostic module (220) and/or the communication module (230).
- 25
3. The kiosk of claim 2, wherein the enclosure (270) comprises a first sensor (274) and an entry openable to permit access into the enclosure (270) upon receiving and verifying an authorized code and/or biometric information provided by the authorized patient through the first sensor (274).

4. The kiosk of claim 1 further comprising a disinfection module (250) configured to run a sterilization course towards the diagnostic module (220) and/or the multimedia unit (231) prior to beginning of each consultation session and entrance of the of the authorized patient.
- 5 5. The kiosk of claim 4, wherein the disinfection module (250) comprises a second sensor configured to detect presence of a human being within the enclosure (270).
6. The kiosk of claim 5, wherein the disinfection module (250) runs the sterilization course upon confirming presence of no human being within the enclosure (270) through the second
10 sensor.
7. The kiosk of claim 1 further comprising a dispenser module having a storage of a plurality of medicines being configured to dispense the authorized patient one or more medicine prescribed by the medical practitioner at end of one consultation session.
15
8. The kiosk of claim 7, wherein the dispenser module further comprises a third sensor to read on a prescription code provided to the user and dispense one or more medicines to the authorized patient according to the prescription code.
- 20 9. The kiosk of claim 8, wherein the prescription code is provided to the user terminal.
10. The kiosk of claim 1 further comprising an emotion module configured to sense state of mind of the authorized patient through the multimedia unit (231) and/or the diagnostic module (220) that the sensed state of mind is applied at least partly to derive the diagnosis outcome.
25
11. The kiosk of claim 8, wherein the communication module (230) communicatively links to a plurality of other telemedicine kiosks located remotely away.
12. The kiosk of claim 11, wherein the control module (210) is configured to direct the
30 authorized patient to obtain the prescribed medicine from one of other kiosks linked upon

detecting shortage of the prescribed medicine in the storage of the dispenser module and verifying availability of the prescribed medicine in the directed other kiosk through the communication module (230).

5 13. The kiosk of claim 12, wherein the control module (210) further determines the directed other kiosk being closest to a home address, an office address or an immediate location of the authorized patient.

10 14. The kiosk of claim 1, wherein the practitioner terminal comprises an emergency module (134) operable by the medical practitioner to contact a facility to dispatch an ambulance to provide immediate medical support to the authorized patient located at the kiosk upon deriving the diagnosis outcome.

15 15. The kiosk of claim 14, wherein the server (140) or the control module (210) is configured to find and contact the facility closest to the authorized patient with available ambulance to be dispatched thereto.

20 16. The kiosk of claim 4, wherein the disinfection module (250) comprises a lockable compartment for keeping at least one of the diagnostic tools within for sterilization that the disinfection module (250) prohibits accessibility of the diagnostic tool kept inside the lockable compartment during performance of a sterilization procedure.

25 17. The kiosk of claim 1, wherein the control module (210) or the server (140) is configured to send a reminder to the user terminal at a predetermined interval prior to beginning of the consultation session.

18. The kiosk of claim 3, wherein the control module (210) further comprises an exit switch activatable to open the entrance after ending on the consultation session.

19. The kiosk of claim 1, wherein the control module (210) is configured to upload a report, a prescription, a medical certificate and/or a diagnosis outcome to a database connected to the server (140).