Automated Medical Machine Using Body Area Networks For Primitive Health Issues In Cloud

K. Ashok Kumar, Sri Keerthi, Manika Iyer

Faculty of Computer Science and Engineering, Sathyabama University, Chennai, India.

INTRODUCTION

In tribal area’s people suffer due to lack of proper medical facilities. Most of the doctors won’t show interest to go to the tribal areas and work in those kind of area’s. The World Health Organization reported that one-third of the world’s population lacks reliable access to required medicines. Only 25% of the health facilities are available for use to 75% population in towns and rural regions[1].

Related Works

Telemedicine:

Telemedicine allows patients to consult the doctors immediately by means of video or audio calls without the physical presence of the doctor. Telecommunication technology will become an effective technology in tribal or rural areas [2][3]. By providing easy means of communication between doctor and patients. Telemedicine connects doctors and patients around the world with no geographical barriers. This can lead to better medical facilities in rural area. This will provide an easier and regular contact with the doctor to the patient. But the problem here is, when the doctor proposes a medicine in emergency situations and if that particular medicine is not available then it can cause harm to the patient.

Telepharmacy:

Telepharmacy is a technology with which medicines can be provided to the patients without the actual presence of the pharmacists. It includes drug therapy monitoring, refill authorization, patient counselling, prior authorization, monitoring formulary compliance with the aid of teleconferencing or videoconferencing. The working of the technology is an application should be filled with doctors prescribed medicines and registration should be done. After this the medicines will be sent. The disadvantage of telepharmacy is that the medicines will not reach the patient immediately it takes a very long time to reach the patient.

Corresponding Author: K. Ashokkumar, Sathyabama University, Department of computer Science and engineering, Faculty of computer Science, Chennai-600119 India. Ph:+91-9941144046, E-mail:kumar.kashok@gmail.com
Proposed Technology:

In the proposed technology both the advantages of the previous works are present. In the proposed system both the technologies telemedicine and telepharmacy are developed. So by using one system a patient can communicate by using telemedicine and can get medicines according to the doctors prescription by using telepharmacy.

![Automated medical machine using body area networks for primitive health issues.](image1)

All the technologies which were discussed till now has been embedded in a one single system like as shown in the above diagram. This system also consists of two sensors a heartbeat sensor and a temperature sensor which helps to find the patients temperature and heartbeat. It also consists of an RFID reader which will find the database of the user once they swipe their cards which is interconnected with a cloud technology.

![Communication using cloud.](image2)

**Algorithm for users to use AMM**

1. Step 1: Insert a card which contains an RFID tag.
2. Step 2: Check the temperature and the heartbeat by using the devices connected to the machine.
3. Step 3: Select the language and specialization of the doctor.
4. Step 4: After connecting with the doctor, consult the doctor.
5. Step 5: Collect the medicines which are prescribed by the doctor from the dispenser.
6. Step 6: Logout the once the medicines are received.
Algorithm for doctors to use AMM.

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Step 1: Doctor has to login with his/her user id and password.
Step 2: Doctor attends the calls made by the user by using videoconferencing.
Step 3: Doctor checks the heartbeat and temperature details of the patients and also his previous medical history.
Step 4: According to the patient’s condition doctor prescribes the medicines and checks the availability of the medicines.
Step 5: Medicines are delivered through the dispenser.
Step 6: Doctor may logout whenever.
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Components Used in Amm Outer Components:

a. Magnetic Card Reader:
   It is used to identify the URL of the RFID tag. Then match that URL with the URL present in the database and the details present in that URL will be sent to the doctor[4].

b. Body Area Network:
   Body area network is a wearable computing device with real time updates of medical conditions by using network. BAN provides health related information about the user such as blood pressure, temperature level to the doctors through network. The sensors present are interfaced with BAN network.

c. Camera:
   It is used to communicate with the Doctor through videoconferencing.

d. Microphone and Speaker:
   Microphone is used for communication between the patient and doctor i.e to hear and speak.

e. Medicine Dispenser:
   Medicine dispenser delivers the medicines to the patient through the door after the doctor prescribes the medicines.

f. Vault:
   It is a place where medicines are kept safely.

Inner Components:

a. Medicine Dispenser:
   Medicine dispenser consists of Electric eye and sensor. When the prescribed medicines are about to deliver they are checked by an electric eye. It monitors and notifies the journal with the delivered medicines to update the count of medicines in the database.

b. Catridge:
   Medicines are kept in the catridge. When the medicines are prescribed by the doctor, the medicines will be collected from the catridge and sent to the patient through the dispenser. This is maintained by only the admin.
C. Network / Internet:
The Wi-Fi can be used to connect each AMM to cloud and it is provided with authentication, use of IEEE 802.11i standard WPA2 (Wi-Fi Protocol Access 2)[11].

V. Working of AMM:
The user will swipe the card with a unique id it will be identified by the RFID reader and his/her details will be collected from the database. He/she has to check their body temperature and heartbeat rate by using the sensors connected to the system. This information will be immediately sent to the doctor by using the body area networks technology. Once the patient logged in by using the RFID tag a window will appear as shown in the below figure.

![Patient's side window](image1)

**Fig. 3:** Patient's side window.

The window is a menu which consists of options like call now, first aid methods, details of near by hospitals, more information and logout. If the patient wants to call the doctor he/she has to press the call now button and another window will appear which consists of several options. By using those options the patient can choose the doctor according to the language and speciality of the doctor. The doctor has to connect with the patients, for this the doctor has to register himself/herself in the main admin. The admin consists of an id and password which will be maintained only by the main administrator. Once the id and password is given correctly a window will be opened which contains a admin menu as shown in the figure(6). The admin menu consists of the options register new doctor (where the doctor has to register himself), doctors availability, add medicine (contains medicine details), display medicine stocks, check expiry date and logout.

![Admin menu](image2)

**Fig. 4:** Window which shows admin menu.

![Doctor menu](image3)

**Fig. 5:** Window which shows doctor menu.

Once the doctor registers with his details he can login in his account and consult patients. To login, the doctor should open the doctor login window and should login with his id and password with which he registered
has to open his login. Then he will enter into another window which consists of the following options as shown in the figure(7). This window consists of a doctor menu. The doctors menu consists of the options attend call, end call, logout.

Once the user selects the doctor if the doctor comes online. Video conference call can be made between the user and the doctor.

After the patient consultancy with the doctor gets over, the doctor prescribes some medicines and those medicines will come through the dispenser.

For sending these medicines the doctor has to type all the medicine details in the space which is provided. The video conferencing window consists of options for the doctor and the space to give the details about the medicines. Details of the medicines means name of the medicine and count of the medicines. Once the medicine details are sent by the doctor then a request will be sent to the admin. The admin has to accept the request then the medicines will come out from the dispenser in the patients end.

The figure(8) is the architecture of the automated medical machine. All the devices will be attached to a one single machine. For example the RFID reader, heartbeat sensor, temperature sensor, dispenser etc. It consists of a screen, web camera and headphones to consult the doctor.

The doctor also consists of a similar setup but there will not be a RFID reader, dispenser, heartbeat sensor and a temperature sensor. All the devices which are to be used are embedded in one single machine to make the system less complex.

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**Fig. 6:** Block diagram of AMM.

**VI. Architecture of AMM:**

The mechanism of the dispenser is, when the doctor press a specific key in the keyboard, There will be a movement in the motor, which helps to send the medicines to the patients through the dispenser. This motor is present inside the medical machine. The motor moves according to the key selected by the doctor. This movement of the motor designates a particular medicine which is present in the dispenser. The doctor has to check the data base of the medicines before choosing the medicines.

In the doctors end each and every doctor has to register in the main admin and should be authorised by the admin. These authorised doctors will be provided by a user id and login.

The doctors should login with their user id and password. Once a doctor is online, in the patients end it will show that the particular doctor is available. In the above shown diagram all the data is stored in one single cloud[9]. In the same way all the AMM’s will be connected to a interconnected large database and it will maintained in well sophisticated manner for better results.
VII. Working of Body Area Networks:

The body area network used in the AMM, senses the temperature and heartbeat of the patient [5] based on the sensors interfaced with it and sends it to the destination. Thus it provides the Doctor with updated health related data in that moment i.e when checked with the help of sensors. This can be attached temporarily to the human body to know about the clinical parameters and body condition. This technology also provides privacy to the data.

VIII. Working of RFID TAG:

RFID belongs to a group of technologies referred to as Automated Identification and Data Capture (AIDC). AIDC methods automatically identifies objects, collects data about the objects and it automatically inserts the data in the computer with no human interference [4].

RFID methods uses radio waves to accomplish this. At a simple level, RFID systems consists of three components: an RFID tag or small label, an RFID reader and an antenna. RFID tags contain an integrated circuit and an antenna, which are used to transmit data to the RFID reader (also called an interrogator) [4]. The reader then converts the radio waves to a more usable form of data. Information collected from the tags is then transferred through a communications interface to a host computer system, where the data can be stored in a database and analyzed at a later time [6].

XI. Conclusion:

Automated medical machines provides a lot of advantages to the people living in rural areas. It also is an added advantage for lorry drivers who travels on the high ways at night times. If a driver has a primitive health issue he can go to the nearest AMM and can get treated easily. In the future this AMM machine can be upgraded for more health issues than the primitive health issues.

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