RURAL BASIC HEALTHCARE AUTOMATED SYATEM

[1]M.Bharathi, [2] S.Ananthi

[1]Assistant Professor, [2]Assistant Professor
Computer Science and Engineering
Sri Sai Ram Institute of Technology, Chennai, India

Abstract : **Doctors are an integral part of our life in maintaining healthcare. In recent times, the availability of doctors to consult in the rural area have gone down drastically such that there is sparse of them even existing for basic health consultation. Here, we propose an automated clinic that takes in the basic vitals from the patient and asks a set of questions. The doctor present in the server side receives the data on their PC. These parameters are important to diagnose an illness, thus are used to prescribe the required set of medicines. The automated system reduces the burden of the doctor and helps manage time judiciously. The doctor can even ask the patients to visit a hospital by analyzing the questions answered. The system on getting the valid response from the doctor dispenses the medicines or suggests patients for further consultation in the hospital. A conceptual console clinic is fitted with sensors and basic decision algorithm to automatically receive data and send them wirelessly to the doctor.**

IndexTerms **-** Decision algorithm, network, GSM, sensors

I. INTRODUCTION

Rural areas are usually deprived of the basic healthcare because of the unavailability of doctors and hospitals being in deserted places. Communication and consultation becomes a very difficult process due to lack of infrastructure and facilities to help the rural people. Though, healthcare systems have been advancing through the years, they have been unsuccessful to help those most needed.

Synergy of the computer science, sensors and technology plays an important role in the development of medicine and hospitals. In recent times, E-healthcare, smart health care systems have been developed to help people with basic consultation without the actual presence of the doctor. E-healthcare is a web based application that deals with user interaction through the network to help determine the diagnosis of diseases. With the current advancements in creating a more independent machine to improve people's health, the usage of supervised learning algorithm and expertise in technology is essential to make a greater impact on the healthcare system.

In India a new implementation has been done for automotive clinic. This is called as the Medical ATM that dispenses medicines like any other vending machine with the prescription. This has been started recently in five of our states. The aim of the project was to set up these ATMs where the availability of qualified medical practitioner is scarce. This machine helps give the basic healthcare or suggests the patient for further treatment with the help of a multipurpose public health worker (MPHW) or an auxiliary nurse midwife (ANM). The current conditions of physical infrastructure, staff, access and usage, gaps and requirements in infrastructure and services related to health in India is of major concern and utmost importance.

Using Interactive voice response technology, the existing medical ATMs can be configured to act as automated machines without the need of even a MPHW and ANM in the vicinity. The use of sensors to detect the temperature and heartbeat will give the basic vitals that the doctors look for. Even the usage of simple machine learning algorithms and decision trees, it can prove to be a better and steadfast way of answering and diagnosing an illness by the doctor. There can be many other ways of probably analyzing the health, but with the current growth on the machine learning algorithms it can be an impressive advancement in the future.

This paper proposes the design and development of a more automated medical clinic using a simple and effective algorithm. The data collected over this is processed by the doctor available through the network to prescribe the medicines for the patients.

II.EXISTING SYSTEM

The healthcare system that is currently there in our country has been only recently released in five of our states. This medical ATM was introduced to places where the availability of the doctors is extremely low. Every system is manned by a multipurpose public health worker who checks the basic vitals like blood pressure, heart rate, glucose level. These data are immediately transmitted to the doctor on call available through the GSM based monitor. Once the data has been received by the doctor, he analyses the condition of the patient and if required even talks to them. Based on all the information gathered by the doctor, they'll either prescribe a medicine or refer them to a hospital nearby. This prescription is directly transmitted back to the ATM

system that dispenses the medicines automatically. The person who always mans the ATM explains the dosages to the patient. This machine was introduced to overcome the ratio of doctors to that of the people who are need of the basic healthcare in rural areas. This system still makes use of people who are in need to continuously man the machine. And this does not solve the entire issue of having lack of people to help medically. The requirement of people to know the basic healthcare makes it equivalent to the necessity of doctors. Hence the existing system, though is extremely beneficial to the people, it still doesn't eradicate the necessity of medically knowledgeable people required with the system.

III. PROPOSED SYSTEM

To overcome certain disadvantages of the existing system, we have proposed a new system that eliminates the need of any person to man the medical dispenser. The rural healthcare system can be made automated by introducing a simple machining learning algorithm in to the system. Basic vitals are checked through sensors that measures the temperature and heart rate. A series of questions is asked to the patient and are answered through a key press. These data are collected and sent to the available doctor through the network. The doctor checks the data and prescribes the medicines or suggests further consultation which goes back to the user as a valid response. The interaction with the patient is done via voice for a more advantageous result for the rural people.

Hardware design:

The hardware comprises of the entire automated machine from the sensor to the medical dispenser. For acquiring the vitals from the patient there are two main sensors that are used- the temperature and heart beat sensor. The sensors are interfaced with the microcontroller and are thus connected to the display. The temperature of the patient is calculated using the LM35 sensor. This sensor gives the value of the temperature in terms of voltage. They are highly recommended for the usage of sensing the temperature as it not only has a higher range of values, it can be easily calibrated to Celsius unlike many sensors. This proves to be a greater advantage than any other temperature sensor. To know the values of the temperature it is essential to convert this analog voltage value into that of digital value and this is done by the Analog to Digital Convertor. An input channel is chosen from the ADC using the address decoder. The address are set to the corresponding channel using the Address Latch Enable. The analog signals come out through eight data lines which gives the digital value of the temperature. These data lines are connected to the microcontroller, which are in turn connected to the display. Thus, the temperature is calculated and displayed. The heart beat sensor calculates the human heart rate through the concept of interrupts. As the patients keep their finger on the sensor, the pulse beat is sent to the microcontroller interrupts. The value of the pulse is taken for a minute, more or less like how the doctor takes in the in an actual clinic. The heart rate is displayed with the delays on the screen. After detecting and acquiring the basic vitals of a patient it is moved further on to the client- server communication.

Client – Server Communication:

The set-up of the rural healthcare system consists of the communication between the patient and the doctor (who is sitting at a distant city). Here the set-up consisting of the LCD screen along with the patient acts as the client module of our proposed system. The doctor sitting at a distant city, connected by an internetwork acts as the serverR module of our proposed system. To ensure that the right patient is connected to an authenticated doctor, we have connected the system with the use of the static IP addressing, where the communication can take place only between the patient and the authenticated doctor and there is no threat of any third party attack.

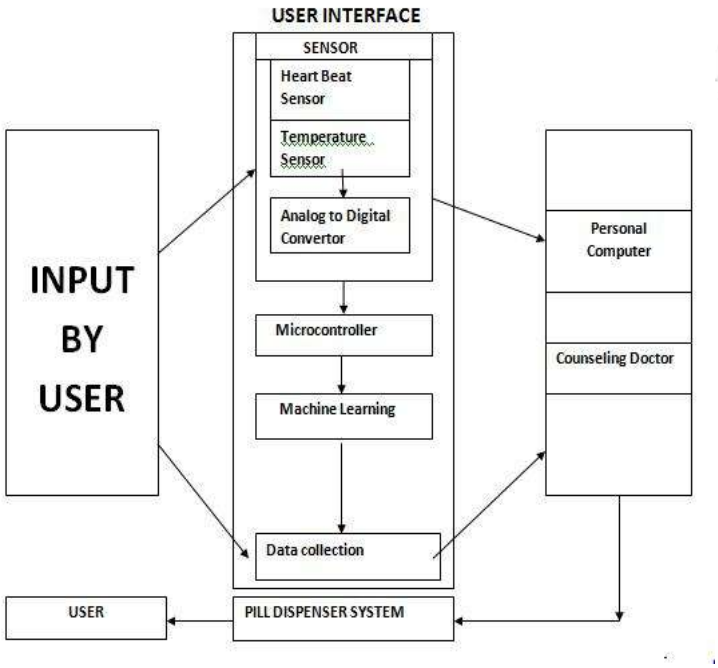

Fig: Basic architecture of the System

Working

At the client side the temperature and the heart rate of the patients are recorded and it is displayed at on the client-side screen.Now four basic clinical level healthcare questions are asked to the patient. Based on the Yes/No response from the patient the check boxes on the screen of client side are either checked or left blank.For example these questions can be the basic clinical level questions like head-ache, stomach-ache, cramps, etc.Now, a similar set of four questions are asked related to the basic healthcare again.Based upon the answers entered , the set of next eight questions are asked. This is done using the Decision Making Algorithm.For example, if the algorithm decides that the patient needs to be treated upon the first four question only then only the first set of eight questions will be asked to the patient, otherwise the next set of eight question.Now this data is passed on the server side, where we have a doctor available. At the server side, doctor examines the data base provided by client side PC and sends the prescription to client side PC.Then the data signal is given to microcontroller which matches the received data ASCII code with ASCII code programmed already in microcontroller.If the code matches microcontroller, it sends the instruction to relay driver circuit which enables one of the two relay to drive the motor in forward direction and the appropriate pill is dispensed out along with the prescription getting printed out.Then the driver circuit makes the another relay to enable the motor to run in reverse direction and dispenser will close.

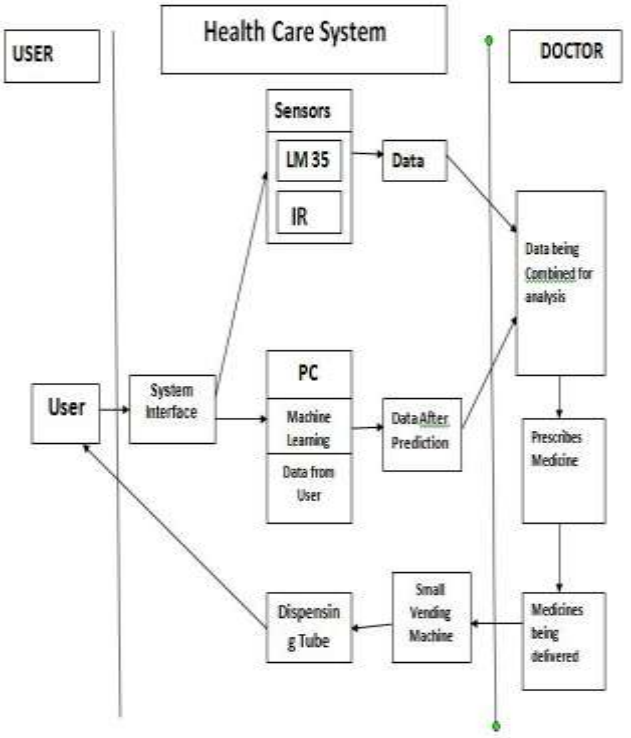

Fig: Detailed view of the system

IV. ADVANTAGES AND FUTURE ENHANCEMENTS

This system has several advantages and are listed below:

Here, there is no need of physician to help the patient unlike the existing system where the patients are dependent on them.

Temperature and heartbeat rate are automatically detected using emerging system within a short span of time.

Every question asked to the patient is in audio with their own state language.

Through network the doctor at present can interact lively as well, which gives a great assurance to patients.

Doctor can immediately prescribes medicine by dispensing and by printing prescription.

Through this system, there is a facility given where the doctor can live stream with the patients when required.

V. CONCLUSION AND FUTURE ENHANCEMENTS

From this paper it can be concluded that the basic healthcare for people can be diagnosed using a systematic and effective automated system. The use of sensors to get the vitals makes it more easy and efficient. The simple algorithm that makes the machine automated is a hassle free process that eliminates the need of anyone being required near the machine. Having an audio is one of the most beneficial things in this system that will help the rural and especially illiterate people.

As a future enhancements, the question-answer can be made into a better machine learning algorithms. And by adding database into the system, doctors can have previous information about the patient. The identity for patient can be kept as Adharnumber and its thumb impression. For more enhancements, the usage of sensors can be increased to detect height , weight, blood group as well.

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