Self Medication System for Remote Areas Using Aurdino

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Abstract- *There are scores of challenges caught up in substantiating a remote area health service. To congregate these challenges, it is vital for service providers to have a thorough grasp of the issues which impact on their ability to deliver consistent quality care in remote areas. To prevail over these crises, our system will provide a valuable resolution. It is an arduino based self- medication capsule storing and dispensing system which can be effortlessly utilized by every person .Because of its elfin size and credence it can be furnished in any place. Physical parameters like blood pressure; pulse rate; body temperature can be measured and relevant medicines will be dispensed. A database will be created for every individual person accommodating a prospect reference.*

Keywords- self medication, Arduino, physical parameters.

I. INTRODUCTION

The self medication system is a machine that helps the people to manage medication on their own based on their symptoms without forthcoming a pharmacy and will be more useful for the people in remote villages. The system can be positioned easily in any places like petty shops, highways, etc…

II. PROBELM FACED

The problems India facing today in healthcare is Lack of infrastructure; inefficient workforce; lack of pharmacies. There is only one doctor per 1,700 citizens in India. Shortage of doctors is one problem; their unwillingness to work in the rural hinterland is another. Generic medicines are highly underrated in country where doctors sometime prescribe expensive medicine. It is a sad reality that people in rural India are dying because of lack of health care infrastructure, our country's total IMR and MMR among the highest in the world and tribal health is at the lowest among all. The figure 1 shows how the medical professionals use a mobile health care van equipped with an examination table.

Figure1: Medical professionals use a mobile healthcare van equipped with an examination table, medical apparatus and medicines.

The state of public healthcare services remains unchanged while looking towards accessibility to healthcare, doctors, and medical. According to the Global Burden of Disease study published in the Lancet, India continues to be a poor performer in terms of providing rural healthcare. The shortfalls in rural health area service are shown in figure 2. Due to the difficulty in accessing medical facilities, People remain unhealed for a long time. On such conditions, even the uncomplicated illness gets raised to the level of non-recovery.

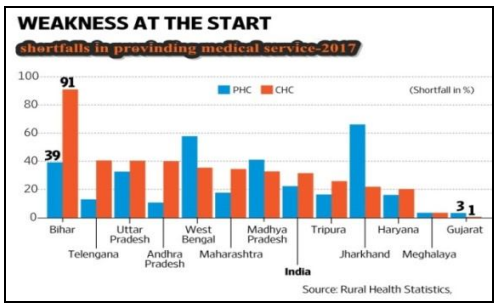

Figure:2: Shortfalls in rural area health service

III.OBJECTIVES

- To realize medication facilities in remote areas.
- To create availability of medicines for any instance attainment.
- To provide a user friendly medication system for self health management.

IV. BACKGROUND STUDY

A. Embedded system

An Embedded System is a combination of computer hardware and software, and perhaps additional mechanical or other parts, designed to perform a specific function. An embedded system is not a computer system that is used primarily for processing, not a software system on PC or UNIX, not a traditional business or scientific application.

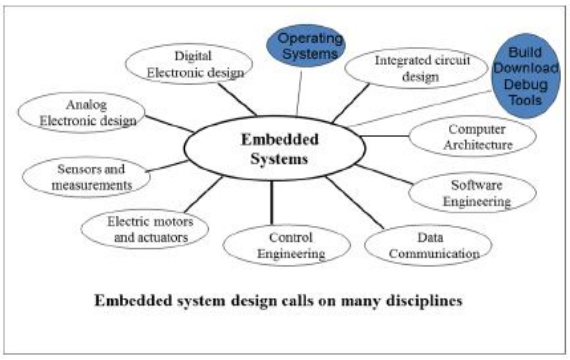

Figure 3 Embedded system design

High-end embedded & lower end embedded systems. High-end embedded system - Generally 32, 64 Bit Controllers used with OS. Examples Personal Digital Assistant and Mobile phones etc .Lower end embedded systems - Generally 8,16 Bit Controllers used with an minimal operating systems and hardware layout designed for the specific purpose. Here we are using the concept for connecting the user interface with microcontroller.

B. Remote Monitoring

Remote monitoring, also known as self-monitoring or testing, enables medical professionals to monitor a patient remotely using various technological devices. This method is primarily used for managing chronic diseases or specific conditions, such as heart disease, diabetes mellitus, or asthma. Wearable devices can monitor and record real-time information about one's physiological condition and motion activities. Wearable sensor-based health monitoring systems may comprise different types of flexible sensors that can be integrated into textile fibre, clothes, and elastic bands or directly attached to the human body.The figure 4 shows the remote monitoring of the human body. The sensors are capable of measuring physiological signs such as electrocardiogram (ECG), electromyogram (EMG), heart rate (HR), body temperature, electro dermal activity (EDA), arterial oxygen saturation (SpO2), blood pressure (BP) and respiration rate. Here we are using sensor's for the assessment of physical parameters of the patient.

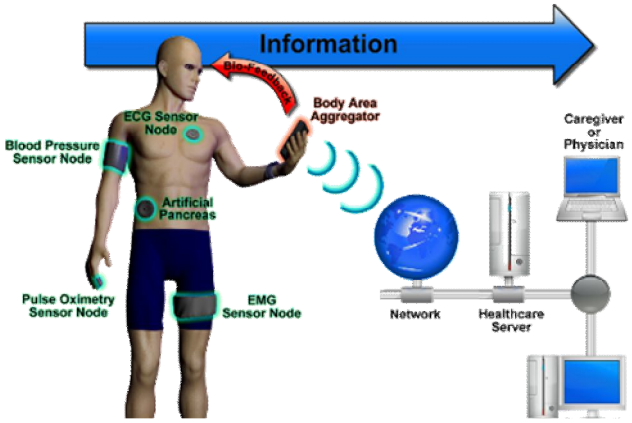

Figure 4 Remote monitoring

C. Tele nursing

Tele nursing refers to the use of telecommunications and information technology in order to provide nursing services in health care whenever a large physical distance exists between patient and nurse, or between any numbers of nurses. As a field it is part of Tele-health, and has many points of contacts with other medical and non-medical applications, such as Tele-diagnosis, Tele-consultation, Tele-monitoring, etc. Patient used to communicate the nurse and convey his illness over phone and the receiver who handles the patient offers his the treatment methodologies or connect him to his superior doctors. The figure 5 provides the information regarding the telenursing medication method through a User interface electronic device which gives self medication for the patient.

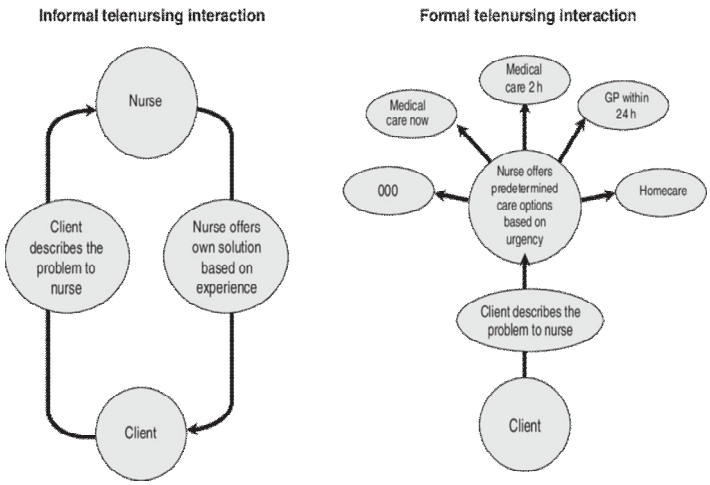

Fig 5 Process of Tele nursing

V. EXISTING SYSTEM

Facial expressions are among behavioural signs of pain that can be employed as an entry point to develop an automatic human pain assessment tool. Such a tool can be an alternative to the self-report method and particularly serve patients who are unable to self-report like patients in the Intensive Care Unit and minors. In this paper, a wearable device with a bio-sensing facial mask is proposed to monitor pain intensity of a patient by utilizing facial surface electromyogram (sEMG). The wearable device works as a wireless sensor node and is integrated into an Internet of Things system for remote pain monitoring. In summary, this study proposes a scalable IOT system for real-time biopotential monitoring and a wearable solution for automatic pain assessment via facial expressions.

Disadvantages

- The patient to take right medication and right dose not at the right time
- Cause medication errors
- Need caregiver any time

VI. PROPOSED WORK & DESIGN FLOW

When we enter in ATM (All Time Medicine) dispenser system first we give a fingerprint for authentication and we have to enter the disease symptoms. This information provides to the microcontroller. The proposed system declared a microcontroller and motor based system to dispense the medicines when accessed by the user through an input event, the data pertaining to the medicine storage can be ascertained from the remote area. Basic human parameters like Temperature, Heartbeat rate, blood pressure can also be tested through this machine and the specified medicine will be dispensed based on the patient condition. The system is loaded with the medicines and will be dispensed upon the request of the users, the total system functioning will be handled by the microcontroller interfaced with the sensors which they detect the ailment according to an information the motors to dispense the medicine. The information related to the storage data of the medicines, and also the user interaction can be done through PC. System is providing certain privileges to the patient to choose the required medicine. Information about the patient and the usage of the medicines by the patient will be tracked.

Advantages

- Prevent medication errors.
- Make the patient and the caregiver feel better.
- Automatic process.
- 24 hours system.
- Increase the human lifetime.
- Decrease the accidents.

A.BLOCK DIAGRAM

The Block diagram of self medication system is shown in the figure 6.

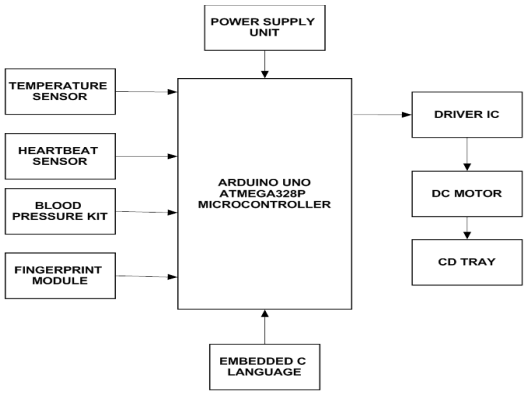

Figure 6 : Block Diagram of Self Medication System

The block diagram contains Arduino which has various sensors that gets live values of Physical parameters from the patient. The Device has hardware connections with the electronic components like Motor-drivers and Finger print sensor.

B. PROCESS DIAGRAM

The process of medicine distribution includes various sequential steps. Each step is pre-programmed using vb.net and the data base is created using sql server. The system will process the given input and dispense medicine according to the commands produced as the output of processed data. Figure 7 shows the process in stepwise. Data manually entered by the patient will be saved in individual profile in the sql server database and retrieved for further process.

- Step 1- System login: The patient has to log on the system for medication using his user id and password.
- Step 2 - Profile creation: A profile will be created for all the user which contains patient's personal information. It has the User name and password column that are used for system login.

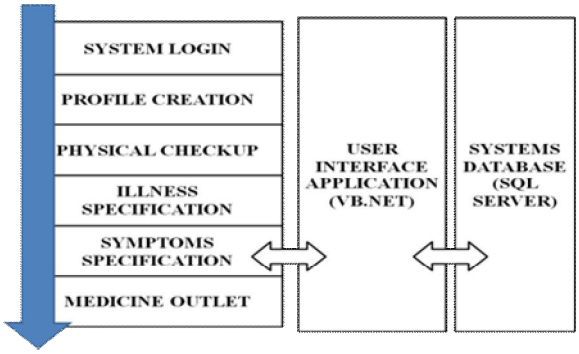

Figure 7 Process flow of self medication system

- Step 3 - Physical Check-up: Using the sensor, physical parameters are taken on live and stored in his database
- Step 4 - Illness Specification: Common health issues are mentioned here and Patients has to select enter his problem manually.
- Step 5 – Symptoms Specification: The other symptoms accompany with their illness are analyzed by the manually entered information
- Step6–Medicine Outlet: The relevant medicine will be dispensed.Medicines are kept in individual racks. For every problem, their resultant medicine will be dispensed

C.FLOW DIAGRAM

Figure 8 shows the flow of process from system login to medicine dispensing. Once the user logged on the system, the physical parameters are taken. The illness has to be manually specified.

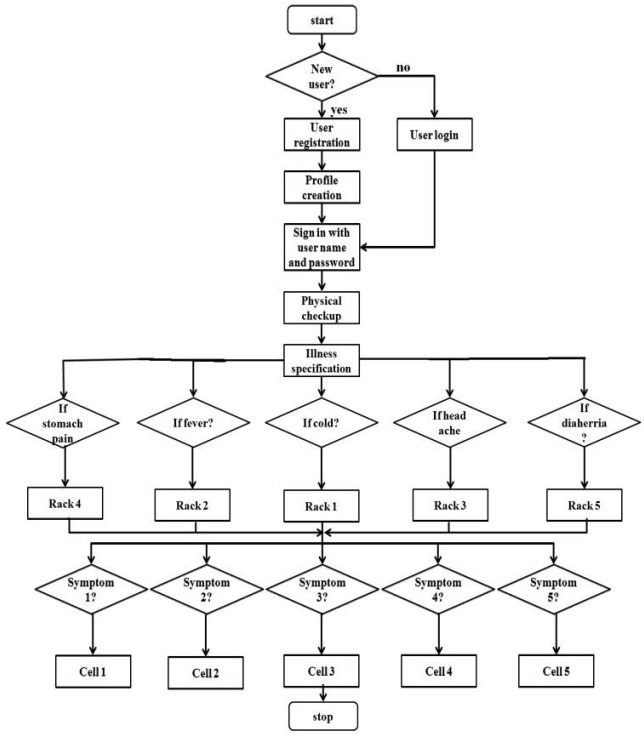

Figure 8 Flow diagram for self medication system

The dc motor in each respective tray will be triggered for each illness. They medicine will be kept in separate cells according to the symptoms that accompanies the illness. The corresponding tray will be opened for each illness and particular cell will me mentioned for the patient's symptoms.

VII. DESIGN IMPLEMENTATION

A.Circuit Diagram

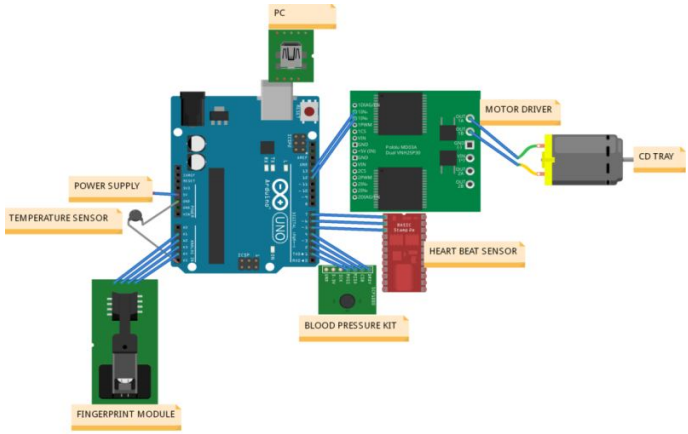

Figure 9 Circuit diagram of the system

The figure 9 shows the overall circuit diagram of the proposed system**.** The figure 4.2 shows the device module of the system. The Device module consists of three individual

motor drivers. Each motor driver is connected with two dc motor which controls opening and closing of medicine shelf. The motor drivers are connected from digital pin 2 to pin 12 respectively. It rotates in one direction if the digital input goes high and rotates in opposite direction if the digital input goes low. The input is generated as per the commands relevant to the prescription. Every medicine rack will have individual cells for different possibilities of illness. This method is used in order to offer an easy identification of the relevant medicine which has to be taken for specific illness.

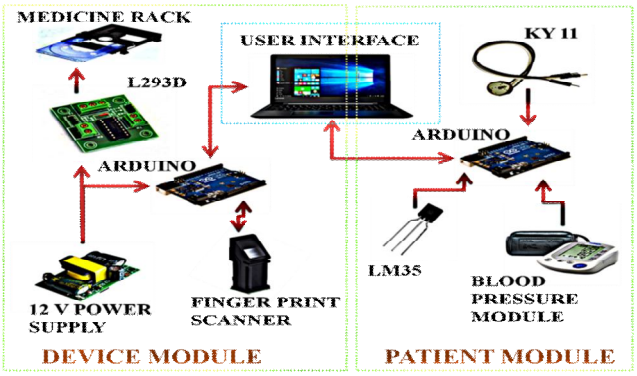

Figure 10 Order of connection

The schematic connections of every individual component to Arduino are discussed below. The device module consists of one Arduino, which has the connection with three individual motor-drivers. Power supply is given to the motor - drivers at VCC and GND from the power supply unit.The motor drivers are used to control the rotation of motors in clockwise and in anti-clockwise direction. Finger print scanner is connected to pin 2 which is a transmitter and pin 3 is the receiver of Arduino which is on connection with the transmitter pin of Finger print scanner. Figure 10 shows the schematic connections of the device module.

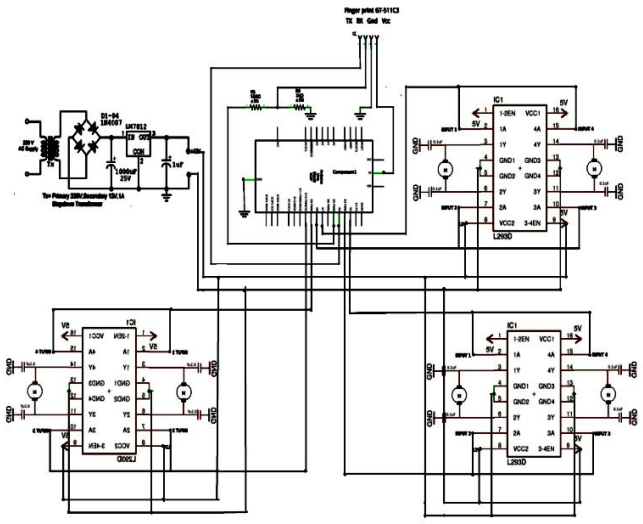

Figure 11 Circuit diagram for device module

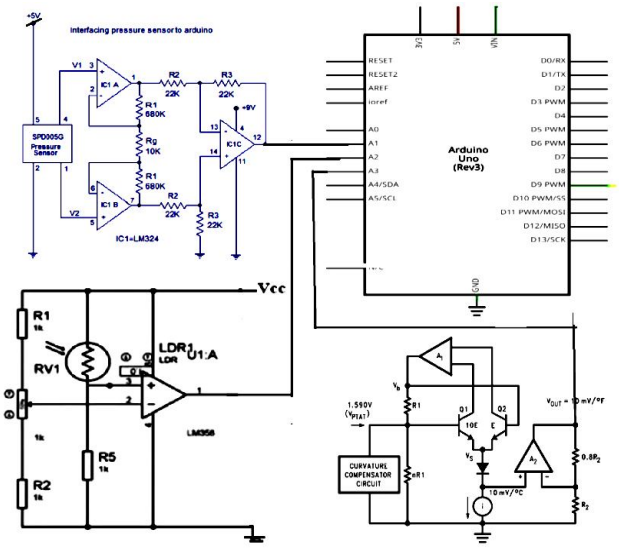

Figure 12 Circuit diagram for patient module

The circuit diagram for the patient module is shown in Figure 12.The data pins of heart beat sensor and the blood pressure sensor are connected to pin A2, A3 in the Arduino. The Vo pin of the temperature sensor is connected to the A4 pin. The blood pressure kit cannot be connected directly to the arduino. For that, UART converter is used. It connects the output pin of the micro controller to the Input pins of the Arduino.

B.Hardware Requirement

- Power supply unit
- Arduino uno
- Microcontroller – Atmega328p
- Motor driver – L293D
- DC motor – 12v
- Temperature sensor
- Blood pressure kit
- Heart beat sensor
- CD tray

C.Software Description

- Visual Basic .net
- Arduino
- Proteus

D.Design Implementation

The design implementation of proposed system is shown in figure 13

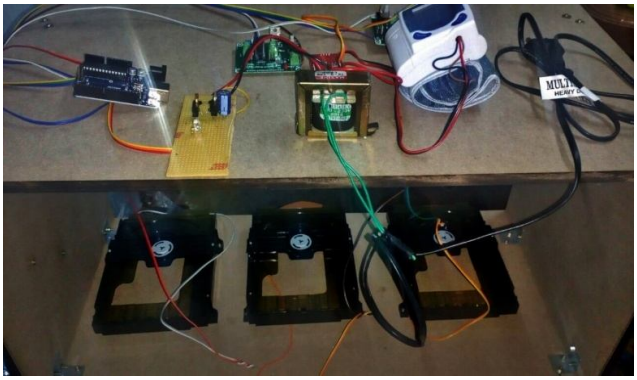

Figure 13 Designed system

IX. RESULTS AND DISCUSSION

The paper has presented to our knowledge about the machinery and technology involved in the most common vending machines present all over the world. It helps increase efficiency by lowering dependence on manpower. The desired outcome is achieved as per the user's requirements in the form of medicines dispensed by the machine.

Step 1: Initiating the process

The opening window which first appears on the screen is shown in the figure 14. It has the contents like Name of the system, date which is the option directly connected to the clock on the system. Other user options are user login, finger print login, finger print enrol and patient registration.

Figure 14 Home screen

The device module and patient module has to be connected on individual ports of the system. For port selection, choose connect option available on the screen. Glowing of Led's as shown in figure 13 shows the power supply and establishment of communication among the device and the user interface.

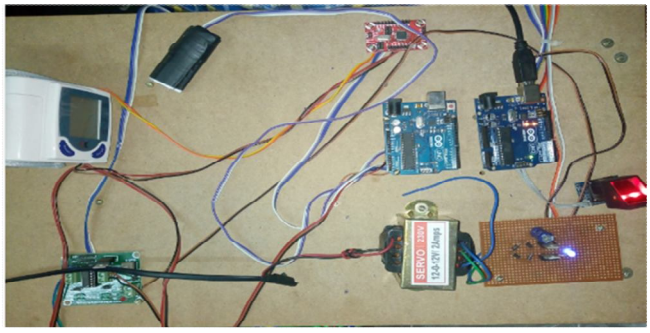

Figure 15 Interconnections of components

Step 2: User login

The user has to use his unique Id and password to logon his profile**.** It will be generated after user registration. The figure 16 represent the user login window.

Figure 16 User login window

Step 3: Physical Check up

The physical parameters are taken using different sensors. For initiating and retrieving the data, timer is used. An additional option is provided to skip this step if the user is not the registered patient (i.e) if the patient could not able to come, hid relation came to took the medicine by manually entering the details. The figure 17 shows the physical check up window.

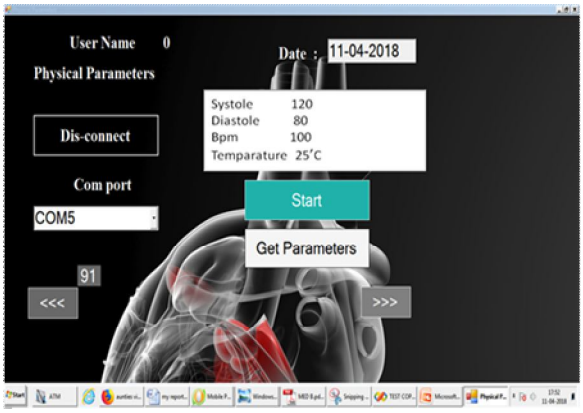

Figure 17 Physical check-up window.

The process has to be initiated after attaching the sensors to the human body or else error may occur. If error occurs means, restarting the process is required. For getting the details manually, Get parameter option can be used. Figure 18 shows the physical check-up process scenario. The temperature sensor is attached with the wrapper of blood pressure module. The patient has to tie this module around his wrist and position his finger on the heart beat sensor.

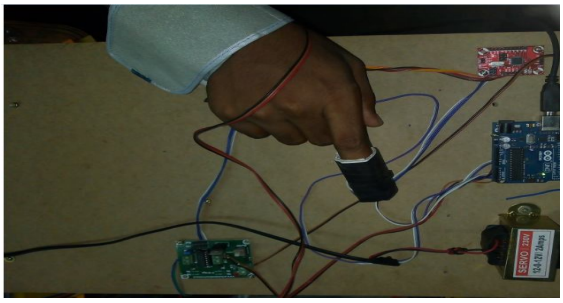

Figure 18 Physical check-up scenarios

Step 4: Illness specification

The common illness will be displayed in the screen. The patient has to choose the problem manually and its relevant symptoms. For additional details, period of suffocation is also provided. Figure 19 shows the illness and symptoms window.

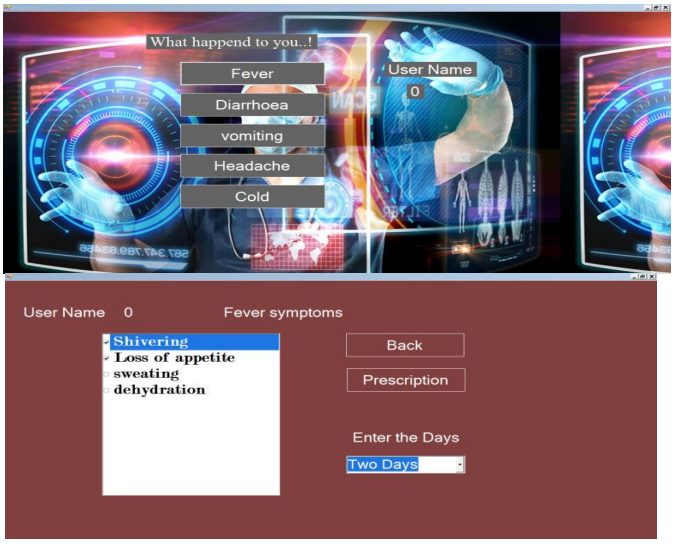

Figure 19 Illness and symptoms

Step 6: Prescription display

Once the illness and symptoms are specified, its relevant medicine will be displayed in the screen with the help of pre-defined program. Figure 20 shows the prescription window.

Figure 20 Prescription window

Step 7: Medicine outlet

Get option is provided to get the medicine from the device. Once the option is selected, the corresponding rack will get opened. Figure 21 shows the medicine rack.

Figure 21 Medicine outlet

X .CONCLUSION AND FUTURE WORK

The proposal Automatic Medicine dispensing machine designed and implemented to improve the health care in the remote rural areas by serving the patients for their basic ailments like fever, headache, and so on, the design of this system using cutting edge technical aspects like embedded systems and Arduino accomplished fruitful results in the improvement of the healthcare by dispensing the required medicine for the patients upon their request through keyboard interface, and the healthcare improved data was justified with a simple experimentation.

Future Scope

The system is designed with the concern of upgradability. The future enhancement of the system will have the following ideas. (i) Introduction of IoT -for patient doctor interface - Medicine refilling - Auto reminder for patient's checkup, (ii) Blood testing facility (iii) Auto dispensing of medicine.

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