IOT BASED SAMRT MEDICINE REMINDER

[1] Poorna Chandana S P, [2]Mrs.Meghashree A.C, [3]Dr. G. F. Ali Ahammed
[1]Masters Student, [2]Assistant Professor, [3]Associate Professor and Course Coordinator
[1]Department of Digital Electronics and Communication Systems,
[1]VTU PG Center, Mysuru, India

Abstract: ***This paper proposes a novel idea to provide the information automatically to patients to take their right dosages at appropriate time. Now a day, most of the patients may forget to take their medicines as per the prescription due to mental stress. Hence, it may cause prolong period to recover from the diseases. Sometimes, the aged patients are gulping tablets and their dosage level incorrectly causing a severe problem. To overcome these problems, a novel Smart Medication Reminder (SMR) system is proposed. This system uses Microcontroller, TFT LCD display and Real Time Clock (RTC) module, WI-FI module and an alarm system used to intimate the patients to take proper dosage according to the prescription at right time. This portable and economical SMR system would help aged patients, especially to the illiterate patients.***

IndexTerms – Reminder,medication schedule,wi-fi module,elderly

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I. INTRODUCTION

The problem of aging population is the trend all over the world. If the elderly people can take care themselves well in the daily living, it will be able to lower the care burden among younger generation; If we can improve the medication compliance, it will promote the physical and mental health of the senior citizens and assist them to live independently.

Elderly, those aged 60 or above, make important contributions as family members, active economy participants, volunteers, etc. Though some people aged well, many other become frail and some of them at risk of disease and a costly dependence. Particularly, demential and cognitive disorders have become a common health problem of elder people. This is due the natural aging which increases chronic diseases. Those health problems require dosages of drugs, which could be supplied many times on a day. [1]

The lack of availability patient-related information causes many errors in healthcare. The use of new information and communication technologies (ICTs) could increase the accessibility of medical information and it's essential for patient safety. Internet of things (IOT) is a global network infrastructure, linking physical and virtual objects through the exploitation of data capture and communications capabilities. The connectivity of sensors and other healthcare devices (IOT) plays an important role on care of patients, because it allows to get access in real-time of medical information. Thus, the study and development of an effective Healthcare/IOT gateway could be crucial in patient care.

II. LITERATURE REVIEW

In this section, a combination between electronic and mechanical pill boxes or dispensers is presented. It's been included certain traditional pills organizers, which represents a first step in these developments and allowed us to obtain ideas about design useful patterns in development of this solution.

In [2] they presented a pill dispenser which has different prescribed administration schedules. It includes a plurality of pill storage compartments, each of them capable of holding more than one pill. This device has a pill detector and generates a signal to alert patients to take the prescribed medicine. There are twelve storage compartments, arranged in a ring about a vertically rotating wheel. However, this solution has a limitation due to this pill dispenser can only hold doses for 24- hours.

In [3] user had to load the pills to the boxes every week. Mixing different pills in the same box would increase the risk of making mistakes. We also found another type of pillbox, which had the sound reminder, and was able to remind the user to take medicine at user specified time. However, the users still have to put different kinds of pills in the same box, and reload the boxes every week. Additionally, it could only remind the user to take pills once a day.

In [5] user had to load the pills to the boxes every week. This device contain separate compartment but placed in a single box, for storing different kind of pills. It is programmed with alarm system and LCD display. Alert the patient many times in a day. In this device mixing different pills in the same box would increase the risk of making mistake, notification system is not included.

In [7] they defined the specifications of the device based on the user needs. From the literature cited, the research proposed an idea of medicine box that will adapt the features of time tracking and alarm triggering additionally, as compared to the existing system, it will remind the user to take medicine not for once per a day but many times a day along with the number of dosages to be taken with the help of LCD display and the patient need not to refill the box every week. But there is no notification system is included.

In the proposed system we come across all the above disadvantages. The invention can store different medicine in different compartment with separate open and closing lid therefore no need to include led in each compartment. The alarm also gets activated at particular time and no need to refill the pills daily. The Medication Reminder can help users to take the correct medicine on time. But, initially doctors, nurses, or family members have to fill the box with right medicine users.

III. METHODOLOGY

The "Smart Medicine Reminder" is used as a pill storage device which contains a programmable alarm system an interactive and friendly user interface and a notification system through Wi-Fi module. The "Smart Medicine Reminder" is connected with an ESP alarm android application via Wi-Fi using the ESP8266 module. We can add/modify/delete/activate/de-activate alarms using the android app when the device is up and connected with the same Wi-Fi network your phone is connected to. Smart medicine remainder has a 1.4inch TFT screen and two buttons as user interface. One button is used to turn off the alarm and the other is to snooze it. The welcome message (for when the user turns the alarm on) and the snooze times are settable through the app. Time and date are shown on the TFT screen and synchronized with the android mobile time/date.

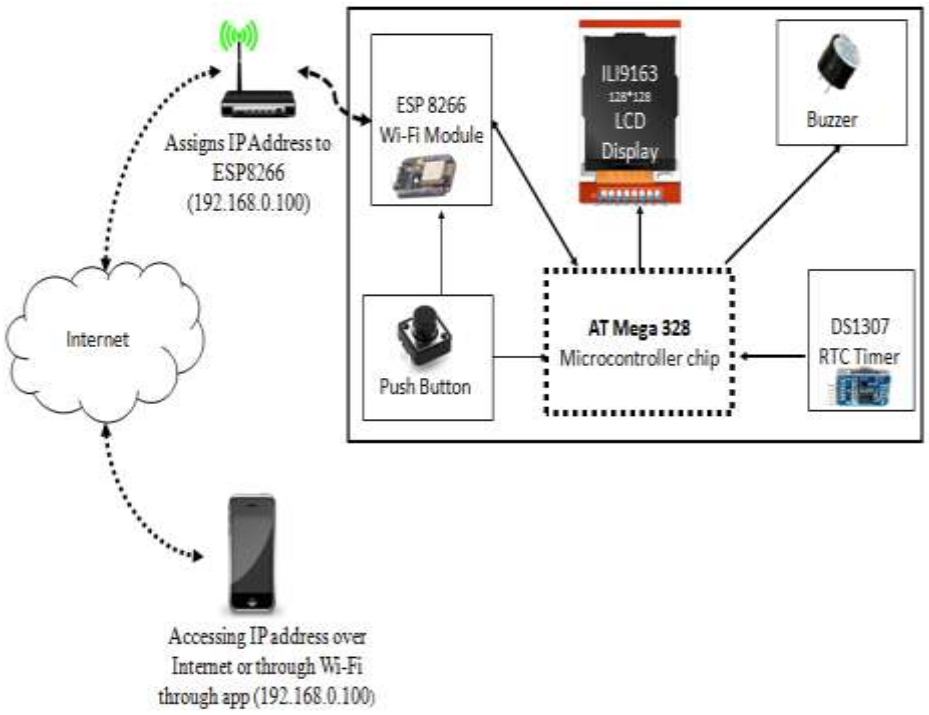

Fig 1: System Architecture of the proposed system.

Alarms can be set to be one at a time or repeatable (based on the day). Each one has a unique title shown on the TFT screen when it goes on. The title includes the compartment number, time, date, number of dosage to be taken by the patient and the pill name if needed. Time and date are kept in the RTC chip (DS1307) [4], which is connected with ardunio using an IC interface. Push bullet is an internet service which is used for SMS sending, notification management and file sending between your mobile device and pc.

The ESP alarm application is developed through the MIT App Inventor for Android. App Inventor for Android is an open-source web application originally provided by Google, and now maintained by the Massachusetts Institute of Technology (MIT).It allows us to computer programming to create software applications for the Android operating system (OS). It uses a graphical interface (the graphical user interface is a type of user interface that allows users to interact with electronic devices through graphical icons and visual indicators), very similar to Scratch and the Star Logo TNG user interface, which allows users to drag-and-drop visual objects to create an application that can run on Android devices. The programmning language used is JAVA.

After develop the ESP alarm application the microcontroller and Smartphone are connected through Wi-Fi module where the current time and date will be updated in the TFT display through the Smartphone. For accessing the microcontroller we need to assign the proper IP address and the Port number to communicate with the smart medicine reminder for sending notifications and receiving the data. In ESP alarm app we can set the timings as well as the notification message where patient will get a display over TFT screen so that they could take the particular pill with compartment specifications.

IV. FLOW DIAGRAM OF THE PROPOSED SYSTEM

The SMR can be used in two ways one by the patient himself or by the care taker of the patient. A pharmacist or family member will arrange the medicine in the slots/holders of the pill box device and can program the device (fig 2(a)). After setting the dosage time using the mobile phone application the real time clock running in the device will start a countdown to the dosage time. Whenever the timings of counter match with the saved timings the SMR hardware starts giving audio and visual alerts. After the stop button is pressed by the patient, the alarm stops and notification message will send to the patient's care taker. If the stop button is not pressed the alarm rang for 1 minute, and alarm deactivates. (Fig 2(b)).

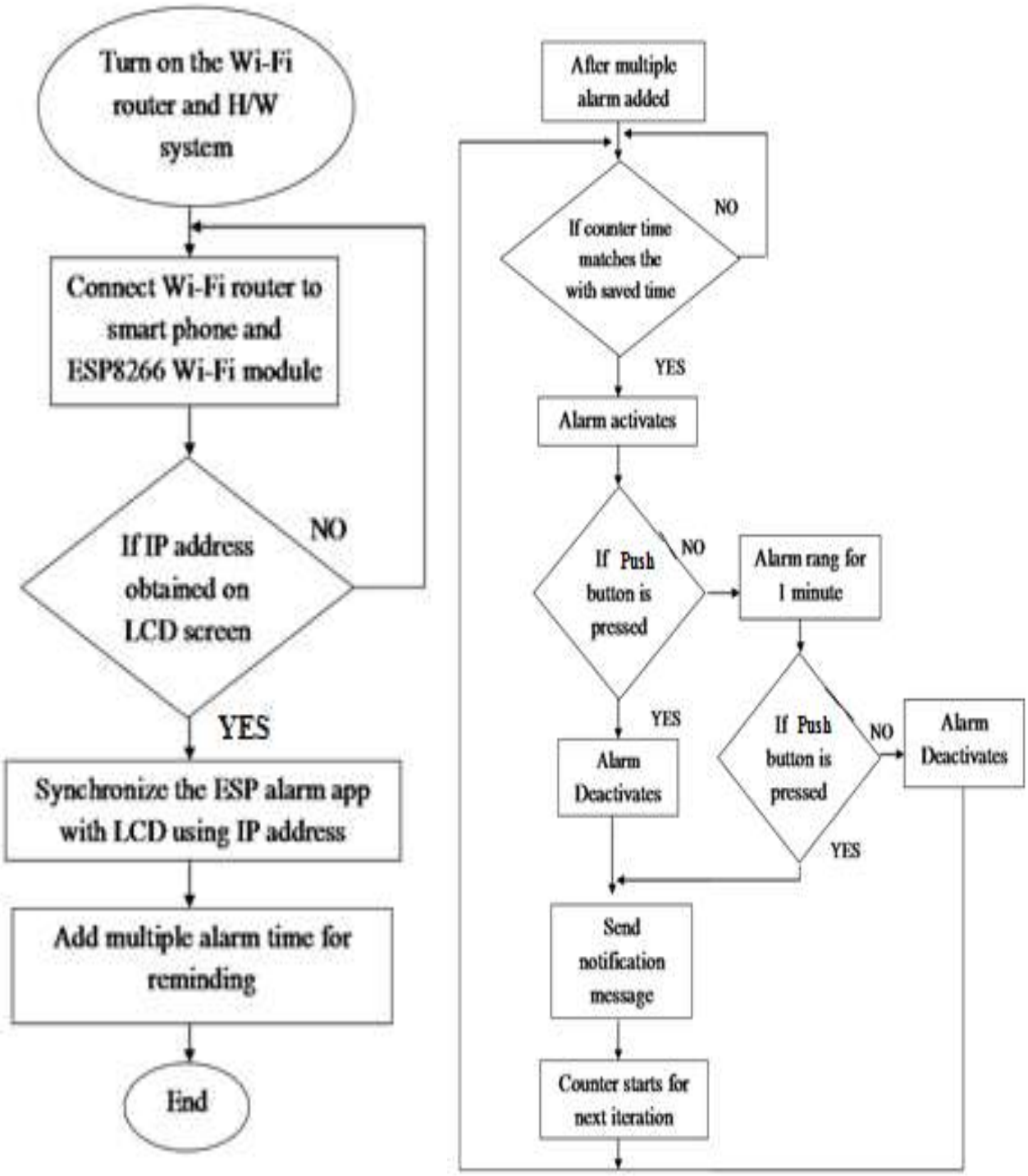

Fig 2: (a) Flow chart for setting the alarm, (b) Flowchart for sending notification

V. RESULTS

The system is composed by different modules that are controlled by AT mega microcontroller. Fig 3 shows the complete module of the smart medicine reminder. There are different types of communication for each module. Therefore the Arduino sends commands to the modules but also receives data from them.

Fig 3: Entire model of the smart medicine reminder

Connect the ESP WI-FI module with the Wi-Fi network will get a particular IP (fig: 4) for the Wi-Fi module with the 1337 port number initiated on IP server.

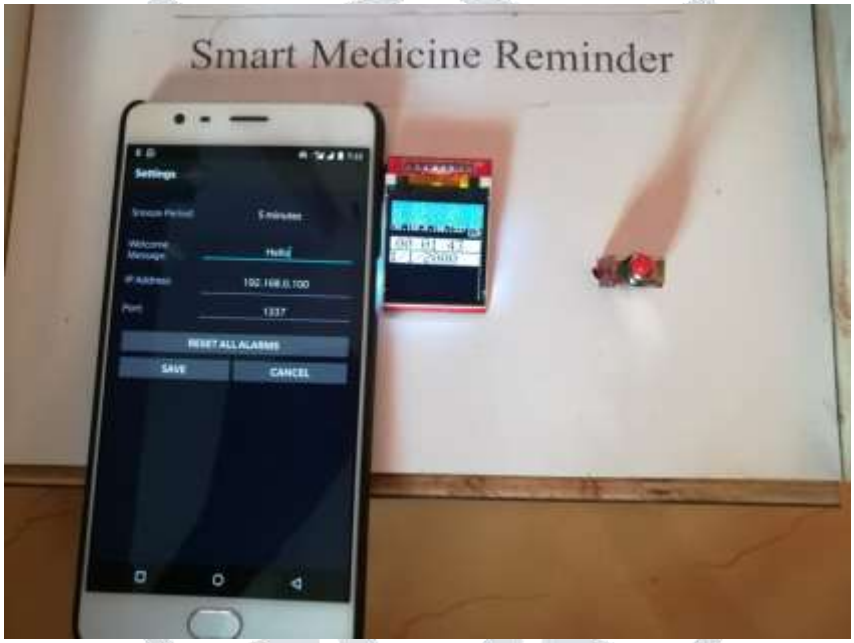

Fig 4: Obtaining the IP address

After connecting with ESP module, I will set the timings of alarm to remind for taking the pill for the patient with a note of required information (fig: 5) and later we will synchronize the information with the microcontroller.

Fig 5: Add timings and patient required information.

When the alarm time synchronized the buzzer alerts with alarm and the information about the medicine is displayed on the LCD display (fig: 6(a)) When the stop button is pressed the alarm will go do OFF mode and the notification message (fig: 6(b)) will send to the patients care taker indicating that the patient has successfully taken the medicine.

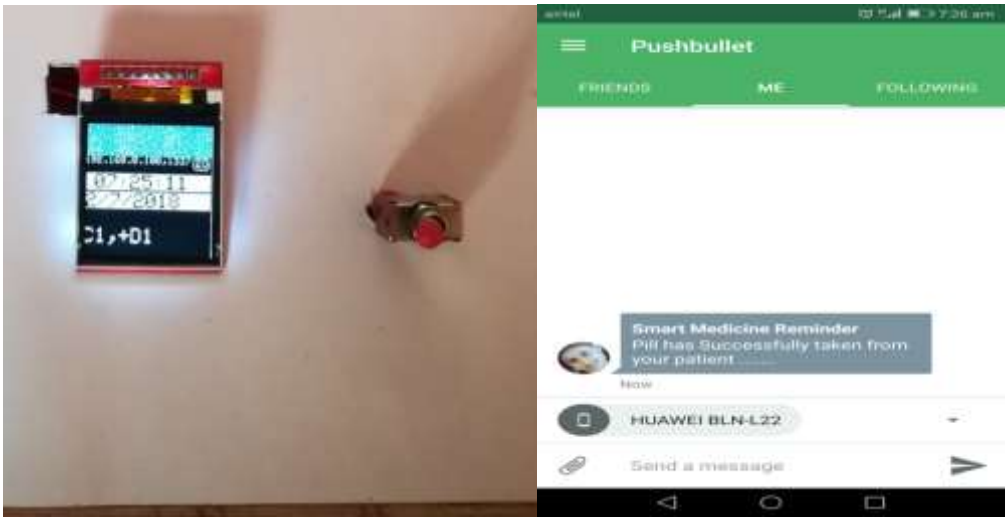

Fig 6: (a) Displaying the information to the patient. (b) Notification message.

CONCLUSION

The project has focused on the problems faced by senior citizens concerning adherence to their prescribed medication. It not only aids the elderly who live independently but also the caretakers of the elderly by reminding right amount of medicine at the right time. The proposed system is suitable for all kinds of patients. It efficiently controls the time of patients to take medicine. It also reduces the ratio that patient misses and delays taking medicine. In addition, this can be used in real time. Find field helps in locating the box.

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