LIFE SAVER MEDICAMENT REMINDER

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Abstract—Across the world patient adhesion to medication regimes has become a large problem. Considering all medicines it's been estimated that 75-80% of people don't take their medicines on time properly. We know that non-compliance is epidemic. In order to promote their well-being, guiding the individuals to take medicine on time is very important. Taking the medicines regularly helps patient to maintain their health. In this paper, we propose an approach of using raspberry pi as the principal controller. "Life Saver Medicament Reminder" allows a person to organise several medications that reminds patient's to take medicine in time. This framework contains an interactive user interface with automatic LED indication and buzzer. The main purpose of this device is not only going to be useful to the elder one's but for the people who are unable to take their medicines on their own and for the people who are very much involved in their hectic works.

Keywords-Arduino, Internet of things, chronic diseases, Reminder system, GSM Notification system.

I. INTRODUCTION

According to World Health Organisation (WHO) it is estimated that people who suffer with long-term diseases are prescribed to take medicines 4-5times a day. The present life of people is filled with many responsibilities and stress. So people are getting affected with different types of new diseases and it is the responsibility of every individual to stay fit and healthy [2]. In order to make a better healthy society we need to invent many healthcare devices so that it can be used by everyone irrespective of cost.

Poor medication management may contribute to the increase in the unwholesomeness and death rate. Taking the wrong medicines at wrong time may sometimes lead patient's life to death. We need to take medications on time, but for some diseases we need to remember that these medications are a treatment not a cure.

Chronic diseases like cancer, diabetes, high blood pressure, Arthritis, Asthma need daily medication[1]. Because of the hectic life of the people they forget to take medicines on time which may lead to the increase in the severity of disease. Medicament reminder mainly focuses on patient's interaction with doctor or caretaker. Not every person is strong at their 60's, some may become weak and need assistance for taking medicines. Due to the high cost of these assistive products only few are able to afford. Because of lack of awareness only few people know about the medicament reminder.

Now-a-days there are few options like alarm systems, applications that allow us to schedule the time in smart phones. The disadvantages with them are, everyone may not be aware of using smartphones and medicines are placed somewhere when the alarm sounds. Globally Internet of things has become network infrastructure connecting virtual and physical objects with the help of sensors. Inventing user-friendly health care IOT devices plays a very crucial role in patient's life. Patient's category involves all mankind-Employees, students, housewives, business men and people with their hectic busy schedule.

The solution for not skipping the medicine regime is medicament reminder. In this paper, the first approach we propose is related to the design of device that gives an alternative in taking dosages using new technologies that are linked to free software and hardware with little cost which doesn't have any limitations on justification and licenses[1]. Considering the quality attributes such as maintainability, availability, performance, usability this device has been constructed, which allows organising several medication schedules for health disorders in elderly need.

The framework of this paper is: section two explains associated works, section three device contribution, section four about materials,secion five about equipment construction, section six phases in working, section seven future works, section eight conclusion.

II.RELATED WORKS

There are many medicated systems that are developed based on different functionalities, concepts and platforms. Android applications are also in existence but the disadvantage with that are only few people know how to use smart phones [3]. In medicine reminder applications it just gives an alarm reminding that it is time to take medicines but the medicines are placed somewhere and patient may sometimes get confused which medicine to take.

So far there are many devices however they do not provide automatic alert system for different time slots in a day.

III.DEVICE CONTRIBUTION

The main goal for the development of this device is to improve the lifestyle of sick people of all age groups especially for elderly one. Our device concerns trustworthiness and usability with user-friendly technology.

As humans become old there is more chance of memory loss. So correct guidance should be there for correct dosage of medicines. Life saver medicament reminder helps to arrange medicines that automatically reminds patient to take medicines.

As we can see life saver medicament reminder is represented in fig 1 block diagram that has been contributed in this paper. There is an interaction between doctor/well-wisher and patient through microcontroller and interface. Notifications will be sent through GSM network to patient and closest one's to remind to take medicines.
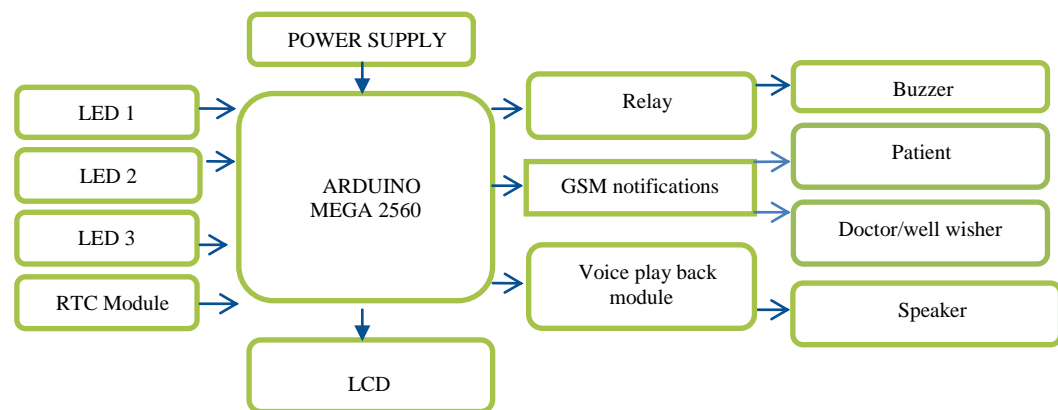

Fig 1.Medicament Reminder Diagram

IV. HARDWARE

There are few hardware materials used in this device. Those are listed below:

1. Arduino Mega 2560

In developing this device arduino mega 2560 plays a vital role, it commands all the characteristics that are proposed.

The Arduino Mega 2560 microcontroller is single board computer which is an open-source, it means the software development is free and hardware is slightly low priced when compare to other micro controllers[4]. There are 16 analog pins, 54 digital Input/output pins (out of which PMW outputs are 15), 4 UARTs are hardware serial ports,USB connector ,ICSP header, reset button. A 16MHz frequency crystal oscillator is added on the board. Powering it with an AC-to-DC adapter or connecting to a computer with USB cable simply does the work. To regulate the voltage this board comes with 5v and 3.3v voltage regulators. Developing a project using Arduino Mega gives us the capability of working with extra memory space and processing power that helps us to work with more sensors at once. Considering other Arduino boards this is physically larger in size.

2. LCD display

LCD (Liquid Crystal Display) screen is an electronic display module and it is used in wide range of applications. The basic module is 16*2 LCD display and is very commonly used in various circuits and devices. A 16*2 LCD means it can display 16 characters line with 2 rows. Each character is displayed in 5*7 pixel matrix. This LCD has two registers, one

is command and other is data. For storing the command instructions given to the LCD we use command register. For displayed the stored data we use data register. The data is the ASCII value of the character to be displayed on the LCD.

3. GSM SIM900 Module

GSM remains for Global system for mobile communications. Adjusting and demodulating the GSM signals is the main ain of GSM Modem. The modem we are utilising is SIMCOM SIM900.SIM900 almost fits in all space requirements in our machine to machine application, mainly for compact and slim demand of design.SIM900 delivers GPRS/GSM 850/900/1800/1900 MHz production for SMS, voice, lower power consumption and data.

4. RTC DS 3231

The DS3231 is highly accurate Real Time Clock that can maintain day, month, year and hours, minutes, second's information. It is low cost and also has an integrated temperature compensated crystal oscillator. The battery has a typical CR2032 3v battery that can maintain the data for more than a year. It has automatic requital for few months that are less than 31days and for leap-years.RTC operates in either 12-hour or 24-hour format with an AM/PM indicator. Through an I2C bidirectional bus address or data are transferred. It maintains precise time keeping by incorporating a battery input even when the main power of the device is disturbed.

5 .Infrared LED

The Infrared Light Emitting Diode (LED) emits infrared waves and it has inflated radiant intensity and inflated reliability. It emits infrared rays ranging from 700nm to 1mm wavelength.

V.DEVICE DESIGN

In this section we analyse the proposal device performed. Developing an effective and valid device to guide people in taking right medicine dosages as prescribed.Arudino Mega 2560 took as a principal controller. "Life Saver Medicament Reminder" is used for pills storage, which contains a notification system through GSM network, an interactive user-friendly interface with a programmable alert system.

1. Programmable Alert System

Irrespective of the many time schedules a day, this device allows to set program to exact hour to take pills. This time can be stored by the care taker or patient or doctor on the microcontroller. In the proposed system it gets time from the Real Time Clock (RTC) DS3231 and compares with the previously saved pill time so that it can create a particular alarm for each dosage in a day. For every medicine we have off time and on time. Buzzer makes a sound during the medicine time. We can also record voice in the voice play module that repeats to take medicine.

2. User Interface

The device consists of few compartments with LED light system that are placed in order so that it helps patient to take the right medicine. When the alarm turns on during the medicine time, a light is blinked at that pill indicating that the patient has to take that pill. The LED light blinks for few minutes and LCD shows information about medicine name, date, time.

3. GSM Notification System

The notification system is activated by the alarm so that it sends Short Message Service (SMS) through patient's phone and the message can also be sent to care-taker, relatives, doctor so that they can also remind patient to take medicine.

VI. WORKING PHASES

Before the working of the device we need to check the functionality. It has three phases:

- User initialisation stage
- Comparison stage
- Reminder stage

These phases have to be performed sequentially so that we can provide a structured plan for fixing and finding errors that takes place during the setup of device and while writing coding. We get accurate results only if we have error free code.
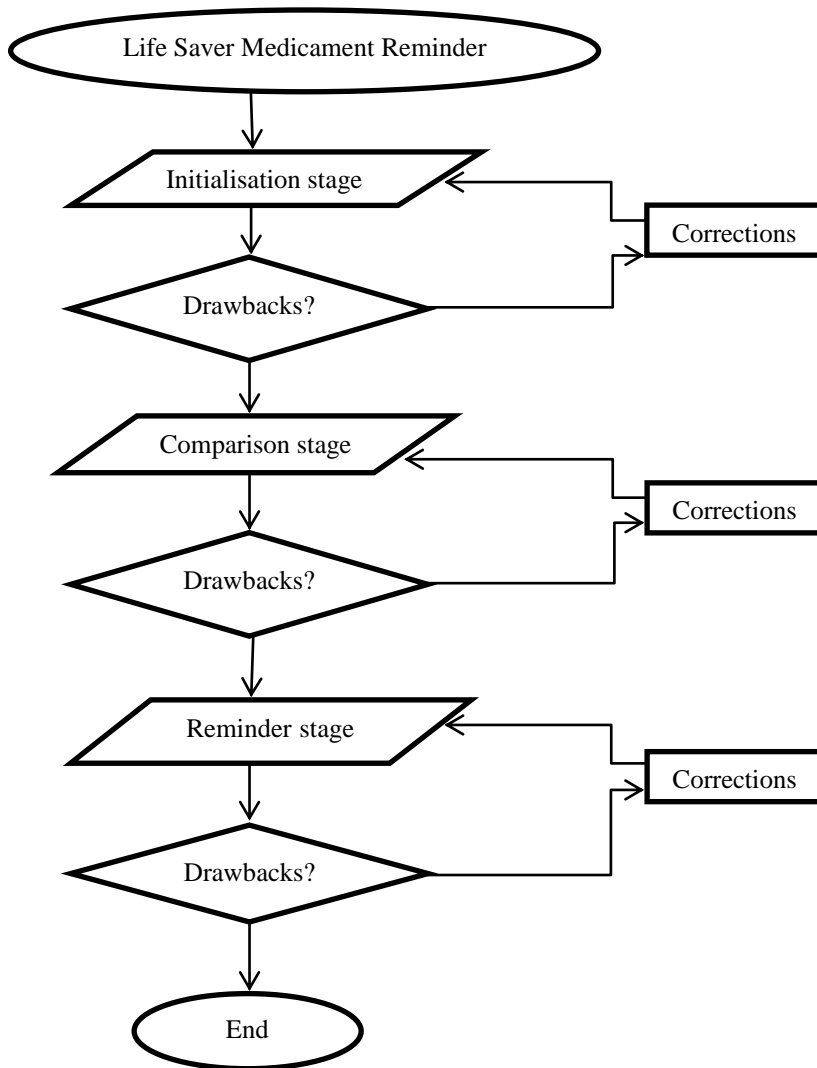
Fig 2.Flowchart for stages in Life Saver Medicament Reminder

1. User Initialization Stage

Testing the preciseness of device hardware is the first step we implement. It is mandatory to check the exact state of each one. For this we use a fluke multimeter for measuring voltage, resistance and current. By using the buttons user increment and decrement the current date, time and pill information if needed. We can confirm the date and time by seeing on the LCD displayed. After initialization the button is pressed. Next the device goes to the comparison stage.

Fig 3 .Checking Connections using Fluke Multimeter

2. Comparison Stage

We have set time in the previous stage. In the comparison stage the system compares real time with set time. If this stage is successful then it goes to the reminder stage.

3. Reminder Stage

In the reminder stage the system plays buzzer sound and voice message telling to take medicine. The LED bulb blinks specifying the patient to take that particular medicine.

While testing the components we get few results which will be shown in the form of a table.

Table 1

S.No	Component Name	Test Result	Result Date
Testing Results			
1	Arduino mega 2560	Pass	04/01/2018
2	LED system	Pass	15/01/2018
3	RTC	Pass	01/02/2018
4	LCD display	Ambiguous	13/02/2018
5	GSM SIM 900 Module	Ambiguous	03/03/2018

Number of cases tested	5	
Passed	3	59.20%
Failed	0	0%
Ambiguous	2	40.79%

The components that are marked as "Ambiguous" could be a case study for forthcoming improvements on the device.
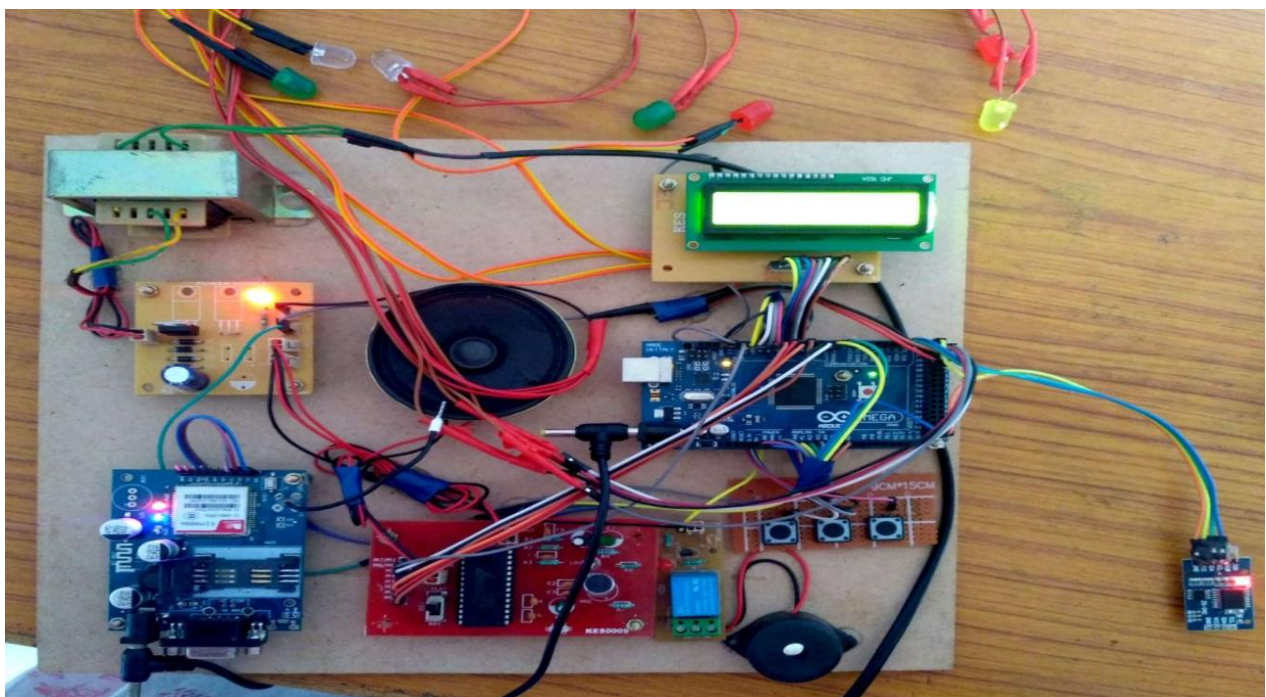

Fig 4.Life Saver Medicament Reminder

The Arduino Mega 2560 obtains hour and minutes from RTC, the buzzer beeps when it is the correct time. The microcontroller activates the stepper motor, LED system and the messages are also sent to patient and well-wishers. The patient or care taker takes the pills only from the box that shows the blinking LED light.
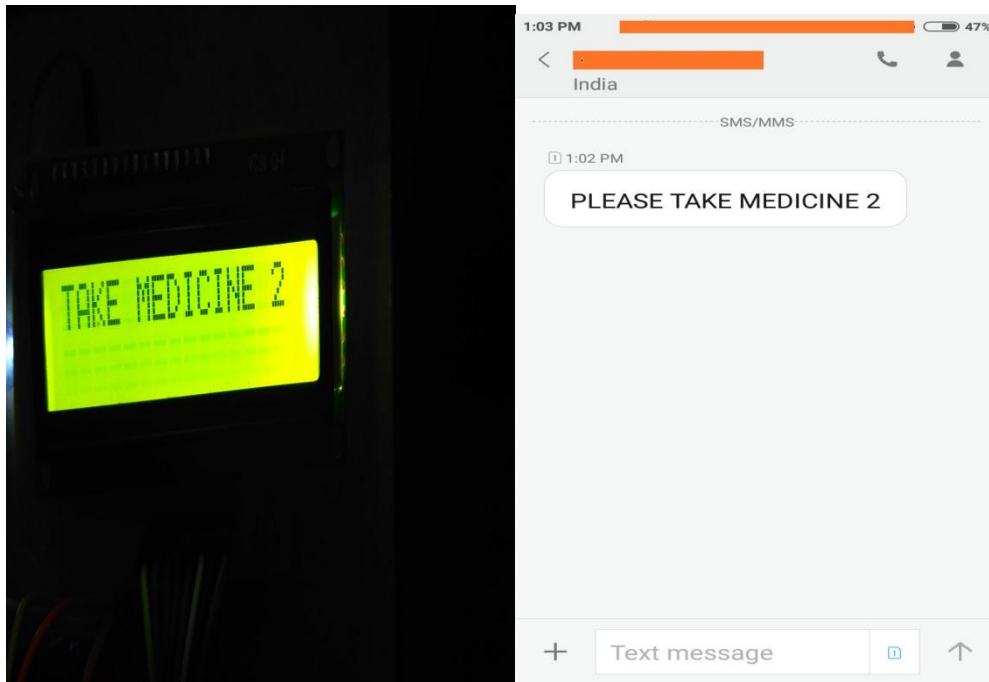
Fig 5. Notifications

VII. FUTURE WORKS

Though this paper has implemented with important medical guidance to take pills. There are many opportunities for the extension of this paper.

- Security
  Personal password can be provided to the device so that it can be used only by the patient, doctor and care takers.
- Economic
  This device does not come into existence because of the cost of materials used. Because of lack of awareness only few people knows about the device. Making this more economic so that it can be used by every elderly people.
- Internet of things(IOT)
  Connecting the device to internet makes patient's data available to doctor at any time.

VIII.CONCLUSION

Elderly people contribute so much to the society. They play a vital role in the society. In the health care priority group older people are the major part. Hence, inventing new devices using the trending technologies so that it can develop their quality of living. Making this device more economic helps many people to make use of the reminder. Because only 1 from 10 people have awareness about the devices in the market. It is all because of lack of awareness and high cost of device which cannot be handled by everyone.

IX.REFERENCES

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