

AI-IoT based Health Care Reminder for Medication

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Abstract—IoT application using Healthcare is the increasing concern for the people needs to take correct medications. Because the prescription of the medication given to the patients is long, it's tough for patients and conjointly for the care takers to recollect. Typically patients miss on taking their medicines or take over indefinite quantity of it, leading to extreme deterioration of physical health. The study has proposed to the remembrance of intake medicine. It's a mixture of physical equipment's and technology which will be useful for any age group of people to recall the intake of medicines. The use of ATmega2560 board, has interfaced with the arduino board. To get connectivity, need to insert the SIM in the GSM module with the patient mobile to send the message. The use of inserted SIM can send the alert messages to the registered number. This approach gives an effective and fast communication and better way to reminding people about my medicine.

Index Terms— medicines, patients, deterioration of health, ATmega2560 microcontroller, RTC, ESP8266, APRP600, GSM module, LCD, Speaker, Smart Card.

I. INTRODUCTION

Nowadays as the medication cost is increased abundantly, we need to monitor patient's every now and then in present situations. For those seniors who live independently in their own homes. A good surveillance on patients schedule and medication should be taken or else it would be difficult for the guiders. The main age group to concentrate regarding this issue is Old age people, they have to take utmost attention on their medicine intake but it is highly difficult. So to irradiate this problem we created this Smart Medicine Box which keep tracks of the dosage and duration. Hence, this Smart medicine box will solve the problem faced by them. This box will remind the patients to take medicines in time and stay healthier.

This Remainder box is a technical device which is programmed in such a way that when the medicine amount and time is set in it, the device will give an alert by ringing buzzer. The main equipped material in this device is RGB LED's-which is used for lightening purpose i.e it will give indication to the user and the next material is LCD- this will display the content of amount intake of medicine by the patient. What percentage medicines are left above all sub-box? Completely different colors of RGB junction rectifier are used for various functions.

There will be a privilege to set timings to require drugs, so the device at first will give the suggestion to set the line for alarm time setting. A speaker equipment is connected to the ARM7 micro controller. Here the main target is on switch of the device [2], the present time and date that's hold on within the RTC is displayed on LCD. The playback voice ought to be recording the voice before itself through microphone voice. The alarm time is compared to the present time by the micro controller and after they match, associate interrupt is generated. Then the junction rectifier on the pillbox glows and a voice replay is additionally generated indicating that pill ought to be taken.

The wireless sensors network that has been specifically made to watch and valuate the well-being of the aged living alone during a home atmosphere is ZIGBEE [3]. Behavior of aged will be evaluated for prediction of unsafe things throughout observation of normal activities. This medicine box is smart enough, sturdy and will not use any cc camera or visualization because it maintains privacy. Supported a survey among aged we discover that it's an enormous satisfaction factor to be used reception thanks to nonuse of the camera or vision based mostly sensors. The intelligent software system, in conjunction with the electronic system, will monitor the usage of various unit appliances and acknowledge the activities to work out the wellbeing of the aged.

[4] Confered IOT based intelligent medicine box to help the patients to take the medicines in time, medical prescription is incredibly long and exhausting to recollect for many users. This kit will be helpful as this will reduce the patient's sickness and there is no need to worry regarding those patients thus nurses or doctors who are taking care and concerning their health will live hale and strain free life.

II. DESIGN OF THE PROPOSED SYSTEM

A. Block Diagram

In this system the alarm has to be set for different times of medicine intake. Each remainder will have to be set as a line for ringing the buzzer. Real world time is been monitored using RTC to recognize medicine taking time. If there is a match with both the times, the system alerts as it is the medicine taking time. At this particular moment a message notification will be given to the particular patient through mobile message, including with message notification there is an output coming out from the speaker through voice modulation giving a remainder to take up the medicine.

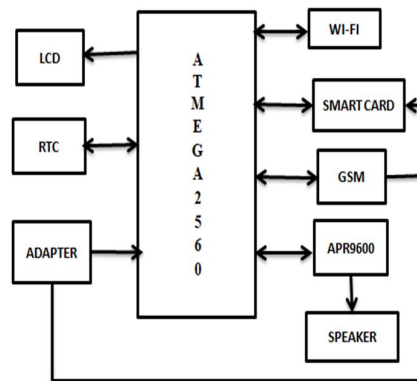


Figure 1. Proposed System Block Diagram

III. COMPONENTS

A. Pin Description of ATMEGA 2560

The Arduino Mega 2560 has been built on ATmega2560. From PWM outputs has owned by 14pins , 16 analog input pins hardware serial ports of UART are 4 respectively. A USB Connector and ICSP header crystal oscillator of 16mhz and reset button were supported for the aximum shields for designing the Arduino Duemilanove.



Figure 2. Arduino ATMEGA2560 Pin Description

B. Wi-Fi Module

ESP8266 is associate degree UART-Wi-Fi clear transmission module with radical low power consumption, particularly designed for the requirements of a replacement connected world. It offers a whole Wi-Fi module which will permit to host the network or not to respond to the network.

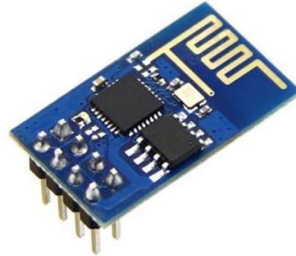


Figure 3. WIFI Module

ESP8266 – process are enabled in the sensors and specific devices has been used for the GPIOs token for improving the specific application devices. In the external circuit high degree of chip integration permits for the external for the front end module to occupy the PCB token spaces. ESP8266 Serial Wi-Fi Wireless Transceiver Module is appropriate for Arduino Uno, Mega 2560 and Nano.

C. GSM Module SIM 800

850MHz, DCS1800MHz and PCS 1900Mhz and EGSM900Mc frequencies are worked in the SIM800s to designed for the GSM/GPRS module in the world market. The voltage of SIM800L has accepted from 3.4v to 4.4v by the SimCom chip. It is preferable for LiPo battery. It is alternative way for placing the tons of house.



Figure 4. GSM Module

D. Real Time Clock

Real time clock or RTC, indicates square measure of clock modules. These Associate with eight pin device exploitation Associate in Nursing I2C interface. The RTC gives appropriate information about time. The data regarding months is appropriately adjusted in RTC as the number of days in a month is not the same for every months as some months have 30 days, some have 31 days and some have 28 or 29 days. The temporal arrangement sort of a clock maintains date as in a calendar. RTC is having an excellent battery backup which helps in running the clock throughout the time even though there is a breakdown. The potential consumption is very less for the association. We are able to notice these RTCs is several applications like embedded systems, motherboards and hard disks.



Figure 5. Real Time Clock

E. Smart Card

A smart card will offer identification, authentication, and knowledge storage and application process. It's a full thirty two KB or seventy two KB of EEPROM application knowledge. It have high speed transmission rate for nine.6 kbps to 223.2kbps with modifiable ATR (Answer To Reset).The user knowledge memory stores the info of the cardboard underneath the management of the appliance. The interior card configuration knowledge is employed by the cardboard OS to manage card functionalities.



Figure 6. . Smart Card Module

F. APR9600 Module

It is one chip, prime quality voice recording and playback resolution. It is no external ICs needed. It is minimum external parts and it conjointly has nonvolatile storage technology and no battery backup needed. It is user selectable electronic communication choices. it's random access of multiple mounted length messages. It is user friendly and straightforward to use operation. It is low power consumption and it's automatic power down.



Figure 7. . APR9600 microcontroller

G. LCD

It is the device which is used for displaying the content, matter or pictures related to the output regarding the input details given by user or patients here. JHD 162A Liquid Crystal Display (20x4), which is shown in the Figure is interfaced with the CPU.



Figure 8. JHD 204A Liquid Crystal Display

The features of JHD 162A LCD is 20 Characters x 4 Lines, 5x7DotswithCursor, Built-in controller, +5v Power Supply, 1/20Duty Circle.

H. Power Supply

Any equipment has to be worked out or started up with the support of electricity itself. Below is the circuit diagram for the power supply.

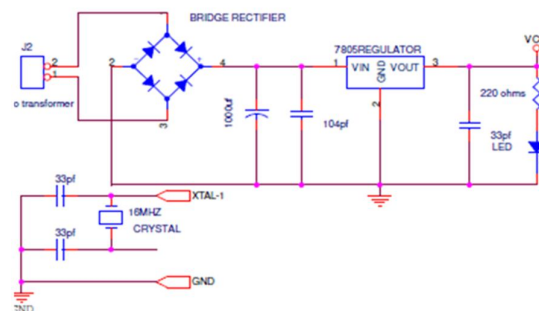


Figure 9. Circuit Diagram of Power Supply

IV. ARDUINO SOFTWARE (IDE)

The Arduino Software - consists a toolbar which is helpful for programming. Sketches are the programs corresponding to Arduino Software. Firstly, sketches are developed by user or developer and are saved with extension .ino. Arduino (IDE) editor is with the feasibility of editing like searching, replacing, cutting, and pasting. Feedback is given by the message area when user tries to save and export sketches. Message area also prompts the errors. Arduino IDE's console portrays the output in the text format, it also comprises total faulty messages and any other details too.

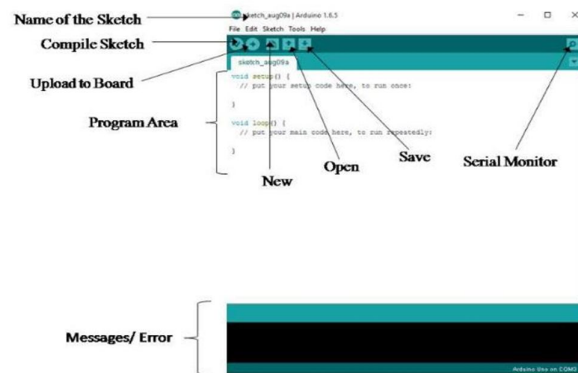


Figure 10. Arduino Uno IDE

A. Flow of Control

The below figure displays the Control flow graph of the system.

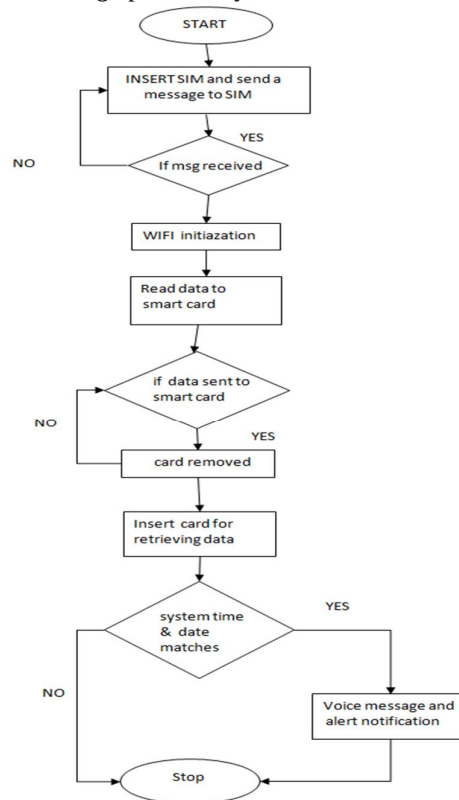


Figure 11. Flow of Control of the proposed system

V. IMPLEMENTATION

The entire system will be initiated once the power is switched on. We use ATmega2560 board, so that each and every module is interfaced with the arduino board. We need to insert the SIM in the GSM module to get connectivity with the patient mobile. After Wi-Fi initialization we need to send the message to the inserted SIM from the patient mobile for registering the number. So that it can send the alert messages to the registered number.

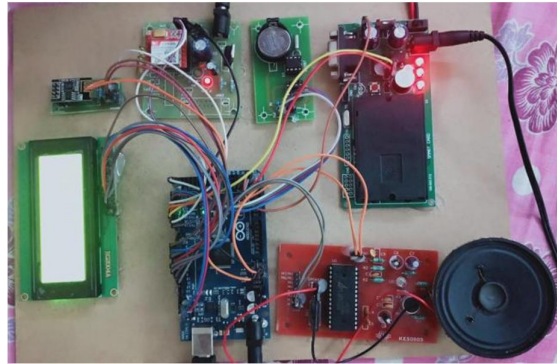


Figure 12. Implementation View

Here we also insert the smart card for storing and retrieving the information in the card. By using the webpage to give the information regarding the patient details about the medications. The data will be stored in the smart card through which the information is retrieved to all the modules. We use RTC to update the date and time automatically. As soon as the system time matches with the medication time, it will send the alert message to the patient mobile and voice message through speaker. Finally, data is stored in the cloud.

VI. EXPERIMENTAL RESULT

As soon as the code is uploaded the power supply is switched on which will trigger all the equipment's inside at once and then the output will be generated accordingly. The results are shown as below.



Figure 13. LCD display requesting to send message



Figure 14. Using Real Time Clock displaying date and time

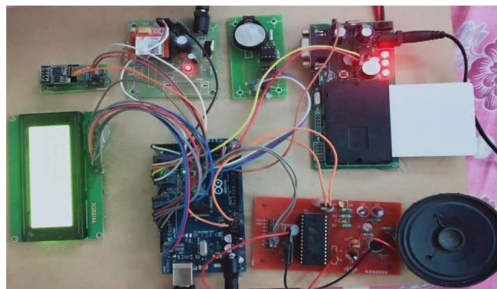


Figure 15. Card is inserted for writing the data



Figure 16: Displaying that writing is completed

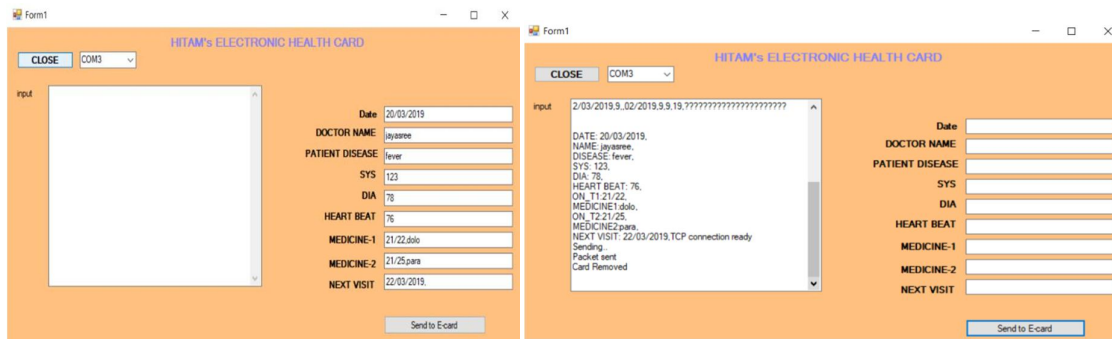


Figure 17. Writing data to the card Figure 18.Data is sent to card

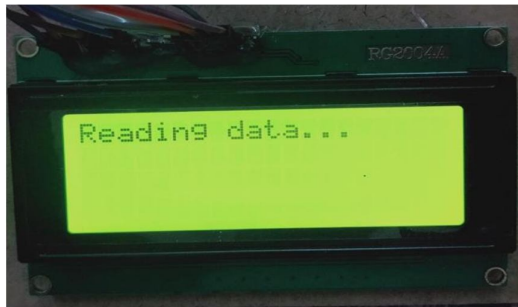


Figure 19. Reading values from the smart card



Figure 20. Displaying the data



Figure 21. Sending the message to the mobile

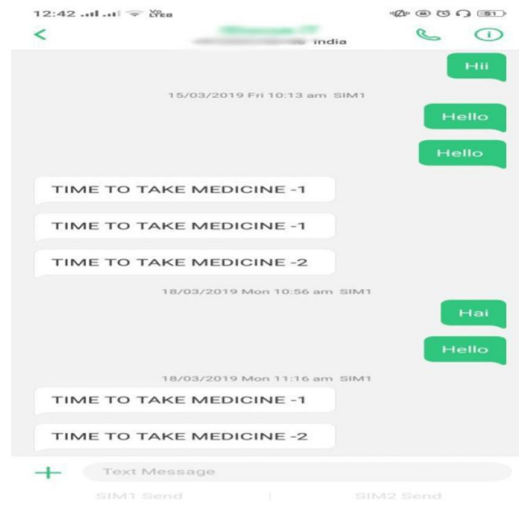


Figure 22. Alert message

VII. CONCLUSION

The main agenda of this health care reminder paper is that the old age people or the people who forget their intake of medicine in this fast growing world will take the proper medication at proper time. This will decrease the problems faced and also the death rate which is caused due the effect of not remembering with the busy schedule. To improve medication safety with remind and confirm their functions. Using our developed system as framework, the idea can be further expanded by integrating different other sensors to take the necessary actions without the human intervention. The system can also be connected to mobile thus making it reliable, flexible and user friendly. The IoT health maintenance network is one of the most vital elements of IoT in health care in leading Secured and Safety Life for long years.

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