CSE3009

Internet of things

Review 1

Prof: Arunkumar T.

Submitted by:
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Project Title:

Automation of the DOTS treatment with the help of IOT

CERTIFICATE

This is to certify that the project work entitled “Automation of DOTS with the help of IoT” that is being submitted by “ Rajvardhan Dixit(16BCB0109) ” for CSE3009 Internet of Thingsis a record of bonafide work done under my supervision. The contents of this Project work, in full or in parts, have neither been taken from any other source nor have been submitted for any other CAL

course.

Place: Vellore

Date:

Signature of Students:

Signature of Faculty:

ACKNOWLEDGEMENT

I take immense pleasure in thanking **Dr. G. Viswanathan**, our beloved Chancellor, VIT University and respected Dean, SCHOOL OF COMPUTeR SCIeNCe AND eNGINeeRING, for having permitted me to carry out the project.
I express gratitude to my guide, **Prof. Arunkumar T.**, for guidance and suggestions that helped me to complete the project on time. Words are inadequate to express my gratitude to the faculty and staff members who encouraged and supported me during the project.
Finally, I would like to thank my ever-loving parents for their blessings and my friends for their timely help and support.

Signature of Student

Rajvardhan Dixit (16BCB0109)

PROBLEM STATEMENT:

There are so many diseases are there that has to be treated in the direct observation of the medical specialists. In the developed countries like US and EU the patient has to be admitted in the hospitals for the long time to just take their medicines in front of doctor, this is happened because only a few medicines are left for which the pathogens are not immunized. As patients forgot to take the medicines on time the pathogens that cause that disease get immunized to that drug which create a medical hazard and make the disease incurable for all. In developed countries like India where sufficient beds are not available in the hospitals, this process can't possible so worst situations has been created in India.

ABOUT DOTS: DOTS stand for direct observation treatment short course, where the medicines are given in the direct observation of the doctor to the patients in the case of above mentioned diseases e.g. Tuberculosis.

I am going to automate this process of treatment with the help of Internet of things in which patient to be notified to take the medicine on time and doctor has been notified that his patient take his medicine on specified time even when they are far apart.

HARDWARE AND SOFTWARE REQUIRED:

1. Raspberry pi Zero WH: Raspberry pi zero is the recent release of raspberry pi foundation it's a small microprocessor on chip. And it will work as the brain of project.

At the heart of the Pi Zero is a Broadcom BCM2835 SoC, housing a 1 GHz ARM1176JZF-S single core CPU, Broadcom Video Core IV @ 250 MHz GPU (still with HD support), and 512MB SDRAM.

2. Micro SD card: It will use a 16GB SanDisk microSD card with 90Mbps transfer rate and HC1 standard.

3. Mini HDMI to HDMI cable: Amazon basics cable has to be used only once to setup raspberry pi and then it can be used in headless mode for convenience by using PuTTY.

4.Stepper motor: To rotate the mechanical part so that the medicine fall in the closed container a steeper motor of Robocraze unipolar 5 pin motor is used.

5. IR Sensor: IR Sensor is used at the bottom of the dispatch container, so that when patient take the medicine from the container IR sensor sends its signal to Raspberry pi.

6. Motor driver: Motor driver is used with the stepper motor

7. Buzzer: A buzzer is used to notify patient to take the medicine.

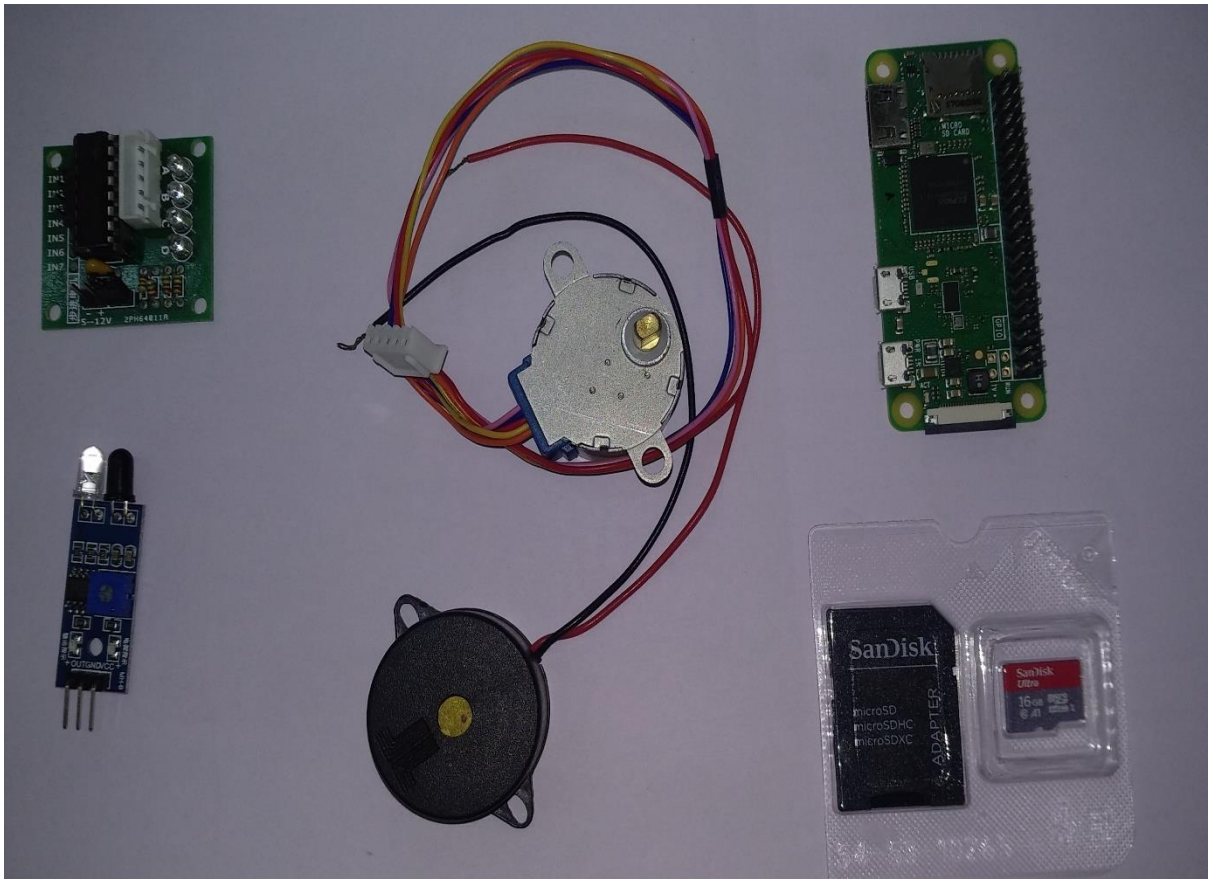
8. Other mechanical parts to be made with the help of cardboard and plastic boxes

9. Rasbian OS: Rasbian OS image is burned on the SD card with the help Eitchler software.

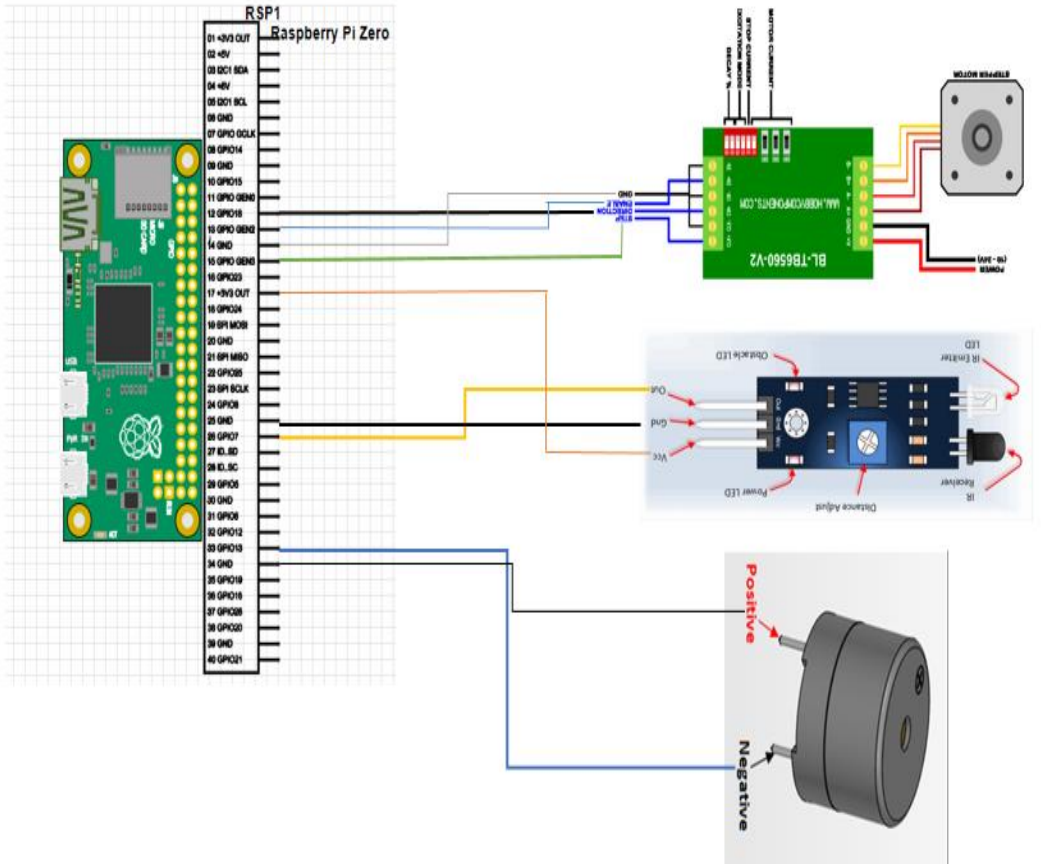
10. Python: The codes for the projects can be written in python

11. Google app creator platform: It will be used to make a app to control the notification and to switch off the buzzer as the patient may not be in the close proximity of the machine.

COMPONENTS PICTURE:



WIRING DIAGRAM:



LITERATURE SURVEY:

There are many medicine vending machines are made and several papers are there on google scholars where with the help of Arduino and raspberry pi very complex machines are made.

1. AUTOMATED DRUG DISPENSER USING ARDUINO MICROCONTROLLER
Engr. Aristotle F. Musni, MIT:

The prototype was designed to make a drug dispenser for the pharmacy use as the dispensers used in mall for toys. Peoples can fetch some instruction and money and they get there require medicines. The Arduino Uno is used in the project that is linked with the coin validator so when someone put a coin into the validator the medicines will be dispensed.

2. MEDICATION ERRORS AND DRUG-DISPENSING SYSTEMS IN A HOSPITAL PHARMACY Tânia Azevedo Anacleto, Edson Perini, Mário Borges Rosa, and Cibele Comini César

The Paper Talks about the researches and the studies that are made into the world on the various drug dispensing systems. Their importance and their implementations across the various countries in the world especially US and Europe.

The dispensing errors are caused due to the various reasons like communication error, poor systems, differences in the physical structures and the physical environment, interruption and the outdated information on the labels and even due to the less knowledge about the drug to the patients (This is the major issue in India). In US the accident happened in 1937 with sulphanilamide elixir containing diethylglycol that becomes toxic and many peoples are affected by the drug. This leads to the making of the first law in 1938 about the drug safety.

The thalidomide induced pacomiline toxicity in 19660 affected 4000 peoples across the world and leads to the legislation on drugs in Europe.

There are various dispensing systems has been made and used across the world:

1. Collective systems: Doctors and nurses are the prime part as the drug delivery agents.

2. Individualized Systems: Pharmacy dispense the drugs individually to each person.

3. Mixed System: Few systems are supported by the hospitals while others are so managed by the Pharmacy in individual way. This is first introduce in Brazil and now 12.3% hospitals used this system.

4. Unit Dose System: This is the more scientific and most recent system that use various medicine vending machines and very less changes has been seen in this system in last 50 years and this system is one that involves more than 30 steps from prescription to dispensing.

3. AUTOMATIC MEDICINE VENDING MACHINE Shrikant Bhnange*1, Kaveri Niphade#2, Tejshri Pachorkar#3, Akshay pansare#4 **Assistant Professor, Department of E&TC, SITRC, Nashik, Maharashtra, India #Department of E&TC, SITRC, Nashik, Maharashtra, India*

This is the NFC operated vending machine that works by accepting the RFID tag that is carried by the patients and accepts only one type of currency the machine consists of the RFID, Stepper motor NFC for money transfer.And many types of medicines can be dispensed through it. System is efficiently works as it is user friendly and easily placed anywhere.

4. Medicine Dispensing Machine Using Raspberry Pi and Arduino Controller Proc. IEEE Conference on Emerging Devices and Smart Systems (ICEDSS 2017) 3-4 March 2017, Mahindra Engineering College, Tamilnadu, India

The machine is made specifically to the India's purpose at various location it is not possible to establish a pharmacy. The machine is consist of the five boxes that contains the medicine and the motors are used to dispense the strips. The camera module integrated with raspberry pi that help in image recognition so that the validation happened for money and the Arduino controls the motors the Motors are interfaced with the Arduino by using L293D which can run two motors at once.

PROPOSED DESIGN:

The proposed design uses a raspberry pi as to process the instructions. The code should be written so that the raspberry pi dispense the medicine at the particular time in a box and at the same time a notification will be sent to the patient that says him to take his medicine and the buzzer will ring (used because at one time at least machine or mobile will be there in the proximity of the patient) if the patient take the medicines by removing the flap over the container a notification will be sent to the doctor that his patient takes his medicine. And the data is also recorded into the cloud so that the track on the left medicines can be made and the message for the new medicines can be send to the pharmacy as an order with the prescription.

One thing is possible that the patient may be outside his home so if the buzzer ring he can't take his medicine from the machine so he can switch off the buzzer from his mobile app and the doctor can know at this time.

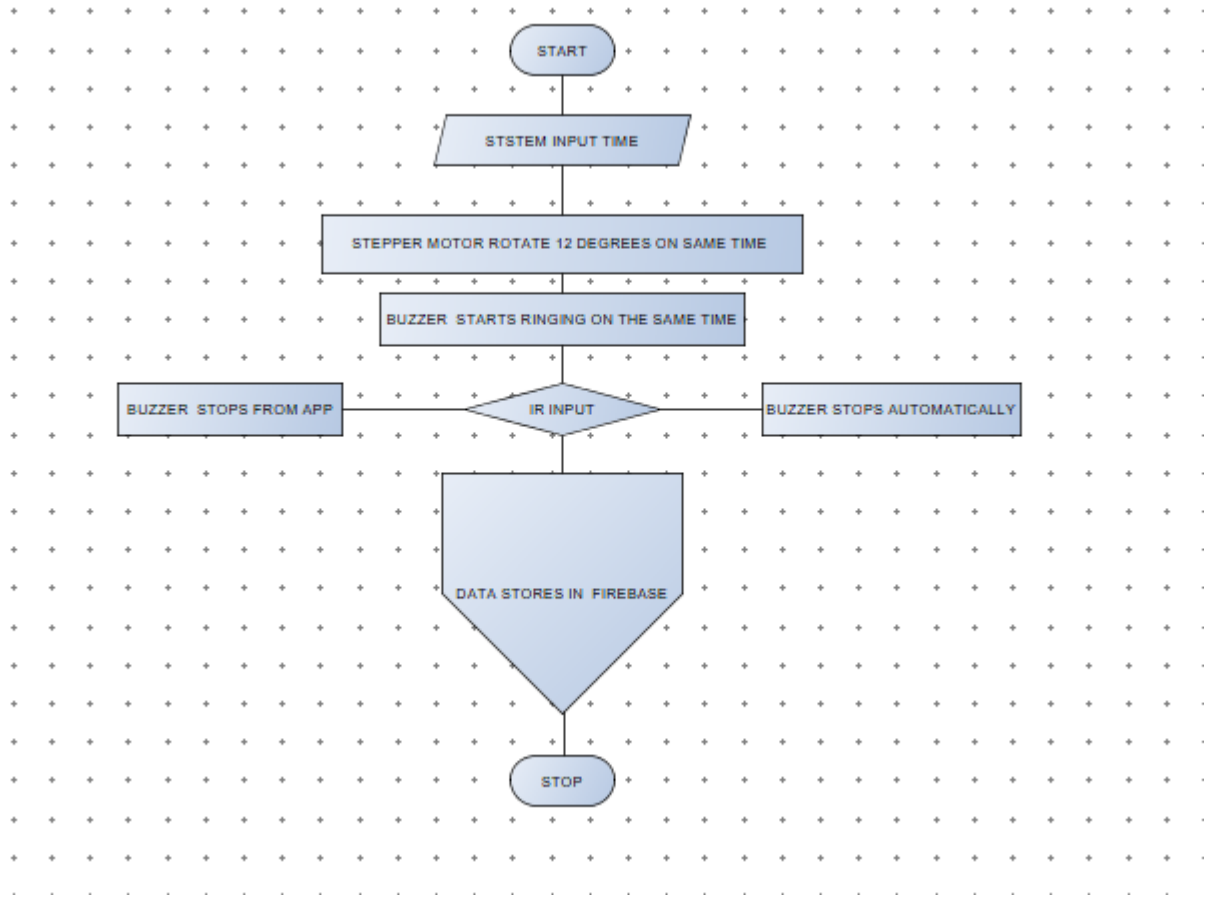
If patient didn't give any response to the buzzer and notification and not taking his medicine then the notification will be send to the doctor again and again in few minutes so that he can call him or make some alternative decision.

WORK FLOW FOR THE PROJECT:

1. All the components has been collected
2. Raspbian OS to be burned on the SD Card
3. Raspberry pi has to be set up at headless mode on first boot
4. The buzzer and the stepper motor to be connected properly with the GPIO pins
5. Mechanical components has to be made with the help of cardboard
6. Codes can be written in python and uploaded on raspberry pi
7. An app can be made by using google app creator platform.

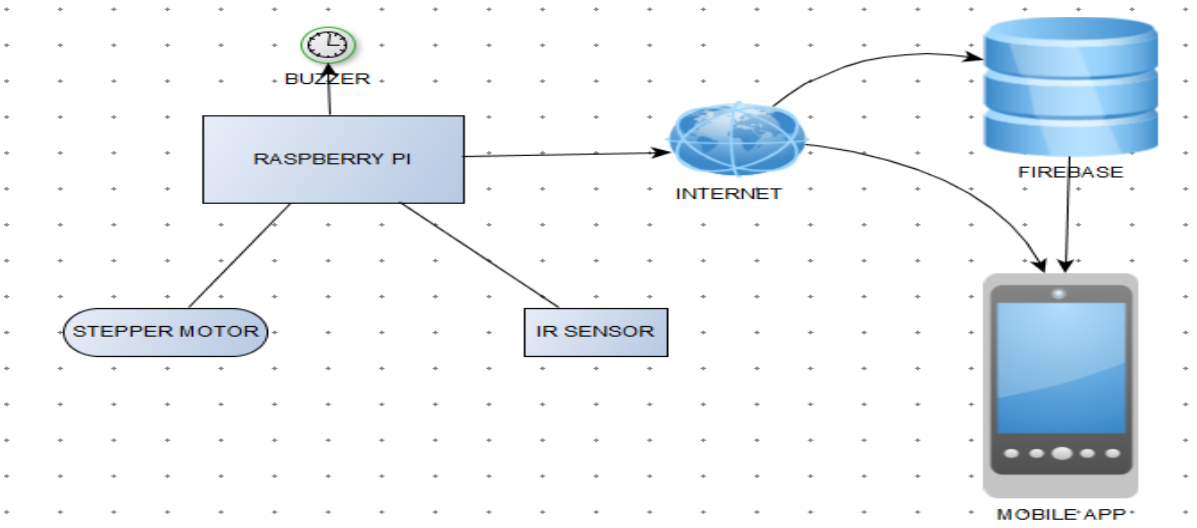
8. Link everything to the Microsoft cloud(freely available for project work)
9. If possible secure the prototype with the help of RFID module so that the refill can be done by the doctor only

WORKING:



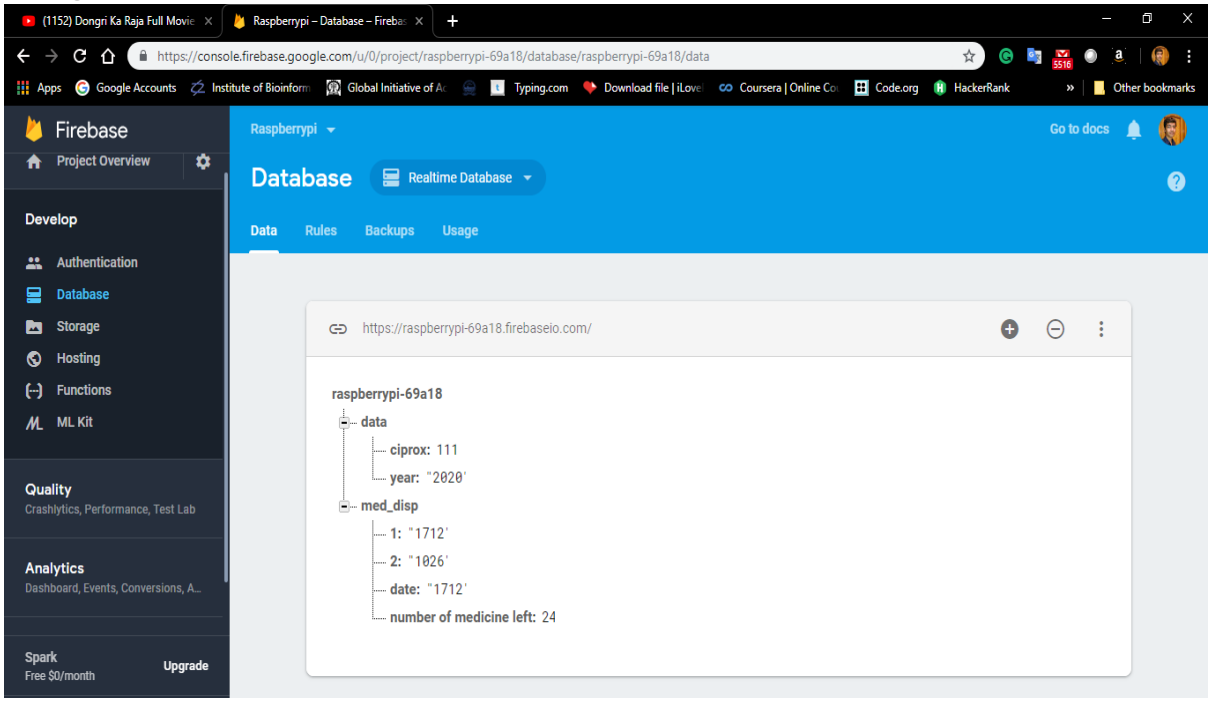
The timings of the system are taken with the help of time function of the python and then simple string search is used to find out the similarity so that at the same time the GPIO output from the buzzer and the stepper motor become high and the medicine dispensed from it. The GPIO pins for IR sensor are always placed in high so it always detect the object and when patient removes the medicine the sensor output becomes low so that the buzzer can be stopped. The Stepper motor has total 16 magnets inside it so whenever we wrote the code for it the stepping are made according to the 512 steps in half stepping and accordingly 512 steeps are consist 360 degrees of movement so if we want 12 degree of movement the (360 / 512) * 12 = 17.06 so i gave 17 steps movement when the time becomes equal it will give some error but only in 15 days and until that time the code will be reset if it will used for two times a day.

BLOCK DIAGRAM:



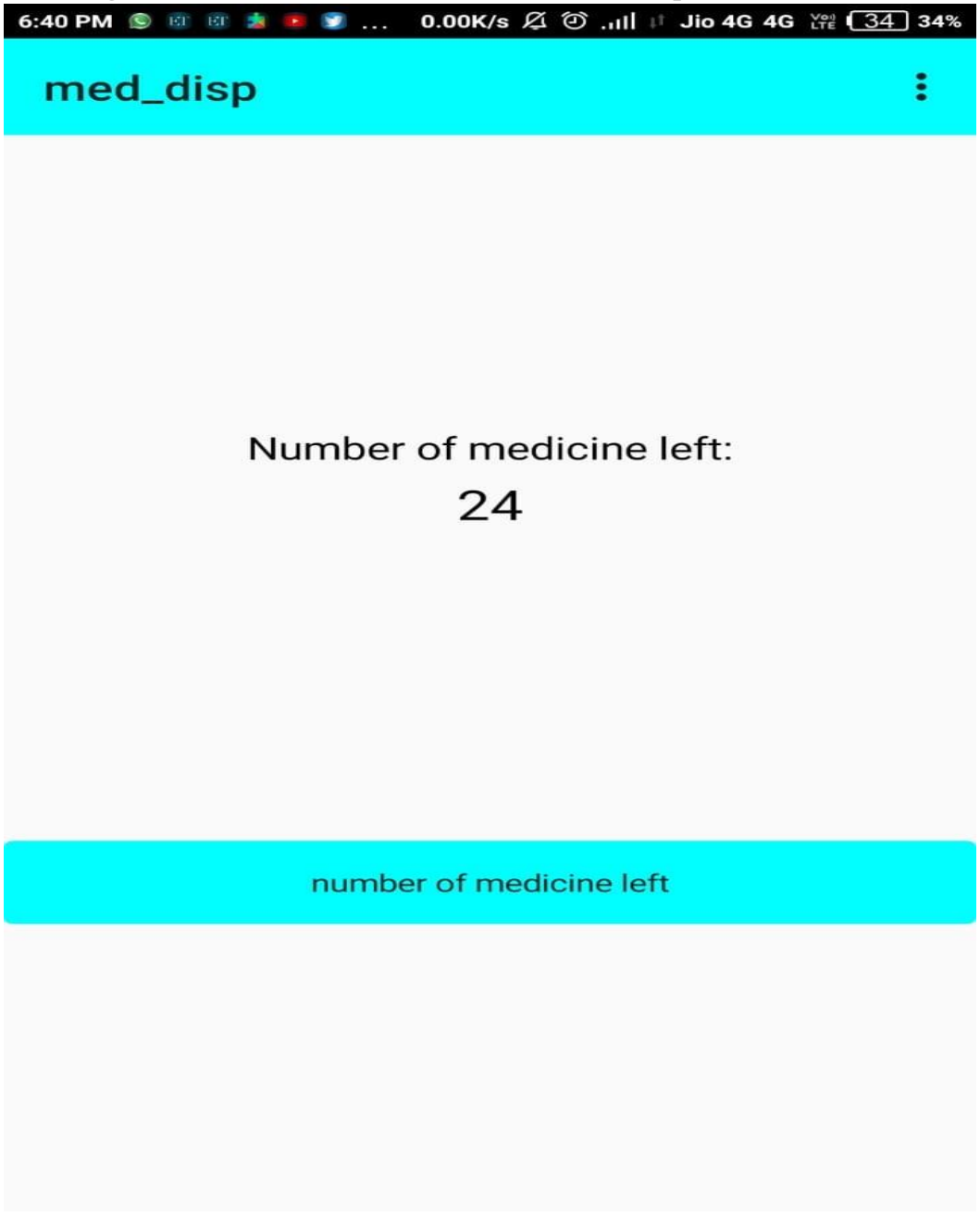
The Raspberry pi is connected to the buzzer internet, IR Sensor; Stepper motor and Firebase. The access key can be generated from the google firebase and the link is copied into the code, so that the data can be sent to the firebase. The token is used to link the firebase to the mobile app, mobile app is created by using MIT App inventor (it has two screens one is for the patient and another is for doctor) The doctor will only get the information about the time at which the patient take his medicine but patient will get two information one is the notification to take the medicine on time and another the number of tablets left so that he can buy the tablets before it ends.

Google Cloud- firebase:



The screenshot showing the data that is sent to the firebase about the number of the medicines left and the time.

MIT APP inventor screenshot – med_disp:
med_disp is the app that I created on the MIP App inventor platform and it is showing the number of the medicines left to the patient.



CODE:

```
import RPi.GPIO as GPIO
import time
import datetime
import urllib2
import urllib
from firebase import firebase
firebase=firebase.FirebaseApplication('https://raspberrypi.firebaseio.com/
')
GPIO.setmode(GPIO.BOARD)
n=0
controlpin=[7,11,13,15]
for pin in controlpin:
   GPIO.setup(pin,GPIO.OUT)
   GPIO.output(pin,0)

seq=[[1,0,0,0],
    [1,1,0,0],
    [0,1,0,0],
    [0,1,1,0],
    [0,0,1,0],
    [0,0,1,1],
    [0,0,0,1],
    [1,0,0,1]]

sensor=16
buzzer=18
GPIO.setup(sensor,GPIO.IN)
GPIO.setup(buzzer,GPIO.OUT)

GPIO.output(buzzer,False)
dat=raw_input("input")
while(1):
   print('checking')
   y= datetime.datetime.now()
   y=str(y)
   y=y[11:16]
   y=y.replace(':','')
   if(y==dat):
```

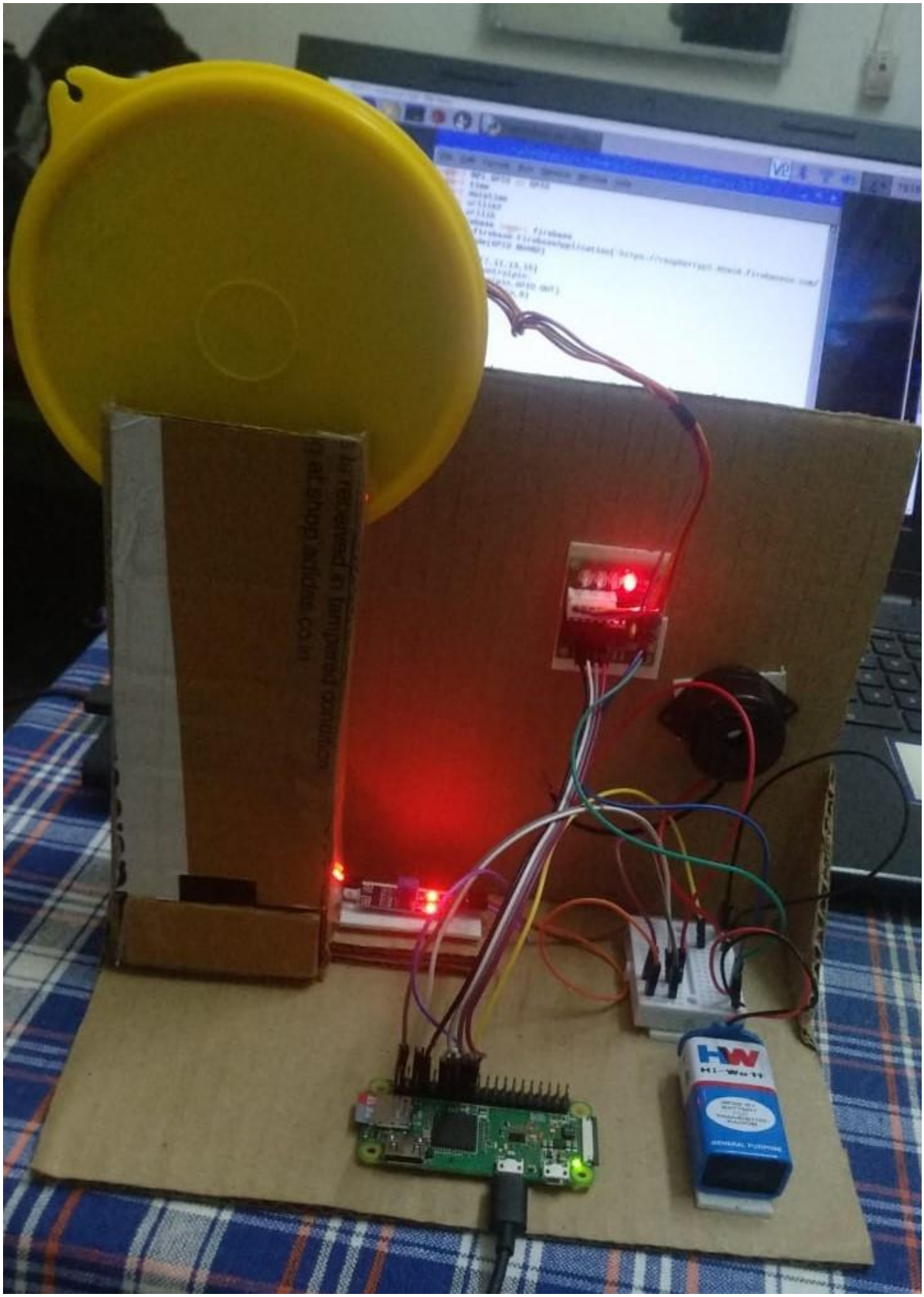
```
        for i in range(116):
            for halfstep in range(8):
                for pin in range(4):
                    GPIO.output(controlpin[pin],seq[halfstep][pin])
                time.sleep(0.001)
        n=n+1
        result1=firebase.put('med_disp',n,y)
        result2=firebase.put('med_disp','date',y)
        take=firebase.get('/med_disp/number of medicine left',None)
        #print(take)
        #take=take[1:3]
        take=int(take)
        no_of_med=take-1
        result3=firebase.put('med_disp','number of medicine
left',no_of_med)



        try:
          while True:
           if GPIO.input(sensor) != 1:
              GPIO.output(buzzer,True)
              print ("Object Detected")

           else:
              GPIO.output(buzzer,False)
              break

        except KeyboardInterrupt:
           GPIO.cleanup()
    time.sleep(60)
```



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