North South University
Department of Electrical and Computer Engineering

Report on

Home Automation For The Disabled

Course Name	: Juniour Design
Course Initials	: EEE 299
Faculty Name	: Mrs. Rummana Rahman
Section	: 3
Submission Date	: 10/12/18
Group Number	: 7

Group Members :

Serial Number	Name	ID
1.	Towfique Ahamed Khan	151 0547 643
2.	Anisur Rahman	151 0652 043

Acknowledgement :

It would not have been possible to work on this project without the help and support of the brilliant kind people around us. We are thankful towards our supervisor for her support and patience. Mrs.Rummana Rahman, professor, department of Electrical and Computer Engineering, Her advice and unsurpassed knowledge has been invaluable, for which we are extremely grateful. We were privileged to experience a sustained enthusiastic involved interest from her side.

Abstract :

Traditionally electrical appliances in a home are controlled via switches that regulate the electricity to these devices. As the world gets more and more technologically advanced, we find new forms of tech approaching deeper into our personal lives and our home. Home automation is becoming more and more popular throughout the world and is turning into a common practice. The processes of home automation works by making everything in the house automatically controlled using specific technology and do the jobs that we would normally do manually. Home automation can take care of a large number of different activities in the house. The main objective of this project is to control our home appliances using a simple circuit.Through an android app Developed by us the user will be able to control all the loads. The app will send signal to our Bluetooth module and it will send a text code to our arduino.The Arduino Recieves the signal and send the signal to the relay and the relay works accordingly. The appliances to be controlled is connected between the pole of the relay and neutral terminal of mains. It gets connected to live terminal of AC mains via normally opened (N/O) contact when the relay energizes.

Table Of Content :

1. Introduction :

1.1. Overview :

Home automation is becoming more and more popular and a common practice around the world. The process works by making certain things at our home automatically controlled using different forms of technology and leave manual labor. It helps us to take care of a large number of house-hold activities without much stress. For our junior project design we have chosen to make a Smart Home automation Device for the disabled. Which can be voice controlled or touch controlled depending on the users preference. It is greatly beneficial for pregnant, disabled , and elderly people.They will be able to control all there appliances of there house through there phone.

1.2. Existing Systems :

Right now at this moment in our country Home automation is not very popular and the standard existing systems are very expensive. In the usual households, mostly around the middle class families, people are not keen of buying expensive household appliances simply for the sake of luxury. This is because the total price of all the Home automation devices currently in the market is way too expensive for an ordinary family to bear. Besides if those expensive products do go wrong, it takes another toll on the owners to fix them due to the very nature of the firms to charge for servicing. And taking these items to a cheaper servicing shop is literally worse than throwing them out. Those shops will simply con their customers and charge lumps of money for parts they don’t even need. The cheap ones are very low in quality.

1.3. Applications :

The main purpose of this application is reduce the efforts of disabled people and elderly. It is also very helpful for the pregnant women. It is time saving and the product is affordable cheap at the same time can be considered as a luxury product.

1.4. Drawbacks :

The only drawback of this project is its complex technology and System compatability.

2. Components :

2.1. Arduino UNO :

Arduino is a microcontroller used for building electronics projects. There are several types of Arduino, for our project we have chosen to use the Arduino Uno. It houses 14 digital input/output pins. 6 of which can provide PWM(pulse width modulation). Pulse width modulation basically means that if an led were to be connected to this pin then the brightness of the led could be controlled whereas if the led were to be connected in any other pin then it could only be turned on or off.Arduino also provides 6 analog pins.

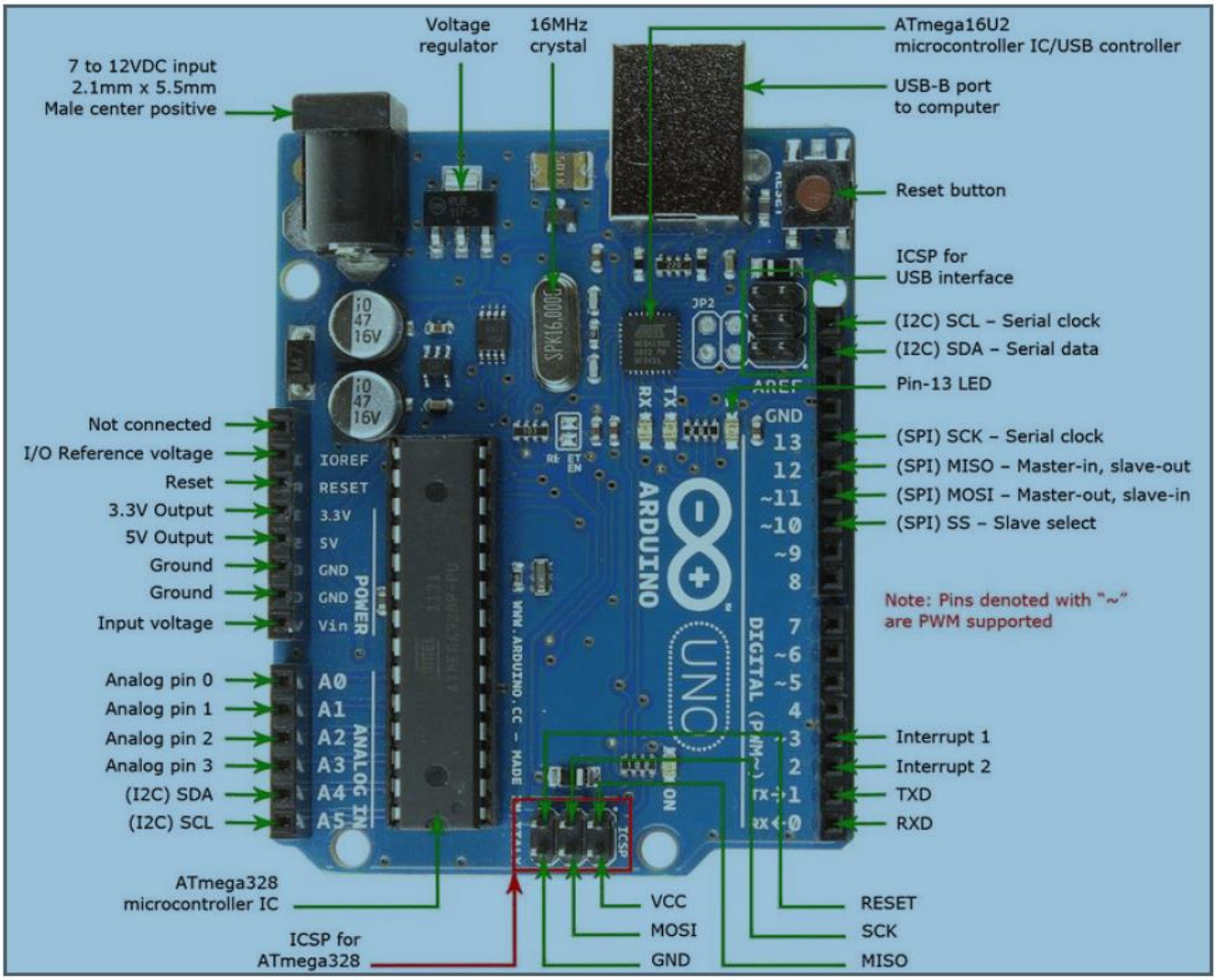


Figure : Arduino UNO

2.2. Relay Module :

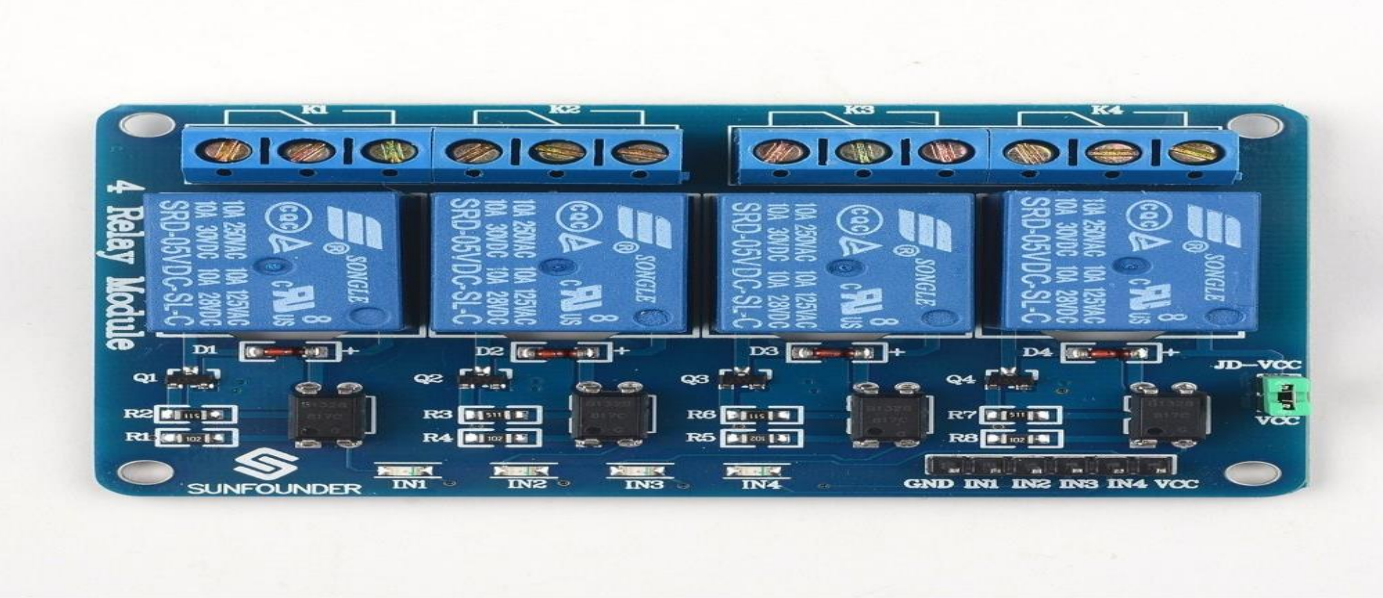
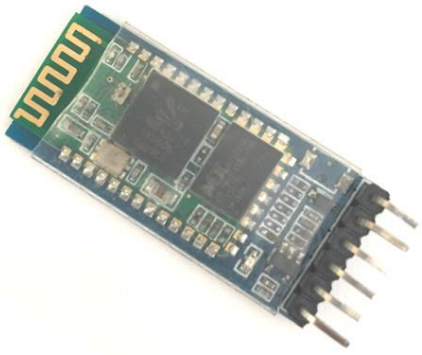


Figure : 4 Chanel Relay Module

This is a 5V 4-Channel Relay interface board, Be able to control various appliances, and other equipments with large current. It can be controlled directly by microcontroller (Arduino , 8051, AVR,PIC,DSP,ARM,ARM,MSP430,TTL_logic).In Diameters it is 3.6mm.The distance between the holes is 132.744mm long and 39.954mm wide.

2.3. HC-05 (Bluetooth Module)



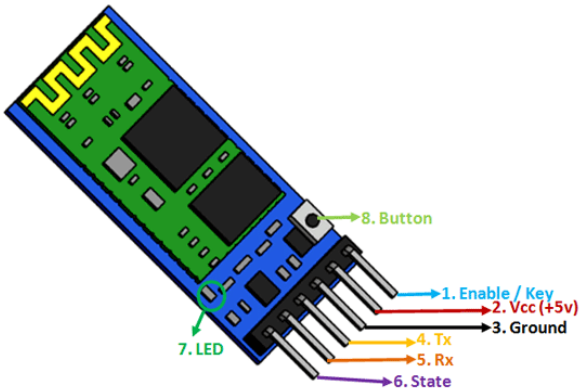


figure : HC-05

The HC-05 is a very effective module which can add two-way (full-duplex) wireless functionality to onces projects. You can use this module to communicate between two microcontrollers like Arduino or communicate with any device with Bluetooth functionality like a Phone or Laptop. There are many android applications that are already available which makes this process a lot easier. We can also configure the default values of the module by using the command mode. The HC-05 has two operating modes, one is the Data mode in which it can send and receive data from other Bluetooth devices and the other is the AT Command mode where the default device settings can be changed. We can operate the device in either of these two modes by using the key pin as explained in the pin description.It is very easy to pair the HC-05 module with microcontrollers because it operates using the Serial Port Protocol During power up the key pin can be grounded to enter into Command mode, if left free it will by default enter into the data mode. As soon as the module is powered you should be able to discover the Bluetooth device as "HC-05" then connect with it using the default password 1234 and start communicating with it. The pinouts are given in the figure.

2.4. Other Components :

We used other components such as Bread board , bulb holder , Bulb, Jumper wire etc.

fig : Other Components

2.5. Softwares :

For this projects we needed to make an app and make code the arduino. To code the arduino we used Arduino IDE and for the app we used MIT app inventor.

3. Description :

3.1. Block Diagram :

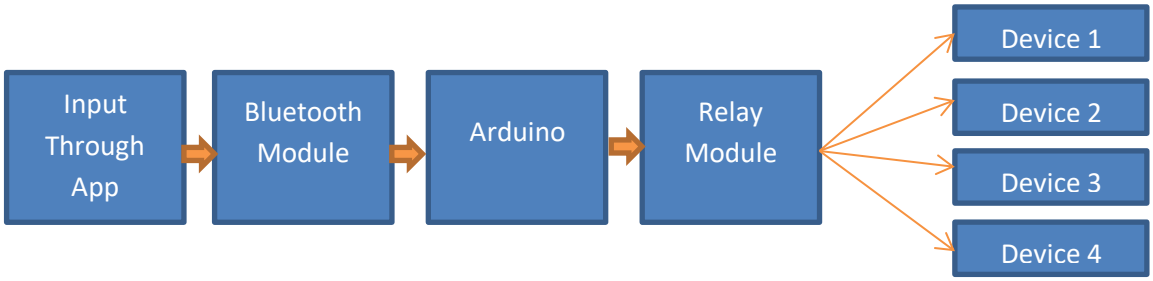


Figure : Block Diagram

3.2. Arduino Code for Voice controlled system :

For our system We used the following code,

```
String voice;
void setup() {
pinMode(7, OUTPUT);
pinMode(8, OUTPUT);
pinMode(9, OUTPUT);
pinMode(10, OUTPUT);
Serial.begin(9600);
}
```

```
void loop() {
while (Serial.available())
{
delay(10);
char c = Serial.read();
voice += c;
}
if (voice.length() > 0)
```

```
{
Serial.println(voice);
if(voice == "white")
{
digitalWrite(7, HIGH);
}
if(voice == "black")
```

```
{
  digitalWrite(7, LOW);
  }
  if(voice == "red")
    {
      digitalWrite(8, HIGH);
     }
 if(voice == "green")
 {
  digitalWrite(8, LOW);
  }
   if(voice == "blue")
    {
      digitalWrite(9, HIGH);
     }
 if(voice == "yellow")
```

```
{
digitalWrite(9, LOW);
}
if(voice == "pink")
{
digitalWrite(10, HIGH);
}
if(voice == "purple")
{
digitalWrite(10, LOW);
}

voice="";
}
}
```

3.3. App diagram for Voice Controlled Device :

We used MIT app inventor for making the app.And the layout and the app diagram is given below

3.3.1. App Layout :

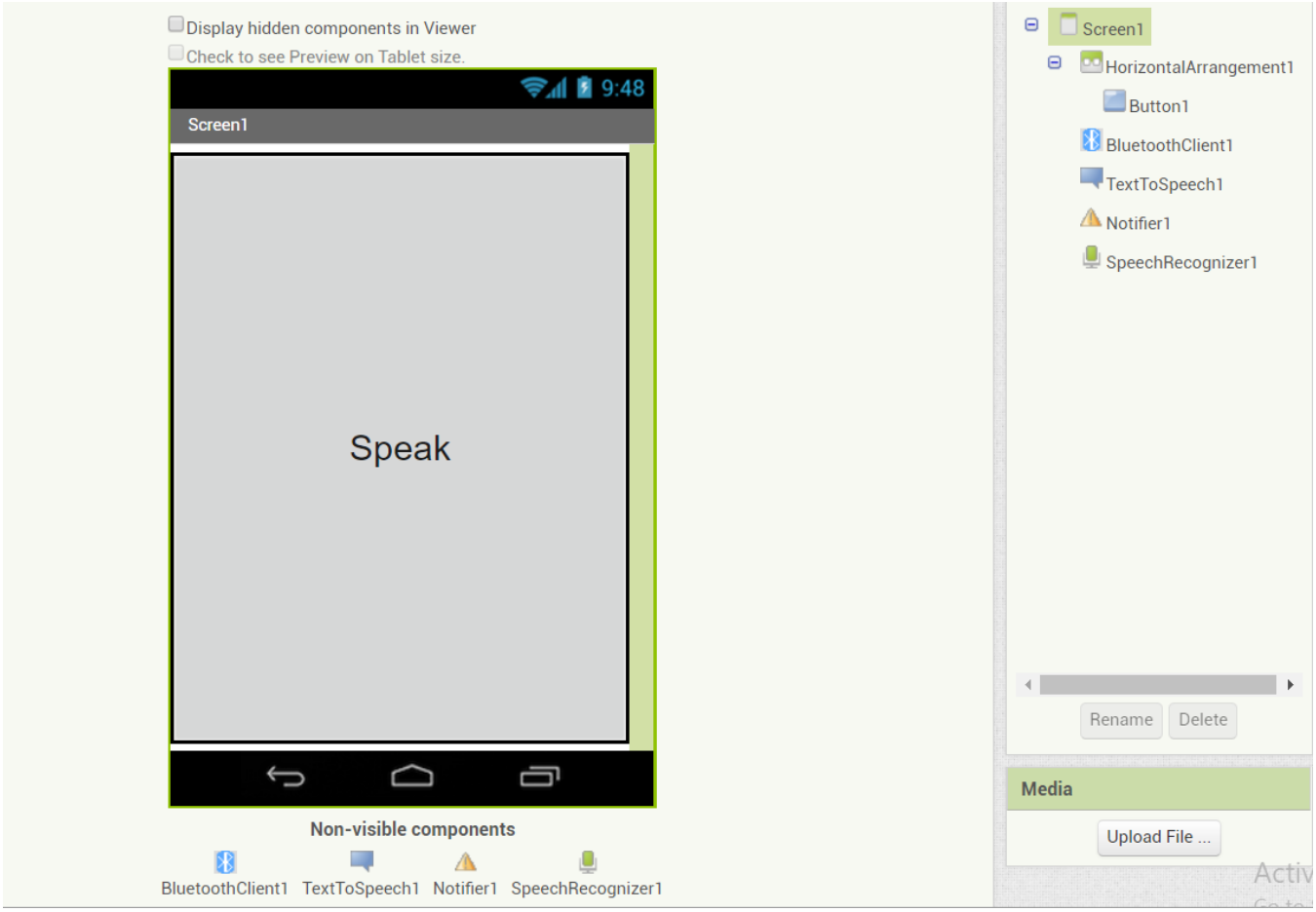


Figure : App layout

We used non visible components such as notifier, Speech Recognizer,Bluetooth client and Text to speech etc and used one button in the whole app.The bluetooth gets autoconnected as the adress is given then the user presses the speak button and it records users input and the input is given to the arduino. Here we used colour codes. If the codes match then the app sends the signal and the system works accordingly

3.3.2. App Diagram :

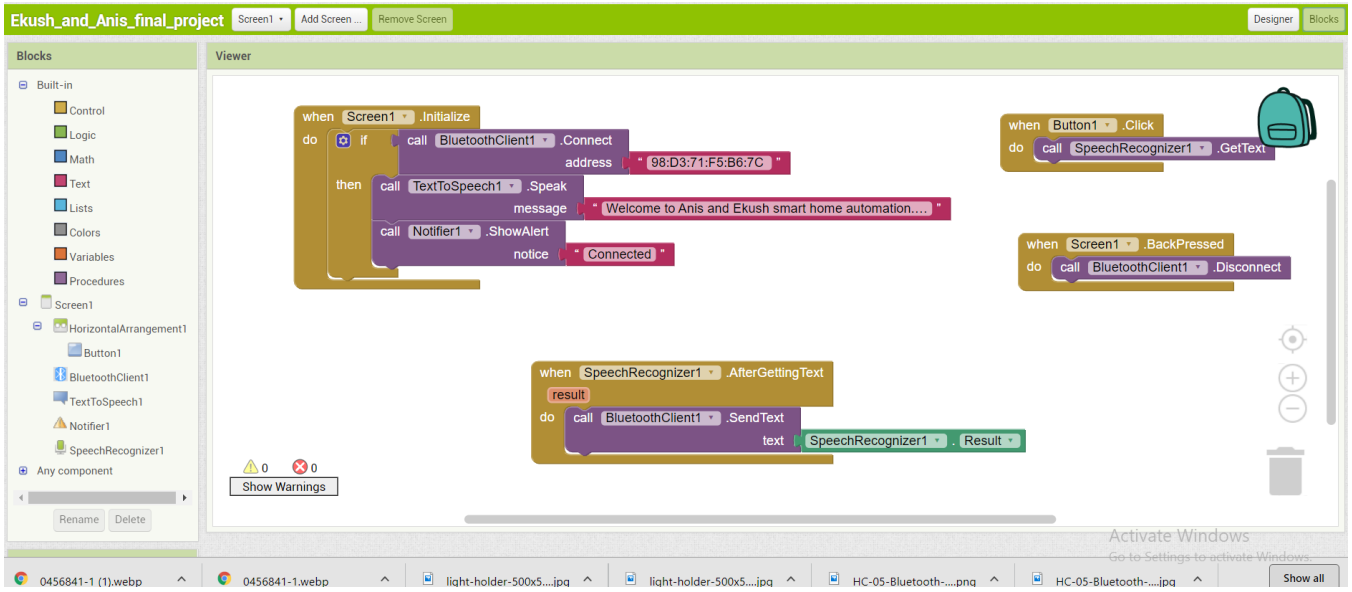


Figure : App Diagram

3.4. Arduino Code for Touch input app :

```
#include <SoftwareSerial.h>

SoftwareSerial h05(10, 11);

int BTData;

int a=0,b=0,c=0,d=0,e=0;

int r1=6;

int r2=7;

int r3=8;

int r4=9;

void setup() {

h05.begin(9600);

pinMode(r1, OUTPUT);

pinMode(r2, OUTPUT);

pinMode(r3, OUTPUT);

pinMode(r4, OUTPUT); }

void loop() {

if (h05.available())

{

BTData=h05.read();

h05.write(BTData);

if(BTData=='1' && a==0){

a=1;

digitalWrite(r1,1);
```

```
}
else if (BTData=='1' && a==1)
{
a=0;
digitalWrite(r1,0);
}
else if (BTData=='2' && b==0)
{
b=1;
digitalWrite(r2,1);
}
else if (BTData=='2' && b==1)
{
b=0;
digitalWrite(r2,0);
}
else if(BTData=='3' && c==0){
c=1;
digitalWrite(r3,1);
}
else if (BTData=='3' && c==1)
{
c=0;
digitalWrite(r3,0);
```

```
}
else if (BTData=='4' && d==0)
{
d=1;
digitalWrite(r4,1);
}
else if (BTData=='4' && d==1)
{
d=0;
digitalWrite(r4,0);
}
}
}
```

3.5. App Diagram for Touch Input App :

We only used one non visible component which is Bluetooth client. It first gives the user option to connect Bluetooth. When the user connects the relay part shows its connected. Then through button input is given in a text form. The text is received by the Bluetooth module. Then the circuit does it work accordingly.

3.5.1. App Layout :

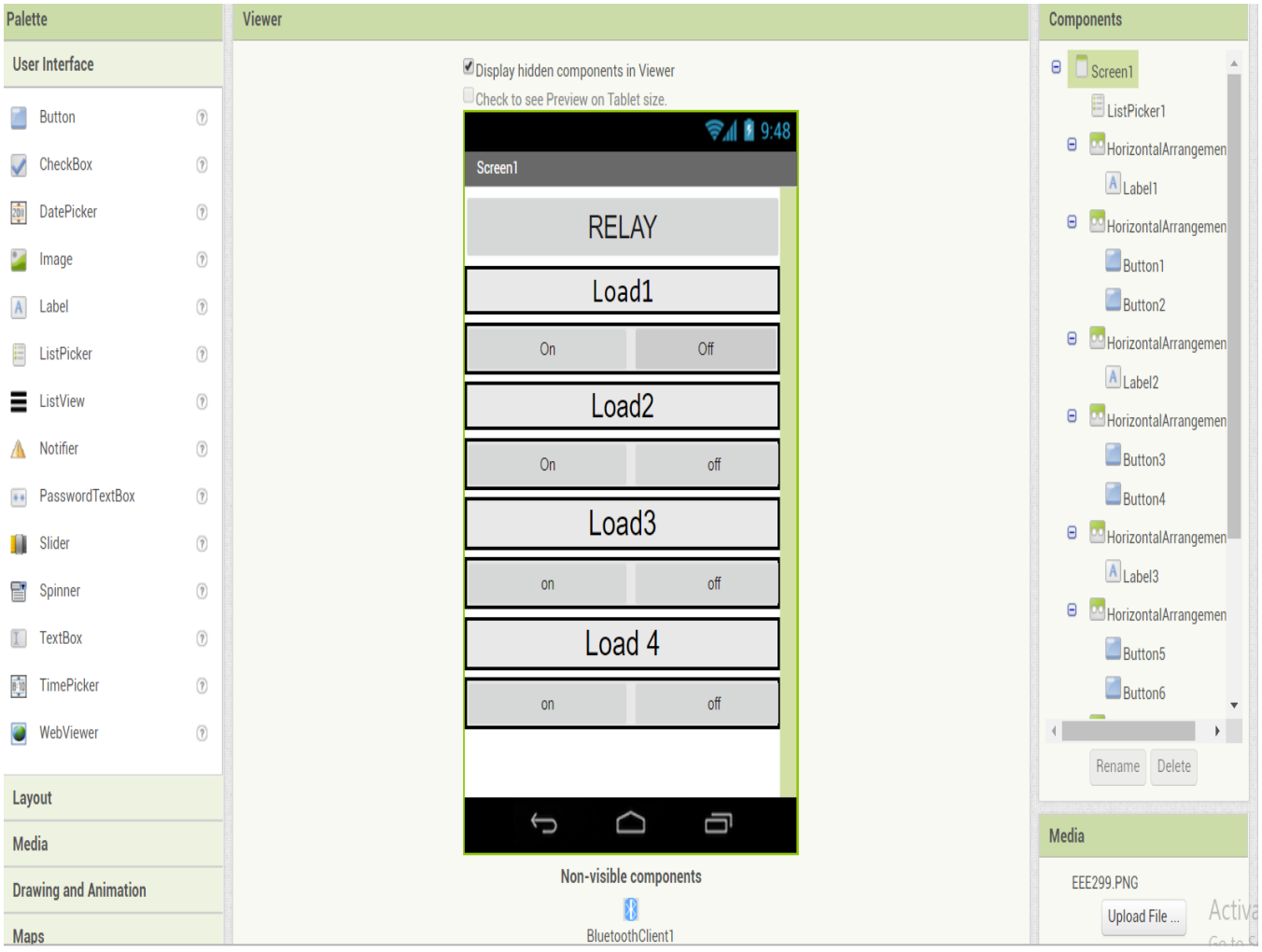


Figure : App Layout

3.5.2. App Diagram :

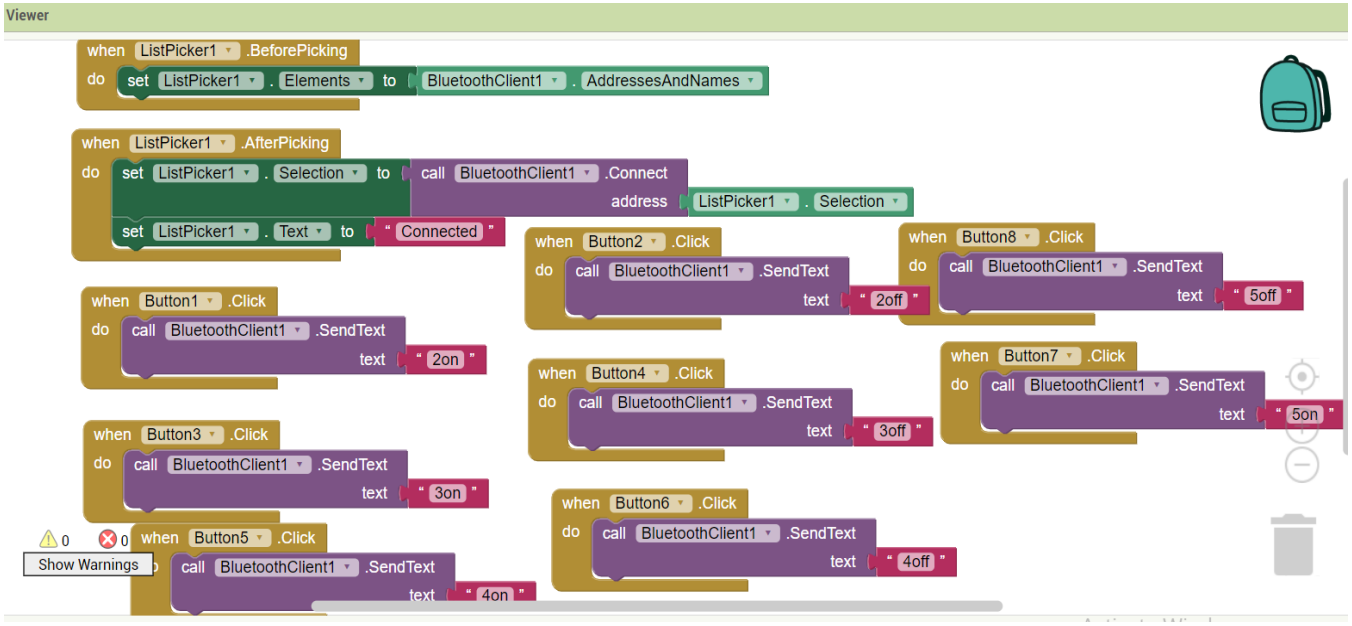


Figure : App Diagram

4. Results :

After constructing the circuit we tested it and it worked perfectly.

Figure : Result

5. Approximate Budget :

Component	Quantity	Price
Arduino	1	450 tk
Relay Module	1	275 tk
Bulb Holders	4	400tk
Wires	2	80tk
Bulb	4	200tk
HC-05	1	290tk
Breadboard	1	100tk
Total	14	1795tk

6. Market Research :

Global Home automation Market was valued at $39,607 million in 2016, and is projected to reach at $81,645 million by 2023, growing at a CAGR of 11.2% from 2017 to 2023. Home automation is utilization of intelligent terminals, which is automation system to control home appliances and equipment. Increase in awareness for efficient energy usage, rise in electricity prices, and technological advancements are expected to drive the home automation market growth. Moreover, increase in safety & security concerns fueled the adoption of home automation system, thus boosting the market growth.However, lack of awareness about home automation products and high initial investments in home automation are expected to hamper the home automation market growth. Increase in adoption of automated services is expected to provide lucrative opportunities for the global home automation market.The report segments the global home automation market on the basis of application, type, technology, and region. Applications covered in the study includes lighting, safety & security, heating, ventilation, and air conditioning (HVAC), entertainment, and others. On the basis of technology, the home automation market is bifurcated into wired and wireless technology. By type, the home automation market, is classified into luxury, do it yourself (DIY), mainstream, and managed services. Geographically, it is analyzed across North America, Europe, Asia-Pacific, and LAMEA. Safety & security systems accounted for a dominant share of the market in 2016, and are expected to grow at a CAGR of 11.8% during the forecast period. The wireless technology was the dominant segment for home automation market accounting for about 53% in 2016.The key players profiled in the home automation market are ABB Ltd., AMX LLC. (Harman), Control4 Corporation, Crestron Electronics, Inc., Honeywell International Inc., Johnson Controls Inc., Savant Systems LLC., Siemens AG, Vantage Controls (Legrand), and Zigbee alliance. Home automation market is estimated to depict a significant growth during the forecast period, owing to the factors such as increase in energy costs, government regulations towards effective utilization and managing electricity consumption, and technological advancements. With the advent of various wireless technologies such as ZigBee, Z-wave, and Bluetooth, installation of home automation systems has been simplified. Advancements in technologies and improved connectivity solutions have increased the adoption of home automation systems globally, which is expected the fuel the home automation market growth.

Consumers are shifting from traditional & mechanical locks to automated security systems & smart locks due to an increase in awareness related to secure home solutions and growth in trend for IoT. Rise in household automation is expected to provide significant opportunities for the global home automation market growth. Companies are introducing products that are compatible with different standards of wireless connectivity, owing to increase in adoption of wireless technologies. Control Scope, a product from Daintree Networks, offers centralized control for lighting management, which results in a reduction of up to 70% in lighting costs. This is anticipated to improve the occupant's comfort and enhance the visibility in building operations. Out of all continent Asia and Americas is already producing a large amount of home automation system. So if a person wants to start a business abroad Africa will be a good option. Because there they prefer very low cost product which we think we can provide. In our country The scenario is the system is very expensive.

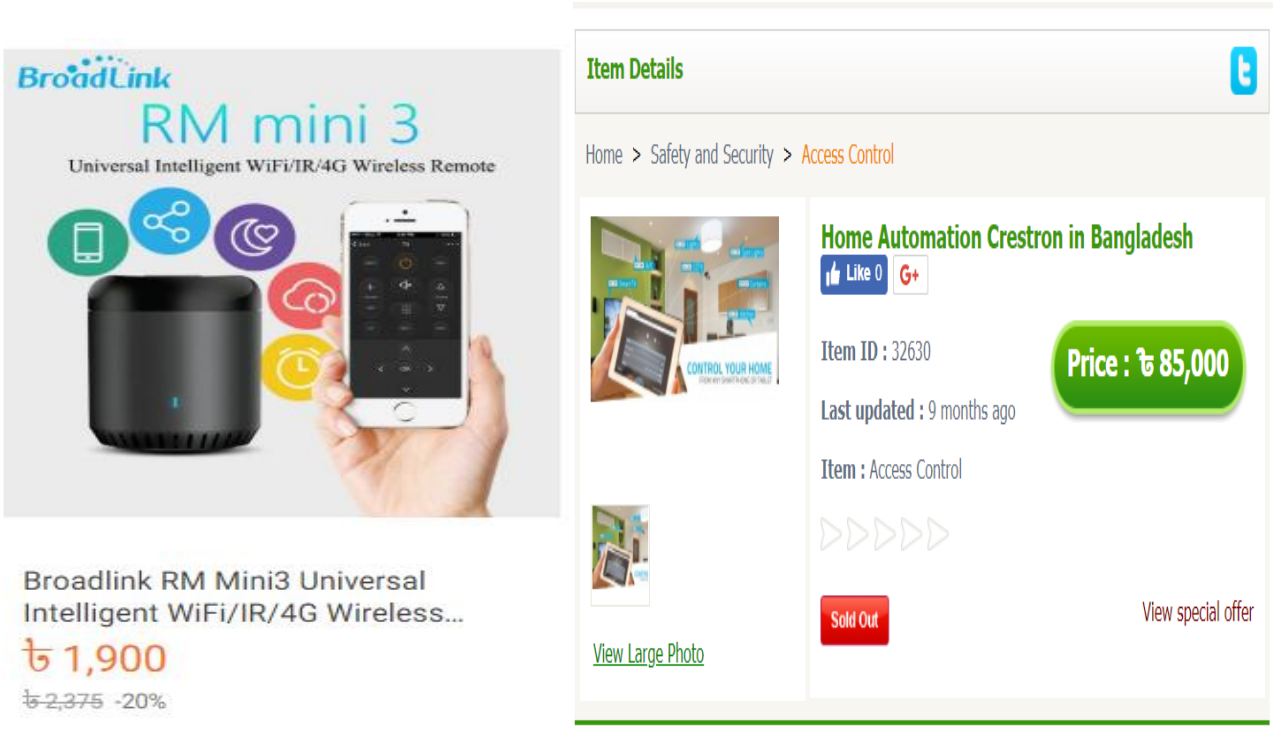


Figure : Price range of a home automation systems

And these don't have a customer care. So the market here is very vulnerable so if we can sell the product in the range of 2500tk it can be very effective.But we need to maintain the quality. For the disabled it will be very effective and it is profitable.

7. Future Works :

In future we are looking forward to do it in a industry scale. And for our we look forward to add more features. And merge both app so that anyone who is disabled can use it giving dual inputs.

8. Reference :

1. http://www.bdstall.com/details/home-automation-crestron-in-bangladesh-32630/
2. https://www.alliedmarketresearch.com/home-automation-market
3. https://www.engineersgarage.com/contribution/bluetooth-controlled-home-automation-system?fbclid=IwAR3xYz_qygjIJ3B3krWAusSmjZ3xjaSmlrFklpGuRIVnT4_8FL9mKZh_QRc
4. https://www.circuito.io/blog/arduino-uno-pinout/
5. http://wiki.sunfounder.cc/index.php?title=4_Channel_5V_Relay_Module
6. https://www.electronicshub.org/bluetooth-controlled-electronic-home-appliances/?fbclid=IwAR0WC1iaHSKC88xHoUkVuiwuFFCi7oO-KjFkeO-YWFat_ioumILs3AIKcgM