

Embedded Systems Class Project 2 Report

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Experiment : 1

Aim : Remote Operated Domestic Appliances Control By Android Application:

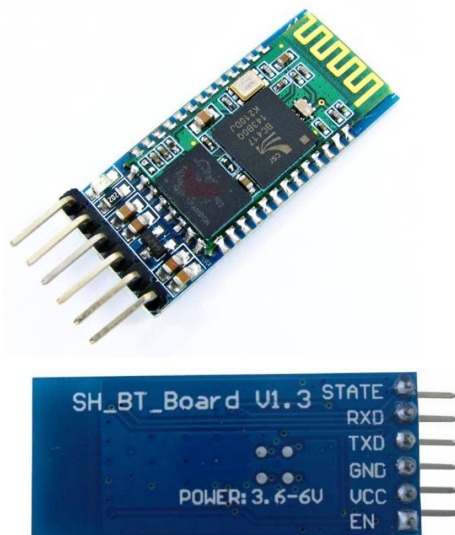
Operating conventional wall switches is difficult for elderly or physically handicapped people. The project is designed to operate electrical loads using relays interfaced to a Arduino board through remotely operated commands to it by touch screen based user friendly GUI on any smart phone with Android /MAC applications.

Hardware : Arduino UNO microcontroller, wires ,4 LEDs, HC 05 Bluetooth module, android app.

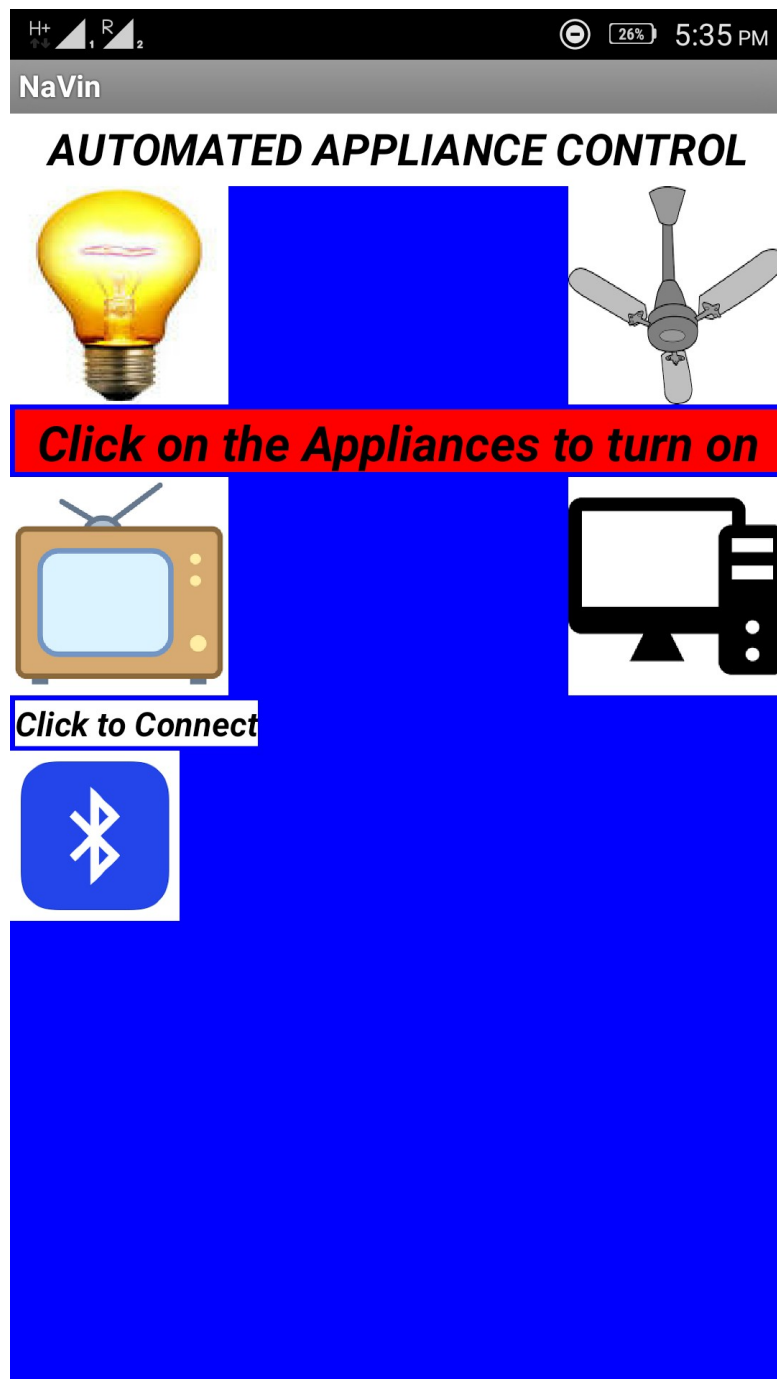
Theory :

HC-05 module has two modes.

1. Data mode: Exchange of data between devices.
 2. Command mode: It uses AT commands which are used to change setting of HC-05. To send these commands to module serial (USART) port is used.
- VCC: Connect 5 V or 3.3 V to this Pin.
 - GND: Ground Pin of module.
 - TXD: Transmit Serial data (wirelessly received data by Bluetooth module transmitted out serially on TXD pin)
 - RXD: Receive data serially (received data will be transmitted wirelessly by Bluetooth module).
 - State: It tells whether module is connected or not.

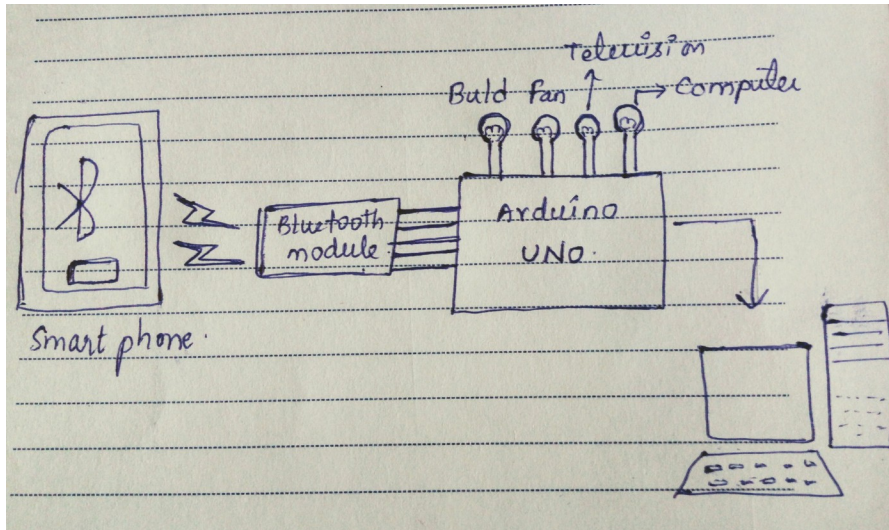


Connections:



- Vcc of Bluetooth module is connected to 5v pin of arduino
- Gnd of Bluetooth module is connected to Gnd pin of arduino
- Tx of Bluetooth module is connected Rx of Arduino
- Rx of Bluetooth module is connected to Tx of Arduino
- Anode of LED1 is connected to pin 9
- Anode of LED2 is connected to pin 10

- Anode of LED3 is connected to pin 11
- Anode of LED4 is connected to pin 14
- Cathodes of all leds are grounded.



Program Code :

```
int bulb = 9;
int fan = 10;
int tv = 11;
int computer = 12;

int received = 0;
int bulb_state = 0;
int fan_state = 0;
int tv_state = 0;
int computer_state = 0;

void setup() {
  Serial.begin(9600);
  pinMode(bulb, OUTPUT);
  pinMode(fan, OUTPUT);
  pinMode(tv, OUTPUT);
  pinMode(computer, OUTPUT);
  // put your setup code here, to run once:
}

void loop() {
  // put your main code here, to run repeatedly:
  if (Serial.available() > 0) {
```

```

    received = Serial.read();
}
//*****
if(bulb_state == 0 && received == '1'){
    digitalWrite(bulb,HIGH);
    bulb_state = 1;
    received = 0;
}

if(bulb_state == 1 && received == '1'){
    digitalWrite(bulb,LOW);
    bulb_state =0;
    received = 0;
}
//*****
//*****
if(fan_state == 0 && received == '2'){
    digitalWrite(fan,HIGH);
    fan_state = 1;
    received = 0;
}

if(fan_state == 1 && received == '2'){
    digitalWrite(fan,LOW);
    fan_state =0;
    received = 0;
}
//*****
//*****
if(tv_state == 0 && received == '4'){
    digitalWrite(tv,HIGH);
    tv_state = 1;
    received = 0;
}

if(tv_state == 1 && received == '4'){
    digitalWrite(tv,LOW);
    tv_state =0;
    received = 0;
}
//*****
//*****

```

```

if(computer_state == 0 && received == '6'){
    digitalWrite(computer,HIGH);
    computer_state = 1;
    received = 0;
}

if(computer_state == 1 && received == '6'){
    digitalWrite(computer,LOW);
    computer_state =0;
    received = 0;
}
//*****
}

```

Conclusion:

We observe that when the corresponding button is pressed related to the electronic device in the android app, it will send a bluetooth signal and the bluetooth module connected to the arduino receives it and sends to the arduino so corresponding led is turn on.

Experiment : 2

Aim : Railway Level Crossing Gate Operation Remotely By Android:

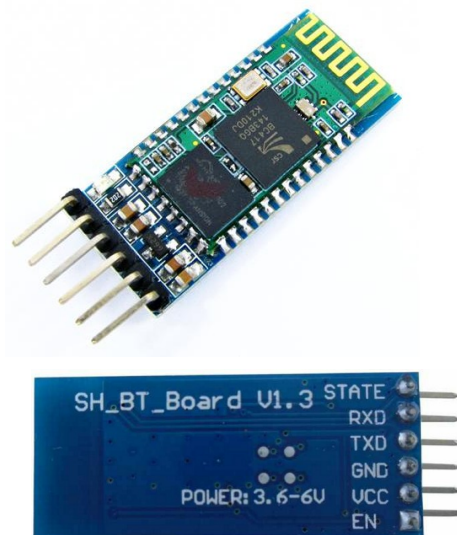
Opening and closing of railway level crossing gate involves manpower, which could be often erroneous leading to accidents. Railway level crossing gate motor ,controlled by the the engine driver from a smart phone to a microcontroller through remotely operated commands to its by touch screen based user friendly GUI with Android applications for deriving an output to drive a relay for the gate motor operation.

Hardware : Arduino UNO microcontroller, wires ,3 LEDs, HC 05 Bluetooth module,android app.

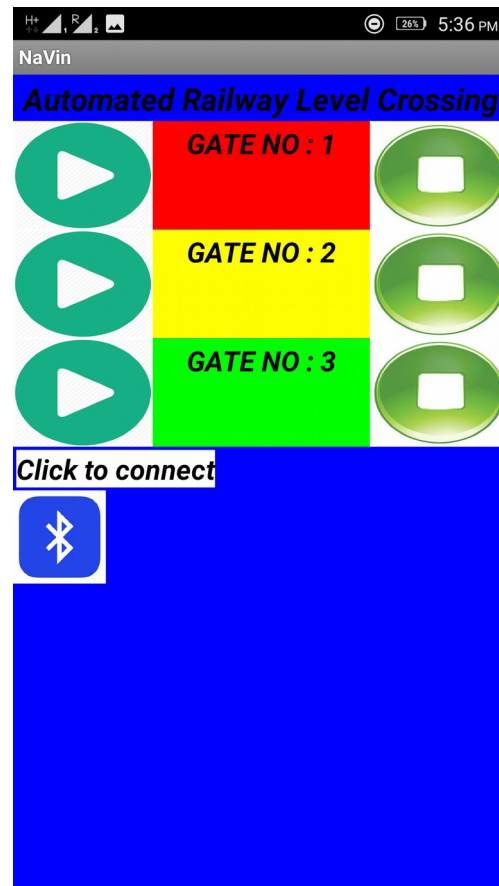
Theory :

HC-05 module has two modes.

1. Data mode: Exchange of data between devices.
 2. Command mode: It uses AT commands which are used to change setting of HC-05. To send these commands to module serial (USART) port is used.
- VCC: Connect 5 V or 3.3 V to this Pin.
 - GND: Ground Pin of module.
 - TXD: Transmit Serial data (wirelessly received data by Bluetooth module transmitted out serially on TXD pin)
 - RXD: Receive data serially (received data will be transmitted wirelessly by Bluetooth module).
 - State: It tells whether module is connected or not.



Connections:



- Vcc of Bluetooth module is connected to 5v pin of arduino
- Gnd of Bluetooth module is connected to Gnd pin of arduino
- Tx of Bluetooth module is connected Rx of Arduino
- Rx of Bluetooth module is connected to Tx of Arduino
- Anode of LED1 is connected to pin 7
- Cathode of LED1 is connected to pin 8
- Anode of LED2 is connected to pin 9
- Cathode of LED2 is connected to pin 10
- Anode of LED3 is connected to pin 11
- Cathode of LED3 is connected to pin 12

Program Code :

```
int gate1_open = 7;
int gate1_close = 8;

int gate2_open = 9;
int gate2_close = 10;

int gate3_open = 11;
int gate3_close = 12;

int received = 0;

void setup() {
  Serial.begin(9600);
  pinMode(gate1_open, OUTPUT);
  pinMode(gate1_close, OUTPUT);
  pinMode(gate2_open, OUTPUT);
  pinMode(gate2_close, OUTPUT);
  pinMode(gate3_open, OUTPUT);
  pinMode(gate3_close, OUTPUT);
  // put your setup code here, to run once:

}

void loop() {
  // put your main code here, to run repeatedly:
  if (Serial.available() > 0) {
    received = Serial.read();
  }
  //*****
  if(received == '1'){
    digitalWrite(gate1_open, HIGH);
    received = 0;
  }
}
```



```

    if(received == '2'){
        digitalWrite(gate1_close,LOW);
        received = 0;
    }
//*****
//*****

    if(received == '3'){
        digitalWrite(gate2_open,HIGH);
        received = 0;
    }

    if(received == '4'){
        digitalWrite(gate2_close,LOW);
        received = 0;
    }
//*****
//*****

    if(received == '5'){
        digitalWrite(gate3_open,HIGH);
        received = 0;
    }

    if(received == '6'){
        digitalWrite(gate3_close,LOW);
        received = 0;
    }
//*****

}

```

Conclusion:

We observe that when the corresponding railway gate button is pressed related to the railway gate in the android app, it will send a bluetooth signal and the bluetooth module connected to the arduino receives it and sends to the arduino so corresponding led is turn on.