

GENERAL SIR JOHN KOTELAWALA DEFENSE UNIVERSITY

DEPARTMENT OF COMPUTER ENGINEERING

INTAKE 39



GROUP PROJECT IN HARDWARE – COE1993

GROUP 01

AUTOMATED RAILWAY GATE SYSTEM

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Contribution to the project CODING

01) The codes that I have written.....

```
// Import required libraries
//#include <ESP8266WiFi.h>
#include <ESPAsyncWebServer.h>

const int ir_near1 = D1; //close to gate
const int ir_far1 = D2; //far from gate
const int ir_near2 = D3;
const int ir_far2 = D4;

bool isGateOpen = false;

int val_near1 =0;
int val_far1 =0;
int val_near2 =0;
int val_far2 =0;

// Set your access point network credentials
const char* ssid = "GG";
const char* password = "GG123456";

// Create AsyncWebServer object on port 80
AsyncWebServer server(80);

String readGate(){
    return String(isGateOpen);
}

void setup() {
    pinMode(ir_near1,INPUT);
    pinMode(ir_far1,INPUT);
    pinMode(ir_near2,INPUT);
    pinMode(ir_far2,INPUT);

    pinMode(D0, OUTPUT);
    // Serial port for debugging purposes
    Serial.begin(115200);
    Serial.println();
```

.....

```

void loop() {
    // put your main code here, to run repeatedly:
    // val_near = digitalRead(ir_near);
    // val_far = digitalRead(ir_far);
    // Serial.println(val_near);
    // Serial.println(val_far);
    digitalWrite(D0, HIGH);
    isGateOpen = false;

    if(digitalRead(ir_far1) ==LOW){
        val_far1 = 1;
    }
    if(digitalRead(ir_near1) ==LOW){
        val_near1 = 1;
    }
    if(digitalRead(ir_far2) ==LOW){
        val_far2 = 1;
    }
    if(digitalRead(ir_near2) ==LOW){
        val_near2 = 1;
    }
    Serial.print("Far 1 = ");
    Serial.println(val_far1);
    Serial.print("Near 1 = ");
    Serial.println(val_near1);
    Serial.print("Far 2 = ");
    Serial.println(val_far2);
    Serial.print("Near 2 = ");
    Serial.println(val_near2);
    delay(1000);

    while((val_far1 == 1 && val_near1 == 1) || (val_far2 == 1 && val_near2 ==
1)){
        //if(val_near == 1 && val_far == 0 ){
        // isGateOpen = true;
        // Serial.println("Gate Close");
        //}
        //if(val_far == 1 && val_near == 0){
        //Serial.println("Gate Open");
        //isGateOpen = false;
        // }
        digitalWrite(D0, LOW);
        isGateOpen = true;
        Serial.println("Gate Close");

        if(digitalRead(ir_far1) ==LOW){

```

```

    val_far1 = 1;
  }
  if(digitalRead(ir_near1) ==LOW){
    val_near1 = 1;
  }
  if(digitalRead(ir_far2) ==LOW){
    val_far2 = 1;
  }
  if(digitalRead(ir_near2) ==LOW){
    val_near2 = 1;
  }
  //    delay(5000);

  while((val_far1 == 1 && val_near1 == 1) && (val_far2 == 1 && val_near2 ==
1)){
    Serial.println("Gate Open");
    val_far1 = 0;
    val_near1 = 0;
    val_far2 = 0;
    val_near2 = 0;

  }
  //    if((val_far1 == 0 && val_near1 == 0) || (val_far2 == 0 && val_near2 ==
0)){
  //      Serial.println("Gate Open");
  //    }

  }

}

```

02) The codes that I have directly taken.....

```

// Setting the ESP as an access point
Serial.print("Setting AP...");
// // Remove the password parameter, if you want the AP (Access Point) to be
open
WiFi.softAP(ssid, password);

```

```

IPAddress IP = WiFi.softAPIP();
Serial.print("AP IP address: ");
Serial.println(IP);

server.on("/gate", HTTP_GET, [](AsyncWebServerRequest *request){
    request->send_P(200, "text/plain", readGate().c_str());
});
bool status;

server.begin();
}

```

Reference Web Site :- Random Nerd Tutorials

<https://randomnerdtutorials.com/>

03) The Codes that I have taken and modified.....

Here I gave it a new SS ID and a new Password for the local server.

```

// Set your access point network credentials
const char* ssid = "GG";
const char* password = "GG123456";

```

04)

- Here I have learnt about the ESP8266 Wifi Module and the Adapter Based Modle Of ESP8266, the NODEMCU and the way of connecting it with Arduino.
- I learned the basic Arduino codes and learned the way of connecting two Arduino Boards together by using a wifi module or wifi antenna.
- Learned the way of connecting a NODEMCU with Arduino Board by using a wifi signal receiver.
- Learned the way of communicating wirelessly within a range of 400m to 1K m by using NRF24L01 wifi Module.

- Learned to Use the Arduino IDE in NODEMCU by downloading relevant libraries which needed

05)

We used Two NODEMCU Wifi modules to develop our automatic railway gate system and we made a direct communication in between two NODEMCUs .Here we learned the clien-server relationship and even learned the way of connecting multiple clients with one server. C++ is the programming language used in Arduino because it is not only cost effectively but also accurately. Further more We have the idea of connecting our setup of 4 sensors , motor controllers and server motors with NODEMCU or With Arduino Wirelessly. Therefore, we expect atleast 18 marks out of 20 for the software.

Contribution to the project HARDWARE

01)

We used following components for the project.

- (ESP8266) NodeMCU Wifi modules

- IR sensors

- Servo motor

- Jumper wires

- Male to Male
- Male to Female
- Female to Female

- USB cables

- LEDs

- Bread boards

- Power Bank

(We used the power bank as the power supply unit because that was easy to use and easy to recharge without additional cables and components)

I used.

- 4 IR Sensors
- A (ESP8266) NodeMCU Wifi module
- Jumper Wires
- Bread boards
- A USB cable

to develop the Server circuit unit.

02)

While working with the team members I learned to connect sensors to the NODEMCUs and the Arduino Boards as well as the way of connecting two or more wifi modules together.

I learned about how the two NODEMCU modules transfer data among them by using a local server as well as through a network.

I also got an idea about how to connect the LCD screen(tried to implement) to the Arduino by using all the 16 pins of it and also by the 4 pins adapter as well by trying it.

Got an idea about the Arduino Uno board and the Mega board and its port configuration.

Here by this project I new that using more and more sensors in a related circuit will make the process more accurate and if the one sensor is malfunctioned the other sensors will do the rest.

I did understand that relays should use to give the needed current when we are implementing the practical model

When we are placing the sensors.....the X bee sensors can be used to do a major roll than IR sensors because with X bee Sensors we can commonly use it in home automation , smart energy, wireless sensing and industrial automation etc.

Furthermore X bee sensors are rarely used in measuring temperature , Humidity and light etc.



Image of an X- Bee Sensor

03)

In this Project we planned to implement a automated rail gate which can be used in upcountry rail roads as well as in the railway crossings where the trail track is going through rural areas like Hatton , Diyatalawa etc. So in those areas there may be no any proper electricity supply or source of power .

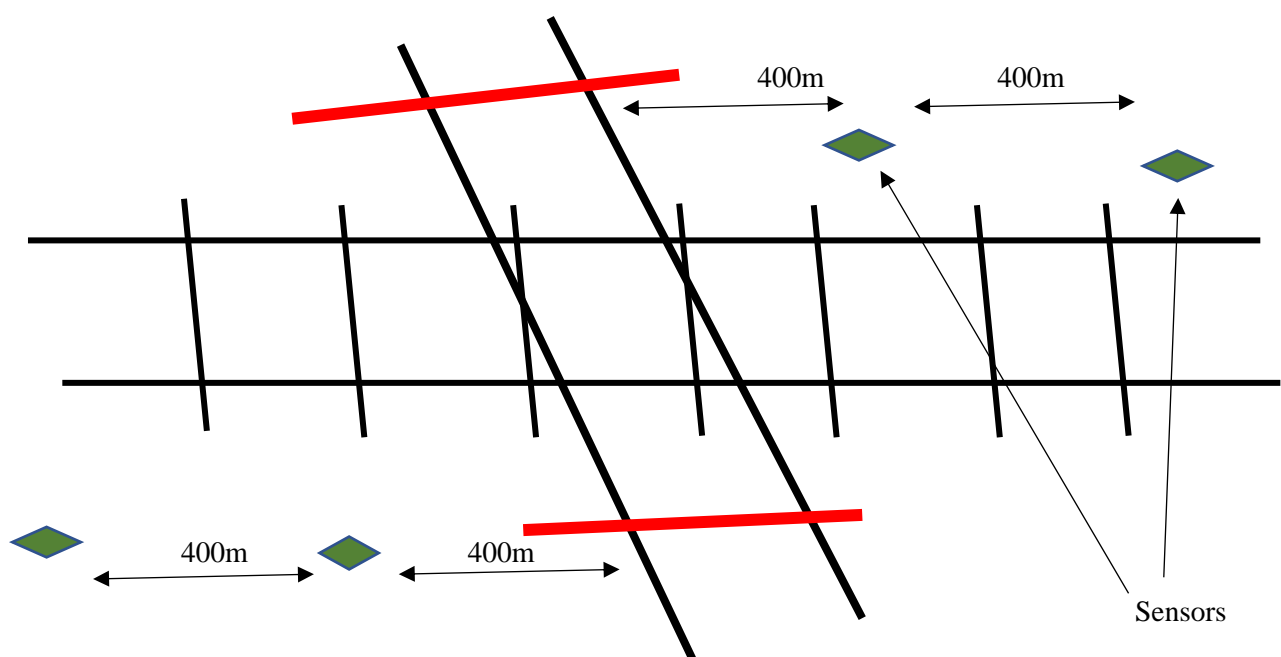
So in our project we tried to make a simple project for such areas .

Here for sensors had been used to detect the arriving and the passing of the train through the rail crossing. In either sides We kept Two Sensors (IR Sensors) which named Far 1 , Near 1 and Far 2, Near 2.

When the train is arriving the railway crossing, the sensor no.01 which is named as Far 1 (800m away from the gate) detecting the Train and after that when Train entered the sensor no.02 which is named as Near 1.....the signal wil automatically pass through wirelessly to the client servo motor and the rail gate will be closed.

When the train reach the sensor no.03 which is named as Near 2 (400m away from the gate) , even the the train passed the gate , still the gate will remain close. Once the Train reached the sensor no.04 which is named as Far 2 the gate will automatically opened as it happened in the process of closing the gate.

Same scenario is happening when the train moves either sides. In each and every time what must happen istrain should pass the both two sensors at the same side of the rail crossing left or right which are placed in the distance of 400m(Near 1 & Near 2) and 800m(Far 1 and Far 2) respectively from the gate.



Here in our model we used a local server....so we can only keep the sensors at the distance range of up to 25 m.

04)

I developed the logic and forwarded the idea of using 4 Sensors in either sides of the gate for keep the accuracy and for easiness of detecting the correct signals. And also I developed the serve part of the project and helped to made the client part as well.

So I think I deserve the 20 marks as the main part of this project is understanding the idea and the circuit logic.

Other tasks I have done

01)

The research area of this project was huge. As Many people from different countries had the idea of implementing a automatic railway gate for the safety of man kind. So,

We went through many research papers to get an idea about the other similar projects done by the people and the I went through the research papers about the various wifi modules and wifi sensors.

Not only that , But also I did research on the following fields such as,

- Railroad accidents happened in the last five years of time in Sri Lanka.
- The safety of the Sri Lankan Rail Roads and the the technologies using in Sri Lankan Railway System.
- The technologies other countries using.
- The new devices and sensors which can be used in this project.
- The main reasons and rates of the train accidents.
- The comparison of the railroad quality between the Sri Lanka and other countries.
- The Cost or the expenses we need in implementing the real model.

I explained and gave my team members an idea about the servo client models, the functions and the capabilities of the sensors as well.z

02)

I made both Server And Client Circuits with the help of my team members .

Found all the items needed in the project including sensors and wifi modules.

Helped my team members to get the proper idea about the functionof the code.

The Literature Review of the Project Proposal was done by me.

I explained the project updates to my instructors and gave the updates to them in presentations and in lab sessions as well

Explained the function of the circuit , idea and the way we came up with this problem and the way we solved it to our senior and junior undergraduates and took their ideas as well.

03)

With considering my contribution from the researching and the commitment to success our project, I really expect full marks for this area of the project.