

ACHARYA NARENDRA DEV COLLEGE DELHI UNIVERSITY



ELITE PROJECT REPORT

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ACKNOWLEDGEMENT:-

The project brings in a sense of satisfaction but never complete without thanking those people who made it possible and constant support crowned our effort with success . First of all,we would like to thank our principal Dr. Ravi Toteja for providing us with an opportunity to explore our ideas through summer fellowship ELITE program .We would like to thank our mentor Assistant Professor Mr. Dinesh Kumar and Dr. Anita Kumari for guiding us at every stage of our project. We would like to thank Dr. Ravneet Kaur and Ms. Gauri Ghai for supporting us every time and helping us during our project. We would like to thank our Non-Teaching staff Mr. Ravinder Kumar and Mr. Pankaj for helping us in issuing different hardware items from Department of Electronics.

CERTIFICATE

This is to certify that the project entitled “ R.T.P.C.S (Real Time Passenger Counting System)” has been undertaken under the ELITE scheme of Acharya Narendra Dev College, University Of Delhi and implemented by us in the Electronic Laboratory. This work has not been submitted anywhere earlier, partially or fully.

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ABSTRACT:-

In any public transportation system crowd management is very big problem . As we live in Delhi here DTC (Delhi Transport Corporation) manage bus transportation system in Delhi. As we daily travel in DTC buses we also face it. Approx 4 million passenger daily travel in DTC in 6000 (estimated) buses . As a passenger we should know how many buses are on my route and where they are? How many passenger already in specific bus? Some times it happens that two bus one after one, one is crowded another is vacant. If we know how many people are there and where is the bus so as a passenger we prefer to go that bus in which there are less passenger in comparison to another and sometimes it happens that passenger leaves a slightly loaded bus in expectation of that coming bus will be empty sometimes this happens and not many times .The motive of the project is to provide information to the passengers about number of buses running on specific route and how many passengers are there in the specific bus and where it is. If passenger know the correct timing of bus then their time will not be waste. To solve this problem we have created a R.T.P.C.S which tells how many passenger are there in the bus and all the data we send to the web server at a real time.

So distribution of people in the DTC buses can be adjust in better way. In this project we have built a counter system which count number of passengers entering in bus and exiting the bus at real time .

INTRODUCTION:-

Real time passenger counting system is a system through which we count number of passenger and upload data to website at real time through which every one can access.

APPARATUS:-

HARDWARE PART:-

Arduino:-

Arduino is a open-source electronics platform based on easy to use hardware and software. Arduino boards are able to read input - light on a sensor , finger on a button ,and turn it into an output – activating a motor ,turning on an LED,publishing something's online. The Arduino board is connected to a computer via USB ,where it connect with the Arduino development environment (IDE) the user writes the Arduino code in the IDE , then uploads it to be microcontroller which executes the code, interacting with input and outputs such as sensor motor and light.

Types of Arduino

Arduino uno

Mega arduino

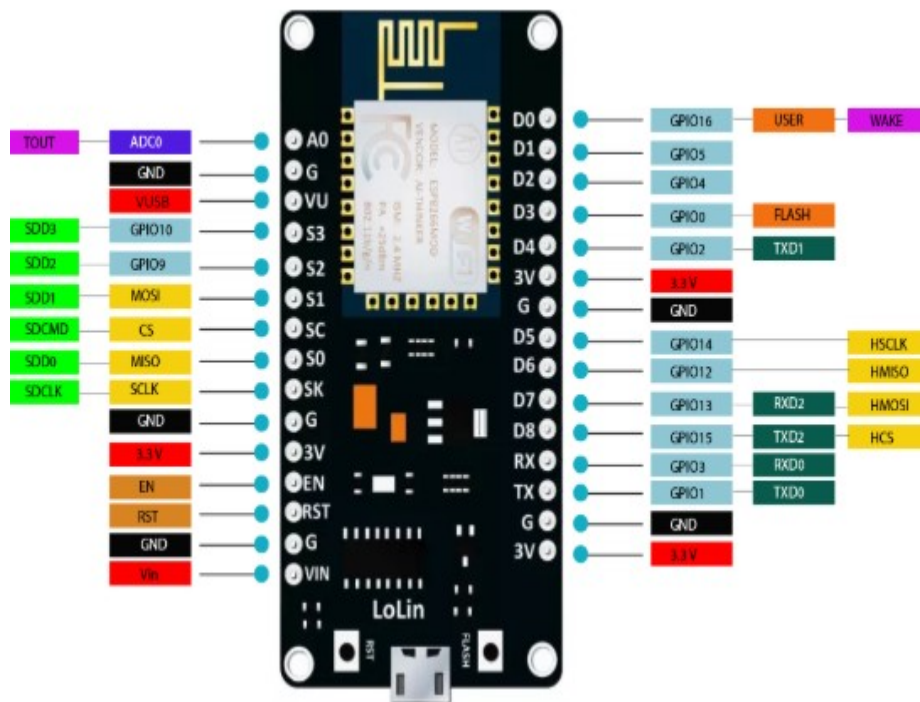
Nano arduinoLilypad arduino

Red board arduino



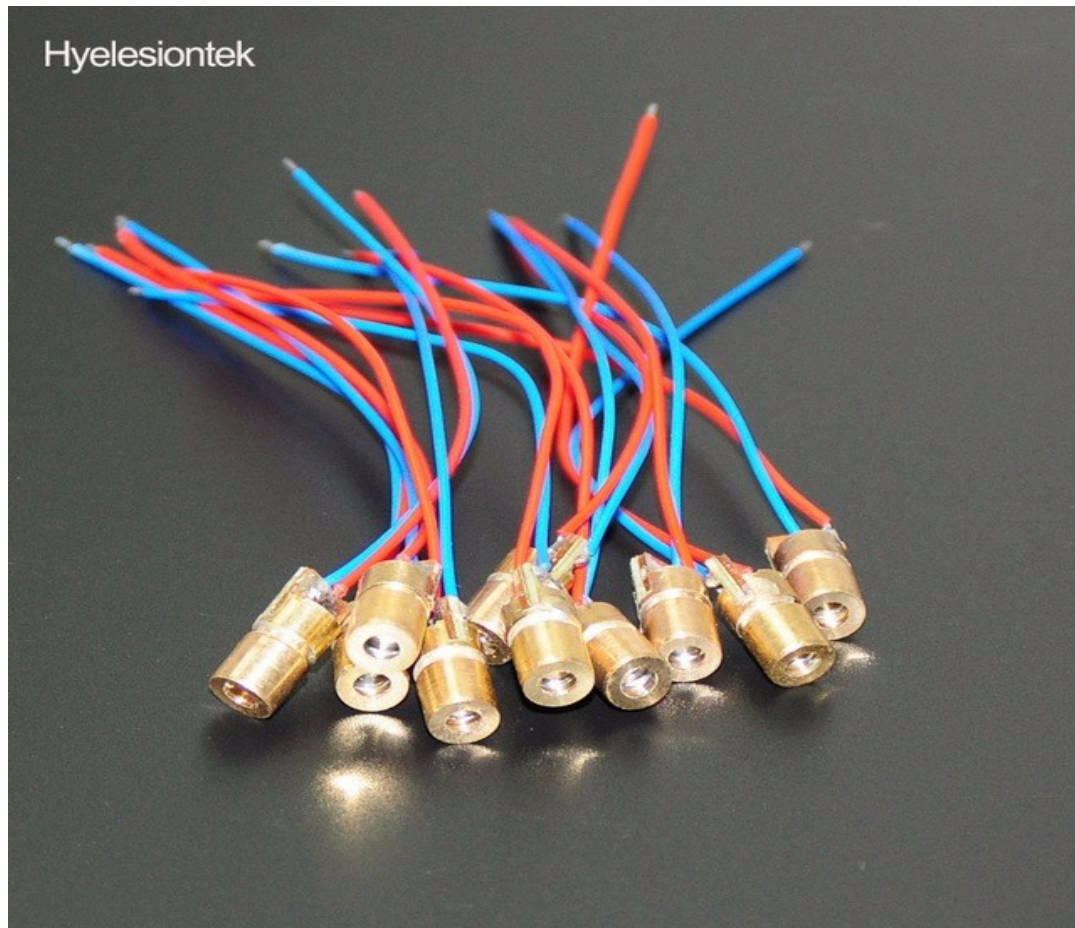
NodeMCU ESP8266 12E:-

NodeMCU is open source platform, their hardware design is open for edit/modify/build. NodeMCU Dev Kit/board consist of ESP8266 Wi-Fi enabled chip. The ESP8266 is a low-cost Wi-Fi chip. NodeMCU Dev Kit has **Arduino like** Analog (i.e. A0) and Digital (D0-D8) pins on its board. It supports serial communication protocols i.e. UART, SPI, I2C etc.



LASER(Light Amplification By Stimulated Emission of Radiation)-

A semiconductor device that generates coherent light of high intensity is known as Laser diode. Stimulated emission is the basis of working of a laser diode. Laser diode is similar to LED, however, different from LED, the PN junction of laser diode produces coherent radiation.



LIGHT DEPENDENT RESISTOR:-

A Light Dependent Resistor (**LDR**) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells.



SOFTWARE PART:-

1. ARDUINO IDE:-

The Arduino integrated development environment (**IDE**) is a cross-platform application (for Windows, MacOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

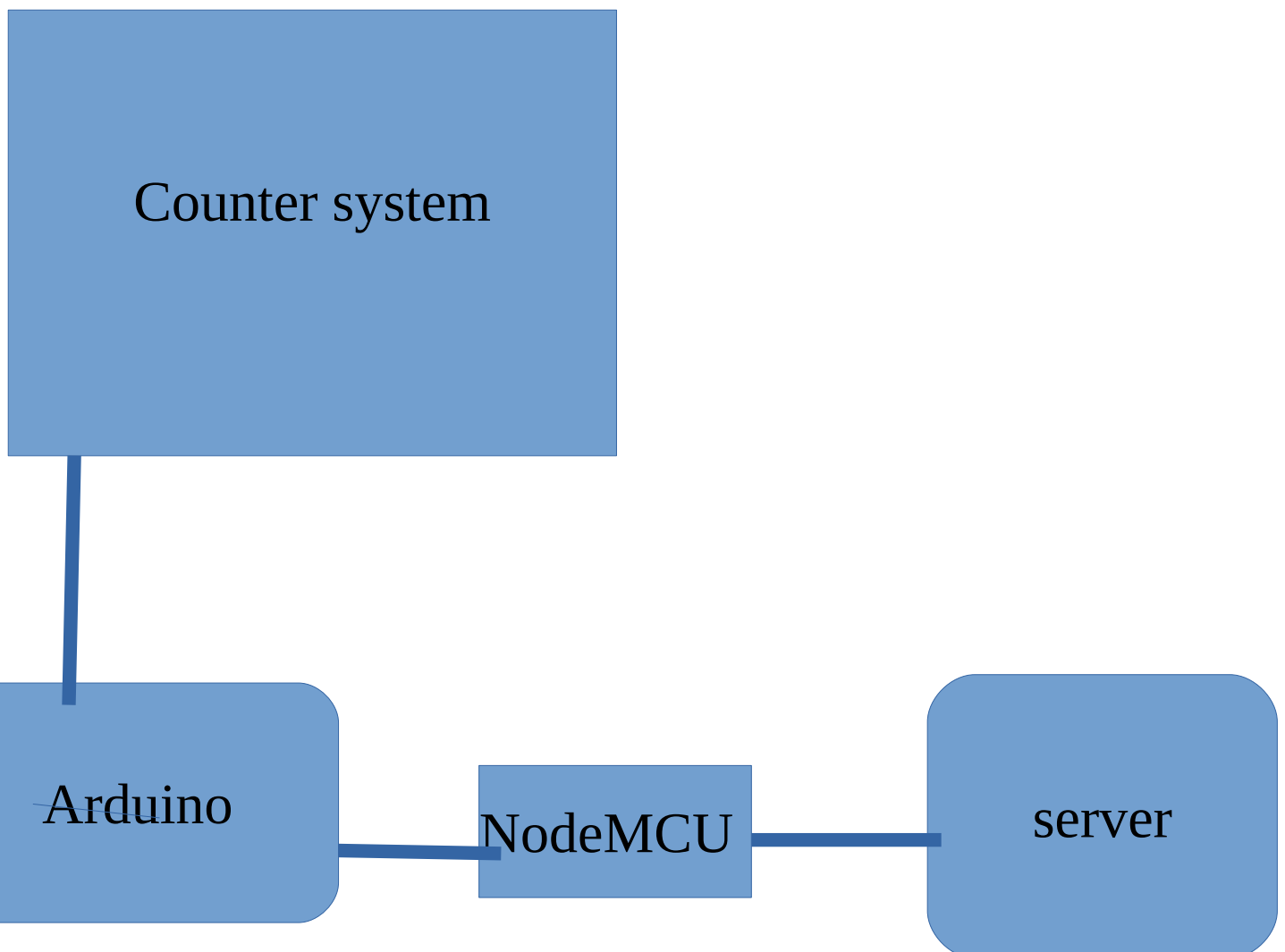
The source code for the IDE is released under the GNU General public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software_library from the wiring project, which provides many common input and output procedures.



2. 000webhost:-

000webhost is one of the very few web host which give you the ability to host your website while paying nothing.

BLOCK DIAGRAM



1. COUNTER SYSTEM :-

In this process we have made two gates. One gate for enter and another gate for exit. But they can also exit from the enter gate and enter from exit gate because the counting will also be correct with this process. In this system we have put up two laser at one gate whose light is falling direct on LDR. If there is any moment between laser light falling on direct LDR circuit count it like a person.

2. Arduino UNO:-

As i told about the arduino in apparatus arduino is an open source hardware and software company, project and user community that designs and manufactures single board microcontrollers and microcontroller kits for building digital devices. Arduino reads analog value of LDR. Then we calculate number of passenger .

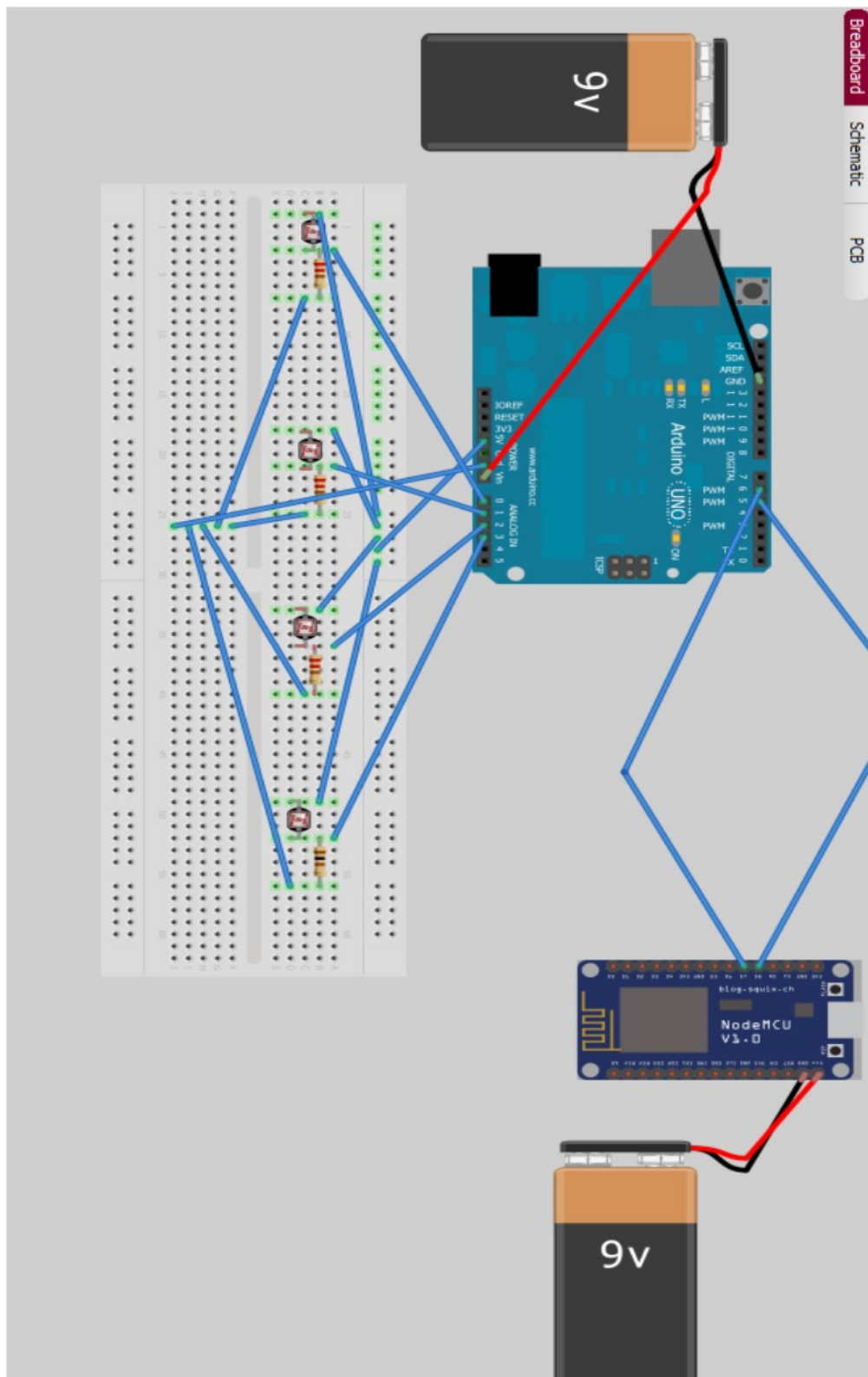
3. NodeMCU ESP8266 :-

NodeMCU use for send all the data from arduino to server at real time and It works on the concept of IOT(Internet Of Things) and there is a UART(Universal Asynchronous Receiver/Transmitter) communication between arduino and NodeMCU. NodeMCU is an open source IoT Platform. It includes firmware which runs on the ESP8266 Wi-Fi system of chip form Espressif system and hardware which is based on the ESP-12 module. NodeMCU is connected to arduino with jumper wire in whatever pin we have to use and then upload program in NodeMCU.

4. Server

Server is a computer that serves many kinds of information to user or client machines. Usually a server will only do a few things for many clients. All the data of passenger counting it will be come to our created database on real time. And we made our database on **000webhost** website it give free web hosting for creating website and database on their server.

Circuit diagram:-



Connection between Arduino and NodeMCU

Arduino	NodeMCU
PIN 4(RX)	D5
PIN7(TX)	D6

Working of code :-

PHP SCRIPT:-

```
<?php
$servername = "localhost";
$username   = "id1k0150321_yash";
$password   = "123456789";
$dbname     = "id10150321_yash";

if($_SERVER["REQUEST_NAME"] == "GET") {

    $api_key = $GWT["api_key"];
    $bus_number = $_GET["bus_number"];
    $no_passengers=$_GET["no_passenger"];
    echo"$api_key";
    echo"$distance";
    // Create connection
    $conn = new mysqli($servername, $username, $password, $dbname);
    // Check connection
    if ($conn->connect_error) {
        die("Connection failed: " . $conn->connect_error);
    }
    $sql = "INSERT INTO data1". "(api_key, bus_number,no_passengers
    "VALUES". "('$api_key','$bus_number','$no._passengers')";
    if ($conn->query($sql) === TRUE) {
        echo "New record created successfully";
```

```

} else {
echo "Error: " . $sql . "<br>" . $conn->error;
}

}

```

?>

Above is php script which runs on server .It made connection with database and insert values in a table.

ARDUINO CODE:-

```

#include <SoftwareSerial.h>
SoftwareSerial s(4,7);

```

For serial communication with computer arduino uses digital pin 0 and 1.The above code snippet declares digital pin4 as RX and 7 as TX which we use for serial communication with NodeMCU ESP8266 with the help of a UART .

```

SoftwareSerial s(D6,D5);

```

Similarly in NodeMCU we declares D6 and D5 as serial pins.

```

int ldr_min_val = 400;
int sensor1= 0;
int sensor2= 0;
int sensor3= 0;
int sensor4= 0;
int step_old= 10;
int steps = 10;
int step_old1= 10;
int steps1 = 10;
int pulse_count1 = 0;
int person_count = 0;
int pulse_count = 0;
int person_count1 = 0;
int total_person = 0;
int ldr1 = A0;
int ldr2 = A1;
int ldr3 = A2;
int ldr4 = A3;
int ldr1_value = 0;
int ldr2_value = 0;
int ldr3_value = 0;
int ldr4_value = 0;

```

These are the set of variables which we are using through out the program for computation

And counting the number of passenger . These variables are declare in arduino. As counting is done by arduino uno.

```
    if(ldr1_value < ldr_min_val)
    {
        sensor1 = 1;
    }
    else{
        sensor1 = 0;
    }
if(ldr2_value < ldr_min_val)
{ sensor2 = 1; }
else{
    sensor2 = 0;
}
    if(ldr3_value < ldr_min_val)
    { sensor3 = 1;
    }else{
        sensor3 = 0;
    }
if(ldr4_value < ldr_min_val)
{ sensor4 = 1;
}
else{
    sensor4 = 0;
}
```

This makes variables LDR1_value, LDR2_value, LDR3_value and LDR4_value 1 when analog value of LDR becomes less than minimum specified by us. Else they have value 0;

```
if(sensor3 == 1 && sensor4 == 1){
    steps1 = 0;
    if(step_old1 == 1){
        pulse_count1-- ;
    }if(step_old1 == 3){
        pulse_count1++;
    }step_old1 = 0;
} if(sensor3 == 0 && sensor4 == 1){
    steps1 = 1;
    if(step_old1 == 2){
        pulse_count1--;}
    if(step_old1 == 0){
        pulse_count1++;
    }step_old1 = 1;
}if(sensor3 == 0 && sensor4 == 0){
    steps1 = 2;
    if(step_old1 == 3){
        pulse_count1--;}
    if(step_old1 == 1){
        pulse_count1++;}
    step_old1 = 2;
}if(sensor3 == 1 && sensor4 == 0){
    steps1 = 3;

    if(step_old1 == 0){
        pulse_count1--;}
    if(step_old1 == 2){
        pulse_count1++;}
    step_old1 = 3;}
```

Above code is algorithm to know whether person is entering in a bus or leaving the bus . Here is some limitation of algorithm it can only work when passenger

enter one by one. If two passenger enter at same time it count as one entry . As bus have two gates passenger can enter or exit from the gates. So we have applied same algorithm to another gate .This algorithm work very efficiently but sometimes it cannot detect passenger when passenger moves very fast.

```
person_count = pulse_count/4;
person_count1 = pulse_count1/4;
total_person = 0 ;
total_person= person_count + person_count1;
```

When person enter in a bus or exit from bus we analysed that it happens in four steps when each step is completed pulse_count increase by one so in one entry pulse_count is increases by four. So we divide pulse_count by four to get number of person enter or exit from bus . Similarly for another gate same setup is made.

```
if(s.available()>0)
{
  s.write(total_person);
  delayMicroseconds(200);
}
```

The above code snippet is for sending data to NodeMCU through UART communication. It check first whether device is connected to serial pins of arduino or not . If yes then it send here device is NodeMCU ESP8266 12e for UART communication.

```
const char* ssid = "CPH1801";
const char* password = "987654321";
```

These are the Wi-Fi credentials we are using . This can be change according to Wi-Fi we are using.

```
const char* host = "realtimepassenger.000webhostapp.com";
```

This is our hosting website.


```

if (s.available()>0)
{
    data=s.read();
    Serial.println(data);
    Serial.print("connecting to ");
    Serial.println(host);
    WiFiClient client;
    const int httpPort = 80;
    if (!client.connect(host, httpPort)) {
        Serial.println("connection failed");
        return;
    }
    String url = "/poist.php?api_key="+ String(api_key)+ "&bus_number="+ String(bus_number)+
        "&no_passengers="+ String(data);
    client.print(String("GET ") + url + " HTTP/1.1\r\n" +
        "Host: " + host + "\r\n" +
        "Connection: close\r\n\r\n");
    delay(500);
}

```

This is a part of NodeMCU program it reads data send by arduino. It makes connection with our hosting website and send data to website. Actually we requesting php page for inserting data to the database which we have created on 000webhost.

RESULT

The Prototype model of “R.T.P.C.S” has been successfully implemented.

which count number of passenger entering or exiting in a bus and data upload on a website database.

Picture of data inserted at database on 000webhost server by NodeMCU.

[illegible]

Future Improvement:-

In ELITE we have made only counter system which count number of passenger in bus. That we upload on our website server. We can improve the counter system further by following ways:-

1) Laser should be pointed on LDR i.e beam produced by it should be more intense and narrow.

2) If we put LDR's in black box so that only laser light hit the LDR. Any other light after reflecting from the box will not hit the LDR or outside environment will not be able to disturb the system.

3) Holes should be more narrow so that only Laser will enter the box. If person come between laser and LDR and analog value of LDR should become less than value specified by us.

4) Efficiency can be more improved by using better microcontroller. We suggest that WEMOS D1 or similar microcontroller is the best choice for our work.

We are not satisfied till the model is not complete for use. The following thing must be in R.T.P.C.S to apply in real world. Following things are:-

1) Keypad through every time conductor enter bus number .

2) GPS module for tracking the bus location.

3) Android application OR website for user to access the service.

CONCLUSION:-

Today world is full of technology. We can see and also use the advanced technology around us. Through this type of technology our lives become easy. We can save our valuable time and use it in doing any other our important work. we can managed a crowd and also keep the valuable data for further reference.

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