Project Report on

Four Pillar Alert System

Submission to THE ROBOTICS CLUB - SNIST as a part of INDUCTION'23

TEAM NO -12

THE ROBOTICS CLUB

Integrating Knowledge...

THE ROBOTICS CLUB-SNIST

SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY

(AUTONOMOUS)

(Affiliated to JNTU University, Hyderabad)

Yamnampet, Ghatkesar, Hyderabad – 501301.

2023

CERTIFICATE

This is the project work titled '**Four Pillar Alert System**' by '**Ananth Jeeth, Vishwa Teja, Harini Siddharth, Pavan Raju**'
under the mentorship of '**P.Aarushraj, K. Bharath Chandra**' and is a record of the project work carried out by them during the year
2022-2023 as part of INDUCTION under the guidance and supervision of

Mr. D P Naga Ajay Kumar
&
Ms. P Tapaswini
Technical Heads

Mr. T Bharat Kumar
The President of
THE ROBOTICS CLUB

Dr. A. PURUSHOTHAM
Faculty Advisor
Mechanical Department

DECLARATION

The project work reported in the present thesis titled **"Four Pillar Alert System',"** is a record of work done by Team-12 in **THE ROBOTICS CLUB** as a part of **INDUCTION-2023.**

No part of the thesis is copied from books/ journals/ Internet and wherever the portion is taken, the same has been duly referred in the text. The report is based on the project work done entirely by TEAM-12 and not copied from any other source.

ACKNOWLEDGMENT

This project report is the outcome of the efforts of many people who have driven our passion to explore into implementation of '**Four Pillar Alert System**'**.** We have received great guidance, encouragement and support from them and have learned a lot because of their willingness to share their knowledge and experience.

We thank our technical heads **Mr. D P Naga Ajay Kumar and Ms. P Tapaswini** for being with us till the end of the project completion.

We thank all the members of the **Steering Body**, **Executive Body, Technical Advisory Board, and Club's Incubation and Competence Committee** of **The Robotics Club** for helping us with crucial parts of the project. We are deeply indebted to **Mr. T Bharat Kumar -** The President, **Mr. N Abinav -** The Vice President, **Mr. Jayanth Siva Madhav** - SAB Chairman and **Mr. S.V. Reddy** - General Secretary **THE ROBOTICS CLUB-SNIST** respectively and also every other person who spared their valuable time without any hesitation whenever we wanted.

We also thank our faculty advisor **Dr. A. Purushotham**, Professor Mechanical Department, who encouraged us during this project by rendering his help when needed.

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ABSTRACT

THE ROBOTICS CLUB – SNIST

INDUCTION’23

TEAM-NO – 12

THE PROBLEM:

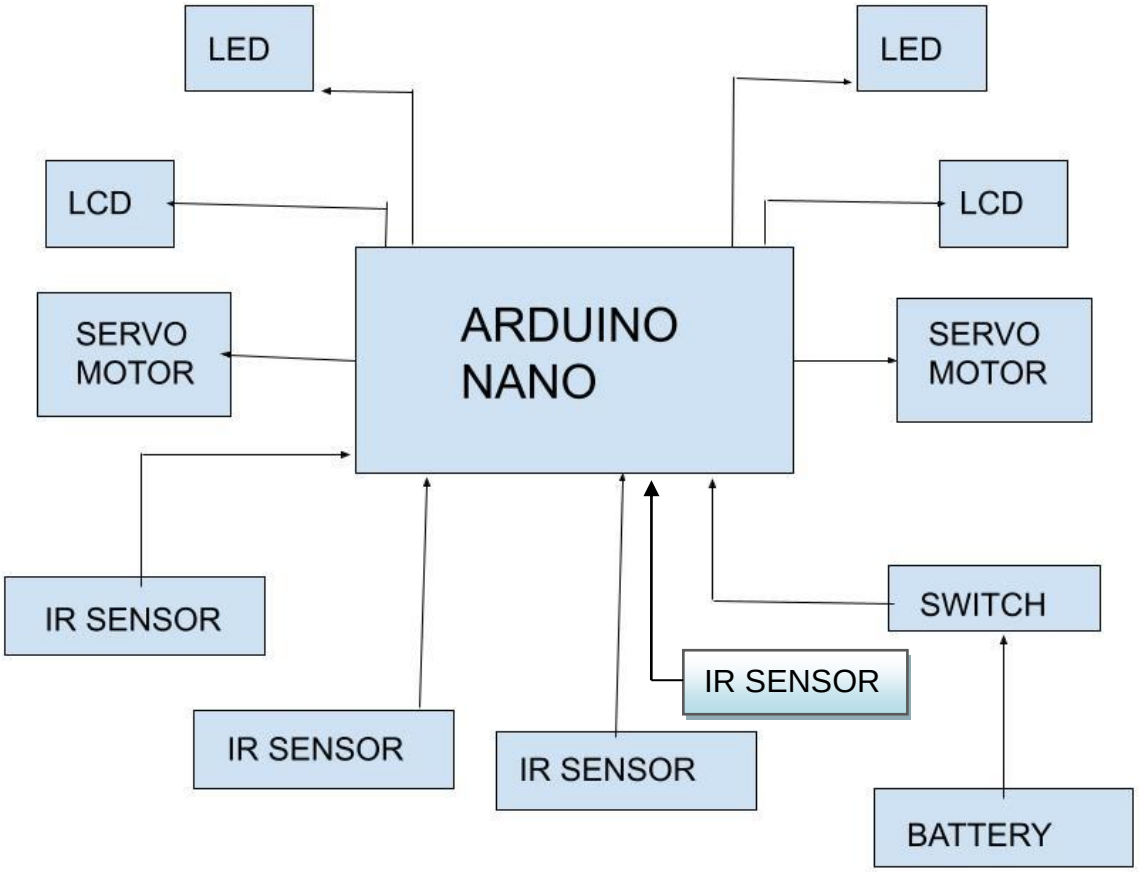
There are many accidents occurring at sharp turns especially at narrow roads for example at ghat roads or hilly areas, Traffic Police intervention, convex mirrors installation, and other techniques, though helpful in these situations but they are not much efficient in preventing accidents. So, if you see there will be only one convex mirror place at the turning but the disadvantage of this convex mirror is until the vehicle come closer to the mirror they can't see other side. The drivers are not alert of the opposite vehicles. It become difficult to manage vehicles in severe and extreme conditions like rainfall, snow, foggy weather and high number of sharp curves and U-turns.

Also at hilly areas due to narrow road it will get difficult for two vehicles to pass in opposite directions so even to reduce this problem we need to develop a system that can manage the flow of vehicles smoothly at narrows roads.

THE TEAMS APPROACH TO THE PROBLEM: -

A four pillar vehicle alert system, this system is helpful to reduce the accidents at Blind curve and hair pin bend roads. When a vehicle is detected at one side of the road Alert signal will be provided and vehicle will be stopped on the other side of the road to prevent road accidents and traffic congestion at blind curve.

BLOCK DIAGRAM:



1. Introduction

Abstract: A four pillar vehicle alert system ,this system is helpful to reduce the accidents at Blind curve and hair pin bend roads.When a vehicle is detected at one side of the road Alert signal will be provided and vehicle will be stopped on the other side of the road to prevent an road accidents and traffic congestion at blind curve.

1.1 Problem Statement: Blind turns, characterized by limited visibility, pose significant risks to drivers, pedestrians, and cyclists. Accidents at blind turns often occur due to the inability to anticipate oncoming vehicles or pedestrians, leading to collisions and potential fatalities. The Smart Road System seeks to tackle this problem by employing advanced technologies and intelligent infrastructure.

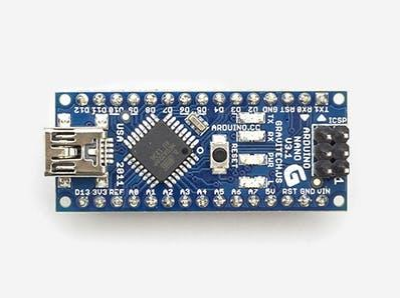
1.2 Introduction:
Blind turns, characterized by limited visibility, pose significant risks to drivers, pedestrians, and cyclists. Accidents at blind turns often occur due to the inability to anticipate oncoming vehicles or pedestrians, leading to collisions and potential fatalities. The Smart Road System seeks to tackle this problem by employing advanced technologies and intelligent infrastructure.

1.3 Literature Survey: We all discussed about the problem statement and putout our own ideas and changes to bring this small-scale project which can be made vast. We saw multiple videos and read many articles about our project.

1. ARCHITECTURE:

2.1 Hardware Used:

1. . Arduino Nano:
Based on the ATmega328P, the Arduino Nano is a compact, complete, and breadboard-friendly board that was introduced in 2008. The Arduino Nano has 30 male I/O headers that are arranged in a DIP-30-like format and can be programmed using the Arduino Software integrated development environment (IDE), which is available both online and offline and is shared by all Arduino boards. The board can be powered by a 9 V battery or a type-B mini-USB connection.



2.LCD Display: This is a basic 16 character by 2 line Al- phanumeric display. Black text on Green background. Utilizes the extremely common HD44780 parallel interface chipset.
Interface code is freely available. You will need Mini- mum 6 general I/O pins to interface to this LCD screen. Includes LED backlight. Works in 4bit and 8 bit Mode.

3. Servo Motor: Micro Servo Motor SG90 is a tiny and lightweight server motor with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos.

4. Jumper wires: These are used to connect the components to the pins of Arduino boardwith the help of connecting pins.

5. IR Sensor: The IR sensor or infrared sensor is one kind of electronic component, used to detect specific characteristics in its surroundings through emitting or detecting IR radiation.

6. LED: A light-emitting diode (LED) is a semiconductor device that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photon**.**

2.2 Software Used:

1.Arduino IDE: -

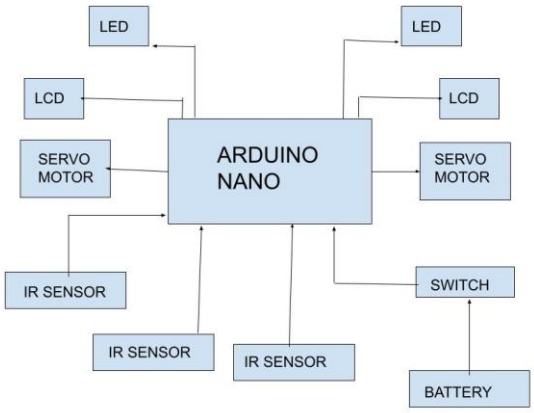
Arduino is an open-source hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices. Its hardware products are licensed under a CC BY-SA license, while software is licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially from the official website or through authorized distributors.

2. Fusion 360:

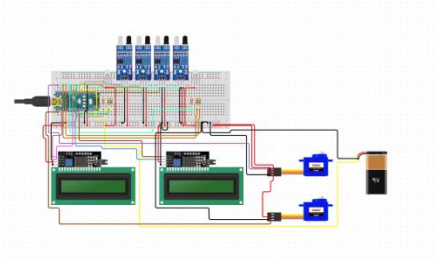
Fusion 360 is a commercial computer-aided design, computer-aided manufacturing, computer-aided engineering, and printed circuit board design software application, developed by Autodesk. It is available for Windows and macOS, with simplified applications available for Android and iOS. Fusion 360 is licensed as a paid subscription, with a free limited home-based, non-commercial personal edition available.

2. Implementation and working:

3.1 BLOCK DIAGRAM:



3.2 CIRCUIT DIAGRAM



3.3 WORKING:

The working of Four piller system (Alert system) is simple. When a vehicle is detected using IR sensor either at downhill or uphill, then a alert signal is displayed on other side of the hill and the gate is closed untill the vehicle is detected on other side. At the same time a RGB led light will blow.

1. **Experimental Results and Conclusions:**

4.1 Future enhancements:

This data can be used for enhanced traffic management, road use, traffic flow on single line tunnels and restricted areas by employing Artificial Intelligence and machine learning tools. This alert system can also be used for challan system. We can also use this project for commercial purposes like traffic control in malls and buildings with multi-storey parking system.

4.2 Source Code:

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#include <Servo.h>
LiquidCrystal_I2C Ulcd(0x26,16,2);
LiquidCrystal_I2C Dlcd(0x27,16,2);
Servo Ugate;
Servo Dgate;
int Uir1=11;
int Uir2=12;
int Dir1=10;
int Dir2=9;
int Uledr=2;
int Uledg=6;
int Dledr=7;
int Dledg=8;
int on=0;
int off=1;
int irvalues[4];
int Uir1v,Uir2v,Dir1v,Dir2v;
void setup() {
  pinMode(Uledr,OUTPUT);
  pinMode(Uledg,OUTPUT);
  pinMode(Dledr,OUTPUT);
  pinMode(Dledg,OUTPUT);

  pinMode(Uir1,INPUT);
  pinMode(Uir2,INPUT);
  pinMode(Dir1,INPUT);
  pinMode(Dir2,INPUT);

  Ugate.attach(5);
  Dgate.attach(3);
  Ugate.write(100);
  Dgate.write(0);

  Ulcd.init();
  Dlcd.init();
  Ulcd.backlight();
  Dlcd.backlight();
  Serial.begin(9600);
}

void loop() {
  int t2=0;
  if(t2==1)
  {
    Dir1=0;
    t2=0;
  }
  ReadIRs();
  int Flag=0;
  int t=0;
  if(Dir1v==1)
  {
    Dlcd.clear();
    Flag=1;
    while(Flag==1)
    {
      CloseUgate();
      OpenDgate();
    digitalWrite(Uledr,on);
    digitalWrite(Uledg,off);
    Ulcd.setCursor(0,0);
    Ulcd.print("Vehicle is");
    Ulcd.setCursor(0,1);
    Ulcd.print("Approaching");
    ReadIRs();
    Flag=2;
    while(Flag==2)
    {
      ReadIRs();
    if(Dir2v==1)
    {
      delay(250);
      CloseDgate();
      Flag=3;
```

```
  }
  }
  while(Flag==3)
  {
   ReadIRs();
  if(Uir2v==1)
  {
   OpenUgate();
   digitalWrite(Uledr,off);
   digitalWrite(Uledg,on);
   Ulcd.clear();
   Flag=4;
   t=1;
  }
  }
  }
  while(t==1)
  {
     ReadIRs();
   if(Uir1v==1)
   {
    t=0;
    Uir1v==0;
    delay(500);
    CloseUgate();
    delay(250);
    break;
   }
  }
}
ReadIRs();
int Flag2=0;
if(Uir1v==1)
{
 Ulcd.clear();
 Flag2=1;
 while(Flag2==1)
 {
  CloseDgate();
  OpenUgate();
 digitalWrite(Dledr,on);
 digitalWrite(Dledg,off);
 Dlcd.setCursor(0,0);
 Dlcd.print("Vehicle is");
 Dlcd.setCursor(0,1);
 Dlcd.print("Approaching");
 ReadIRs();
 Flag2=2;
 while(Flag2==2)
 {
  ReadIRs();
 if(Uir2v==1)
 {
  delay(500);
  CloseUgate();
  Flag2=3;
 }
 }
 while(Flag2==3)
  {
   ReadIRs();
  if(Dir2v==1)
  {
   OpenDgate();
   digitalWrite(Dledr,off);
   digitalWrite(Dledg,on);
   Dlcd.clear();
   Flag2=4;
   t2=1;
  }
  }
 }
 while(t2==1)
  {
     ReadIRs();
   if(Dir1v==1)
   {
    t2=0;
    Dir1v==0;
    delay(500);
    CloseDgate();
    break;
   }
  }
 }
 Ulcd.clear();
 Ulcd.setCursor(0,0);
 Ulcd.print("HYD 150km ^");
 Dlcd.clear();
 Dlcd.setCursor(0,0);
 Dlcd.print("Goa 350km ^");
 }

void ReadIRs()
{
 Uir1v = not(digitalRead(Uir1));
 Uir2v = not(digitalRead(Uir2));
 Dir1v = not(digitalRead(Dir1));
 Dir2v = not(digitalRead(Dir2));
}

void OpenUgate()
{
 Ugate.write(0);
}
void CloseUgate()
{
 Ugate.write(100);
}
void OpenDgate()
{
 Dgate.write(100);
}
void CloseDgate()
{
 Dgate.write(0);

}
```

```
void UlcdAlert()
{
   Ulcd.setCursor(0,0);
   Ulcd.print("Vehicle is");
   Ulcd.setCursor(1,0);
   Ulcd.print("Approaching");
}
```

4.3 Conclusions:

This system will reduce the accident risk in sharp curves. Additionally, It will also help in reducing human intervention on traffic counts, management and helps in decision making.