PHASE 4 - DEVELOPMENT PART 2

PROJECT TITLE: TRAFFIC MANAGEMENT

TITLE OF THE PROJECT: SMART TRAFFIC SYSTEM AND TECHNOLOGY

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Flow of Presentation:

- Current Traffic Light System in India
- Problems Faced
- Components
- Proposed Idea
- Real Life Implementation
- Our Prototype
- Functioning
- Requirement and Objectives of the Project
- Advantages

Current Traffic Light System

The current traffic light system is such that transition time slots of lights are fixed regularly and do not depend on real-time traffic flow.

Problem Faced:

- *Due to fixed time, traffic in lanes with high density keeps on increasing.*
- *Also, if there is not that much traffic any particular lane, then manual switching of signal is required.*
- *No mechanism for assisting Emergency vehicles.*
- *Manual assistance required.*
- *No feedback based system.*

COMPONENTS :

- Arduino Board
- ESP32 Board
- Half Bread Board
- Connecting Wires
- **Sensors:**
- Ultra Sonic Sensor
- PIR Sensor(Motion Sensor)
- Temperature Sensor
- DHT22(Temperature and Humidity) Sensor and Sound Sensor

From Ultra Sonic Sensor:

- This Sensor will Provide the Calculation of Distance from the vehicle .This Sensor also used to calculate the Speed of the Vehicle Ultrasonic sensors can be effectively used in traffic management to monitor and
regulate traffic flow, enhance safety, and improve overall traffic management
efficiency. Here are some key applications and uses of ultrasonic sensors in traffic management:
1. Vehicle Detection and Presence Monitoring: Ultrasonic sensors can be installed at various points on the road to detect the presence of vehicles. This information is valuable for traffic signal control, toll booth management, and automated parking systems.
2. Traffic Density Monitoring: By measuring the distance between vehicles using ultrasonic sensors, traffic density can be accurately assessed. This data helps in adjusting traffic light timings and optimizing traffic flow during peak hours.

3. _Queue Length Detection:_ Ultrasonic sensors can determine the length of queues at traffic lights or toll booths. This information enables traffic light controllers to adjust signal timings and improve traffic flow, reducing congestion.

4. _Speed Measurement:_ Ultrasonic sensors can be used to measure the speed of vehicles on the road. This data can be utilized to enforce speed limits and monitor traffic speed patterns, helping in traffic management and safety enforcement.

5. _Wrong-Way Detection:_ Ultrasonic sensors can detect vehicles traveling in the wrong direction on one-way roads or entry ramps. Immediate alerts can be sent to authorities, enabling prompt action to prevent accidents.

6. _Pedestrian Safety:_ Ultrasonic sensors can be used at crosswalks to detect pedestrians waiting to cross. This information can trigger pedestrian crossing signals and ensure safe passage for pedestrians.

7. _Intelligent Parking Management:_ Ultrasonic sensors can be integrated into parking lots to detect the availability of parking spaces. This data can be shared with drivers through mobile apps, guiding them to open parking spots and reducing traffic caused by vehicles searching for parking.

Test Analysis and simulation :
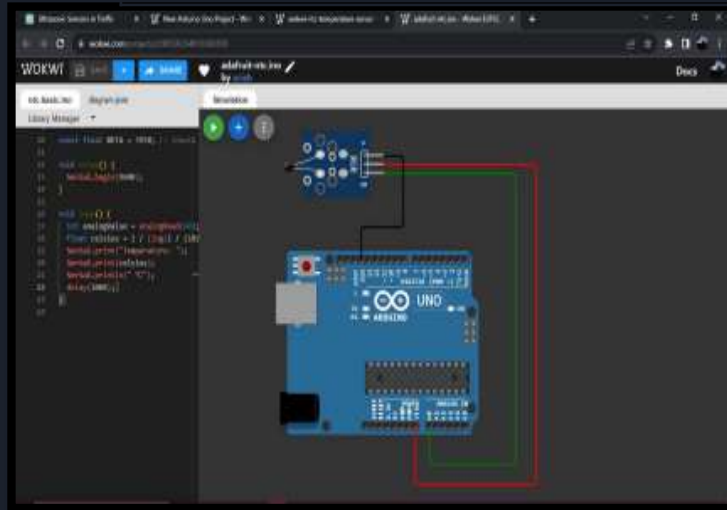
From DHT22(Temperature and Humidity)

From PIR Sensor(Motion Sensor):

Proposed Idea:

Our Smart Traffic Light System leverages technology to improve traffic outcomes by introducing a sensing network, which provides feedback to the existing network, so that it can adapt to the changing traffic density patterns and provide necessary signals to the controller in real-time.

A robust system is able to:

- Collect data from vehicle detector devices at each intersection

- Dynamically adapt traffic signal timing in real time

- Make incremental adjustments to the traffic signal timing based on the changes in traffic flow at each intersection

Real Life Implementation:

The system works on a 3-step model – data collection, data processing, and communication at each intersection point, i.e. traffic light. There are several technical implementation options for each of these functions. This system could work as follows:

1. Video Analysis

2. Image Processing

3. Controller

Our Prototype

We have developed a working model to demonstrate the efficiency of our idea.

In prototype we have used:

- **Ultrasonics Sensors**: To detect the density of traffic in various lanes.
- **RFID Tags**: To detect the Emergency Vehicles.
- **Arduino Mega**: To process the input data and and control the traffic lights.

But in real life, we will be using:

- **Cameras and Image Processing**: To detect the density of traffic and emergency vehicles.
- **Servers**: For high speed image processing and controlling the lights.

Functioning:

1. **Traffic Density Distribution:-** Ultrasonic sensors have been used for detecting traffic density.

2. **Switching of traffic lights:-** If traffic density is high in any lane, system will increase the green light time for that lane. And when the density is not that much the orange light will glow.

3. **Exit of Emergency vehicles:-** We have added a clearance mechanism for emergency vehicles like ambulance and fire engines which basically works on RFID tags. RFID tags are allotted to a emergency vehicles. As soon as the RFID reader detects emergency vehicle, system will display the message on LCD screens to ask people to make way. And the system will also turn on the green light of that lane to make way.

Requirement and Objectives of the Project :

- *The main objective of our Project is to Analysis of the Traffic places and providing the Data of that Traffic Place and Provide easy way for Management.*
- *Materials that mainly used :*
       Arduino Microcontroller, Analog and Digital Sensors, Camera and other basic components.

- *Software Platform: Either TinkerCad or WOKWI*

Advantages:

- We have added a clearance mechanism for emergency vehicles.
- The inefficient traffic light switching in quad-lane system can be rectified with our project.
- Unnecessary man power which was a disadvantage in existing system can be eliminated with this project.
- Traffic lights will switch based on real time Traffic density feedback.

Innovative things to solve the Traffic problems in Our Projects are Listted Below:

➢ *Analysis of the Traffic signal Place parameters and also provide all Data that Required to Manage the Traffic.*

➢ *To Provide the notification to the Traffic Police when Any Vehicles are Run in the Over speed with the time and speed of the Vehicle.*

➢ *Also this send the message with which type of Vehicle like two wheelers or Four wheelers.*

➢ *And this provide communication between others Traffic Places . When an Emergency situation like Ambulance Vehicle this communicate with other signals to clear the traffic before it comes.*

➢ *It contain a sensors like Gas sensors that provide the analysis of the surrounding environmental gas pollution level.*

➢ *All the Data are recorded in the cloud for a particular period of the time. It Provide the Efficiency of the traffic level inn common to open website. This helps the people to know the traffic is free or heavy to travel along that side.*

THANK YOU.....