DENSITY BASED TRAFFIC MANAGEMENT USING IOT

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Abstract -Traffic congestion is a pressing issue in cities worldwide, impacting commuters' time and causing delays. Traditional traffic lights with fixed timings exacerbate the problem. To address this, a microcontroller-based system utilizes IR sensors to detect vehicle presence, adjusting signal timings based on traffic density. By categorizing density as low, medium, or high, the system dynamically controls LED glow durations, prioritizing roads with heavier traffic. An emergency override allows authorities to prioritize emergency vehicles. Signal status is accessible via the Blynk application. This innovation aims to alleviate congestion, with potential for further development.

Key Words: Traffic congestion, IR sensors, Traffic signal control, IoT-based traffic management
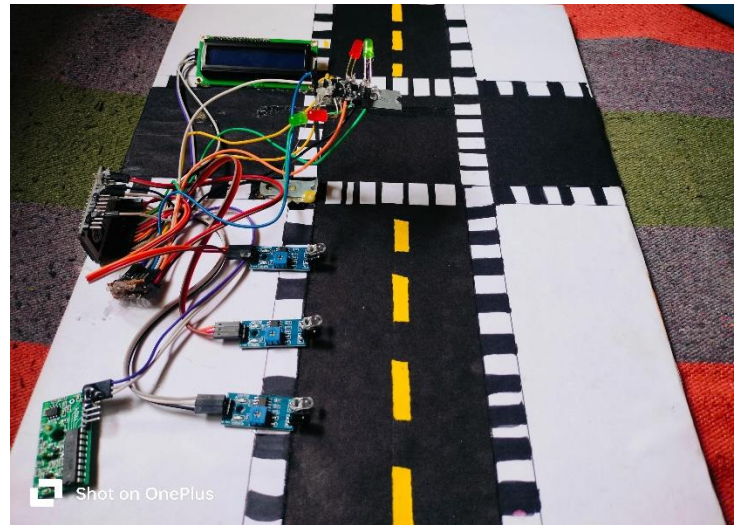
1. INTRODUCTION

In present day world, traffic congestion has become a genuine issue in our daily life. It brings down the productivity of individuals and therefore lots of working hours are wasting at signals. Huge volumes of vehicle will also cause chaotic congestion. It indirectly adds to increase in pollution level, huge volume of natural resources like petrol, diesel is consumed. Therefore, to reduce this we should implement newer schemes by using IR sensors based on automation technique. Even though today's methods are robust and work well when traffic load is distributed evenly across the lane in intersection, unnecessary waiting time in the signal can be avoided by determining which side the green should be showed. This project is designed such that system will work on traffic density and manage signal light based on density using IR sensors. The timing will vary according to density hence improve the light system and reducing the traffic congestion Over recent years, more people have started moving from rural to urban areas for their survival fitness. Increase in population around the globe has led to usage of more vehicles (2,3& 4 wheelers) and this has led to emergency crises in traffic management for supervising the traffic scenarios in both (pedestrian or vehicles). In this regard several studies have been either proposed or implemented towards avoiding traffic congestion on the lane having more number of vehicles. This makes more traffic on the road and with the help of this module we can monitor and automate the traffic signals according to the density of the vehicles on the road.

Fig -1: Project model

2. PROBLEM STATEMENT

Model Traffic congestion is increasing on the road day-by- day. As a result of which, following issues arises. One of the issues is that the vehicles need to wait at the junctions even if there is no traffic on the other side. These problems occur due to fixed control on traffic signal timing. This project will aim to control the traffic according to the density. Emergency service vehicles like ambulance, fire fighting vehicle, police vehicle etc. might have to wait till the signal turns green which can be solved using this system. This system has a built in WIFI module connected to the microcontroller which notifies about the traffic to the users through BLYNK application

3. OBJECTIVES OF THE PROJECT

- ➢ To reduce the traffic.
- ➢ To ensure immediate clearance for emergency vehicle.
- ➢ To reduce the congestion and energy consumption at inter sections.
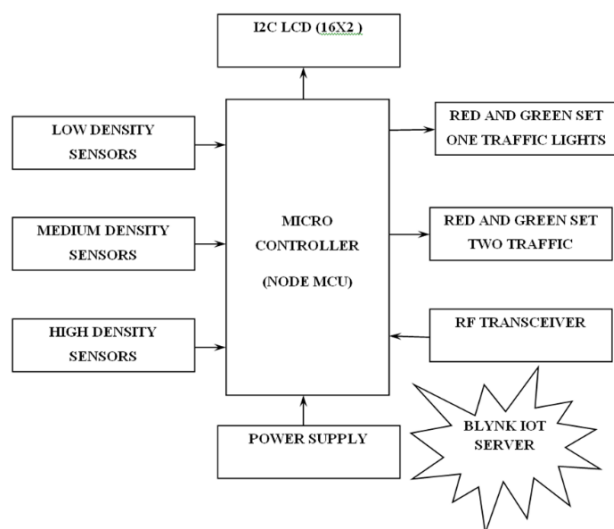- ➢ To update the traffic status to the blynk cloud

Fig 2: Block Diagram

4. OVERVIEW OF THE PROJECT

This project addresses the prevalent issue of traffic congestion through an innovative traffic control system employing IR sensors and IoT technology. The introduction underscores the detrimental effects of congestion on productivity, fuel consumption, and environmental pollution, highlighting the need for dynamic traffic management solutions. Leveraging IR sensors, the system dynamically adjusts traffic signal timings based on real-time traffic density, aiming to alleviate congestion effectively.

The literature survey delves into existing studies such as adaptive traffic control systems and congestion monitoring using RFID and GSM technology, providing valuable insights into traffic management methodologies. These studies inform the project's approach, emphasizing the importance of adaptive systems in mitigating traffic congestion.

The problem statement articulates the urgency of addressing increasing traffic congestion and outlines the project's objectives, including prioritizing emergency vehicle clearance and updating traffic status to the Blynk cloud. By dynamically adjusting signal timings and providing real-time traffic updates, the project aims to enhance traffic flow efficiency and user experience.

The methodology section details the implementation approach, utilizing IoT technology, the Node MCU ESP8266 controller, and various sensors to monitor traffic density and control signals. Through a comprehensive system architecture illustrated in the block diagram, the project aims to optimize traffic management and prioritize emergency vehicle passage, ultimately offering a sustainable solution to urban congestion

3. CONCLUSIONS

Nowadays, traffic congestion is a main problem in major cities since the traffic signal lights are programmed for particular time intervals. However, sometimes the demand for longer green light comes in at the one side of the junction due to huge traffic density. Thus, the traffic signal lights system is enhanced to generate traffic-light signals based on the traffic on roads at that particular instant. The advanced technologies and sensors have given the capability to build smart and intelligent embedded IOT systems to solve human problems and facilitate the life style. Our system is capable of estimating traffic density using IR sensors placed on either side of the roads. Based on it, the time delay for the green light can be increased and we can reduce unnecessary waiting time. The whole system is controlled by node MCU microcontroller. The designed system is implemented, tested to ensure its performance and other design factors. The data is sent to the blynk cloud and emergency vehicles are allowed as the emergency vehicles approach near the signal.

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