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Density Based Traffic Signal Control

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ABSTRACT: -In the present life we need to deal with numerous issues, one being traffic congestion and it's turning out to be more serious these days. Regular traffic system management often lacks legitimate oversight and requires processing at intersections. Not only does this cause mental stress to passengers, but it also wastes a lot of fuel due to delays at intersections. This involves the progress of a system to handle traffic smartly by automatically correcting its timing based on traffic density using the Arduino Nano AT-Mega 328 Microcontroller. Traffic with digital IR sensors makes sense, and IR sensors continue to distinguish the vehicle based on the mirrored signal. Consequently, sensors placed along with the road control road traffic density by changing traffic lights. All IR sensors are connected to the Arduino Uno and read data from the IR sensor. The system traffic lights are designed with LEDs, and each signal consists of two LEDs per lane. With this system development at the transportation hub, you don't have to worry about manually handing over traffic and it takes less time than traditional transportation systems. We use solar energy from solar panels to prototype a working model of a smart traffic light that automatically adjusts timing based on the direction of traffic.

KEYWORDS: -Traffic Light system, Infrared Sensor, Arduino Nano AT-mega 328 microcontroller, Light Emitting Diodes, ThingSpeak Web Server.

I.INTRODUCTION

In the current scenario, the problem of traffic congestion is getting worse every day. As the population remains to grow, so will the number of vehicles. Various problems are occurring due to underdeveloped infrastructure and insufficient decentralization of development. Especially in developing countries, intelligent traffic lights are needed to reduce traffic delays and travel times. Current transportation systems are either handled manually or use fixed timing systems. Thus, you need an intelligent, fast, and robust traffic managing system. In a lane at an intersection with an additional vehicle, the traffic lights on the other side will be green and red until there is no traffic in that lane. This contributes to the smooth flow of traffic and improves the comfort and driving safety of travelers. Our Project aims at reducing traffic congestion and unwanted longtime delay during the traffic light switchovers especially when the traffic is very low. It is designed to be implemented in places nearing the junctions where the traffic signals are placed, in the order to reduce the congestion in these junctions. It keeps a track of the vehicles on each road and therefore adjusts the time for each traffic light signal. The higher the number of vehicles on the road the lengthier will be the time delay allotted for that conforming traffic light signal.

Systems that need to combine existing technology with artificial intelligence to save time and complexity need to think about themselves. In this newly developed project, you can switch the traffic light from red to green depending on the traffic density. This white paper describes developing and implementing a sensor-based traffic light system with dynamic control. This reduces the average drive time (ATWT). It consistsof an IR sensor, a low-power embedded controller, a comparator, and a storage device.

This study uses professional systems, one of the areas of artificial intelligence (AI). IT & # 41; You Can & # 40; RBS & # 41; As a rule-based system. Researchers have designed a new expert system called thetraffic light expert system "TLES". TLES uses a rule base as a data description and clarification as an inference engine. Thesystem can allocate the appropriate dynamic cycle time at intersections. The system works in conjunction with the hardware design to control traffic lights and use Arduino and infrared (IR) radiation sensors to monitor intersection congestion.

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II. LITERATURE SURVEY

In [1] order to reduce the time and complexity, a system has to combine the existing technology with artificial intelligence to think itself. This newly developed project will enable the traffic light to switch from red to green based on traffic density. This paper is concerned with the development and implementation of a Sensor-based Traffic Light System with Dynamic Control which in turn reduces the Average Trip Waiting Time (ATWT). It consists of IR sensors, Low Power embedded controllers, comparators, and storage devices.

In [2] the project aims to provide an automated IR sense-based solution with dynamically changing signals (red/amber/green). This white paper implements a "proof-of-concept" linking project that consists of a signal, an IR sensor, a WiFi transmitter, and a Raspberry Pi microcontroller. The data captured by the IR sensor is sent by the WiFi transmitter, which is received by the Raspberry Pi controller. Based on this compilation, the time of the red light is dynamically shifted so that the user can see the status of the signal on the go. The Raspberry Pi controller acts as the central console and determines which side of the road traffic lights to is open or closed. The central console gathers all the data from sensors and stores it in the cloud which intimates traffic status to a mobile device.

In [3] this project plan to provide an automated IR-sense-based solution that makes traffic signals shift the lights (red/yellow/green) dynamically. We plan on implementing the project for one junction “Proof-of-Concept” for this paper, which includes traffic lights, IR sensors, a Wi-Fi transmitter, and a Raspberry Pi microcontroller. The sensed data gathered from the IR sensor is transmitted by the Wi-Fi transmitter which is received by the raspberry-pi controller. Based on this compilation it dynamically shifts the time of the red signal and the user gets an intimation of status of the signal on his way. The Raspberry Pi controller works as a central console, it determines which sideways of the road signal is to get open or close. The central console gathers all the data from sensors and stores it in the cloud which intimates traffic status to a mobile device.

III.PROPOSED METHODOLOGY

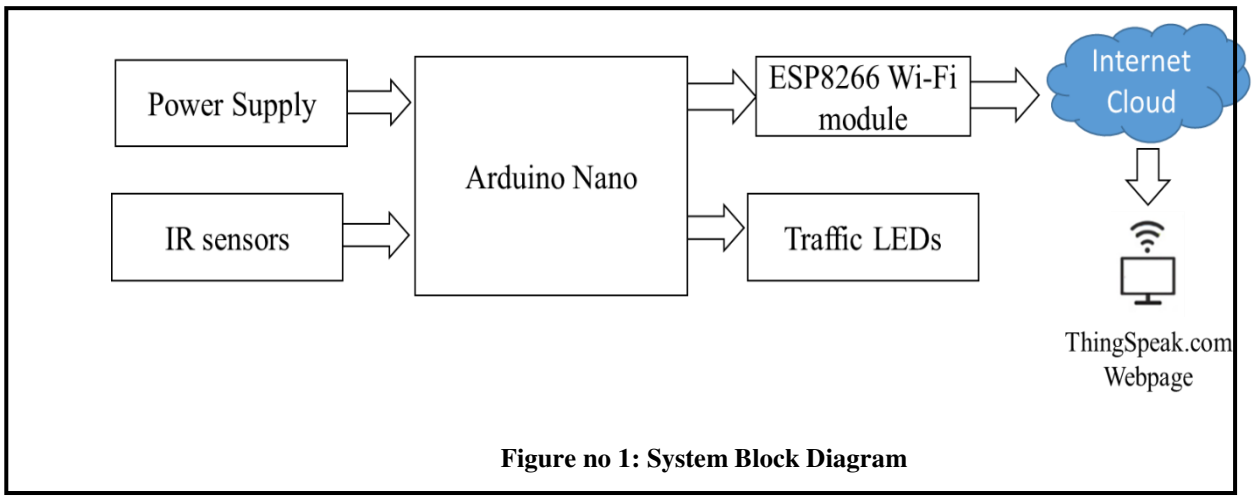

Figure no 1: System Block Diagram

The smart traffic control system is meant to manage the traffic signals based on the traffic density of the lane. It's designed to sense traffic and manage the traffic based on density by operating the traffic signals appropriately. The traffic is sensed using digital IR sensors. The IR sensors detect vehicles based on the light reflected from them. They are placed adjacent to the road and facing the lane so that they can detect the traffic. Also, we will place them at a significant distance from the junction such that they detect stagnant traffic only after a threshold is reached

• Our project aims at reducing traffic congestion and unwanted longtime delay during the traffic light switch-overs especially when the traffic is very low.

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• In order to alleviate traffic congestion at intersections, we plan to implement it near intersections with traffic lights.

•Track vehicles on each street and adjust the time for each signal accordingly.

• The more vehicles on the road, the longer the time delay of the corresponding traffic light.

IV. FLOWCHART

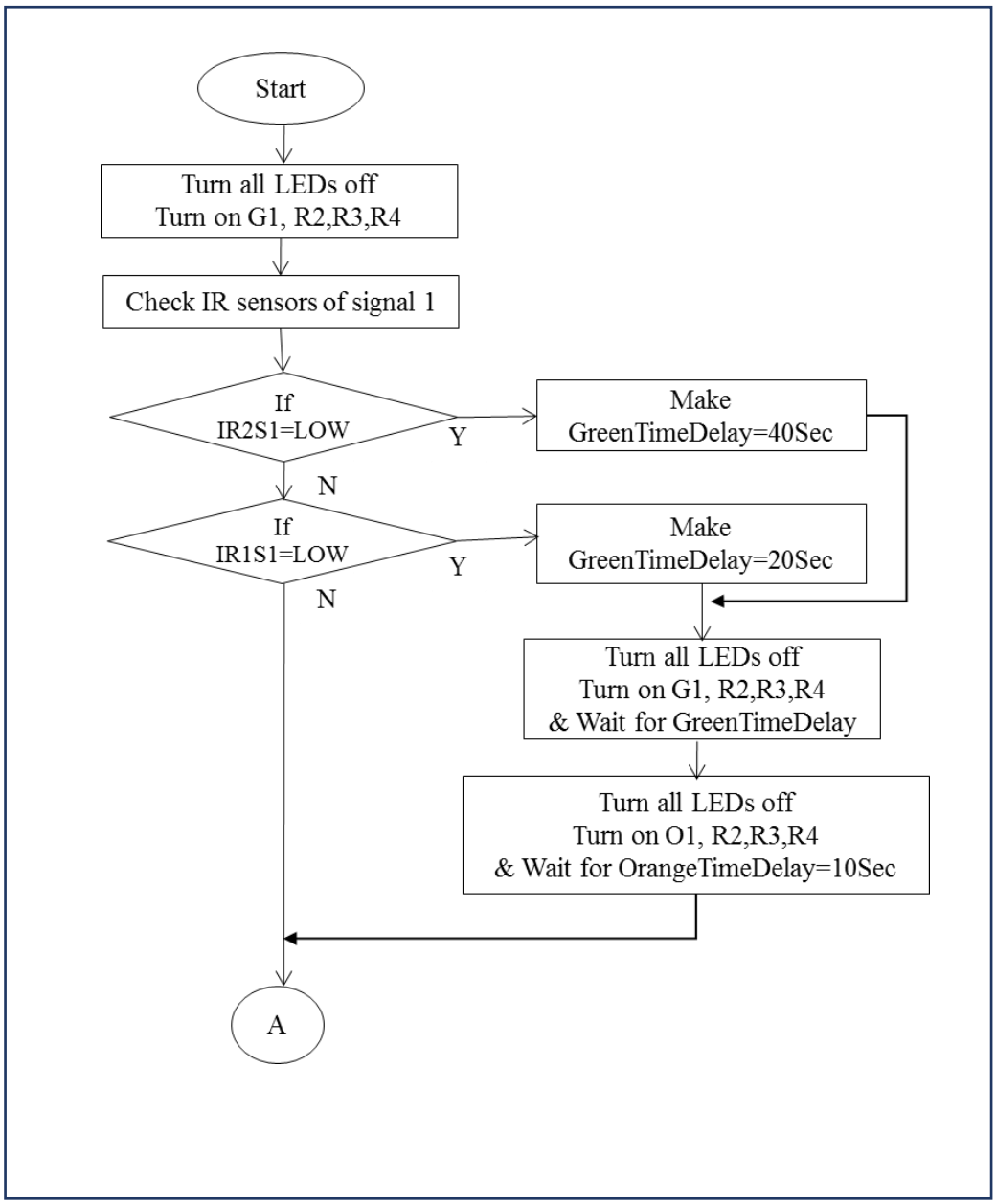

Figure no2: Arduino Programming Flowchart

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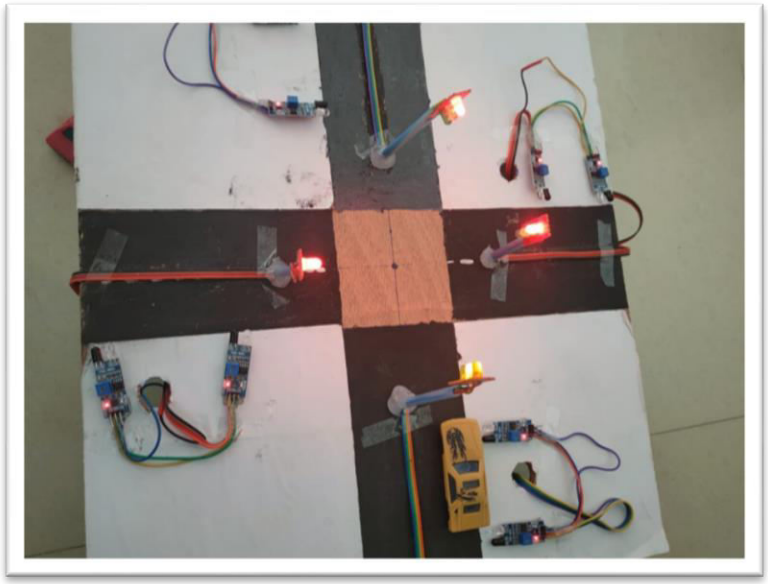
V. RESULT AND DISCUSSIONS

1. Reduce the waiting time at a traffic signal.
2. Reduce the traffic with better time management.
3. Show the traffic status on the webpage so that traffic police can route the traffic in the best possible route.
4. System should make automatic control possible 24 x 7.



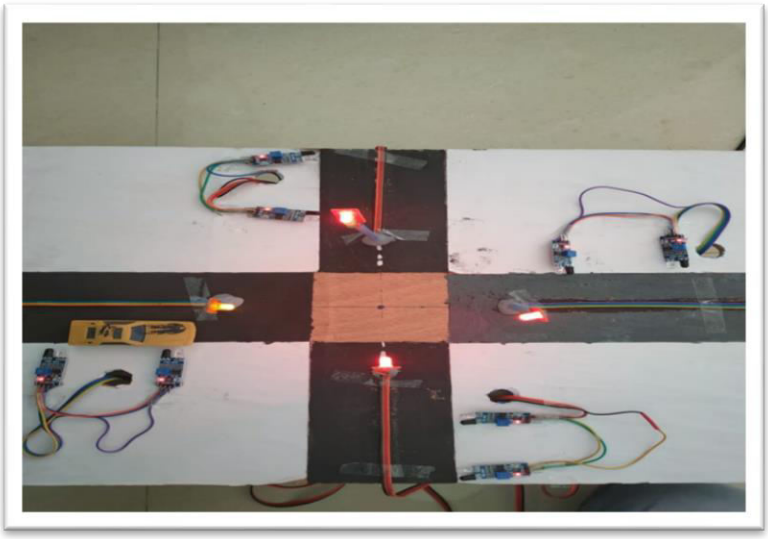


Figure no 3:Traffic Signal Module

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VI. CONCLUSION AND FUTURE SCOPE

Conclusion: -

With 384 traffic accidents occurring every day in India, there is an urgent need for an effective traffic control system in India. To reduce this crowding and unwanted time delay in traffic a state-of-the-art system is designed here in this project. With field application of this technology, the annoying confusion of traffic can be effectively directed by allocating the time slots based on the merit of the vehicle load in confident lanes of multi-junction crossing. We have successfully implemented the sample at a research laboratory scale with outstanding results. The next step forward is to implement this schema in real-life scenarios for first-hand results, before implementing it on the largest scale. We believe that this may bring a groundbreaking change in traffic management system on its application in the actual field environment.

Future Scope: -

As the world's population continues to grow, managing the transportation system for the next generation is a major challenge. Many improvements are expected in the future.To manage a traditional transportation system, you need to consider how to control thesystem intelligently and automatically.As the population grows, so does the number of vehicles. To control a large number of vehicles, you need to adopt intelligent methods. You can use an image sensor or imager for future purposes. It works by creating a street image. Create an image by converting the variable attenuation of light into a signal that conveys the image. Imagers used both digital and analog electronic devices

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