Journal of Science Technology and Research (JSTAR)

Modern Automated System for Traffic Signals

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Abstract:

This work has been designed to develop an a dynamic road signal based on an emergency with density. The sync signal automatically switches to detecting traffic density at the intersection. Traffic congestion is a serious problem in many large cities around the world and has become a nightmare for travelers in these cities. The conventional traffic light system is based on the concept of fixed time assigned to each side of the join that cannot be varied by varying traffic density. The tie times assigned are fixed. But in an emergency, emergency timings change according to the distance and depth of the traffic. At the time the emergency vehicle is read by the receiver it will execute the management of the traffic light. These projects are infrared proximity sensors in the sightline configuration through the load to detect the traffic light density. The vehicle density is measured in several sectors based on the times assigned as a result. Every crossing of the emergency vehicle logs the data's to the cloud. This log signal would help with the destination acknowledgment. This synchronization will greatly reduce traffic jam.

Key words: RFID sensor, Infrared Sensors, Arduino IDE, Node MCU

INTRODUCTION

In the current scenario, the matter is increasing and congestion of vehicle traffic may be a significant issue in many modern cities everywhere on the planet. To overcome the matter, we've created a singular idea for one dynamic light and expert automatic control combined with a simulation model. Traffic Search aims to optimize the flow of traffic, as the roads are overloaded. The number of vehicles and resources is limited.

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However, there are still some limitations in the existing control. Several models provide solutions. In our research, we focused on the semaphore optimization controller during a city using a wireless sensor. Traffic signal optimization is a big problem. Even for simple attachment optimal solution. The problem becomes even more complex with multiple connections, as a lightweight state is liable for traffic flow only on this road. Another complication is that the traffic density fluctuates frequently depending on the time of the day, the day of the week, and the time of the year.

IMPLEMENTATION

This project is implemented by placing IR transmitters, receivers, microcontrollers, and

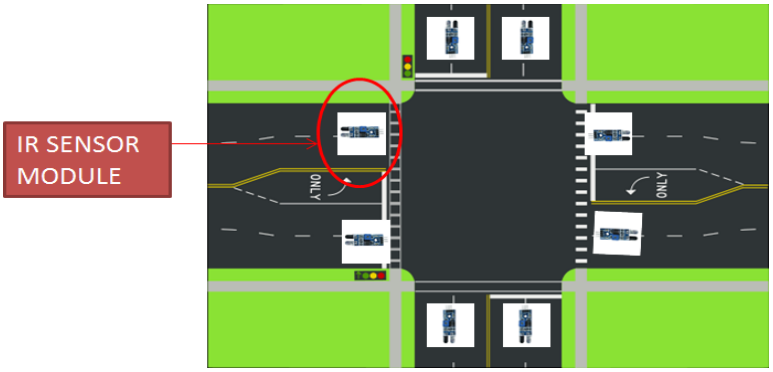

Fig. 1.LED's at a 4-way junction

Figure 1 The RFID sensor monitors the traffic emergency vehicle at the four lanes of the intersection as shown in fig(ii).

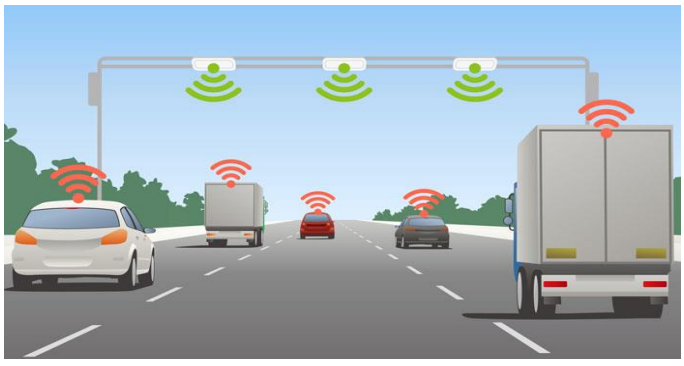

Figure 2 The microcontroller reads the voltage output of the IR sensor and sets the corresponding delay time for the traffic signal at that lane.

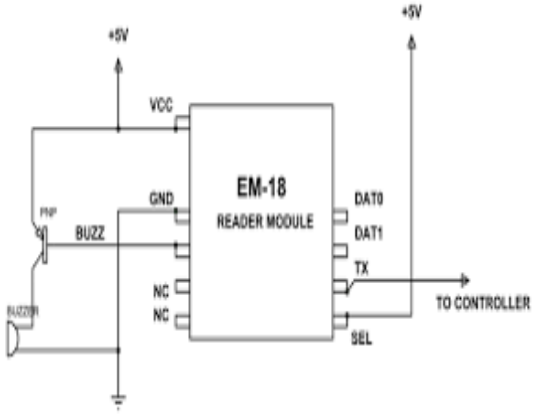

Figure 3 COMPONENTS USED

Infrared Sensors

A. IR transmitter IR emits IR radiation (infrared). This is received by the photodiode, which acts as an IR receiver at the receiving end. Because IR radiation is invisible to the human eye it's perfect for wireless communication. A common modulation scheme for IR communication is 38kHz modulation. Few natural sources emit a 38kHz signal, so an IR transmitter that sends data at that frequency would stand out between the environment.

B. Modular data 38kHz IR are the foremost common, but other frequencies are often used. An IR sensor is shown in Fig(iv).

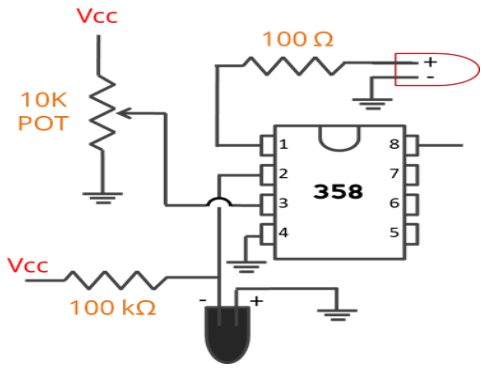

Fig.4 IR Sensors

The advantages of using IR sensors are

- Infrared sensors can detect infrared light from large distances over a wide area
- No interference with electrical devices
- Infrared technology is simple and extremely cheap
- The shield is simple
- No licenses are required

RFID

Radiofrequency identification (**RFID**) is **used** to gather information about the violation of drivers. The **RFID** tag is embedded with two components, first one is computer vision mainly **used** to recognize and identify the **traffic** sign for the whole day.

"Bulk reading" may be a strategy for interrogating multiple tags at an equivalent time, but lacks sufficient precision for internal control. A group of objects, all of the RFID tagged, are read completely from one single reader position on just one occasion. Bulk reading could also be a possible use of HF (ISO 18000-3), UHF (ISO 18000-6), and SHF (ISO 18000-4) RFID tags. However, as tags respond strictly sequentially, the time needed for bulk reading grows linearly with the number of labels to be read.

Arduino IDE

"One" means one in Italian and was chosen to celebrate the launch of Arduino Software (IDE) 1.0. A plate and version 1.0 of Arduino Software (IDE) were the Arduino reference versions, now evolved to newer versions . Atlantis is the first of a series of Arduino USB plates and the reference model for the Arduino platform.

ATmega8

The high-performance, low-power Microchip 8-bit AVR® RISC-based microcontroller combines 8 KB ISP Flash memory with read-while-write capabilities, 512B EEPROM, 1 KB SRAM, 23 general-purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable

The pin Structure of Atmega8 is shown in fig.5

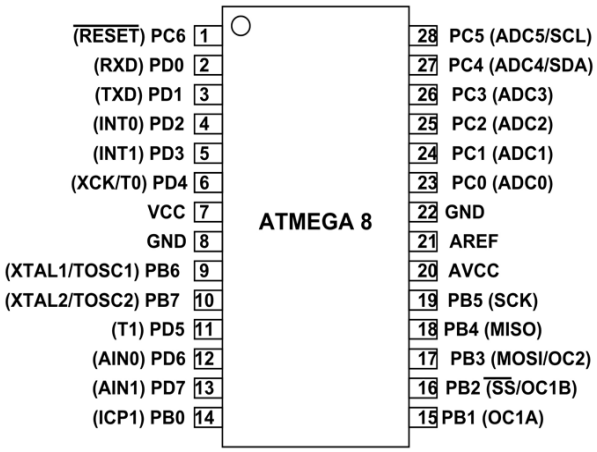

Fig.5 The pin Structure of Atmega8 is shown

USART, a byte-oriented Two-Wire serial interface, 6-channel 10-bit A/D converter (8-channel in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, SPI serial port, and five software selectable power saving modes. device operates between 2.7-5.5 volts.By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching one MIPS per MHz, balancing power consumption and processing speed.

WORKING METHODOLOGY

Usually, the traffic system will be a normal traffic system with normal timings. But when the emergency occurs the emergency vehicle trying to communicate with the traffic RFID reader for the confirmation of the emergency. IF the traffic signal would be green then it works as it's Common behavior. But if it is red light then it will start the management system with the traffic timing and start calculating the density. After reading the emergency signal only all the IR sensor's start calculating the density and increase the timing for the already Standing vehicles to move. So, the emergency vehicle can clear the traffic without intersections. Every time an emergency vehicle crosses the traffic light it will log the reference of the place. Here we using the cloud for all the references of emergency vehicle positions. Using that value we can calculate the traffic-free paths and navigate the emergency vehicle to the destination in the fastest manner. Make use of the current location of this emergency vehicle we can give acknowledgment to the destination place and alert the place with the timing.

BLOCK DIAGRAM

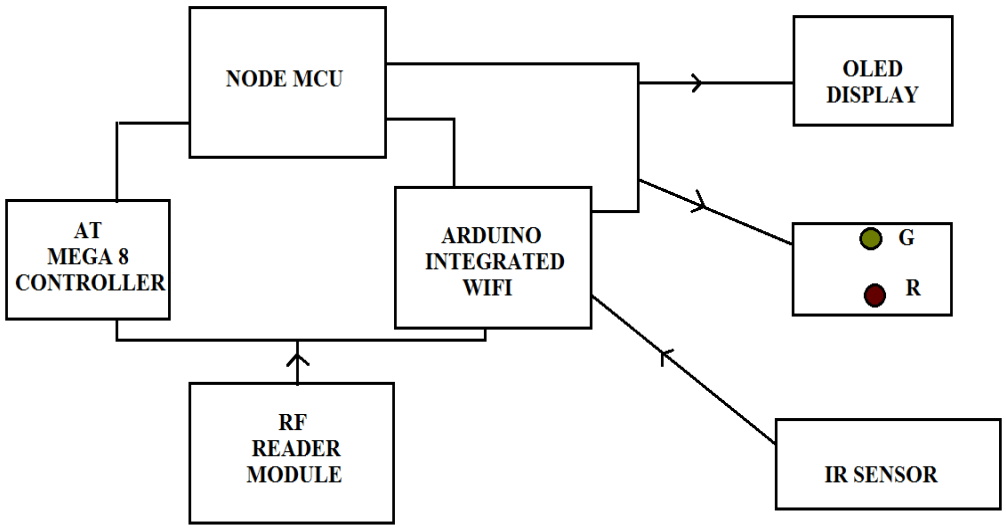

Fig.6 The Block Diagram for Proposed System

SIMULATION TIMINGS

For the adjustment of the timing we are using calculations every time an emergency occurs:

CALCULATIONS:

- Timing Changes dynamically every lane
- RFID gives the signal for the lane details.
- IR sensor gives density and gives extra time for the vehicle to move.
- LCD will show the timings.

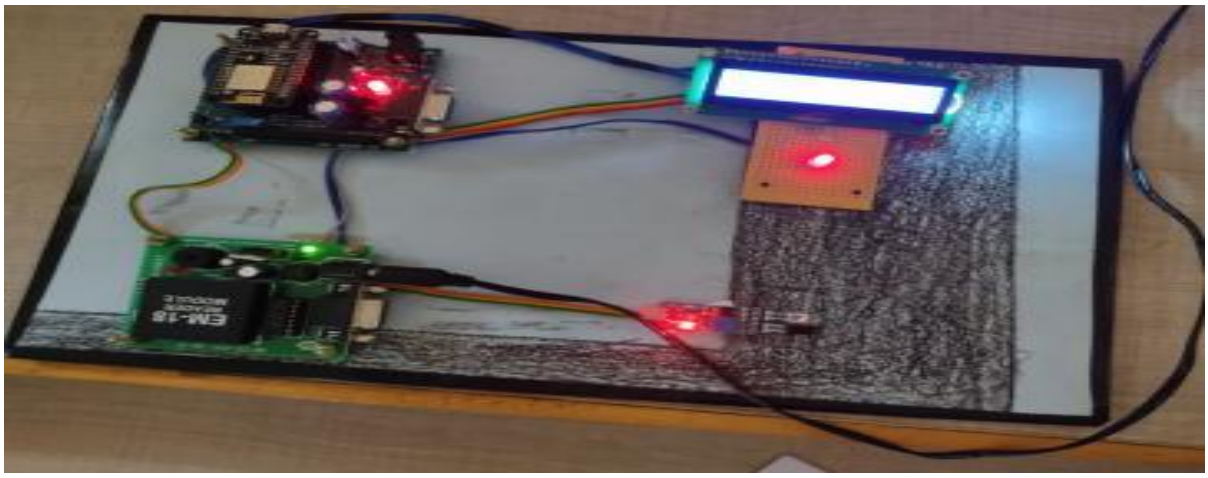

Fig .7 Screenshots from the simulation

ADVANTAGES AND DISADVANTAGES

Advantages

- For faster traffic transfer at crossroads
- Reducing travel times
- Greater efficiency
- Fuel-saving
- Save people time
- Reduction of injuries.

Disadvantages

- Sometimes IR sensors can also absorb normal light. As a result, the traffic system

works incorrectly.

- Infrared sensors work only for lower distances
- We need to accurately fix IR sensors, otherwise, they will not be able to detect traffic density.
- If the image processing is performed, the output would be more accurate but would become more complex
- The infrared sensor may output erroneously, dust particles are recorded at a receiver signal transmitter

CONCLUSION:

By this work we can achieve the traffic system with emergency management. Every emergency situation we can reach the destination in most efficient way of navigation without making many waiting time to other vehicles. Creates the efficient lane timing according to the depth and not bothering other peoples. This managemant definitely will save time and energy and giving more important to the people who are in a high emergency.

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