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AMBULANCE AWARE EFFICIENT TRAFFIC MANAGEMENT SYSTEM USING IOT

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ABSTRACT: As the population grows and the number of cars on the road decreases, it is reasonable to expect that the number of site visitors will increase, making manual control more difficult. Site visitors' police officers will benefit from this project, which is aimed at creating a cloud-based interface between motors so that traffic may be tracked automatically. The regulation of traffic lights on the road crossing has to be done on basis of traffic congestion and it is measured through the ultrasonic sensors. At road crossing four routes are making junction and on each route three sensors are connected to measure three levels of congestion i-e low, medium and high. Different technologies are there to detect traffic congestion and making congestion management more efficient. But these technologies have several drawbacks. RFID is easier, efficient and inexpensive congestion detection technology. Using RFID, we emerge new technique called as “Controller Based Intelligent Traffic Control System”. This uses sensors along with embedded technology. It has facility to control timings of the red and green lights based on the traffic, pass the emergency vehicles such as ambulance, fire brigade etc.

Keywords: Radio Frequency Identification, Internet of Things, Emergency Vehicles, Ambulance.

1.0 INTRODUCTION:

Nowadays especially in urban areas traffic system is not efficient. The traditional traffic system has the drawbacks: - heavy traffic jam, even though no traffic in road vehicles have to wait, emergency car stuck in jam, lack of traffic information to users. To provide efficient traffic system we have to manipulate the traffic light dynamically based on real time traffic size, also we have to provide some mechanism to provide passage for priority vehicles so that they didn’t stuck in the traffic. Also it needs some mechanism to help people to get information about traffic in specific areas if they wish. And also some mechanisms to take actions against rule breakers, such as fine deduction. Today the metropolis has a hard time dealing with the traffic. The traffic in the metropolis forces the ambulances to stop now and then. Also, the traffic signal creates a situation where the ambulance would not be able to pass as the traffic ahead of it is blocked by a traffic signal. This poses a great threat to the Ambulance as every second is vital to the healthy state of the patient. One of the effective ways to clear out

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Vol 12, Issue.1 March 2024

the traffic ahead of the ambulance is by turning the signal green. The signal can be turned green by requesting the traffic signal controller or the cloud. However, this is a very time-consuming process. This won't also be effective as the traffic signal controller won't be able to track the live location These demerits can be handled effectively if the process is automated with the ability to live track the ambulance.

2.0 LITERATURE SURVEY:

Since inefficient traffic system results in great economic loss in terms of fuel time and money, sometime it results in loss of someone's life. So a lot of works are done to solve these problems. In 2009 IEEE published an intelligent traffic control system using RFID it tracks the vehicle through the RFID tag attached to the vehicle and retrieves its electronic product code (EPC) data. The volume of traffic is calculated according to type of vehicle, priority of vehicle and path and time. The decision making section (DMS) contains a decision making algorithm that determines how the traffic lights are operated. In 2012 a research was done by shilpa s. chavan (walke), dr. r. s. deshpande, j. g. rana in design of intelligent traffic light controller using embedded system. It uses sensor network along with embedded technology. Thus traffic light switching increases road capacity and traffic flow, and can prevent traffic congestions. Additionally a GSM cell phone interface is also provided for users those who wish to obtain the latest position of traffic on congested road. In 2013 IEEE published a paper on DTC: a framework to detect traffic congestion by mining versatile GPS data which consist of the mining of GPS data to help in detection of the locations which face frequent traffic congestion will help the users in deciding whether or not to opt for that route. In 2014 another research done by p. Lakshmi Pallavi, et al as intelligent traffic control system using embedded web technology. The emerging embedded web server technology to design a web-based traffic management system that can remotely control and monitor the traffic at various road intersections simultaneously.

3.0 PROPOSED METHOD:

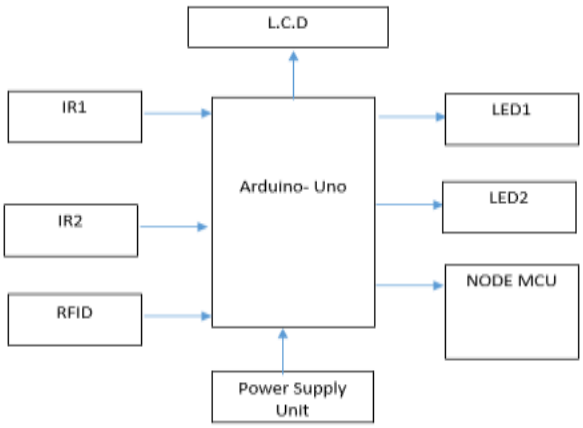

Fig1: Proposed block diagram

ARDUINO-UNO:

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programed (referred to as a microcontroller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.

Arduino provides a standard form factor that breaks the functions of the micro-controller into a more accessible package

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(Integrated Development Environment), which is used to write and upload the computer code to the physical board.

Fig 2: Arduino Uno

LIQUID CRYSTAL DISPLAY:

Most of the LCD Displays available in the market are 16X2 (That means, the LCD displays are capable of displaying 2 lines each having 16 Characters a), 20X4 LCD Displays (4 lines, 20 characters). It has 14 pins. It uses 8lines for parallel data plus 3 control signals, 2 connections to power, one more for contrast adjustment and two connections for LED back light.

Data/Signals/Execution of LCD

Now that was all about the signals and the hardware. Let us come to data, signals and execution.

LCD accepts two types of signals, one is data, and another is control. These signals are recognized by the LCD module from status of the RS pin. Now data can be read also from the LCD display, by pulling the R/W pin high. As soon as the E pin is pulsed, LCD display reads data at the falling edge of the pulse and executes it, same for the case of transmission.

LCD display takes a time of 39-43µS to place a character or execute a command. Except for clearing display and to seek cursor to home position it takes 1.53ms to 1.64ms. Any attempt to send any data before this interval may lead to failure to read data or execution of the current data in some devices. Some devices compensate the speed by storing the incoming data to some temporary registers. LCD displays have two RAMs, naming DDRAM and CGRAM. DDRAM registers in which position which character in the ASCII chart would be displayed. Each byte of DDRAM represents each unique position on the LCD display. The LCD controller reads the information from the DDRAM and displays it on the LCD screen. CGRAM allows user to define their custom characters. For that purpose, address space for first 16 ASCII characters are reserved for users. After CGRAM has been setup to display characters, user can easily display their custom characters on the LCD screen.

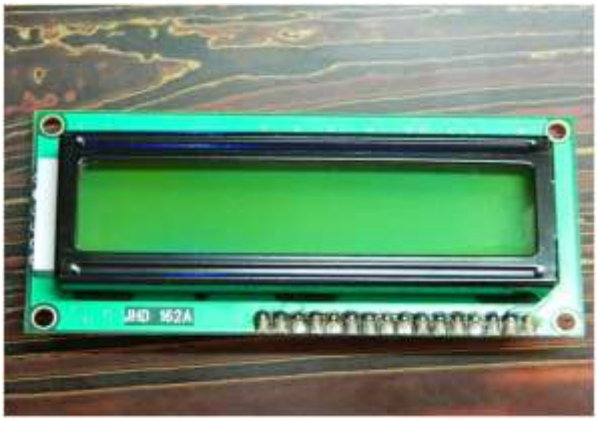

Fig 3: LCD Front View

NODEMCU ESP8266:

The ESP8266 series, or family, of Wi-Fi chips is produced by Espressif Systems, a fabless semiconductor company operating out of Shanghai, China. The ESP8266 series presently includes the ESP8266EX and ESP8285 chips.

ESP8266EX (simply referred to as ESP8266) is a system-on-chip (SoC) which integrates a 32-bit Tensilica microcontroller, standard digital peripheral interfaces, antenna switches, RF balun, power amplifier, low noise receive amplifier, filters and power management modules into a small package. It provides capabilities for 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2), general-purpose

input/output (16 GPIO), Inter-Integrated Circuit (I²C), analog-to-digital conversion (10-bit ADC), Serial Peripheral Interface (SPI), I²S interfaces with DMA (sharing pins with GPIO), UART (on dedicated pins, plus a transmit-only UART can be enabled on GPIO2), and pulse-width modulation (PWM). The processor core, called "L106" by Espressif, is based on Tensilica's Diamond Standard 106Micro 32-bit processor controller core and runs at 80 MHz (or overclocked to 160 MHz). It has a 64 KiB boot ROM, 32 KiB instruction RAM, and 80 KiB user data RAM. (Also, 32 KiB instruction cache RAM and 16 KiB ETS system data RAM.) External flash memory can be accessed through SPI. The silicon chip itself is housed within a 5 mm × 5 mm Quad Flat No-Leads package with 33 connection pads — 8 pads along each side and one large thermal/ground pad in the center. The ESP8266 is a System on a Chip (SoC), manufactured by the Chinese company Espressif. It consists of a Tensilica L106 32-bit **micro controller** unit (MCU) and a **Wi-Fi transceiver**. It has **11 GPIO pins*** (General Purpose Input/Output pins), and an **analog input** as well. This means that you can program it like any normal Arduino or other microcontroller. And on top of that, you get Wi-Fi communication, so you can use it to connect to your Wi-Fi network, connect to the Internet, host a web server with real web pages, let your smartphone connect to it, etc ... The possibilities are endless! It's no wonder that this chip has become the most popular IOT device available.

IR SENSOR:

An infrared (IR) sensor a proximity sensor, or a 'nearness' sensor that senses whether there is an object near it or not. The IR stands for Infrared sensor. Infrared is the light out of our visible spectrum.

4.0 WORKING OF AN IR SENSOR

The white LED here is an IR LED which works as the transmitter and the component next to the IR LED is a photodiode that works as the receiver in the IR sensor.

The IR transmitter continuously emits the IR light and the IR receiver keeps on checking for the reflected light. If the light gets reflected back by hitting any object in front it, the IR receiver receives this light. This way the object is detected in the case of the IR sensor.

The blue knob here is a potentiometer. You can control the range i.e. from how far you want to detect the object by changing the value of the potentiometer.

An IR sensor has two small LED indicators – one for power, which is ON the entire time the sensor is ON; the other is the Signal LED which detects the object. The signal LED has two states or situations:

- ON (Active) when it detects an object
- OFF (Inactive) when it doesn't detect any object

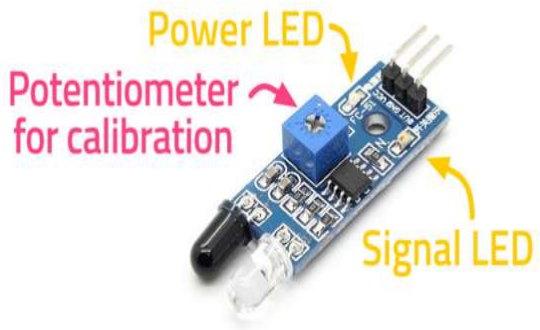

Fig 4: IR Module

The IR sensor is a digital sensor, thus, the output received from it will either be **1** or **0**.

RFID:

RFID or Radio Frequency Identification system consists of two main components, a transponder/tag attached to an object to be identified, and a Transceiver also known as interrogator/Reader. A Reader consists

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of a Radio Frequency module and an antenna which generates high frequency electromagnetic field. On the other hand, the tag is usually a passive device, meaning it doesn't contain a battery. Instead it contains a microchip that stores and processes information, and an antenna to receive and transmit a signal. To read the information encoded on a tag, it is placed in close proximity to the Reader (does not need to be within direct line-of-sight of the reader). A Reader generates an electromagnetic field which causes electrons to move through the tag's antenna and subsequently power the chip.

The powered chip inside the tag then responds by sending its stored information back to the reader in the form of another radio signal. This is called backscatter. The backscatter, or change in the electromagnetic/RF wave, is detected and interpreted by the reader which then sends the data out to a computer or microcontroller.

The RC522 RFID module based on MFRC522 IC from NXP is one of the most inexpensive RFID options that you can get online for less than four dollars. It usually comes with a RFID card tag and key fob tag having 1KB memory. And best of all, it can write a tag, so you can store your some sort of secret message in it.

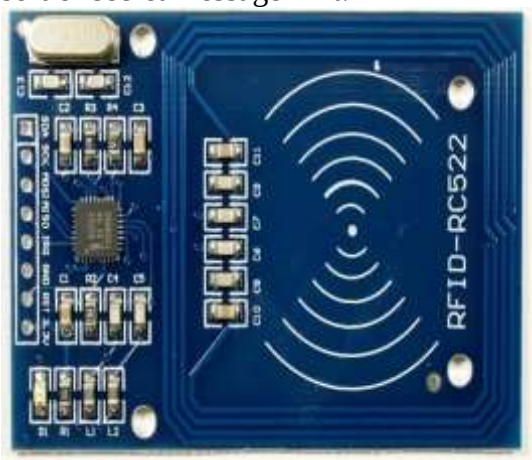

Fig 5: RFID Module

The RC522 RFID Reader module is designed to create a 13.56MHz electromagnetic field that it uses to communicate with the RFID tags (ISO 14443A standard tags). The reader can communicate with a microcontroller over a 4-pin Serial Peripheral Interface (SPI) with a maximum data rate of 10Mbps. It also supports communication over I2C and UART protocols.

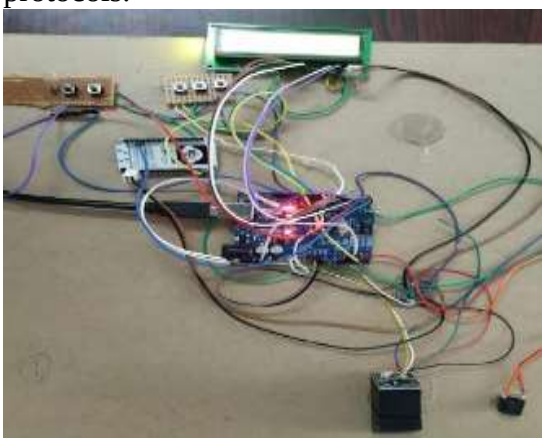

Fig 6: Proposed hardware model

CONCLUSION:

With automatic traffic light control supported the traffic density within the route, the manual effort on a part of the traffic policeman is saved. because the entire system is automated, it requires very less human intervention. The vehicle information is stored within the database so it's easy to trace the stolen vehicle. Also SMS are going to be sent in order that they will prepare to catch the stolen vehicle at subsequent possible junctions. Emergency vehicles like ambulance, fire trucks, got to reach their destinations at the earliest. If they spend tons of your time in traffic jams, precious lives of the many people could also be at risk. With emergency vehicle clearance, the traffic light turns to green as long because the emergency vehicle is waiting within the traffic unction. The traffic signal turns to red, only after the emergency vehicle passes through traffic signal.

FUTURE SCOPE

- Extending the idea by implanting shortest location and way to hospital.
- Alerting the respective doctor in that hospital by providing initial medical details of patients.
- Facility to store details of several patients over long period of time. Ambulance and the web applications should be interfaced so that he need to give the input in order to start the ambulance.

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