

EMERGENCY VEHICLE PRE-EMPTION USING SMART CITY CONCEPT

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Abstract:- Emergency patient transportation via ambulances becomes a very critical case in metropolitan cities due to rising traffic. many lives are lost because of ambulances stucking in traffic congestion. Though the ambulances try to find their way through the city, the movement of traffic is very slow because of its volume. Hence, the smart navigation system will help the ambulance to reach quickly to the nearby hospital. When the ambulance driver turns on a path for direction, the smart navigation system will turn all traffic signals Blue (specially for emergency vehicles) on its way as and when needed and thus try to decongest traffic as fast as it can. This can be achieved using cloud computing. The system will also consider if the traffic at the nearby signal is high or low. If it is low, the signal is turned to green only when the ambulance is few hundred meters away. Otherwise, it would be turned green when the ambulance is few kilometres away to decongest the impending traffic. This would require sensors installed at the signals to estimate the traffic density. The proposed system requires IoT enabled traffic signals. When the driver triggers a switch then the location and direction of that ambulance is shared to the cloud. The informations in cloud are send to the nearby traffic signal according to the traffic density the congestion of vehicles are removed for ambulance as described above .With a huge number of traffic signals with the devices throughout the city connected to the Internet, the need for a faster and more sophisticated mobile broadband is needed. So the smart navigation system will need 5G to be working to its complete potential.

Keywords— Smart navigation, ambulance, GPS, smart traffic system, IoT, cloud

1. INTRODUCTION

Smart city is an integration of heterogeneous components of a city automated in a sense to make smart environment and are interconnected within a network. Smart city is collection of smart objects deployed at different places within a city which sense data at particular places, store and interpret it to make valuable decisions. Smart cities are implemented in every field of life including medical institutions, industry, hospitals, offices, transportations, sewerage system, parking and smart grids. Smart cities are modeled using advance technologies of Wireless Sensor Networks (WSNs) such as cloud computing, client server model and central database management systems. Smart city is a need of modern computing to make environment digital, responsive, efficient, reliable and automated. Although there are many benefits of smart cities but there are few issues and challenges which are of interest of the researchers. The researchers have focused to propose different solutions for smart cities but still there is a need to address various issues. In our paper Smart navigation system has been tried .In Existing System there is no smart technology or WSNs used. This may lead to failure of transmission of data when the ambulance is present in longer distance. Some technology also used IR Sensors to intimate the signal posts to intimate the presence of ambulance but this may become failure when LOS (Line Of Sight is not achieved).

This paper is proposed to overcome the drawbacks in existing systems.

There are few approaches proposed by researchers but that do not address in fact the intelligent traffic monitoring and guidance systems.

[1] Illustrates the way in which ambulance can be navigated easily without any traffic slow down. IoT plays the role between ambulance and the traffic signals. Cloud computing provides the way for handling and managing the enormous amount of data that are generated by these devices and it can also be used to send command to those devices to perform a particular task. The drawback of the paper is commuters on the other side are kept waiting for a long duration. Due to rising traffic the traffic jam sometimes stretches for a kilometre in a metropolitan city. Hence, the system will affect other commuters.

[2] Describes different components of a smart city like smart street lights, smart traffic, smart health, smart emergency systems and virtual power plants. Different data acquisition, processing and dissemination methods were discussed. For smart traffic, different ods of capturing data on live traffic are discussed like inductive loop detection, video vehicle detection, audio detection, Bluetooth detection and sensors.

[3] The application of neural-network computers to pattern-recognition tasks , fuzzy logic in the linking of symbolic and sub symbolic processing are discussed to reduce the response time of emergency vehicles.

[4] Wireless Sensor networks (WSNs) have gained increasing attention in traffic detection and avoiding road congestion. WSNs are very trendy due to their faster transfer of information, easy installation, less maintenance, compactness and for being less expensive compared to other network options.

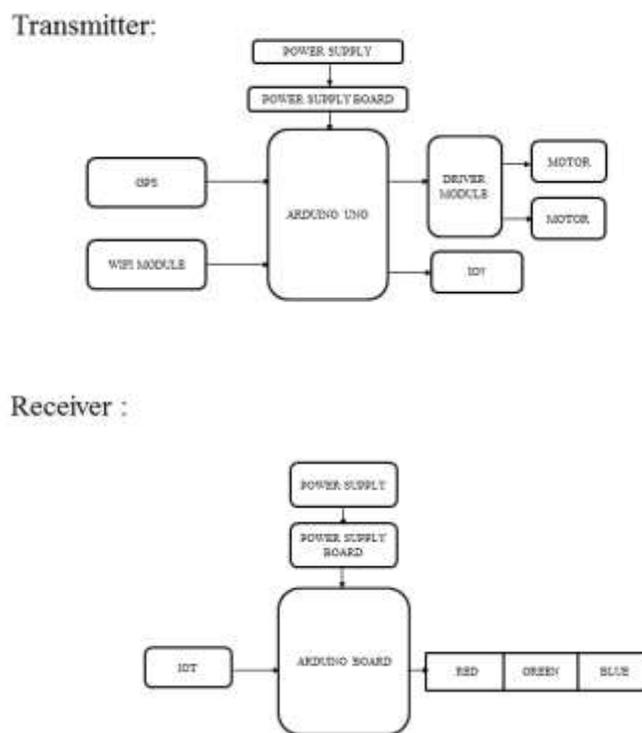
[5] GPS GPRS vehicle tracking system is used to track the location, distance and speed of the moving vehicles.

2. PROPOSED SYSTEM

The location of the moving ambulance and signal posts is updated periodically into cloud with the help of GPS and GSM. The data is analysed in the cloud and sends the data to nearest signal post to turn on the light for ambulance. According to the traffic status the ambulance will be crossed the signal without sticking at the congestion.

There are two modules used in this project transmitter module and the receiver module .ambulance is the transmitter module and receiver module is implemented in the signal post. Using arduino and IoT the location of the transmitter is sent to the receiver and the receiver module which consists of arduino board and sensors. Here the PIR(Passive InfraRed) sensors are used to trace the traffic density according to the density the way for ambulance will be cleared in time before it reaching the traffic signal.

BLOCK DIAGRAM



3. HARDWARE REQUIREMENTS

3.1 ARDUINO MICROCONTROLLER:



The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. Here it is used in the driver module to send the information of the ambulance to the arduino Board placed at receiver Side via cloud using IoT.

3.2 GPS AND GSM LOCATION FINDER:

The System (GPS Global Positioning) is a space age navigational system that can pinpoint your position anywhere on the globe, usually within a few yards or meters. GPS uses a constellation of 24 satellites in precise orbits approximately 12,000 miles above the earth. The satellites transmit data via high frequency radio waves back to Earth. GPS uses satellite ranging to triangulate your position. In other words, the GPS unit simply measures the travel time of the signals transmitted from the satellites, then multiplies them by the speed of light to determine exactly how far the unit is from every satellite it's sampling. GPS module is the main component in our vehicle tracking system project. This device receives the coordinates from the satellite for each and every second, with time and date. So when ambulance going on road current location is monitoring using internet of things continuously if the driver triggers the switch. When ambulance reaches near the traffic signal with certain distance if traffic is high, blue led will glow automatically.



3.3 MOTOR:

Here 60RPM motor is used .Two DC motors with the same IC is used to run the vehicle .Speed and Direction control is possible Connected with Supply Voltage 12V.Here arduino is connected with the motor to control the motion of the motor.



4. SOFTWARE REQUIREMENTS:

For implementing this project, we are using the following softwares

1. Arduino IDE
2. Embedded C

4.1 ARDUINO IDE:

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

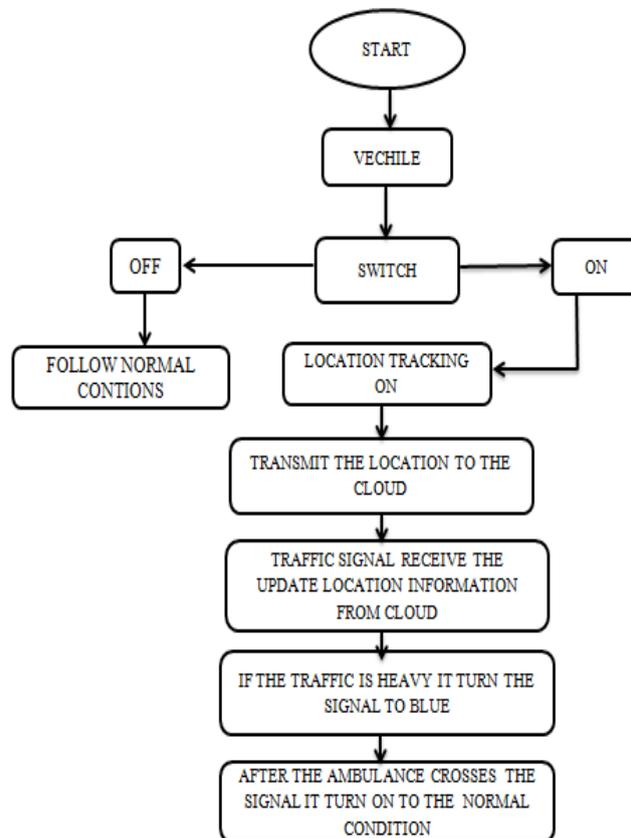
The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the microcontroller into a more accessible package. Programs written using Arduino Software (IDE) are called **sketches**. These sketches are written in the text editor and are saved with the file extension. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

4.2 EMBEDDED C

Embedded C is an extension to C programming language that provides support for developing efficient programs for embedded devices. It is not a part of the C language. Embedded C is the most widely used programming language for embedded processors/controllers. Assembly is also used but mainly to implement those portions of the code where very high timing accuracy, code size efficiency, etc. are prime requirements.

The Arduino IDE is fully developed into functionality of full of libraries, as long as programming the Arduino UNO in Embedded C language is possible because Arduino IDE can Compile both arduino code as well as AVR standard code. The "target" is where the executable code generated by the C compiler will run the CPU in the embedded system, often without any underlying operating system. The GCC compiler is the most popular C compiler for embedded systems.

5. FLOW CHART



6. CONCLUSION:

The Emergency Vehicle Priority for Smart Cities is more reliable, highly accurate and others higher performance over the controllers that were used earlier. The easy availability of good design tool and software engineers has been two key factors infuelling the growth of embedded system. The Emergency Vehicle Priority System Path Clearance is just a small part; looking at the bigger picture it has large-scale application in ITS (Intelligent Transportation System).

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