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Traffic monitoring for emergency vehicle using RFID

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Abstract--In developing countries like India population is significantly growing. As the population grows, the numbers of vehicles on the roads are also exponentially increasing, which results in increase in road accidents and traffic jam. Specifically, when an emergency vehicle such as Ambulance or Fire engine gets stuck in traffic jam, saving the human life becomes difficult. Under such circumstances, a promising system which can clear the traffic congestions especially in peak hours and thereby providing a safe path for emergency vehicles is very much essential. In the existing literature, less focus is given towards the problem of providing a clear path for emergency vehicles during traffic congestions. To solve these issues, a RFID-based system is proposed, which manages and regulates the traffic signals at junctions when the emergency vehicle approaches, by allowing the easy passage out of the traffic congestions. The proposed framework is modelled by means of an experimental setup using ARDUINO and LED displays which simulates a real time traffic scenario. The simulation results illustrate the better performance of the proposed framework in terms of detection as well as management of emergency vehicle by providing passage out of traffic congestions during peak hours.

Keywords--RFID, congestion, dataset.

Introduction

Internet of Things (IoT)

The Internet of Things (IOT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. RFID stands for Radio Frequency Identification. This rapidly-growing technology transmits information wirelessly, through the use of radio waves. RFID requires using a device known as a reader. The reader is needed to retrieve any data stored on a RFID tag. The reader device contains an antenna and a small chip to transmit information via the radio-frequency electromagnetic field. The reader is responsible for picking up identifying information like the unique serial number from package tags. The information is picked up via the antenna which emits radio signals and receives signals back from package tags. These signals are then transmitted in digital format to the appropriate computer system. An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves.

Scope of the Project

The main aim of the project is to clear the traffic jam for emergency vehicle and providing clear path for the emergency vehicles on the road, by finding density of the traffic on the road.

Existing System

In existing technique the emergency vehicles cannot moves fast in traffic congestions. Then the Traffic density on the road cannot be monitored and cleared.

Disadvantages

Requires lot of man power to clear the traffic congestions. Lives in emergency need immediate support which gets delayed due to traffic.

Related Work

Wireless networks for IOT applications support different types or classes of end devices. Each such class results indifferent uplink and downlink traffic behavior. It is important to identify suitable class for each end device. We first propose a generic framework for this purpose. We propose an element, called Software Controller, which learns device profile using variety of means such as information provided by the device itself, information provided by the associated IoT operator and contextual information using other sources. It can also use machine learning techniques to learn how a device might behave during certain period. Suitable resource management methods are to be associated with such classification schemes. We propose one such resource management method for 802.11ah type of networks. Next, we look at some traffic scenarios that may not be supported

well by the existing device classes in some of these networks. Some IoT devices may always communicate low amount of data sporadically but some may need to communicate large amount of uplink or downlink (or bi-directional) data during certain time intervals. For example, an IoT device may need to measure (and report) certain parameters more frequently on detection of certain events, or a network server may want to set certain parameters or upgrade software at an IoT device during some time interval. It becomes important to control uplink / downlink communication opportunities and sleep interval at IoT devices in the network effectively. We propose a new device class and dynamic switching mechanism to handle such traffic scenarios effectively. We also include a software defined controller that provides for dynamic management of these communication opportunities at IoT devices and Access Points in the network.

On-ramps are area of frequent traffic congestion. Proper traffic guidance around on-ramp merging areas exerts a positive effect on the relief of traffic congestion. The objective of this paper is to design an assistive ramp-merging control (ARMCON) system. It utilizes knowledge about professional driver behavior and the dynamical relationship among the on-ramp vehicles, to produce timely information so as to guide the on-ramp drivers when merging with the main traffic flow. Under the guidance of ARMCON, disruption of the main traffic on the express way is minimized while a certain merging rate is maintained.

As the population increases, vehicle usage has been increased considerably. Traffic becomes the most crucial factor at the time of traffic management which needs to be controlled for the improved traffic management. However traffic management would be more difficult task in case of increased vehicles usage by different number of peoples. Internet of Thing makes things easier by interconnecting vehicles with the server through the internet. IoT can monitor the vehicle periodically and track their location by sending periodic information to the server. This is focused in the proposed research framework by collecting and analyzing the traffic information so that traffic can be controlled very effectively. The significant target of this proposed framework is to carry out a novel IoT based Traffic Management (IoT-TM) that can make short term decision about the traffic management, thus the accurate and efficient traffic clearance can be achieved. In this research method, data set is gathered from the multiple traffic profiles which includes attributes such as time consumption, traffic rate, number of vehicles and so on. These data's would be learned in the training phase by using the Hybrid Artificial Neural Network with Hidden Markov Model (HANN-HMM) which can accurately learn the traffic profile information with reduced time. To perform accurate recognition of the traffic optimized feature selection is done before learning by using Hybrid Ant colony Glow worm swarm optimization approach. The complete interpretation of the anticipated investigational framework has been conducted on MATLAB environment from which it is proved that the proposed research method namely IoT-TM can make better decision about the traffic management than the existing research systems.

Proposed System

In this proposed technique the detection as well as management of emergency vehicle by providing passage out of traffic congestions during peak hours be

implemented. The traffic on the road be monitored by use of Internet of things (IOT) and then also use of RFID tag on emergency vehicle also proposed in this technique.

Proposed System Advantages

Emergency vehicles can alter the signal during it approach to save time and lives. Traffic density can be monitored and altered accordingly.

Arduino

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board.

Power Supply

The power supply section is the important one. It should deliver constant output regulated power supply for successful working of the project. A 0-12V/1 mA transformer is used for this purpose. The primary of this transformer is connected in to main supply through on/off switch& fuse for protecting from overload and short circuit protection. The secondary is connected to the diodes to convert 12V AC to 12V DC voltage. And filtered by the capacitors, which is further regulated to +5v, by using IC 7805.

Ultrasonic Sensor

The HC-SR04 ultrasonic sensor uses sonar to determine distance to an object like bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package. It comes complete with ultrasonic transmitter and receiver modules.as the name indicates measure distance by using ultrasonic waves

.the sensor head emits ultrasonic wave and receives the wave reflected back from the target .Ultrasonic measures the distance through the target by measuring time between emission and reception.

RFID Reader and Tag

An RFID reader is a device that is used to interrogate an RFID tag. The reader has an antenna that emits radio waves; the tag responds by sending back its data. An RFID tag is a microchip combined with an antenna in a compact package; the packaging is structured to allow the RFID tag to be attached to an object to be tracked. "RFID " stands for Radio Frequency Identification. The tag's antenna picks up signals from an RFID reader or scanner and then returns the signal, usually with some additional data (like a unique serial number or other customized information).

A passive tag is an RFID tag that does not contain a battery; the power is supplied by the reader. When radio waves from the reader are encountered by a passive RFID tag, the coiled antenna within the tag forms a magnetic field. The tag draws power from it, energizing the circuits in the tag. The tag then sends the information encoded in the tag's memory.

LCD

LCD screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

Arduino Software IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

Libraries

Libraries provide extra functionality for use in sketches, e.g. working with hardware or manipulating data. To use a library in a sketch, select it from the Sketch > Import Library menu. This will insert one or more `#include` statements at the top of the sketch and compile the library with your sketch. Because libraries are uploaded to the board with your sketch, they increase the amount of space it takes up. If a sketch no longer needs a library, simply delete its `#include` statements from the top of your code..

Third-Party Hardware

Support for third-party hardware can be added to the hardware directory of your sketchbook directory. Platforms installed there may include board definitions (which appear in the board menu), core libraries, boot loaders, and programmer definitions. To install, create the hardware directory, then unzip the third-party platform into its own sub-directory. (Don't use "Arduino" as the sub-directory name or you'll override the built-in Arduino platform.) To uninstall, simply delete its directory.

Serial monitor

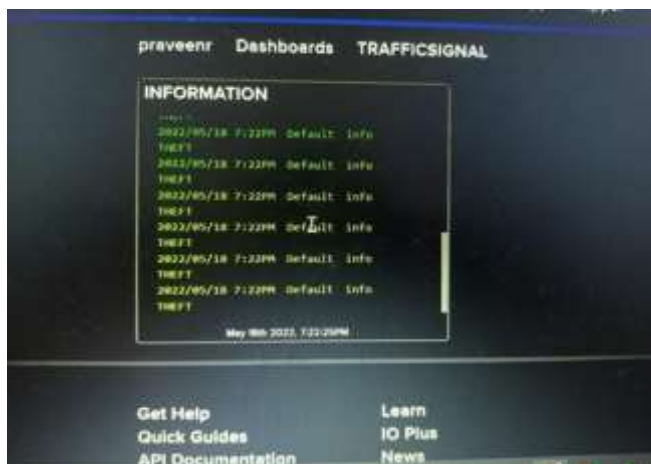
This displays serial sent from the Arduino or Genuino board over USB or serial connector. To send data to the board, enter text and click on the "send" button or press enter. Choose the baud rate from the the Editor Language drop-down. This setting will take effect when you restart the Arduino Software (IDE). Similarly,

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after changing your operating system's settings, you must restart the Arduino Software (IDE) to update it to the new default language.

Output

Traffic Monitoring System



Traffic management is the most concerned research issue in the real world environment which requires to be focused well for the better traffic management. The foremost objective of this investigational work is to implement a novel framework namely traffic monitoring for emergency vehicle using RFID that can make short term decision about the traffic management, thus the accurate and efficient traffic clearance can be achieved .By clearing the traffic on the road, emergency vehicle can easily pass through and save lives .The traffic also monitored on a webpage.

Applications

This method is used in monitoring traffic and clear the traffic for emergency vehicle.

Future Enhancement

In future we add sound waves and image processing techniques made the traffic clearance efficiently.

Advantages

Emergency vehicles can alter the signal during it approach to save time and lives.Traffic density can be monitored and altered accordingly

Conclusion

Traffic management is the most concerned research issue in the real world environment which requires to be focused well for the better traffic management. The foremost objective of this investigational work is to implement a novel framework namely traffic monitoring for emergency vehicle using RFID that can make short term decision about the traffic management, thus the accurate and efficient traffic clearance can be achieved .By clearing the traffic on the road, emergency vehicle can easily pass through and save lives .The traffic also monitored on a webpage.

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