

IOT Based Intelligent Traffic Management System

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Abstract-All metropolitan cities face traffic congestion problems especially in the capital areas. Normal cities can be transformed into "smart cities" by exploiting the information and communication technologies (ICT). The paradigm of Internet of Thing (IOT) can play an important role in realization of smart cities. This paper proposes an IOT based traffic management solutions for smart cities and to coordinate with ambulance to change the signal status and choose the path where traffic flow can be dynamically controlled and traffic violations are been identified by onsite traffic officers through centrally monitored or controlled through Internet. However the scheme proposed is general and can be used in any Metropolitan city without the loss of generality. If any ambulance will come on a signal then it will shows the green path for that ambulance and rest of paths are red.

Keywords-Camera, light sensors, IOT devices, IR sensors, RaspberryPi3, RFID, Traffic congestion.

I. INTRODUCTION

In recent years popularity of private cars is getting urban traffic more and more crowded. As result traffic is becoming one of important problems in big cities in all over the world. Traffic violators are increasing day by day to overcome this issue we need a intelligent system which identify the violator and take action accordingly. The research proposes a system which can identify traffic violator, collect information and send it on database. By using IOT and different sensors like RFID it helps to identify the high priority vehicles like Ambulance.

II. RELATED WORK

The phrase Internet of Things (IoT) heralds a vision of the future Internet where connecting physical things, from banknotes to bicycles, through a network will let them take an active part in the Internet, exchanging information about themselves and their surroundings. This will give immediate access to information about the physical world and the objects in it leading to innovative services and increase in efficiency and productivity. The state-of-the-art of IoT is studied and the key technological drivers, potential applications, challenges and future research areas are presented in the domain of IOT.

India is the second most populous Country in the World is a fast growing economy. It is seeing increased no of road congestion problems in its cities. Development growth is slow as compared to the growth in number of vehicles, due to space and cost constraints [3]. Conventional traffic light system is based on fixed time concept allotted to each side of the junction which cannot be varied as per varying traffic density. Some time it will be not provide sufficient time to pass vehicles because traffic signal time is pre define [1]. Nowadays traffic problem are increasing because of the increasing number of vehicles and the limited resources provided by the current infrastructures. Due to this, there is a need to wait more time in front of the signals [2]. We propose a system for controlling the traffic light by image processing. The system will detect vehicles through capture camera images instead of using electronic sensors embedded in the pavement. A camera will be installed alongside the traffic light. It will capture image sequences. The image sequence will then be analyzed using digital image processing for vehicle detection, and according to traffic conditions on the road traffic light can be controlled [4]

All the current traffic management systems are time based but the proposed system is based on the priority of the vehicles. The proposed system is also help in the smart cities to identify the traffic violators. Most of the existing systems are manual but proposed system is automatic.

III. PROBLEM DEFINITION

"To overcome the major issues related to Traffic like Traffic violation and Traffic Management by using various sensors and camera to make the system technologically as well as flexible to use in Metropolitan cities".

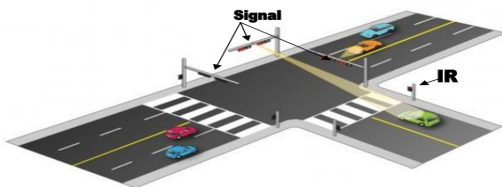
The proposition for the Traffic management System current project is based on two main current traffic issues comprising of traffic violation and high priority vehicle management. This project proposes installation of various sensors and cameras within the range of traffic signal which will detect high priority vehicles, emergency vehicles and traffic violators. This information is then sent to the nearby traffic officers which will take action accordingly.

3.1 Raspberry Pi and IOT

The data collected from all sensors are gathered at the core controller Raspberry Pi. The core controller operates the data on its Raspbian (Raspberry Pi Jessie) operating system and formats the data in a text file using Python which is transmitted to the IOT module. For monitor processed data on the internet cloud computing technology is use which provides the personal local server. In cloud computing, separate IP address is provided which make possible to monitor data from anywhere in the world using the internet. To access that monitor data and make system user-friendly browser application is introduced which work on HTTP. So, by using browser application user can access and monitor the data from all over the world.

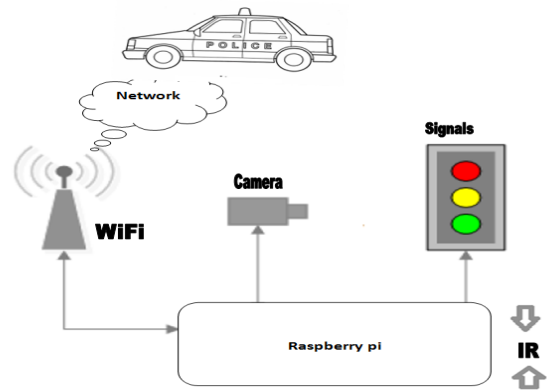
3.2 High Priority Vehicle Management

We use the RFID tags; we can consider the priority of different type of vehicles and also consider the density of traffic on the roads by installing RF reader on the road intersections. These RFID tags identify the vehicles priority and control the traffic signals according to priority. There are three main components of RFID: RFID tag, RF Reader and Database. In this system we provide priorities to vehicle like Ambulance, Fire Brigade etc. If RFID detect the code under the normal traffic flow then it set that signal green and others red.



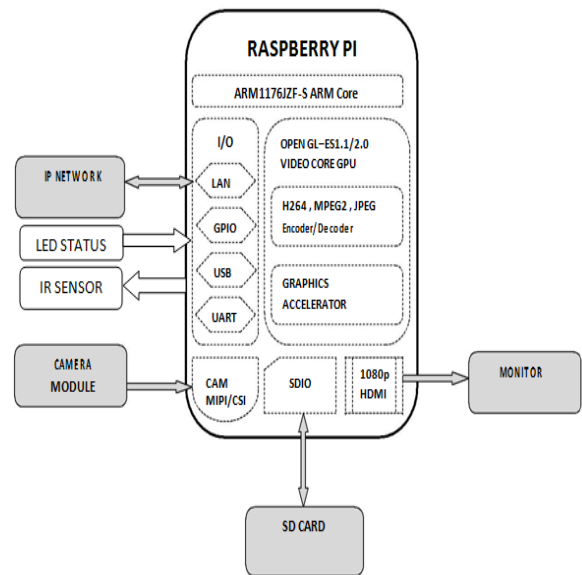
3.3 Traffic Violation

IR sensors are used to detect the traffic intensity which gives a signal to RASPBERRY PI 2 about the traffic intensity and this will be able to clear the traffic Camera module is used to identify the vehicles which are violating the traffic rules. Whenever the traffic signals are break at the same time cameras get triggered and capture the image and send to the traffic officers.



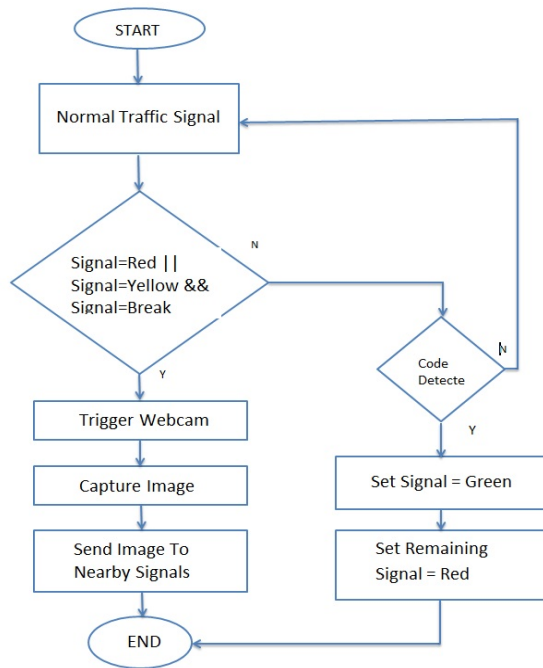
IV. SYSTEM REQUIREMENT AND SPECIFICATION

4.1 Architecture



- Architecture shows the different devices which are being used in the proposed systems which include the SD Card and camera module.
- It also shows the different components which are included in raspberry pi.

4.2 Flow Chart



4.3 Algorithm

Detecting Ambulance and traffic violator

- Step 1. Start
- Step 2. If signal = red and IR sensor is active
- Step 3. Trigger camera
- Send image to nearest RTO traffic officer
- Step 4. If signal = red and RFID sensor detects ambulance Update current signal = green Update neighboring signal = red
- Step 5. End

RF Module

- Step 1. Start
- Step 2. Initialize RF transmitter and receiver.
- Step 3. If vehicle enter into a slot area.
- Read the decoded value of RF signal on raspberry pi.
- Step 4. Match the RF data and identify the vehicle number.
- Step 5. Repeat this process for different vehicles.
- Step 6. End

V. HARDWARE AND SOFTWARE REQUIREMENT

Hardware Requirements

- Internet connection
- 1 GB/ 3 GB RAM
- 8 GB Hard Disk
- Above 1.2 GHz Processor
- Raspberry Pi 3
- LED Lights

Software Requirements

- Language – Python, HTML, PHP
- OS – Raspbian (Raspberry Pi Jessey)

Sensors

- IR sensor
- RFID sensor

Result

All LED shows the normal traffic flow which is time based. When the all three signals are red then all IR sensors according to that signals are turned on. If any obstacles break those IR sensors the cameras triggered and capture the image of traffic violator and send it through mail. By using that image traffic police can take action accordingly.

The use of proposed system is we provide the priority to vehicles. Ambulance has the highest priority. When Ambulance comes under the RFID range then signal turn green and high priority vehicle is ready to go.

Advantages

1. Physical things can be connected to the Internet and information can be exchanged.
2. Because of IOT system is easy to use and more flexible.
3. Raspberry pi is cheaper than other devices .

Application

1. At traffic management Emergency ambulance service
 2. Emergency fire service
 3. To identify traffic violator to store the data about traffic violator
 4. To store information about traffic violator.
 5. To handle traffic in metropolitan cities.
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V. CONCLUSION

The propose system presents a real-time traffic information collection and monitoring system architecture to solve the problem of real-time monitoring and controlling road vehicles. The Internet of Things could prove to be one of the most important approaches for developing more utility-proper systems and for reducing the traffic congestion. An IoT solution for traffic monitoring and control aims at being able to gather data from multiple devices (viewed as things in Internet of Things), analyzing these data and dispatching them or results from processing to various applications or to other devices (also connected to the Internet of Things).

The proposed system can provide a new way of monitoring traffic flow that helps to improve traffic conditions and resource utilization. In addition transport administration department, using real-time traffic monitoring information, can in time detect potentially dangerous situations and take necessary actions to prevent traffic congestion and minimize number of accidents thus ensuring safety of road traffic. In general, the IoT will play an important role in the traffic management enhancing the efficiency of information transmission through devices, improving traffic conditions and management efficiency, traffic safety, and reducing management costs.

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