

# Traffic Control and Vehicle Tracking using RFID

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## Abstract

Currently people tend to face major issues a familiar one in that is traffic congestion. The system tries to reduce possibilities of traffic jams and allows the vehicle to pass through it. The main objective of this project is to control the traffic and the special privileges for emergency vehicles like ambulance and fire extinguisher by using the RFID technology. The software used in this system is pseudo python it helps to track the emergency vehicle. The micro-controller used in the system is Raspberry pi 3. According to this project if any ambulance comes near the traffic post, the traffic signals automatically stop the signals and give green signal for this ambulance with the using of RFID Module.

**Keywords** - IoT, Raspberry Pi-3, RFID Tag, RFID Reader.

## I. INTRODUCTION

Internet of Things (IOT) is used actually playing a vital and important role in our everyday life. As we all know traffic control are one of the main city assets. Many countries are suffer from the traffic congestion problems that affects the transportation system in cities and it causes dilemma. In spite of replacing traffic officers and flagmen by automatic traffic systems, optimization at the heavy traffic jam is still a major issue to be faced, especially with multiple number of automobiles and the constantly raising number of road users are not accompanied with promoted infrastructures with sufficient resources. To overcome this problem we are using RFID module. In the emergency vehicle the RFID tag is placed and it will be read by the RFID reader. A particular number will be given to the RFID tag and it will read by the RFID reader and it will detect the emergency vehicle. The reader will give the information to the Raspberry Pi-3 using python software. Raspberry Pi-3 will receive the information from the RFID reader and it allows the emergency vehicle pass through. Processing time was minimized by using the Raspberry processor, it will minimize the waiting time at signal junction it is a automatic signal control without manpower.

## II. EXISTING SYSTEM

In general, our research cover the literature review from various sources, which is targeted various aspects of traffic control and vehicle tracking. [1]The system investigates the adaptive fine tuning algorithm for determining the set of design parameters of two distinct mutually interacting modules of the traffic responsive urban control(TUC)strategy for the large scale urban road network of the city of China, Greece. Simulation results are presented, demonstrating that the network performance in terms of the daily mean speed, which is attained by the proposed adaptive optimization methodology, is significantly better than the original TUC System in the case in which theaforementioned design parameters are mutually fine-tuned to virtual perfection by the system operation. [2] The system will develop the traffic light configuration, which will be able to determine three street case (empty street case, normal street case and crowded street case) by using small associative memory. The experiments presented provides promising results when the proposed approach was applied by using a program to monitor intersection in penesa island in Malaysia. The program could determine the street cases with different weather conditions depending on the stream of images, which are extracted from the street video cameras. [3] To handle congestion in urban traffic flow through next generation artificial intelligence techniques is an important research area. Various intelligent and approach have been developed using sot computing techniques to tackle with this problem. Major soft computing approaches for those purpose are Fuzzy approaches, Neural Network and Genetic algorithms, Petri nets and many more. Multi-agent systems are also highly applicable in this approach. This paper is an effort towards revisiting such approaches in developing modern traffic control systems.[4] To study primarily focuses

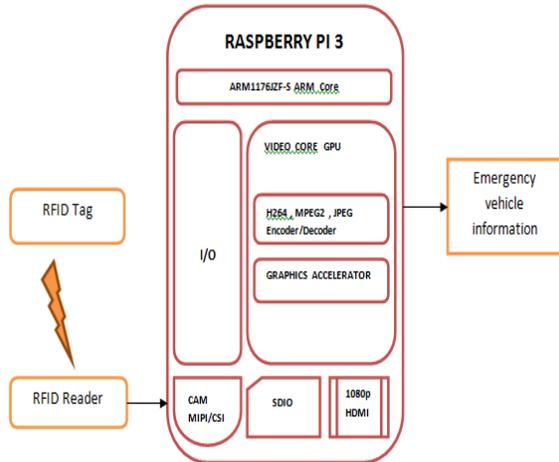
on the use of radio frequency identification (RFID) as a form of traffic flow detection, which transmits collection information related to traffic flow directly to a control system through an RS 232 interface, At the same time, the sensor analyzes and judges the

information using an extension algorithm designed to achieve the objective of controlling the flow of traffic. In addition, the traffic flow situation is also transmitted to a remote monitoring control system through ZigBee wireless network communication technology. The traffic flow control system developed in this study can perform remote transmission and reduce traffic accidents. And it can also effectively control traffic flow while reducing traffic delay time and maintain the smooth flow of traffic. [5] The main objective of this system is that to control the traffic congestion, allowing an ambulance to arrive at a particular location without it having to stop anywhere until the designation is reached. This system includes RFID technology and Lab view software. An RFID reader reads the ID number from the corresponding ambulance RFID tag and then it is sends the data to microcontroller LPC 1768H, which is programmed, with the help of embedded C instructions. Those microcontroller is capable of communicating with input and output modules. The RFID readers provides the data to the microcontroller so that it compares the received ID with default ID's stored in its memory. If the obtained ID gets matched with any of the ID's, then a green signal is given along the path of the ambulance or else no other changes will be taken place in the signal. The signal won't change from green color until the same tag is detected by the other reader in another route. [6]On the traffic incident management (TIM) makes a systematic effort to detect, response to, and remove traffic accidents. It aims to offer the rapid recovery of traffic safety and capacity and lead to many measurable benefits, such as decrease in fuel consumption, accident duration, secondary accidents, and traffic jams. In the past thirty decades, ITS technologies were recognized as valuable tools and being used word wide in traffic accident detection, verification, response, and communication.[7] The traffic system in urban areas increasing day by day which leads to most critical issues of traffic congestion often cause time delay, missed opportunities, etc. To overcome these problems proposed system uses the RFID technology where RFID tag is attached to each vehicle, when vehicle reach the junction the RFID reader will read those RFID tags. Depending upon the count of vehicles green passage will be set dynamically and the proposed system provides special privileges for emergency vehicles like police vehicles, ambulance, VIP vehicles, etc. RFID also enforces law against stolen vehicles. [8]On pre-emptive and predictive methodology, i.e., IT strategy with reactive compensation (ITRC), to reduce network delay time and eliminate unnecessary stops for vehicles. With anticipation for repetitive traffic flows based on historical data, nominal traffic signals are tuned by IT controller over repetitions. The reactive compensation, which is junction based model predictive

control strategy (JMPC), makes adjustment on nominal traffic signals and compensates the no repetitive elements. Rigorous analysis provide sufficient condition for guaranteeing the convergence of ITRC.[9] To offer the idea of traffic light control using wireless sensor network. It is a serious problem in the traffic congestion in many major cities around the world and in this it has become a nightmare for travelers. Traditional systems do not control variable flows coming near junctions. In addition, interconnection between adjacent traffic light systems is not implemented in the current traffic system of passage of vehicles, passage of emergency vehicles, and passage of pedestrians. This leads to traffic jams and rush towards the crowd. Sometimes the high traffic density on one side of the junction demands more green time than the standard allotted time. The system architecture is divided into three layers; the wireless sensor network, the localized traffic flow model policy, and the higher level coordination of the traffic lights agents. [10] The strength of the approach is its formal separation between the low level image processing modules(used for extracting visual data under various illumination conditions) and the high level modules, which provides a general purpose knowledge based framework for tracking vehicles in the lane. The image-processing modules extract visual data from the scene by spatiotemporal analysis during day time, and by morphological analysis of headlights at night. The high-level module is designed as a forward chaining production rule system, working on symbolic data, i.e., vehicles and their attributes (area, pattern, direction, and other) and exploiting a set of heuristic rules tuned to urban traffic conditions.

### III. PROPOSED SYSTEM

In the traffic control system RFID is used to detect the emergency vehicle. If any ambulance comes near when the ambulance at emergency comes to any traffic post the traffic signal automatically stop the signals and give green signal for the ambulance with the use of RFID module. In the emergency vehicle the RFID tag is placed and it will read by the RFID reader. A particular number will be given to the RFID tag and it will read by the RFID reader and it will detect the emergency vehicle. The reader will give the information to the Raspberry pi 3 kit. The program is given in the Raspberry pi 3 using python software. The Raspberry pi 3 will receive the data from the RFID reader and it allows the emergency vehicle pass through.



**Fig.1. Block Diagram for Tracking Emergency Vehicle Using RFID**

### ***I-RFID READER***

In our system, RFID module was used to detect the ambulance, fire truck and any other important vehicle at the traffic signal section. All the important vehicle have must be attached the RFID tag. Each of the RFID tag some ID(alphanumeric characters). These entire ID was stored in a traffic control database. In a traffic signal section, There is one RFID reader will be placed, that RFID reader was used to receive that the ID number. And send the ID data to Raspberry Pi through the serial connection. A Radio Frequency Identification Reader (RFID) is a device used to collect information from an RFID tag. Radio waves are used to transfer data from tag to a reader. RFID reader is generally used for detecting the vehicles that are embedded with the RFID tags. Here we are using the reader for detecting the emergency vehicles which is under threat. Then the reader will read the code which is given for those vehicles.

### ***II-RFID TAG***

A Radio Frequency Identification Tag (RFID Tag) is an electronic tag that exchanges data with an RFID reader through radio frequency waves. RFID tag are mostly made up of at least two main parts .The antenna, which receives radio frequency (RF) waves. Then the integrated circuit(IC), which is used for processing and storing data, as well as modulating and demodulating the radio waves received/sent by the antenna. A RFID tag is also know as a RFID chip.

### ***III-RASPERRY PI***

- Credit card sized CPU
- Processor speed 1.4 GHz
- 1GB RAM
- 8GB-32GB ROM

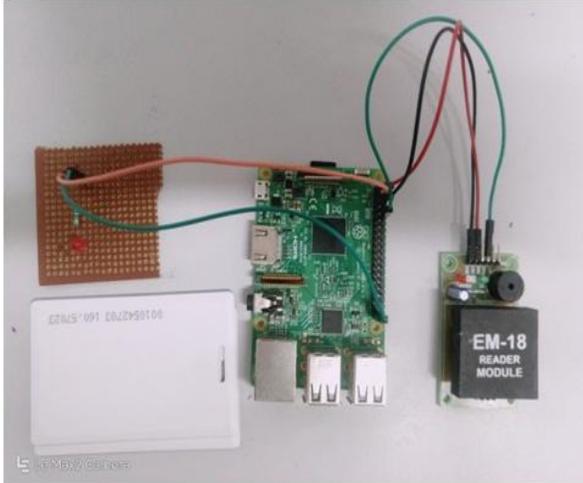
Raspberry pi-3 is smaller in size and accessible price, it was quickly adopted by tinkerers and electronics enthusiasts for projects that require more than a basic microcontroller (such as Arduino devices). The Raspberry pi is slower than a modern laptop but is still a complete Linux computer and can provide all the expected abilities that implies, at a low power consumption level. The Raspberry pi is open hardware, with the exception of the primary chip on the Raspberry pi, the Broad band communication, SoC (System on Chip), which runs many of the main components of the board as CPU, Graphics, memory, the USB controller etc. Many of the projects made with the Raspberry pi are open and well-documented as well and are things you can build and modify our self. We use the advanced microcontroller or else the microprocessor which is the Raspberry Pi. This is the major controlling device in our project. Raspberry Pi has some different versions. We use the Raspberry pi module 3, because it has high specifications when compared with other versions. And the python software was comfortable with Raspberry Pi 3 version only. The Raspberry Pi is comprise of a series of small single-board computers.

### ***IV-HDMI PORT***

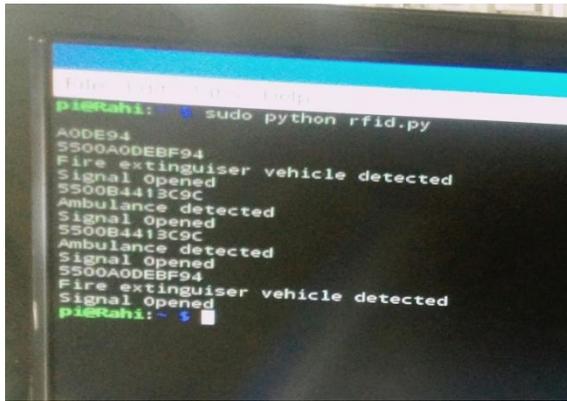
HDMI (High Definition Multimedia Interface) is a two way process that requires communication from sending to receiving device. It has both audio/video interface for transmitting uncompressed video data and compressed or uncompressed digital audio data from the High Definition Multimedia Interface complaint source device as display controller, to a compatible computer monitor, video projector, digital television or digital audio device. It is used as a digital substitute for analog video standards.

## **IV. HARDWARE DESCRIPTION**

The concept of the project is to introduce an RFID based vehicle tracking system for recognizing the emergency vehicles on the lane. With the help of RFID tag which is issued to the vehicles which are under threat, we can be able to get the information of those vehicles. When the vehicle is at some distance the RFID reader will detect the vehicle. Raspberry pi will receive the information from the RFID reader where the Python software is fed. The Python software will comprise of the data of those vehicles. The pseudo python software is used to reduce the complexity`



**Fig.2. Prototype of Traffic Control And Vehicle Tracking Using RFID**



**Fig.3. Output Image**

## V. DESIGN INNOVATION AND DEVELOPMENT

The system can detect the amount of the traffic flows in each lane of the intersections and monitoring the current signal duration time smartly, if there is no vehicle in the crossing roads the device should work endlessly.

## VI. CONCLUSION

The system which was done already works efficiently to manage the traffic but does not provide services for emergencies vehicles. The proposed system works uninterruptedly and with higher accuracy in managing the traffic at junctions.

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