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SMART TRAFFIC CONTROL SYSTEM FOR VEHICLES ON ROADS USING RASPBERRY PI

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Abstract

On the roads the vehicles have been increasing due to the increase in population and controlling visitors is one of the hard tasks for the people who control the traffic. The regular traffic congestion at important junctions becomes more problems for the emergency vehicles and must wait until the green signal. These results in an increase in pollutant levels and wastage of time, pollution levels may increase to a huge scale. Previously the traffic manages strategies used like magnetic loop detectors, induction loop detectors are buried on the street aspect offer the confined traffic records, and necessitate separate monitoring systems for site visitors counting and for traffic surveillance. Here the assignment proposes to put in force an artificial density traffic control machine the usage of photograph processing and Raspberry pi.

Keywords : Microcontroller, Raspberry-pi, RFID

I. Introduction

The major problem for the public on the road in heavy traffic, due to huge traffic on the roads it is difficult to control by the traffic people. This problem requires separate structures like magnetic detectors, radio frequency identification for vehicles, and surveillance cameras on the roads. The magnetic detectors provide a price-effective result, although subject toward failure, with the help of Infrared sensors and video capturing cameras and cannot be used for powerful surveillance. In evaluation, video-based structures provide many opportunities when compared to conventional strategies [I]. They provide extra information this system integrates the

traffic controlling technologies and surveillance together, without any installation problems. In this paper, we tried to present the traffic controlling technologies for the huge traffic on the roads and at the junctions using Raspberry Pi [II]. Also, high-precedence is given to the emergency automobiles. The detection of emergency automobiles is done based on RFID-Radio-Frequency Identification, Based on RFID Tags the emergency automobiles are detected and the vehicles are given high priority on the junctions. For the detection of emergency automobiles, extra hardware is required on the junctions and also an RFID tag should be placed on the emergency automobiles [III].

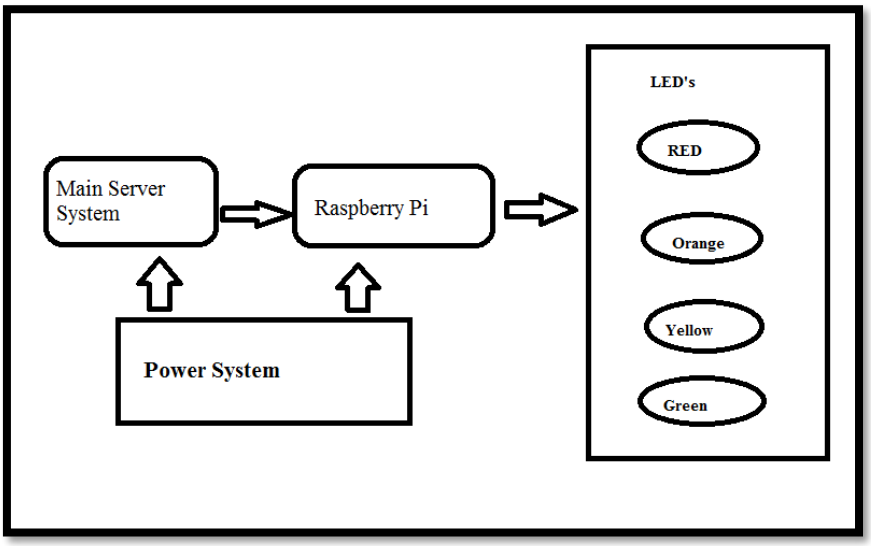

Fig. 1: Block Diagram of Smart traffic control system

II. Requirements to Develop the System

Software

- Python Programming
- MATLAB

Hardware

- Raspberry pi-model B+
- Personal Computer with I5 Processor
- Webcam
- RFID

IoT devices are connected to the Internet and send information about themselves or their surroundings (e.g. information sensed by the connected sensors) over a network (to other devices or servers/storage) or allow actuation upon the physical entities/environment around them remotely [III], [IV]. Raspberry Pi is a low-cost mini-computer with the physical size of a credit card; Raspberry Pi runs various

flavors of Linux and can perform almost all tasks that a normal desktop computer can do. Raspberry Pi also allows interfacing sensors and actuators through the general-purpose I/O pins. Since Raspberry Pi runs Linux operating system, it supports Python "out of the box". Raspberry Pi consists of a camera module that is used for taking pictures of photos. It does now not encompass a built-in tough disk or stable-nation power, Raspberry Pi makes use of SD Card Slot for booting and storage. The programming languages like python, C, and Perl uses as programming languages for Raspberry Pi. Raspberry Pi Model-B with two USB ports and a ten/a hundred Ethernet controller. Though the Raspberry Pi Model-A doesn't have an 8P8C (RJ45)Ethernet port, it can hook up with a network with Wi-Fiadapter or external Ethernet. Raspberry Pi Model-B has a built-in USB Ethernet adapter. As is normal of current computer systems, prevalent USB keyboards and mice are well suited with the Raspberry Pi. The Operating System should be loaded on the Raspberry Pi by using the SD Card [V]. After biking via several suggestions on account that just earlier than the hardware become first made available, the Raspberry Pi Foundation created the New out Of BoxSystem (NOOBS) installer, and as of July 2013 shows using it to put in the Debi an-derived Rasping. The Foundation intends to create an application shop internet site for people to change programs. Rasping is a Debi an-based unfastened working device optimized for the Raspberry Pi hardware. It is the cutting-edge recommended system, and become officially launched in July 2012, although it continues to be in development [VIII]. It is a loose software program and maintained independently of the Raspberry Pi Foundation. It presents some available deb software program packages, precompiled software program bundles [X]. The minimum size of two GBSD cards is needed for Rasping, but a 4 GB SD card or above is usually recommended.

Raspberry Pi Interfaces:

- **Serial:** The serial interface on Raspberry Pi has received (Rx) and transmit (Tx) pins for communication with serial peripherals.
- Serial Peripheral Interface (**SPI):** SPI is an existing occurrence of the same time (synchronous) serial data protocol used to interact with one or other devices.
- **I2C:** The I2C interface pins on Raspberry Pi allow you to connect hardware modules. I2C interface allows synchronous data transfer with just two pins - SDA (data line) and SCL (clock line).

(RFID) Radio Frequency Identification:

Radio Frequency Identificationuseradio frequency to capture and read the data or information stored on a tag attached to a thing (object) [IX]. The tag can read the data up to some feet. Uses NFC (Next Field Communication protocol), IC (Integrated Circuit) Cards, and Radio Waves. RFID Structures are divided into two parts which are shown in the below figure.

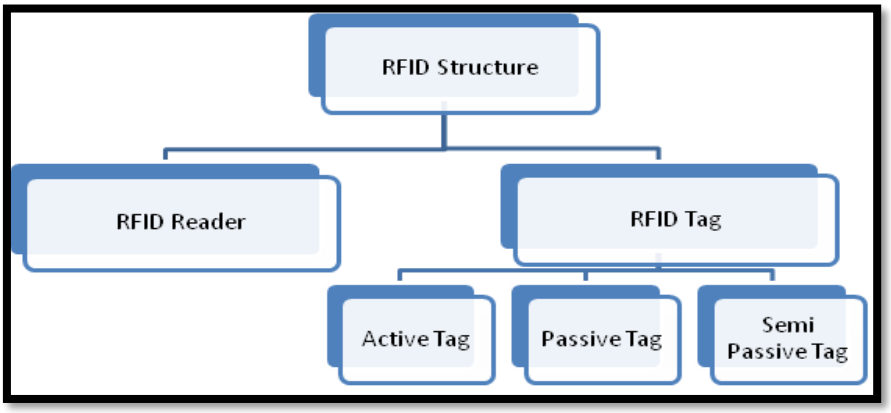

Fig. 2: Show the structure of Radio Frequency Identification Structure

RFID Reader:

RF Signal Generator Generates radio waves that are transmitted through the antenna, receiver, or signal detector receives the signals coming from the object, and to process these signals microcontroller is used [VI].

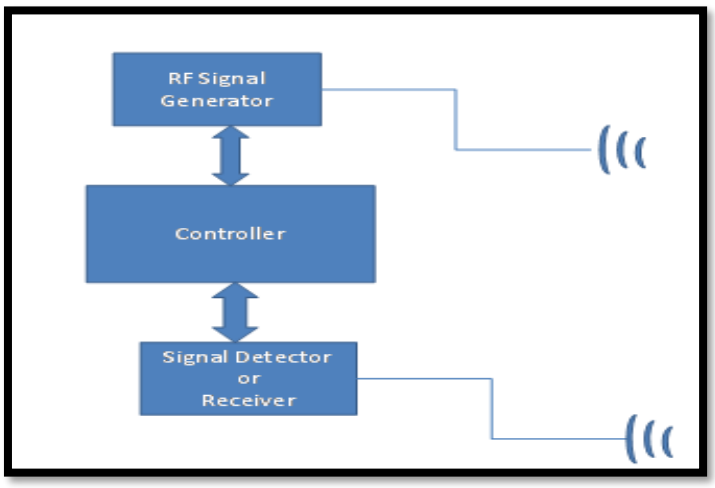

Fig. 3: Shows the process of Radio Frequency Identification Reader

RFID Tags:

The transponder receives signals from the reader and sends back feedback to the reader. The Passive Tags use the rectifier circuit to store the energy coming from the radio waves. This energy is used as the supply for the controller and the memory element [XIV]. Passive Tags do not have their power supply hence rely on radio waves for the source of energy. Semi Passive Tag has its power supply, but for transmitting back they rely on signals coming from RFID Reader. Active Tag uses its

power supply for both transmitting and receiving. The range of Passive Tags is less than that of Semi and Active Tags [X].

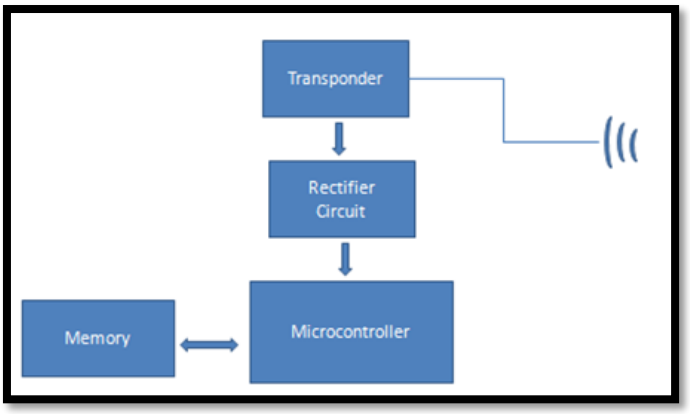

Fig. 4: Shows the functioning of Radio Frequency Identification Tags

III. Implementation

Considering four roads with a center, for each road time limit is fixed for 60 seconds delay, red is on for the other three roads i.e Road2, Road3, Road4, if Road1 is green [V], [VI]. If the LED Orange color is ON it indicates that an Emergency vehicle is ready to pass. This can be explained in a tabular format [VII], [VIII]. Table1

Roads	LED's On-Road			
	Road 1	**Road 2**	**Road 3**	**Road 4**
Road 1	Green	Red	Red	Red
Road 2	Red	Green	Red	Red
Road 3	Red	Red	Green	Red
Road 4	Red	Red	Red	Green

Fig 5: Describes the Structure of the traffic control system.

Emergency Vehicles

Tables 2,3,4 and 5 describes when an emergency vehicle comes from the following roads.

Priority for Road1:

Roads	LED on Road
Road 1	Orange
Road 2	Red
Road 3	Red
Road 4	Red

Table 2: Priority is given for the Road1 when an Emergency vehicle comes on Road1

Priority for Road2:

Roads	LED on Road
Road 1	Red
Road 2	Orange
Road 3	Red
Road 4	Red

Table 3: Priority is given for the Road2 when an Emergency vehicle comes on Road2

Priority for Road3:

Roads	LED on Road
Road 1	Red
Road 2	Red
Road 3	Orange
Road 4	Red

Table 4: Priority is given for the Road3 when an Emergency vehicle comes on Road3

Priority for Road4:

Roads	LED on Road
Road 1	Red
Road 2	Red
Road 3	Red
Road 4	Orange

Table 5: Priority is given for the Road4 when an Emergency vehicle comes on Road4

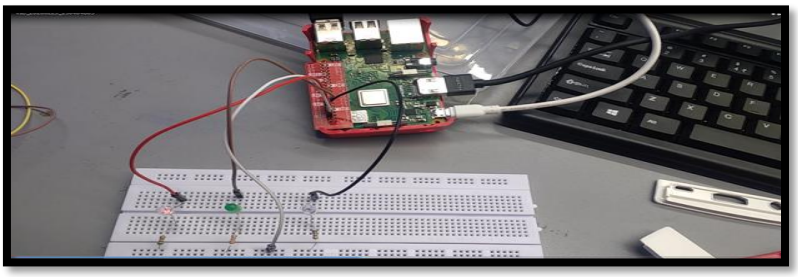

Fig. 6: Shows the implementation of traffic control system on the roads

Output:

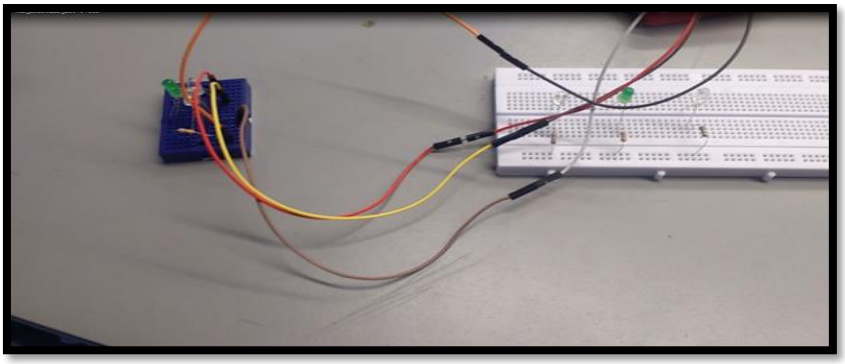

Fig. 7: Traffic control system on the roads when an emergency vehicle comes on the corresponding road

IV. Conclusion

In this paper, we implemented a system that controls the traffic on the roads when an emergency vehicle comes on the corresponding road priority is given for that road, here emergency vehicles are specified the utmost priority.

Conflict of Interest :

No conflict of interest regarding this article.

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