

# Detection and Recognition of Vehicle Using Neural Networks

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**ABSTRACT:** In modern world the technology is growing at faster pace but there is still lot of fields need to be advanced. Toll mechanism is one of those things that needs to be advanced. It is known that the queuing is still a drawback in the toll gate system. There is no such system to eliminate this queue. The systems proposed by others are not implemented because of its major drawback and logical errors. So we propose a concept of queue eliminating system using raspberry pi. By this method we are reducing the queue system in the toll gate by capturing the image of the number plate and detecting the type of vehicle with the captured number plate. And amount will be deduced from the user account then the toll gate will be opened automatically.

## I. INTRODUCTION

Automatic car license plate detection and recognition plays an important role in intelligent transportation systems. It has a variety of potential applications ranging from security to traffic control, and attracts considerable research attentions during recent years.

However, most of the existing algorithms only work well either under controlled conditions or with sophisticated image capture systems. It is still a challenging task to read license plates accurately in an uncontrolled environment. The difficulty lies in the highly complicated backgrounds, like the general text in shop boards, windows, guardrail or bricks, and random photographing conditions, such as illumination, distortion, occlusion or blurring.

The main contributions of this work are as follows:

- A single unified deep neural network is proposed, which can detect license plates from an image and recognize the labels all at once. The whole framework involves no heuristic processes, such as the use of plate colors or character space, and avoids intermediate procedures like character grouping or separation. It can be trained end-to-end, with only the image, plate positions and labels needed for training. The resulting system achieves high accuracy on both plate detection and letter recognition.
- Secondly, the convolutional features are shared by both detection and recognition, which leads to fewer parameters compared to using separated models. Moreover, with the joint optimization of both detection and recognition losses, the extracted features would have richer information.

The use of camera and raspberry pi in combination with each other, along with adequate power supply would result in faster movement of transports through toll booths.

## II. LITERATURE SURVEY 2.1.LI-FI BASED AUTOMATIC

### TRAFFIC SIGNAL CONTROL FOR EMERGENCY VEHICLES

In this paper, a V2V communication system is proposed in which the headlight and tail light of a vehicle are made as Li-Fi transmitter and Li-Fi receiver respectively. Using the proposed system, when a traffic signal receives an alert regarding an emergency vehicle, the traffic signal would immediately turn green. Thus, decreasing the waiting time of emergency vehicles in traffic dense lanes. The proposed system was designed, implemented and tested for its operation.

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PUBLISHED IN: 2018 Second International Conference on Advances in Electronics, Computers and Communications (ICAIECC) AUTHOR(S): R Shanmughasundaram ; S Prasanna Vadanam ; Vivek Dharmarajan

**AUTOMATIC TOLL COLLECTION USING QR CODE** Nowadays streams of traffic are increased, toll gates on highways are congested and use manual toll collection system causing long queues of vehicles, the heavy traffic jam and the waste of time of travelers. To avoid such problems, we are developing the system which automatically will reduce the toll amount registered with a vehicle at the time of vehicle registration.

In this system camera is used for capturing the QR code mounted on front side of the vehicle which will be sent to QR code decoding process, if the information is authentic which is already stored in central database, the amount will be deducted and booms will open automatically, if it is not then vehicle will be blocked.

PUBLISHED IN: International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 10 | Oct - 2016 AUTHORS: Kasturi Shah, Prajakta Joshi, Dishaa Garg

### MEASUREMENT PLATFORM FOR ELECTROMAGNETIC CHARACTERIZATION AND PERFORMANCE EVALUATION OF UHF RFID TAGS

In this paper, after a theoretical formulation, an accurate, flexible, robust, and cost-effective RFID tag characterization and performance evaluation platform is presented and validated. It allows the calculation of the main metrics characterizing an RFID tag as a function of the tag activation power threshold when varying both interrogation frequency and tag orientation. The system is validated on both specifically designed and commercial RFID tags in terms of sensitivity, working range, and tag antenna radiation pattern: measurements show strong agreement with the theoretical and simulation results.

AUTHORS: RICCARDO COLELLA, LUCA CATARINUCCZ

PUBLISHED IN: IEEE Transactions on Instrumentation and Measurement (Volume: 65 , Issue: 4, April 2016)

### VULNERABILITY ANALYSIS OF HIGHWAY TRAFFIC NETWORKS USING ORIGIN-DESTINATION TOLLGATE DATA

The existing research on analyzing the vulnerability of road networks is largely dependent on the assumption of a known traffic model in the simulations. In this paper, the author, presents a new approach for quantitatively evaluating the vulnerability of highway networks based on real-world highway tollgate data that reflect the highway's characteristics, such as structural betweenness and traffic movements. Specifically, O-D (origin- destination) tollgate data are collected across three major highway networks in China (Beijing city and Shanxi and Anhui Provinces) for three months.

The case study examines the vulnerability of highway traffic networks from both macroscopic and microscopic perspectives. Moreover, a more in-depth study of vulnerability is conducted from residential and transportation perspectives. The evaluation results will serve as guidelines for improving the toll highway system. i.e., to help the road administration identify the critical sections (that are highly vulnerable to congestion) and take early maintenance actions for avoiding monetary/time costs caused by disruptions.

PUBLISHED IN: 2016 IEEE 19th

International Conference on Intelligent Transportation Systems (ITSC) AUTHOR(S): Shi Fang; Kaigui Bian ; Kunqing Xie

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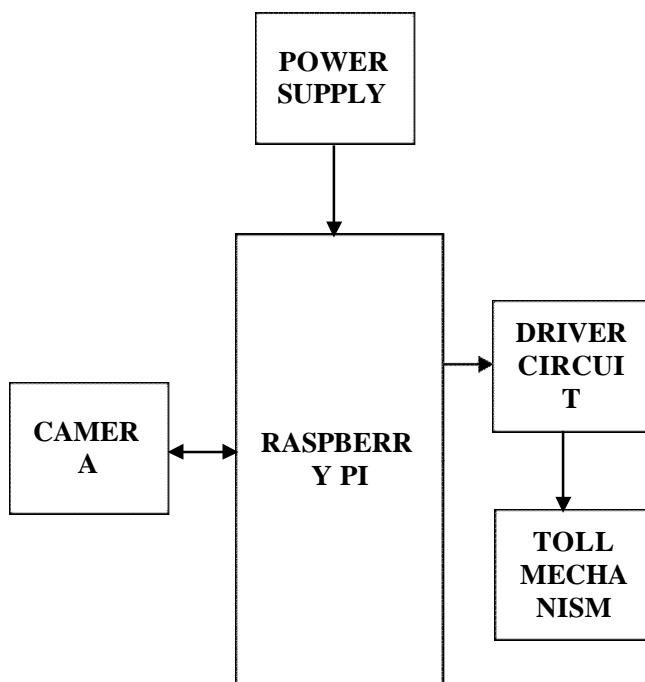
## A MOBILE CHANNEL MODEL FOR VLC AND APPLICATION TO ADAPTIVE SYSTEM DESIGN

In this paper, the author proposes a realistic channel model for visible light communication (VLC) assuming a mobile user. Based on non-sequential ray tracing, we first obtain channel impulse responses for each point over the user movement trajectories, and then express path loss and delay spread as a function of distance through curve fitting.

The results demonstrate large variations in received power. In system design, this necessitates the use of adaptive schemes, where transmission parameters can be selected according to channel conditions. To demonstrate the benefits of link adaptation over a mobile VLC channel, the author, proposes an adaptive system with luminary selection and demonstrate improvements in spectral efficiency over non-adaptive systems.

PUBLISHED IN: IEEE Communications Letters (Volume: 21, Issue: 5, May 2017 ) AUTHOR(S): Farshad Miramirkhani; Omer Narmanlioglu ; Murat Uysal ; Erdal Panayirci

### III. WORKING PRINCIPLE BLOCK DIAGRAM



#### HARDWARE REQUIRED

- POWER SUPPLY
- CAMERA
- RASPBERRY PI
- DRIVER CIRCUIT
- TOLL MECHANISM

#### SOFTWARE REQUIRED

- PYTHON
- RASPIAN OS

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## IV. HARDWARE DESCRIPTION

### POWER SUPPLY

This includes three major components, which are 1) **Transformer**- The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op-amp. 2) **Bridge rectifier**- When four diodes are connected as shown in figure, the circuit is called as bridge rectifier. The input to the circuit is applied to the diagonally opposite corners of the network, and the output is taken from the remaining two corners. 3) **Voltage Regulators**- Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage. The regulators can be selected for operation with load currents from hundreds of milli amperes to tens of amperes, corresponding to power ratings from milli watts to tens of watts.

### DRIVER CIRCUIT

The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays. It consists of seven NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diode for switching inductive loads. The collector- current rating of a single Darlington pair is 500mA. The darlington pairs may be paralleled for higher current capability. Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED gas discharge), line drivers, and logic buffers. The ULN2003 has a 2.7k $\Omega$  series base resistor for each Darlington pair for operation directly with TTL or 5V CMOS devices.

### TOLL MECHANISM

**DC MOTOR**- A DC motor is designed to run on DC electric power. Two examples of pure DC designs are Michael Faraday's homopolar motor (which is uncommon), and the ball bearing motor, which is (so far) a novelty.

**RASPBERRY PI CAMERA** Raspberry Pi Camera Module Mount – Acrylic is an adjustable mount setup for the Raspberry Pi camera. These are cut out of acrylic sheet. Raspberry Pi Camera Module Mount is a great accessory for Pi shutterbugs. The Pi camera can be attached using little screws; also the design allows multiple positions. Ultimately it gives you amount which aids to fix the camera in the desired position as well as provides protection for the camera board. The Raspberry Pi camera module can be used to take high-definition video, as well as stills photographs. It's easy to use for beginners, but has plenty to offer advanced users if you're looking to expand your knowledge.

### CAMERA

A webcam is a video camera that feeds or streams its image in real time to or through a computer to computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and email as an attachment. When sent to a remote location, the video stream may be saved, viewed or on sent there. Unlike an IP camera (which connects using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops.

## V. PROPOSED SYSTEM

In the proposed system, we are overcoming the drawbacks from the existing system. Here we are using raspberry pi microprocessor to control the toll gates. When a vehicle reaches the toll gate then the number plate of the vehicle is captured by the camera and send the details to the microprocessor to check what type of vehicle (truck, car) and the respective cost will be deducted from the vehicle then the toll gate will be opened for the vehicle automatically. If the vehicle doesn't had enough money, then the toll gate will not be opened for that vehicle.

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## ADVANTAGES: -

- Fast check out from toll gate.
- No need of manual effort

## VI. CONCLUSION

In this fast paced world, queue system is one of the things every individual loathes. The above proposed mechanism of using Raspberry pi and webcam in the toll mechanism would aid in motion capture and recognition of number plates, while the vehicle approaches the toll. The instant detection of the vehicle and its weightage would automatically deduct the toll fare. Thus this will result in a hassle free transportation. Thus in conclusion the toll mechanism in combination with use of web cam and raspberry pi proves to be efficient in faster movement of transports.

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