Smart Traffic Management System

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Abstract: We have a new concept for smart traffic system, here we have two approaches for managing the traffic. The first one is attaching an electromagnet just before the junction. The effect of magnetic field will depend on the rush and gathering of the vehicles which will be calculated using machine learning techniques. The second one is to install an advanced camera system at the toll gate to identify the vehicle authorization for tax collection.

Introduction: Introducing a technique is not here the main goal but making the system smooth and seamless journey on the road. As we see on crossings where there is much more vehicles passing, sometimes the single one driver causes the big problems for all the other vehicles. So to taking care on these things we have introduced an electromagnetic system to stop the vehicles if they try to move in unmannered way. Before the crossings we are attaching an electromagnet whose effect will depend on the algorithm which will be calculated on the machine learning technique. The moment the red light of the signal will be shown magnetic effect will start working and the moment the green light will be shown magnetic

The other place where we find the problem is toll gate. This is the place we wait for giving our money. Here we are trying to install a powerful camera system which will detect the moving vehicle's number plate. Here the number plate will be directly linked with the bank account of the owner of the vehicle which can be done at the time of buying the number plate. Whenever the vehicle will pass through the toll gate the number will be identified and toll tax will be collected directly through the account. This way there is no need to wait for giving tax.

Existing System: The present system is not bad until you face a gathering of the vehicles. In day to day life we often see accidents due to rush and a long queue of vehicles at the toll gates. At present we have a traffic signal which switches it's light signal after a time limit. The toll tax system is now having two ways either collecting through manually or through fastag. The fastag method is newly implemented way which is good but in the practical life we also face problems like buying a physical sticker from certain official tag provider and then installing also we see at the toll gate there is separate way for with fastag and without fastag installed vehicles.

System Design: There is two separate design one for electromagnetic crossings and other for toll gate. This system do not uses human interaction anywhere neither at the crossings nor at the toll gate. It uses various hardware components like Arduino Uno, traffic light led, Raspberry Pi kit, electromagnet etc.
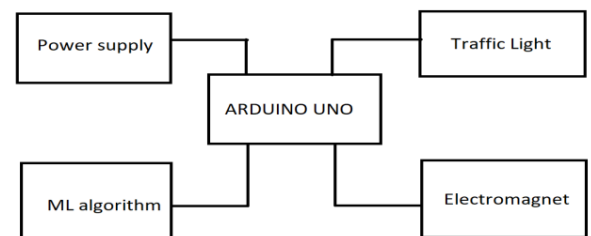

Fig 1: System Block Diagram for electromagnetic crossings

The all four component Arduino Uno, electromagnet, traffic light led and battery connected together and will perform their function according to the algorithm. Whenever there is a red signal then electromagnet will also start working.
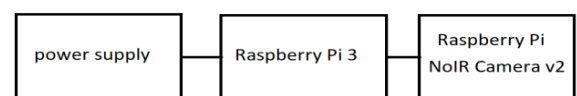

Fig 2: Block diagram for toll gate camera system

The Raspberry Pi is a controller which will be connected to the power supply and Raspberry Pi NoIR Camera. This connection has the function to identify the moving vehicle authorization by detecting the number plate.

Hardware Description:

A. Arduino Uno: The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.

B. LED Traffic signal light: In market there are available led signal lights which work as traffic signal light. It has red, yellow and green LEDs.

C. Electromagnet: An electromagnet is a type of magnet in which the magnetic field is produced by an electric current. Electromagnets usually consist of wire wound into a coil. A current through the wire creates a magnetic field which is concentrated in the hole, denoting the centre of the coil.

D. Raspberry Pi: Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation in association with Broadcom. The Raspberry Pi project originally leaned towards the promotion of teaching basic computer science in schools and in developing countries.

E. Raspberry Pi NoIR camera v2 : The Raspberry Pi Camera Module v2 replaced the original Camera Module in April 2016. The v2 Camera Module has a Sony IMX219 8-megapixel sensor. This camera module is used to take high definition video as well as photographs.

Results: The results shown are based on prototype we have used.
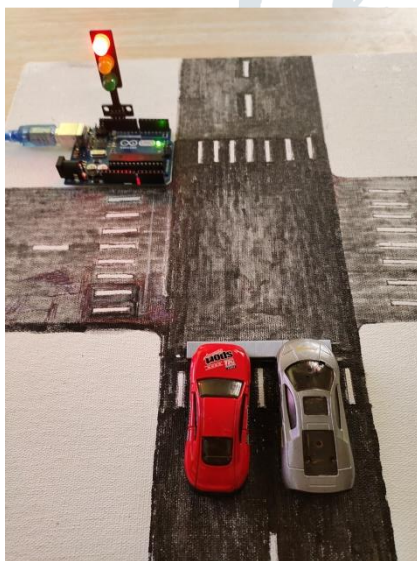

Fig 3: Vehicle standing on red signal

The number plate recognition have been done using raspberry Pi and Pi camera.

Here, OpenCV library is used to detect and recognize faces.
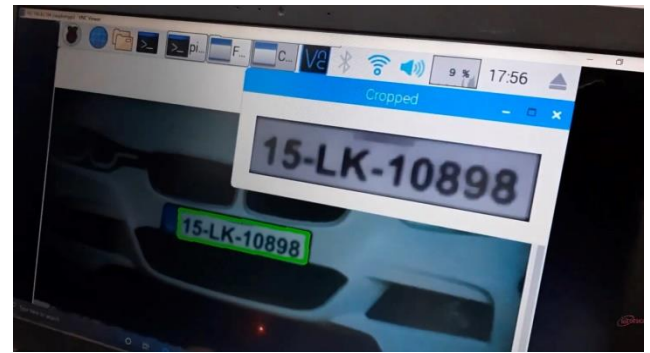

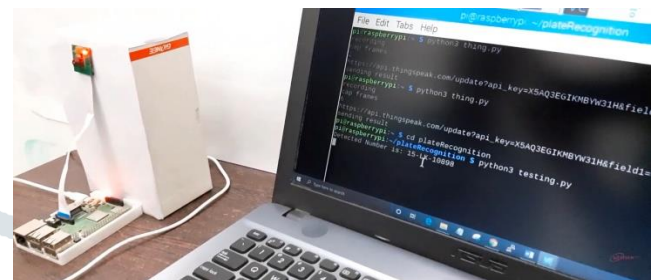Fig 5: Number plate detection after putting an image in front of camera

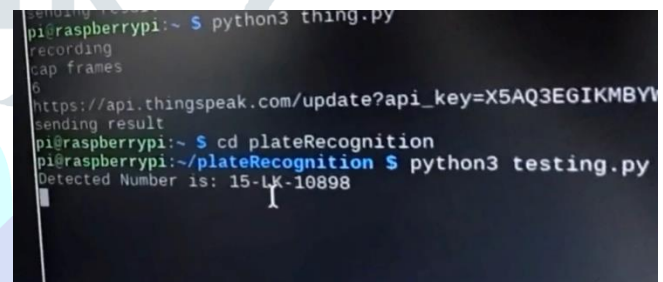Fig 6: Number plate recognition on monitor

Fig 7: Showing the number plate detected is 15-LK-10898

Conclusion: In this paper we have discussed how to improve the present existing system. How we can make a small and well managed traffic system. We have seen various surveys regarding traffic control. Many countries are trying to implement various methods to overcome the present situation of traffic. Our project will be beneficial in many ways. It will make our journey pleasant, will reduce traffic congestion. It will also boost the economy of the country. By implementing this system, we can save money time and efforts all this with free of hazardous incident which nowadays happen generally more often.

Refrences:

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Guo-You Wang, "Automatic LicensePlate Location and Recognition Based on Feature Saliance," IEEE Transactions on Vehicular Technology, vol. 58, no. 7, pp. 3781-3785, 2009.