Research Article

DESIGN OF AUTOMATIC NUMBER PLATE RECOGNITION SYSTEM FOR MOVING VEHICLE

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ABSTRACT

Automatic Number Plate Recognition (ANPR) system is a process of capturing the image of the number plate of a vehicle and the captured images are then processed using image processing. The processed image is then compared with the vehicle database in this system; we also calculate the speed of the vehicle using the sensor unit. The speed details are displayed on the webpage. This system gives an automatic alert if the vehicle crosses the speed limit. If any traffic violation occurs the information will be sent to the internet. The stolen vehicles are also detected using RFID technology. The use of ANPR will be helpful in the place of accidents, and toll collection, tracking stolen cars, red-light violation enforcement, and border checkpoints.

Keywords: Number plate recognition, Image processing, Compare with the database, RFID for unique identification of the vehicle, Speed calculation.

INTRODUCTION

Automatic Number Plate Recognition (ANPR) system has a wide range of applications, which use the extracted number plate to create an automatic solution for various problems. The number plate image is captured using the ANPR cameras. These captured images are processed and then compared with the database. The speed limit is monitored using a sensor unit. If the vehicle number plate is replaced by a stranger it can be detected using the RFID technology.

Related Work

The number plate images are captured using the camera. The license plate location, character segmentation and character recognition are done.

The system performs well on various types of vehicle license plate images, even on scratched, scaled plate images [1]. Main objective of this paper is to successfully locate this standard Egyptian number plate, segment characters and recognize them to

given car image. The system deals with different angles, distances, scales, resolutions, and illumination conditions [2]. This system deals with the detection of an Indian number plate. Extraction of number plate accuracy may be increased for low ambient light image [3]. In this system the input car image is converted into grayscale image, the noises are reduced, license plate detection, a segmentation of characters, and then recognition. The noises will be filtered in this technique [4]. The main objective of this system is to detect the Iranian number plate. This system has proved the accuracy of %97.3 in the extraction of plate region, %94 in the segmentation of characters, % 92 in recognition of the characters [5]. The main objective of this number plate is to detect Turkish license plates. The accuracy of this system is that %97.6 in extraction, %96 in segmentation, %98.8 recognition, and % 92.57 overall system performance recognition rates [6].In this paper, Gabor filter based extraction method is used. These are used in the place of low-resolution gray character. This method is very effective in character recognition [7]. This method is mainly

applicable to Malaysian number plates and used for number plate having Latin characters. This system is also applied for various images under the condition of sunny, cloudy, rainy, daytimes, night times and so on[8].

Problem Statement

In the existing system, the number plate is recognized for the standing vehicle. There will be no more automatic alert. It is difficult to detect the violating vehicle. The number plates are recognized using the morphological operator. The templates are matched using optical character recognition. Some filtering techniques are used to locate the number plate. It is difficult to detect the vehicle details if it is moving. The vehicles speed details are also not added in the existing system. Also, this existing system is difficult if noises are introduced. This system is also complicated if the vehicle number plate is replaced by the stranger.

Proposed System

In the proposed system, the number plate is processed using image processing and are compared with the database. This also includes RFID technology to find the vehicle details uniquely. By this RFID technology if the vehicle is stolen and replaced by the stranger means it can be easily detected using this system. This system includes the cameras of infrared illumination where we can able to capture the images at any time. The speed details are also monitored and displayed on the webpage. There will be an indication and alert if any traffic violation occurs, and the vehicle crosses the speed limit. This system is very effective and fast when compared to the existing system.
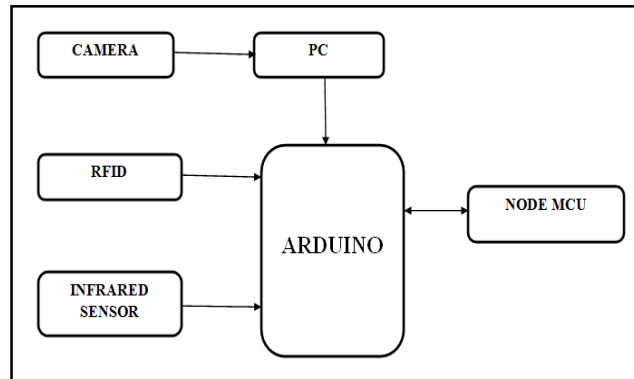
Features

- Detects and read number plates automatically 24*7 in real time system.
- Gives an automatic alert for the over speed and stolen vehicles.
- Detects vehicle speed up to 60 km/hr.
- Highly precise details of the vehicles.
- Displays the vehicles details as well as the speed limit in the webpage.

Block Diagram

Components Used

Hardware components used are Arduino Uno, RFID, Node MCU (Wi-Fi), and Hall sensor. Software components used are Arduino IDE, language: Embedded C.

ARDUINO UNO

Arduino Uno is an open-source microcontroller board based on the Microchip AT mega328P microcontroller. The board is equipped with sets of

digital and analog input/output (I/O) pins that may be interfaced to various expansion boards and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmed with Arduino IDE (Integrated Development Environment) via a type B USB cable. The operating voltage is 5 Volts. The input voltage is 7 to 20 volts. It is an open-source electronic platform based easy to use hardware and software. The Arduino Uno is easy to use for beginners and flexible with the environment.

RFID

Radio Frequency Identification (RFID) uses radio frequency waves to communicate with RFID readers. The tags have electronically-stored information. Passive tags collect energy from nearby RFID reader's interrogating radio waves. Active tags have a local power source (such as the battery) and may operate hundreds of meter from the RFID reader. RFID is one method of automatic identification and data capture (AIDC). RFID tags are used in many industries. RFID tags can be attached to cash, clothing, and automobiles and provide the information of the objects. It can able to read the details of the object without direct contact. The maximum distance of the RFID reader is 1.5 meters. The ranges can be increased by using a multi-port reader. It can access multiple RF tags.
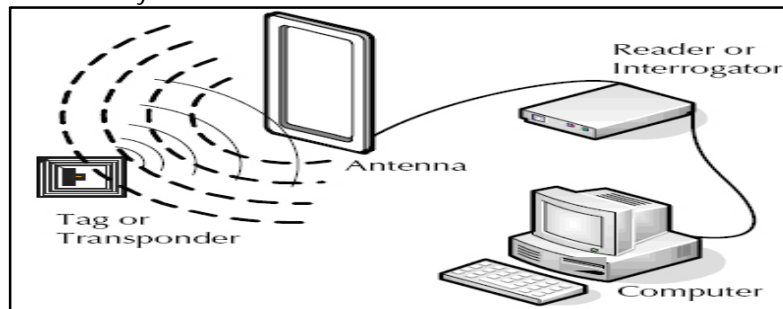

INFRARED SENSOR
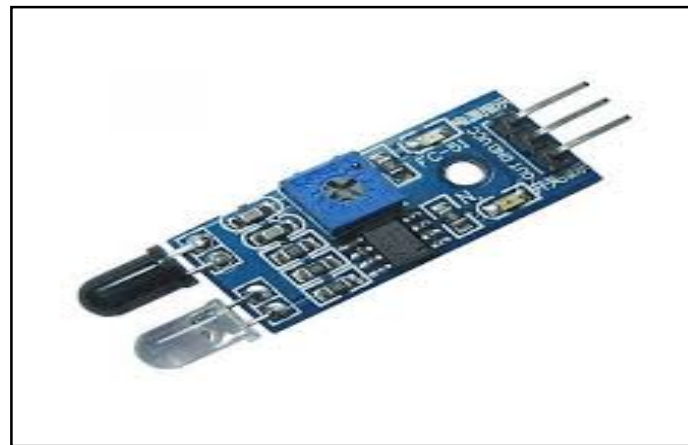
Infra red sensors are used to sense the surrounding aspects. It senses the object by emitting infrared radiation. It also detects the object in motion. It is also capable of measuring the heat emitted. The supply voltage of infrared sensor is between 4.5 and 5v direct current. It extends the nominal red range of the visible spectrum at 700 nanometer (nm) to 1 millimeter (mm). The frequency range varies from 430 THz to 300 GHz. Infrared sensor can be active or passive. There are two types of infrared sensor. They are thermal infrared sensor and quantum infrared sensor. The motion of an object can be detected using passive infrared sensor. There are wide ranges of application in the infrared sensor. They are used to calculate the speed of the motor, temperature control, target acquisition, surveillance, night vision, homing, tracking. It also detects the overheating of electrical appliances.
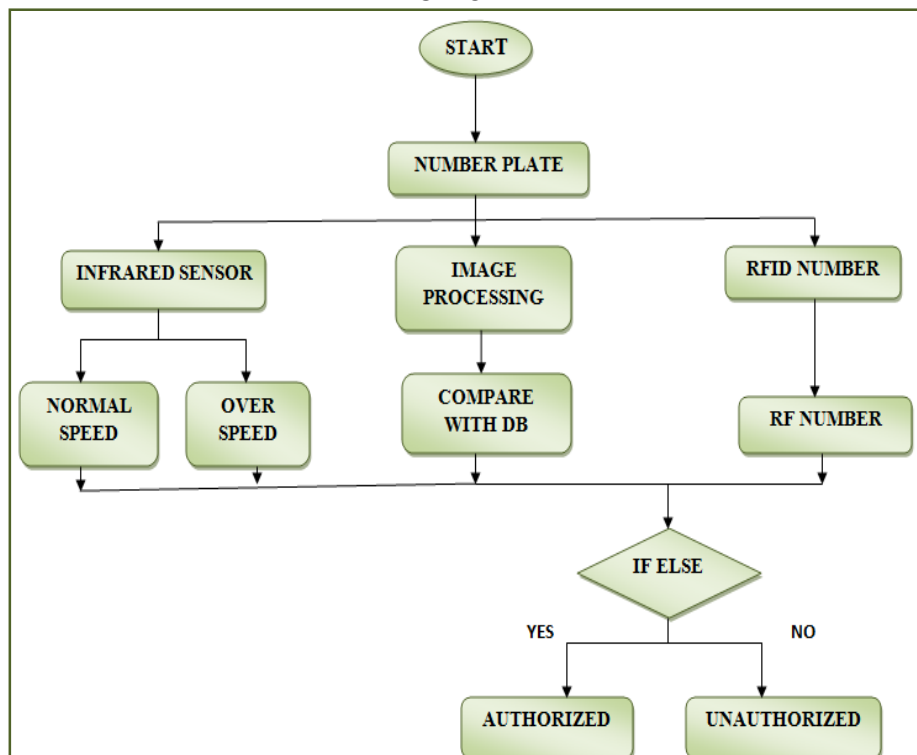
NODE MCU
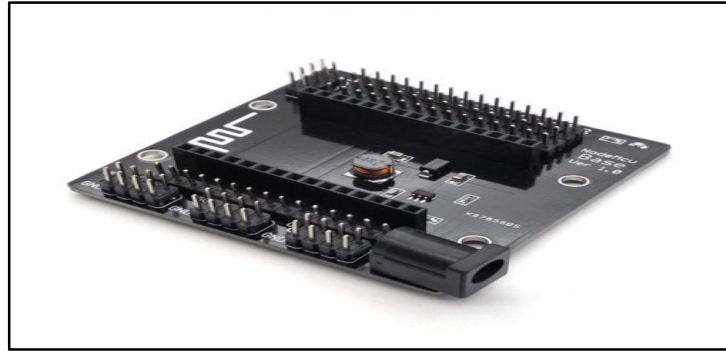
It can be programmed with a simple and Lua programming language or Arduino IDE. The node MCU is a programmable Wi-Fi module. Node MCU is an extremely powerful tool for Wi-Fi networking.

The USB-TTL and plug and play are also included in the Node MCU. This is an event-driven API for network application.

FLOW CHART

Implementation And Methodology

This ANPR system was implemented using the Arduino microcontroller. The Arduino is used to control the hardware components. The Node MCU will act as the Wi-Fi module. In this Node MCU, we will create the Webpage using the HTML language. The HTML program will be uploaded in the Node MCU and the webpage will be created, the URL of this webpage will be noted. We can use this URL and display the vehicle details. Initially, the image will be captured by the ANPR camera after that the images are processed using the image processing; meanwhile, the speed of the vehicle will be calculated using the sensor unit. Also we will have a unique RFID for every vehicle these RFID details also will be added in the database whenever the processed images of the vehicles is compared with the database the RFID is also compared if these two things match with the database the webpage will display as the Authorized vehicle otherwise it will display as Unauthorized vehicle. In the final output, we will display the vehicle details as well as the speed of the vehicle. The vehicle speed will be calculated if it crosses the speed limit there will be

an indication in the webpage. This is the implementation of the Automatic Number Plate Recognition System.

ADVANTAGES

- Fast process
- Accurate results
- Road safety can be increased
- Reduced crime
- Deterring terrorism.
- More efficient and provides automatic solution.

Conclusion

The Automatic Number Plate Recognition system plays an important role in detecting a security threat. Furthermore, this system can also detect the vehicle moving at a speed of 120 km/hr also can detect the person if he speaks over the phone during driving. The system is used in traffic control, tracking the stolen cars, traffic violation, and border checkpoints and so on. System speed and accuracy can be increased if we use high- resolution cameras.

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