Autonomous Tracking of Vehicle Taillights and Signal Detection by Using Arduino

T.Selvi[1], N. Ramya Devi[2]
[1, 2] Department of Electronics & Communication Engineering
[1, 2] Sri Guru Institute of Technology, Coimbatore, India

Abstract- *This project deals with the headlight detection in movable object. The tail light appears as a bright with high luminous, hence it is observed by a sensor and its data is sent to the controlling unit. An important aspect of collision avoidance and driver assistance systems, as well as autonomous vehicles, is the tracking of vehicle taillights and the detection of alert signals (turns and brakes).The tail light is detected by coding in MATLAB. In the prototype model the arduino UNO is used with RFID reader. The serial communication UART is used here for data transmission. In this project, we propose an efficient and robust algorithm for tracking vehicle taillights in all lighting conditions, detecting and classifying vehicle alert signals, and counting the number of passing vehicles in neighboring lanes.*

Keywords- Arduino,RF Reader, UART and MATLAB

I. INTRODUCTION

The ability of computer vision-based systems to provide visual data for other advanced applications make them preferable over current systems being researched and marketed Vision-based mobile tracking systems with decision capabilities have become a viable application with the development of embedded smart cameras capable of performing onboard processing and wireless communication.

Vehicle detection has many applications in military and home-land surveillance, intelligent traffic systems, traffic management, and transportation planning. Most vehicle detection research and development has been done with respect to the aerial imagery with a spatial resolution of 0.35 m or less [1]. The morphological image processing is a technique used for collection of non-linear operations, to relate the shape or morphology in an image. According to the imaging morphological operations rely only on the relative ordering of pixel values, not on their numerical values, and therefore are especially suited to the processing of binary images. Morphological operations can be applied to grayscale images such that their light transfer functions are unknown signals are arranged with respect to the and therefore their absolute pixel values are of no or minor interest [2]. Mathematical morphology is a technique, it is very useful for image processing, shape analysis, pattern recognition and feature extraction. The Morphological shared-weight neural networks (MSNNs) have been successfully used for automatic vehicle detection. Vehicle detection using morphological and fuzzy logical was carried out in [3]. Automatic Traffic Estimation using morphological operation, image enhancement, RGB to gray transform is carried out in [4] Morphological change detection algorithm for Real Time Traffic Analysis is one of the application of vehicle detection is implemented in [5]. Erosion and Gray scale Dilation , in gray scale binary images are simply enlarge to gray scale images using min, max operations. Erosion and dilation of an each image in the operation assigns to an each pixel with minimum and maximum value create in the neighborhood of the matching pixel in the input image.

II. SYSTEM DESCRIPTION

Fig 1 shows the block diagram it illustrates the block diagram of proposed methodology. First the input traffic video is captured using MATLAB command. Then Video is converted into number of frames and each frame is assigned as an image.

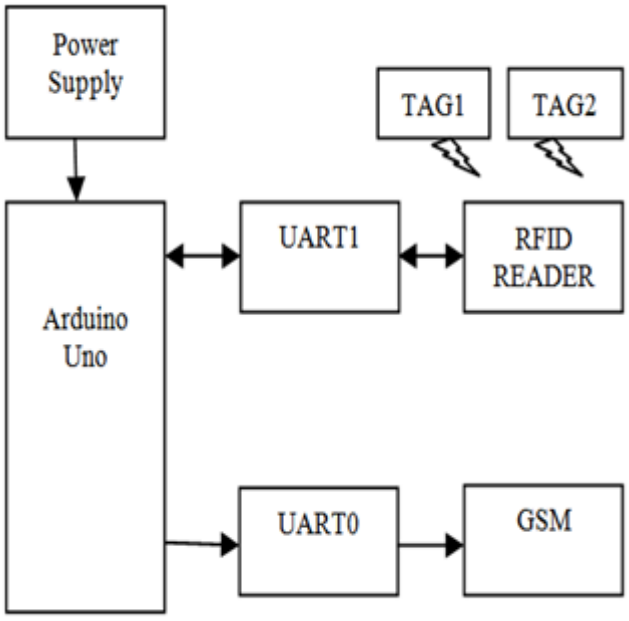

Fig. 1. Block Diagram

The assigned image is sent to the serial port communication UART with respect to the Arduino UNO unit. The prototype model is designed and assigned to the each light movement. The tail light detection is used in many applications for accident prevention and it also gives to the hand to improve the traffic analysis. The GSM module is used here to communicate the system with the owner or customer in case of emergency.

A. Arduino UNO

The Arduino Uno is a microcontroller board based on the ATmega328 . It contains 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. Simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter. For this task arduino is chosen because it is an free open source hardware and software developing company that facilitates the people with its various microcontrollers that help an individual to explore the world of electronics with just a little knowledge.

In addition Arduino is very cheap and affordable. Similarly it works on various other platforms like Mac OS, Linux and Windows. Hence Arduino is the most reliable, efficient and affordable microcontrollers to test the task.

B. Serial Communication with Arduino

The Arduino board can communicate at various baud ("baud rates"). A baud is a measure of how many times the hardware can send 0s and 1s in a second. The baud rate must be set properly for the board to convert incoming and outgoing information to useful data. If your receiver is expecting to communicate at a baud rate of 2400, but your transmitter is transmitting at a different rate (for example 9600), the data you get will not make sense. To set the baud rate, use the following code:

```
void setup()
{
Serial.begin(9600);
}
```

9600 is a good baud rate to start with. Other standard baud rates available on most Arduino modules include: 300, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, or 115200 and you are free to specify other baud rates.

C. Ultra sonic sensor with Arduino

In industrial applications, ultrasonic sensors are characterized by their reliability and outstanding versatility. Ultrasonic sensors can be used to solve even the most complex tasks involving object detection or level measurement with millimeter precision, because their measuring method works reliably under almost all conditions.

Fig. 2. Ultra Sonic Sensor

D. L293 x Quadruple Half H Drivers

The L293 and L293D devices are quadruple high current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, DC and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications.

Fig. 3. Detected image in MATLAB

Fig 3 shows the headlight detection is achieved by using MATLAB coding, which directly processed by the captured images. The implementation will be in prototype model represented in Fig 4 as shown below

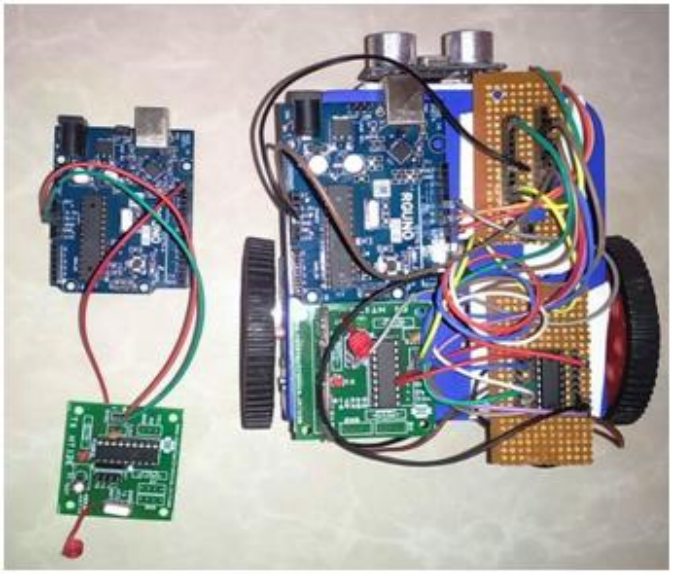

Fig. 4. Hardware Model

III. CONCLUSION

The prototype model indicates with a Arduino UNO and RF module, this system reduces the external dependency on a central database, which would involve some tedious work in putting together a lot of information on mapping the desired locations. Since, each tag is separately programmed to relay-time information; this system is more advantageous and requires lesser implementation of time. Through developed with the welfare of the visually impaired in mind, the system could still be used by all people, making the system economically feasible.

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