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An Efficient Accident Detection and Alert System through Surveillance Camera for Vehicle Tracking Algorithm Using WSN

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Abstract: In this architecture, the automatic recognition emergency system with an intensity high camera is used for real-time emergency vehicle tracking and is located in traffic signals on highways. Many people lost their lives due to the delay in the emergency services. If we minimize the traffic delay, many heart attack patients can be saved. Emergency services should be provided timely and accurately to detect the ambulance when it comes close to a traffic signal and finally estimate the distance to the incoming emergency vehicle with the help of a roadside traffic surveillance unit. Microcontroller used as Raspberry Pi B+ module. ARM11 32-bit processor sensor interfacing such as sound detection siren. The system generates a sequence of information regarding traffic emergency situations and networking. Using the Internet of Things technique, a tracking system for vehicles can be built. The illustrations and assessment are offered to demonstrate and be verified by the embedded system design.

Keywords: ARM, Wireless Sensor Network (WSN), Internet of Things (IoT), Vehicle Tracking Algorithm

1. Introduction

Highway congestion is in massive part as a result of the inefficiency with the roadways networks facility in traffic management. Traffic signals are the mechanism for managing arterial community capability, yet the supervising learning of emergency vehicle alerts, I. Lenz, R. Knepper, et al. (2015) has now not substantially modified over the last few years, notwithstanding rapid and profound changes in electronics, wireless sensors are used in information exchange technologies, and software G. Endo, J. Morimoto, et al. (2008). The principle impediment to enhancements in emergency vehicle control signal systems has been the constrained structures such us constant-factor detectors to measure the actual country of the site visitor‘s. Vehicle to roadside unit (V2RSU) and vehicle-to- vehicle (V2V) cooperation could offer this comprehensive real-time statistics on the movements and interactions of cars within the complete street community and allow a transformation trade on site visitors control techniques and its architecture is shown in the Fig. 1.

Although a majority of the massive cities inside the Asian countries employ pre-timed visitors control, it's far ever visited that nearly 8% of all site visitor’s indicators in the state use traffic detectors, especially for local intersection management (traffic actuation) and a small variety of visitors responsive structures.

1.1. Identification of Emergency Vehicle Images

The identification of emergency vehicle image comprises of identifying and discovering characteristics like the objects in pictures or videos. For identification schemes, the images from the databases are evaluated with the actual image if the equivalent is initiated then added the implementation of the process will be performed in real time application Zhang, and M. Yang, (2012). It aids in verification and agreement process. The below stated are the techniques involved in Emergency vehicle image identification.

Emergency light identifying any pixel samples in an emergency vehicle image. The aims as to identifying the emergency vehicle character such a (AMBULANCE, EMERGENCY, +, 108) textures from an emergency vehicles image. The optical character identification identifies the text and reads it. Police and scientist’s analyses CCTV video footage. When investigating criminal activity. Police use computer code, that performs video content analysis to go looking for key events in video and realize suspects. Surveys have shown that up to seventy fifth of cases involve CCTV. Police uses video content analysis and

computer code for necessary events. K. Zhang, L. Zhang, et al. (2012).

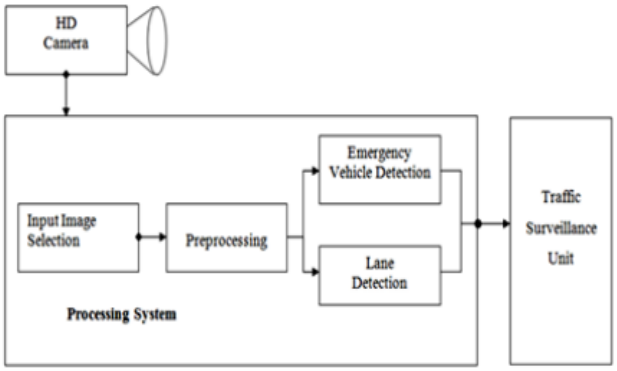

Fig.1 *Block diagram of vehicle tracking System*

A real time video processing based on emergency Vehicle vital information can be provided to traffic police by tracking system can reduce the accident. It consists of High-definition camera to track an emergency vehicle, A. Mohamad Mahdi, M. Kassir, et al. (2014). Pre-processing stage is used to improve the intensity of an emergency vehicle image that suppresses unwanted distortion. Required information to the emergency vehicle driver can be provided correctly. On real time the proposed system should work. To track the high way lanes the system should be able to identify Suarez, S.A, Quintero, et al. (2010). In this research work emergency vehicle. Through Hilditch calculation hypothesis investigating picture is prepared.

2. Proposed Method

In this proposed system the emergency services response time is improved. Optimized Emergency Vehicle Tracking Algorithm is used to identify the emergency vehicle in high way lanes (OEVTA) are used.

Optical Character Recognition capability can be determined by OEVTA software. The details of emergency vehicles is provided by lobby team. Around the road network the flow and movement of vehicles can be provided by Traffic surveillance unit.

Fig. 2 *Flowchart for Optimized Vehicle Emergency Tracking Algorithm*

2.1 Vehicle Emergency Classification

The main goal of this work is to extend an algorithm capable of classifying foreground feature and blob extraction of an emergency vehicle image into the following categories: Ambulance, Fire brigade, Government officials or VIP, Defence Vehicle, Police vehicle and School vans. After training a supervised classifier using classification information provided by the operator, the algorithm should be able to emulate the operator's choices B. R. Talmon, et al. (2016). A graphical user interface was developed using MATLAB library, providing the operator a simple way to classify each one of the vehicles detected, M. Stocker, P. Silvonen, et al. (2015). This allows us to obtain more than 500 blob samples and create a database, where extracted information from the blob as well as the physical classification performed by the operator we restored. Sample emergency vehicle images.

2.2 Standardize Area

Due to point of view effects, each blobs measured area depends on the emergency vehicle image distance to the high-definition camera. To avoid this effect, compute a normalized area, using the area occupied by a blob and its location on scene. where a and b are upper and lower dimensions respectively of the analysis's quadrilateral, and f the relative position of the vehicle inside it, as illustrated in Figure 2. The normalized area is characteristic size relative to the blob 's position inside the quadrilateral.

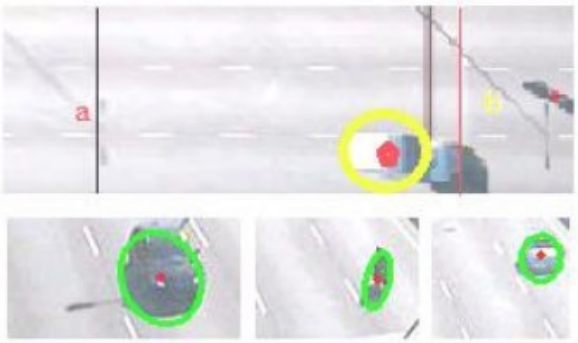

Fig. 3 *Left: upper (a) and lower (b) dimensions of the Emergency vehicle target area.*

Right: relative position f in the range 0-1.

3. Emergency Vehicle Identification using Image Processing Tools

The cameras are located at road side unit (RSU) far away from traffic signal When the system works, the high definition. The video buffer Collects the data and save the data. For video capture high definition digital camera is used. The ability to see in a dark environment the Night visions camera is used.

Table. 1 *Comparison with Proposed and Existing Algorithm*

S.No	Evaluation Factor	Thinning Algorithm	Hilditch's Algorithm	OCR Algorithm	Proposed OEVTA Algorithm
1	Accurate detection	Poor	Average	Good	Good
2	Result of illumination (Day/Night) on a Emergency Vehicle	Day time only	Day time only	Day time only	Accurate on both Day and Night
3	Result of surroundings noise on a Emergency Vehicle	Poor recognition	Average recognition	Better recognition	Accurate Recognition
4	Effect of change in view angle of the Emergency Vehicle	Poor recognition	Average recognition	Accurate recognition	Accurate Recognition
5	Inter vehicle Communication	No	No	No	Yes
6	Information provided to the Emergency center	No	No	No	Yes
7	Execution time (seconds)	56.835	52.456	49.652	45.652

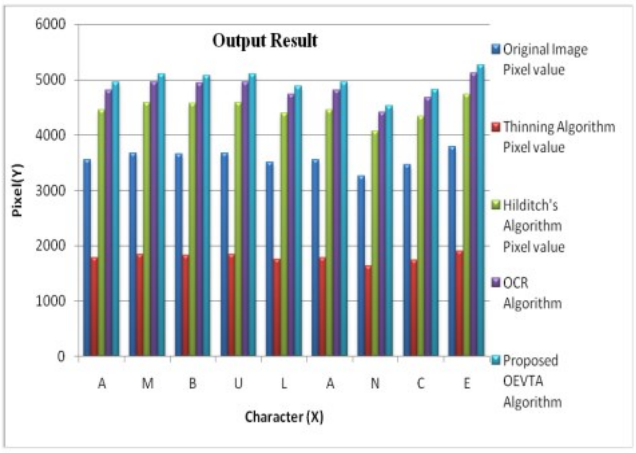

Fig. 4 *Bar Chart Comparison of the Proposed and Existing OEVTA Algorithm of Emergency vehicle*

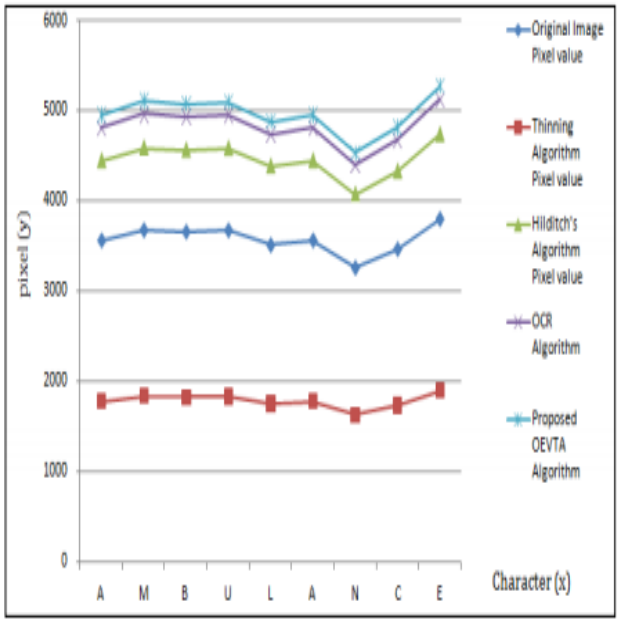

Fig. 5 *Comparison chart of Existing and Proposed OEVTA Algorithm of Emergency vehicle.*

4. Emergency Vehicle Moment Direction

Everyone on the traffic signal get panic how to move in left are right direction at the time emergency situation, while ambulance approach near the traffic signal.

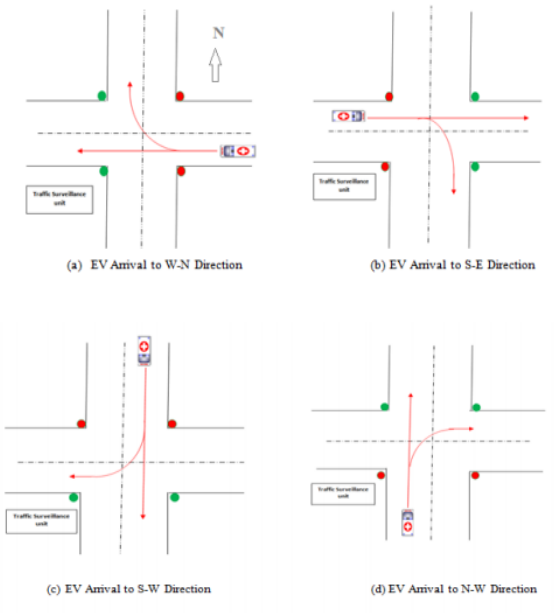

Fig. 6 *Emergency Vehicle arrival from different directions*

4.1 Performance and Analysis Results of Wireless Sensor network

This work was performed using Network simulator 2. The free time was finished utilizing two situations with 100 nodes. In the two cases the seed is set at one packet for each one sec. Both the situations are tried for close to 1-hop, far 5 hops utilizing low 10 packet, and high 100 packets movement loads CBR information Rate and utilizing three unique conventions AODV, DSR for each situation. The time set for reproduction is 1000sec. Subsequently the most extreme number packets decided for transmission are 1000 System activity stack is unaffected. Thirukrishna. et al. (2018), Whenever DSR and AODV are dissected utilizing a packets conveyance proportion parameter by shifting the stopped time in the interims of 0, 10, 20, 40, 100, the outcomes acquired for both on interest directing conventions seem to be comparative. The standardized steering load is broken down for the two conventions by differing delayed occasions.

The qualities for the DSR convention were less when contrasted with the AODV which demonstrate genuinely stable outcomes even subsequent to expanding the quantity of sources. Whenever standardized directing burden is steady, the convention is viewed as adaptable. The directing overhead for AODV is fundamentally from the course asks. DSR finds the course in the reserve because of forceful storing. This keeps away from a successive course revelation process in DSR along these lines diminishing the steering overhead for DSR when contrasted with AODV. The standardized MAC stack is broken down by fluctuating distinctive delayed occasions. The qualities for AODV are less when contrasted with DSR when broke down for lower delayed occasions.

5. Results and Discussion

This method is tested on a portable computer powered by Associate in Raspberry pi B + (1.83 GHZ) electronic equipment. Wireless high-definition camera. We tend to test. Due to increase in highway, highways and tie up, there's an enormous quantity. During this paper we've got incontestable vision primarily based system for effective detection and count of vehicles running on roads Zhang, L. Zhang, and M. Yang (2015). The most aim of our system is to find the moments of vehicles by analyzing camera photos with the assistance of open cv. Prototype Model for EV Siren Sound Detection Setup and Open CV Snap shot result Vehicle character recognition and EV ‘s count method.

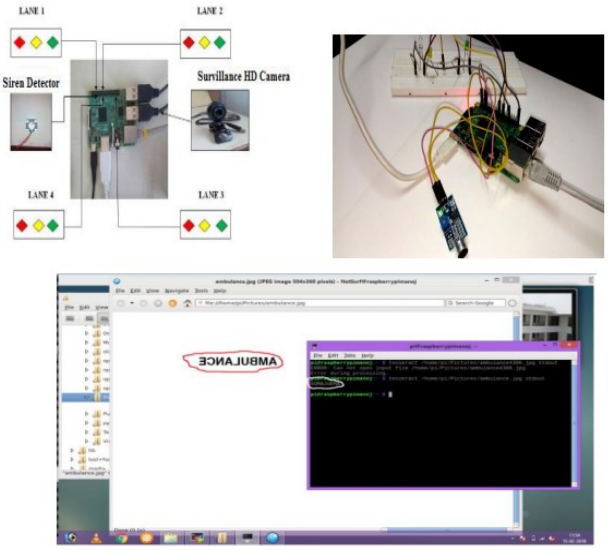

Fig. 7 *Prototype Model for Sound Detection Setup and Open CV Snap shot result*

6. Conclusion

In this research work, for regulating the traffic density and controlling the traffic signal traffic signaling system relies purely on emergency vehicle surveillance. The traffic light signals in different places is controlled by employing sensors can be employed. By using Internet of things vehicle to vehicle communication can be employed. To identify emergency vehicle by using IOT Wireless Mote and ZigBee sensor are placed in every 800 meters of road. Finally, the designing of a new secrecy based a prototype module for Emergency vehicle identification and traffic path clearance.

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