ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 8, Issue 3, March 2020

Multi Sensor Interface for Proactive Accident Detection and Location Tracking Using Extended Kalman Filter Algorithm

Dr.V.Subedha[1], Deepika S[2,] Dharshini G[3], Nandhini Syamala G[4]

Professor & Head, Department of Computer Science and Engineering, Panimalar Institute of Technology, Chennai, India[1]

Final Year, Department of Computer Science and Engineering, Panimalar Institute of Technology, Chennai, India[2 3 4]

ABSTRACT: Bus accidents usually cause more serious injuries than other type of crashes. There are many reason for a accident to occur includes a mechanical failure, poor road infrastructure and other external factors. The existing system, involves scanning the entire image of obstacle which is a time consuming task. The project proposes developing an android application to access the location of the vehicle in case of any minor accidents, puncture and breakdown. The location report can be communicated to the main server. Ultrasonic sensor is placed to detect any footboard travel. Load cell is connected to identify the overall road of the bus. Capacitive sensor is stationed to detect seat vacancy in the bus. Brake sensor is attached to avoid accidents during travel.

KEYWORDS: Android application, Ultrasonic sensor, Load cell, Capacitive sensor.

I. INTRODUCTION

Road safety is one of the critical issue worldwide. Road accidents accounts nearly 1.25 million fatality rate in 2013 placing it in the top 10 causes of death. This is particularly severe in developing countries, with a rapidly growing population of vehicles, inadequate road infrastructure, and poor driver training and discipline. In our project implementation process, Android application is deployed. Through the mobile application driver details is fed into the server and in case of any emergency such as Breakdown, Puncture and minor accidents occurred, the driver should post the information through the mobile application. The location will be shared using GPS to the authorized person and the server. In bus various sensors is placed to compute the capacity and load of the bus and also it is able to detect any footboard travellers it indicates the server. The project would help to reduce the fatality rate by incorporating these techniques in the bus.

II. RELATED WORK

SAYANAN SIVARAMAN AND MOHAN MANUBHAI TRIVEDI(2013)

He provides a review of the literature in on-road vision based vehicle detection, tracking, and behavior understanding. Over the past decade, vision-based surround perception has progressed from its infancy into maturity. It provide a survey of recent works in the literature, placing vision based vehicle detection in the context of sensor-based on-road surround analysis. He details advances in vehicle detection, discussing monocular, stereo vision, and active sensor–vision fusion for on-road vehicle detection. He discuss vision-based vehicle tracking in the monocular and stereo-vision domains, analyzing filtering, estimation, and dynamical models. They provide the nascent branch of intelligent vehicles research concerned with utilizing spatiotemporal measurements, trajectories, and various features to characterize on-road behavior. It provide a discussion on the state of the art, detail common performance metrics and benchmarks, and

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 8, Issue 3, March 2020

provide perspective on future research directions in the field. The GPS vehicles tracking system makes sure that you monitor your resources in real time. It would be able to know numerous aspects such as which resources are free, which routes are the best, what is the ideal speed, etc. GPS also makes you handle your resources more effectively and it builds you're your trust in drivers. Vision-based vehicle detection has maturely significant which is a deeper and more holistic understanding of the on-road environment will remain an active area of research.

VINH DINH NGUYEN, THUY TUONG NGUYEN, DUNG DUC NGUYEN, SANG JUN LEE, AND JAE WOOK JEON (2013)

This evolutionary algorithm (EA) is an effective method for solving various problems because it can search through very large search spaces and can quickly come to nearly optimal solutions. However, existing EA-based methods for vehicle detection cannot achieve high performance because their fitness functions depend on sensitive information, such as edge or color information on the preceding vehicle. They focuses on improving the performance of existing evolutionary-based methods for vehicle detection by introducing an effective fitness function that can more accurately capture a vehicle's information by combining a disparity map, edge information, and the position and motion of the preceding vehicle. Their proposed method can detect multiple vehicles by using a turn-back genetic algorithm (GA) and can prevent false detection by using motion detection. Our fitness function is designed in a typical manner along with the fitness parameters. These parameters are usually selected using heuristic methods, making the choice of optimal parameters difficult. Therefore, this paper proposes a new approach to estimating optimal fitness parameters using EA and the least squares method. Robustness testing showed that the proposed method provides detection rate (DR) results close to those obtained using a state-of-the art system and outperforms other dominant vehicle-detection-based EAs**.** Cheap and self-contained the easiest to deploy of all intrusive systems, recognized technology with acceptable accuracy for strategic traffic modelling purposes, hence very widely used. Axle-based classification appears attractive, given sub-vehicle categories are partially axle based. Some units are not counted or classify vehicles. Tube installations are not durable, the life of tubes are less than one month only. The tube detectors are not suitable for high flow and speed roads. Units should not be positioned where there is the possibility of vehicles parking on the tube. It can't detect the two wheelers.

GWENAËLLE TOULMINET, MASSIMO BERTOZZI, STÉPHANE MOUSSET, ABDELAZIZ BENSRHAIR, AND ALBERTO BROGGI (2006)

This paper presents a stereo vision system for the detection and distance computation of a preceding vehicle. It is divided in two major steps. Initially, a stereo vision-based algorithm is used to extract relevant three dimensional (3-D) features in the scene, these features are investigated further in order to select theones that belong to *vertical* objects only and not to the road or background.These 3-D vertical features are then used as a starting point for preceding vehicle detection; by using a symmetry operator, a match against a simplified model of a rear vehicle's shape is performed using a monocular vision based approach that allows the identification of a preceding vehicle. In addition, using the 3-D information previously extracted, an accurate distance computation is performed. It has potential to extract the 3-D edges of obstacles and ploits the vertical symmetry characteristics of a vehicle. Their technique focuses specifically on image processing which has its own limits.The depth accuracy depends on an precise calibration of the stereo vision sensor,and it is inversely proportional to depth,to put it another way,it rapidly decreases with depth.

FRIEDRICH ERBS, ALEXANDER BARTH AND UWE FRANK (2011)

This is reliable detection of moving objects from a moving observer is one of the most challenging and important tasks for driver assistance and safety systems. Modern sensors such as Lidar, Imaging Radar or Stereo Vision deliver range data plus longitudinal motion (Radar) or even full 3D motion (space-time vision). Based on this data, moving objects have to be separated from the static background to be able to determine their pose and motion state. Usually, heuristics are applied to cluster the data. In order to find the most probable segmentation, they formulate the task as a hypotheses

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 8, Issue 3, March 2020

testing problem that allows taking into account various constraints and assumptions simultaneously. They show that the optimal segmentation can be efficiently found by means of DynamicProgramming, for an arbitrary number of objects in the scene. In this paper they concentrate on the segmentation of space-time data obtained from stereo image sequences. This vision-based depth and motion information is transferred into so called Stixels, a very compact representation of 3D scenes that can also be applied to Lidar or Radar data. It turns out that our optimal segmentation is more robust w.r.t. noisy and erroneous data. Able to incorporate local features as the velocity variance and use global object knowledge, geometric constraints plus global scene modeling to find the most probable interpretation of traffic scenarios which greatly increase the stability. Real world data sets which cannot be clustered trivially butneed strong regularization and prior knowledge.

COSMIN D. PANTILIE, SERGIU NEDEVSCHI (2010)

Mobile robots as well as tomorrow's intelligent vehicles acting in complex dynamic environments must be able to detect both static and moving obstacles. In intersections or crowded urban areas this task proves to be highly demanding. Stereo vision has been extensively used for this task, as it provides a large amount of data. Since it does not reveal any motion information, static and dynamic objects immediately next to each other, or closely positioned obstacles moving in different directions are often merged into a single obstacle. In this paper they address these problems through a powerful fusion between 3D position information delivered by the stereo sensor and 3D motion information, derived from optical flow, in a depth-adaptive occupancy grid. They proposed model is presented and then applied for determining obstacle localization, orientation and speed. Their method uses an original occupancy grid framework for fusion of range and motion information. The local density and vicinity of the 3D points is analyzed in a depth-adaptive polar occupancy grid. The local density and vicinity of the 3D points is analysed in a depth-adaptive polar occupancy grid.

III. PRINCIPLE OF WORKING

The principle of the project, to detect the footboard travelers using ultrasonic sensor and report it to the server and to the authorized person and also it has various sensors such as capacitor sensor to detect the capacity, Load sensor to detect the Load of the bus and brake sensor used to monitor the brake of the bus before journey start.

A. ULTRASONIC SENSOR

In the proposed system, several sensors are employed in the bus to avoid some of the usual cases of bus accidents. First, the ultrasonic sensor is placed between the doors. This pair of sensor will ensure that no commuter is travelling in footboard by transmitting the signal back and forth and if the sensor detects any obstacle, it will send the information to the server that, this particular bus has foot boarders.

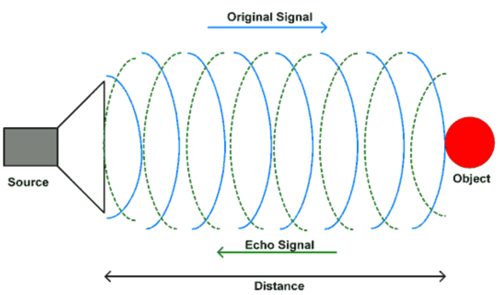

Fig No: 1 Ultraonic Sensor

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 8, Issue 3, March 2020

B. **CAPACITVE SENSOR**

The capacitive sensor is positioned under the seats of the bus. This sensor works by calculating the pressure which is given by the passenger when they rest on the seat. By this manner, it calculates the capacity of the bus and the computed results will be displayed through the mobile application.

C. **LOAD CELL SENSOR**

The load sensor is placed underneath the bus, through which the overall load of the bus is quantified.

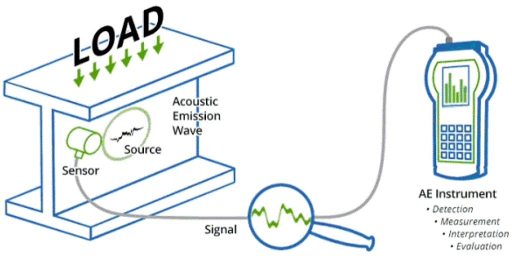

Fig No:2 Load Cell

D. **BRAKE SENSOR**

Through break sensor, the condition of the break is monitored frequently and if in case of breaak failure it automatically hits the server.

E. **ANDROID**

A linux based operating system called android which is primarily intended for touch screen devices, namely smartphones and tablet computers. In the last 15 years starting from black and white mobiles to recent smartphones or even a minicomputers, the operating system has developed in a myriad manner. Android is one of the most extensively used mobile operating system .One of the dynamic operating system called Android which supports a multitude applications in the smartphones. The android applications usually provide a comfortable and advanced environment for the users. The hardware that supports android software is based on ARM architecture. For managing your lifestyle in one or other ways, the android has got trillions of application available in it. These applications are feasible at low capital in market. Because of all these wit android is chart-topping. The latest version of android is 10.0

Android Architecture

The android is a operating system and is a stack of software components which is divided into five sections and four main layers that is

- Linux kernel
- Libraries
- Android runtime.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 8, Issue 3, March 2020

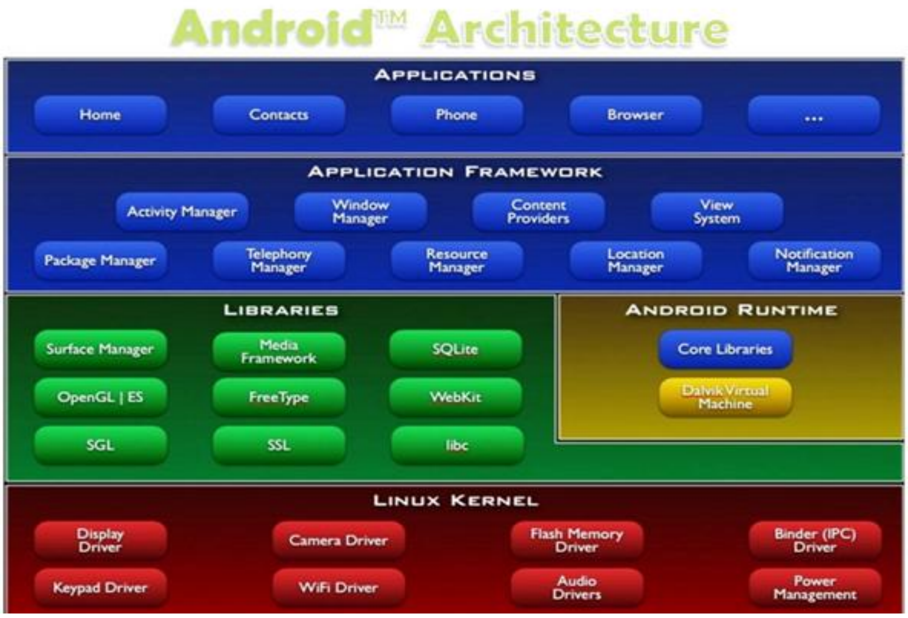

Fig No: 3 Android Architecture

BLOCK DIAGRAM

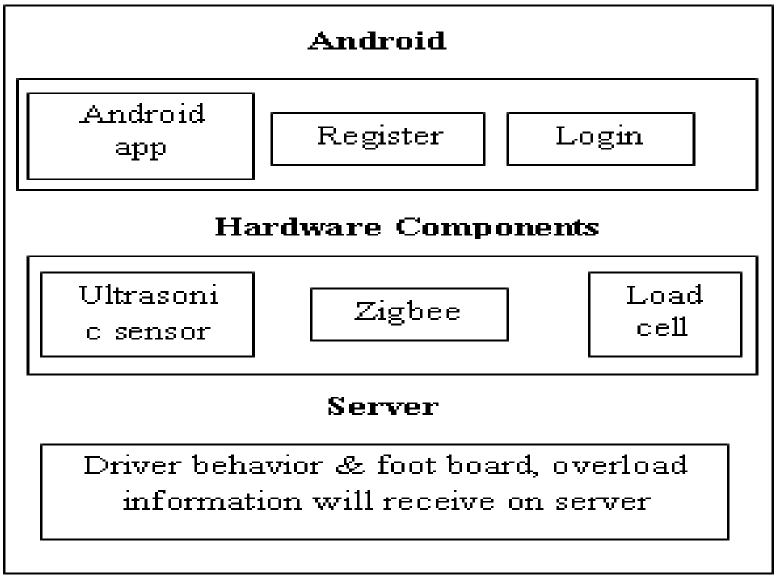

Fig No: 4 Block Diagram

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 8, Issue 3, March 2020

IV. ADVANTAGES

The accidents caused by the foot board commuters has been diminished. The capacity of the bus is detected and the information is intimated to the passengers through mobile application. The condition of the brake is monitored prior to the journey.

V. OUTPUT

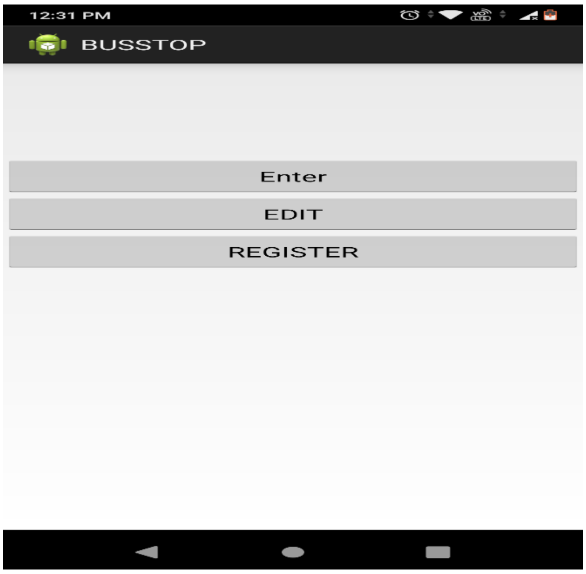

Fig No: 5 Main Page

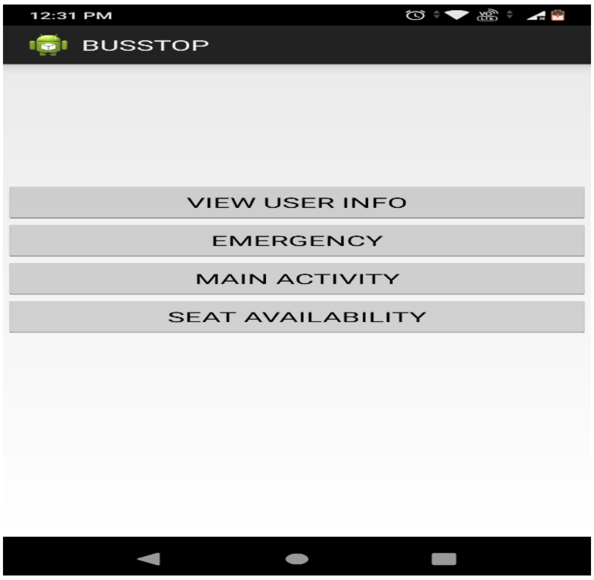

Fig No: 6 Index Page

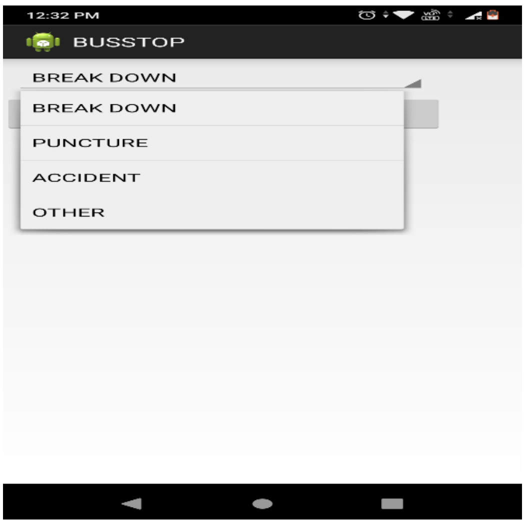

Fig No: 7 Reporting Page

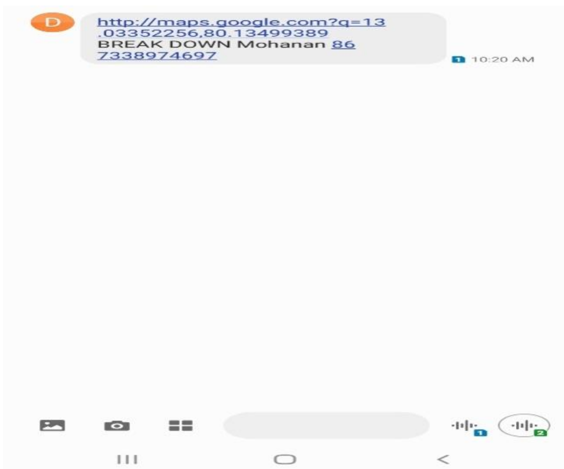

Fig No: 8 SMS

Fig No: 9 FootBoard

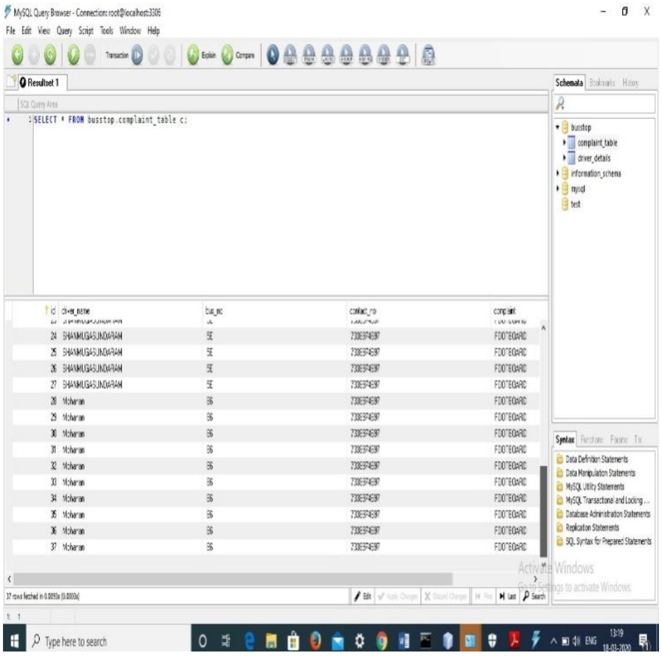

Fig No: 10 Database

V. CONCLUSION

The project concludes that the rate of bus accident will be abate using these techniques. On the whole, the main intention of the project is to implement proactive mechanism to avoid accidents and alert the driver as well as the server along with location inputs. The process will detect the driver behaviour and alert him to save the accident.

REFERENCES

[1] S. Sivaraman and M. M. Trivedi, "Looking at vehicles on the road:A survey of vision-based vehicle detection, tracking, and behavior analysis," IEEE Trans. Intell. Transp. Sys., vol. 14, no. 4,pp. 1773–1795, Dec. 2013.

[2] V. D. Nguyen, T. T. Nguyen, D. D. Nguyen, S. J. Lee, and J. W. Jeon,"A fast evolutionary algorithm for real-time vehicle detection," IEEE Trans. Veh. Tech., vol. 62, no. 6, pp. 2453–2468, Jul. 2013.

[3] G. Toulminet, M. Bertozzi, S. Mousset, A. Bensrhair, and A. Broggi, "Vehicle detection by means of stereo vision-based obstacles features extraction and monocular pattern analysis," IEEE Trans. Image Process., vol. 15, no. 8, pp. 2364–2375, Aug. 2006.

[4] F. Erbs, A. Barth, and U. Franke, "Moving vehicle detection by optimal segmentation of the dynamic stixel world," in Proc. IEEE Intell. Veh. Symp., Jun. 2011, pp. 951–956.

[5] C. D. Pantilie and S. Nedevschi, "Real-time obstacle detection in complex scenarios using dense stereo vision and optical flow," in Proc. 13th Int. IEEE Conf. Intell. Transp. Syst. (ITSC), Sep. 2010, pp. 439–444.

[6] M. Nishigaki and Y. Aloimonos, "Moving obstacle detection using cameras for driver assistance system," in Proc. IEEE Intell. Veh. Symp., Jun. 2010, pp. 805–812.

[7] S. Sivaraman and M. M. Trivedi, "A general active-learning framework for on-road vehicle recognition and tracking," IEEE Trans. Intell. Transp. Syst., vol. 11, no. 2, pp. 267–276, Jun. 2010.

[8] C. Caraffi, T. Vojíˇr, J. Trefný, and J. Šochman, "A system for real-time detection and tracking of vehicles from a single car-mounted camera," in Proc. 15th Int. IEEE Conf. Intell. Transp. Syst. (ITSC), Sep. 2012, pp. 975–982.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 8, Issue 3, March 2020

[9] V. D. Nguyen, D. D. Nguyen, S. J. Lee, and J. W. Jeon, "Local density encoding for robust stereo matching," IEEE Trans. Circuits Syst. Video Technol., vol. 24, no. 12, pp. 2049–2062, Dec. 2014.
[10] C. G. Keller, M. Enzweiler, M. Rohrbach, D. F. Llorca, C. Schnorr, and D. M. Gavrila, "The benefits of dense stereo for pedestrian detection," IEEE Trans. Intell. Transp. Syst., vol. 12, no. 2, pp. 1096–1106, Dec. 2011.
[11] M. Zhang, P. Liu, X. Zhao, X. Zhao, and Y. Zhang, "An obstacle detection algorithm based on U-V disparity map analysis," in Proc. IEEE Int. Conf. ICITIS, Dec. 2010, pp. 763–776.
[12] Z. Hu, F. Lamosa, and K. Uchimura, "A complete U-V-disparity study for stereovision based 3D driving environment analysis," in Proc. Int. Conf. DIM, Jun. 2005, pp. 204–211.