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Obstacle Detection & Distance Calculating for Driver-less Car

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ABSTRACT: Driver accidents are the most common accidents that occur resulting in almost 70% of total deaths due to accidents. Of which major accidents occurs due to carelessness of drives Also to increase user reliability we have come up with the idea of object detection and distance finding for normal as well as driverless cars .This system proposes the accurate detection of the object and the accurate detection of distance using in stereo images and of calculating the distance, size and speed of these objects.

KEYWORDS: driverless car; stereo image; object detection; threshold distance.

I. INTRODUCTION

As per the Global status investigate street security 2015, the total number of deaths brought on because of street mischances has leveled out at 1.25 million a year. India confronts the most elevated number of mischances and unintentional fatalities on the planet. In India, there are numerous spots like sloping territory levels, and because of inappropriate street officers, mischances are progressive and demise rates because of mishaps are more. The most extreme number of mischances are accounted for in the vehicle area, that is, on street and also railroads. A few approximations guarantee that Indian streets alone represented around 105,000 inadvertent fatalities in 2010. As indicated by the "WHO Report 2015: Data Tables" the aggregate number of fatalities in India in 2013 is 238,562 and revealed number of street activity passing is 137,572 with the evaluated street movement demise rate per 100,000 populace being 16.6. To plunge the number of mishaps driverless car is the best solution. In many advanced surveillance systems and autonomous robots, cameras are used as sensors for detecting objects. The standard one camera system is able to detect objects by background subtraction. This causes unclear situations, mainly when the object is similar to the background, or when object is in motion. The robustness of this detection of object can be increased by using stereo camera or two cameras separated by a particular distance. The second camera is used to provide depth information and for calculating the position of objects in image. The system designed uses the libraries of OpenCV and runs on Raspberry pi 3.

II. PROBLEM STATEMENT

The main aim of our project is to detect the object and calculate the distance using parallax method for driverless car.

III. OBJECTIVE

- i. To detect an object.
- ii. To calculate the distance between identified object and module.
- iii. Use Obtained distance for Decision making.
- iv. Check status of IR sensors to find any object present to right and left of module.

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IV. LITERATURE SURVEY

In literature, the problem with the previous techniques of obstacle detection is described. The proposed system in [4] deals with an automatic accident detection system involving vehicles which sends information about the accident including the location, the time and angle of the accident to a rescue team like a first aid center and the police station. This information is sent in the form of an alert message. But in the cases where there are no casualties a switch is provided which can be turned off by the driver to terminate sending the alert message. A GSM module is used to send the alert message and a GPS module is used to detect the location of the accident.

The GPS and GSM module are interfaced to the control unit using serial communication [5]. The accident itself is detected using two sensors- Micro Electro Mechanical System (MEMS) sensor and vibration sensor. MEMS sensor also helps in measuring the angle of roll over of the car. A 32-bit ARM controller is used as the main high speed data-processing unit. The vibrations are sent from the vibrating sensor to the controller after passing through an amplifying circuit. Similarly the roll over angle is sent from the MEMS sensor to the controller. Both the accident and the accident location can be detected as opposed to only one in the other approaches. There is also a method to stop sending the alert message and hence saves time of the rescue time. In [7], traffic accidents have been detected successfully using an Internet of Things (IoT) and cloud computing framework. Traffic accidents have been detected using Support Vector Machine (SVM) that has been improved with the Ant Colony Algorithm (ACA). ACA is used for the parameter selection of SVM which plays an important role in the accuracy that can be achieved by SVM. SVM is trained with historical traffic information and tested on future traffic data.

V. PROPOSED SYSTEM

The below figure shows the proposed architecture of the obstacle detection

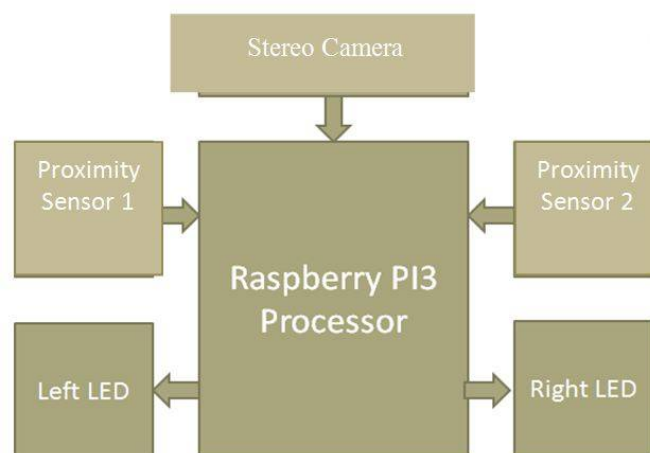


Fig: No 01 System Architecture

This system presents an improved method for finding objects in stereo images and for calculating the distance of these objects in real time. This can be obtained by using a standard background subtraction method on the left and right image, subsequently a method known as subtraction stereo calculates the disparity of detected objects. The disparity is used to calculate the distance and position of this object. Obtained distance is compared with threshold distance limit of module. When obtained distance is less than threshold distance “Object detected” message is displayed. After object detection system checks status of IR sensors. When high quality proximity sensor on left side of car is Low (Obstacle not present) System commands car to move towards left side lane & vice versa.

Depth Estimation:-

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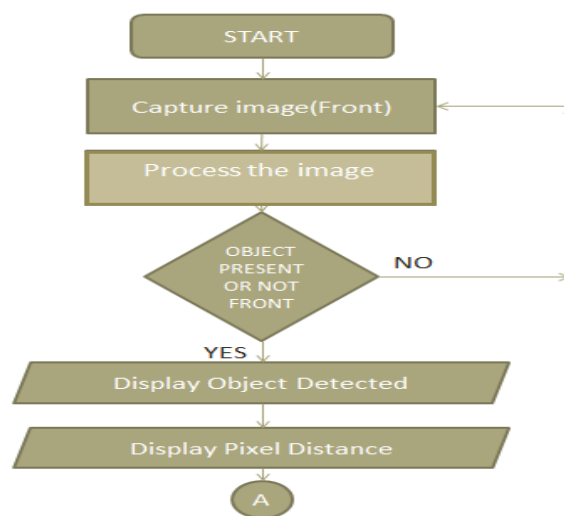
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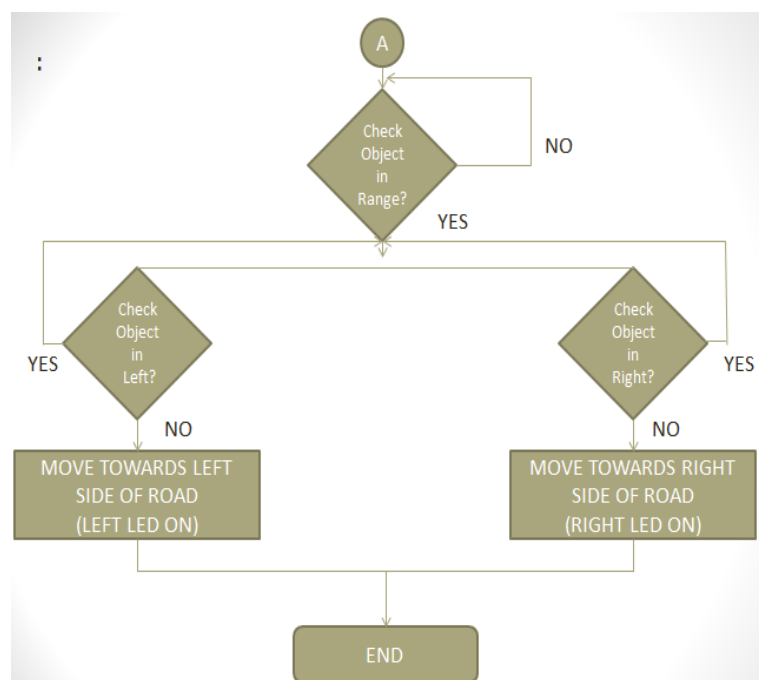
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Consider a left and right rectified image denoted by Image1 and Image2, respectively. To apply depth estimation, it is important to establish the point-correspondence (A_1, A_2) for each pixel in the frame. Set the pixel A_1 as a reference pixel, a simple strategy consists of searching for the pixel A_2 that corresponds to pixel A_1 along the unipolar straight line. Because the images are rectified, we search for the point-correspondence along horizontal lines. To constraint the search area, a maximum disparity value D_{max} is defined. The similarity between pixels A_1 and A_2 is measured using a matching block (window) W surrounding the pixels.

VI. WORKING FLOWCHART OF SYSTEM



Flowchart 1: Object detection



Flowchart 2: Check object is present on both sides

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The components information is listed below:-

Raspberry Pi:-

Raspberry Pi is a charge card estimated single board PC created in the UK by Raspberry Pi establishment with the expectation of animating the educating of essential software engineering in schools. It has two models; Model A has 256Mb RAM, one USB port and no system association.

Proximity Sensor

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target.

ADVANTAGES

- Low time delays
- Quick response time
- Fully automate system
- Robust system
- Low power requirement

APPLICATIONS

- For autopilot working mode of car.
- Help to control traffic.
- Eliminate accident caused by driver error.
- Increasing roadway capacity by reducing distance between cars.
- Capacity is utilized of highway.

VI. CONCLUSION

This method helps to find a stable location of objects. To obtain better distance resolution the cameras should be placed with greater distance. As calibration is crucial part for calculation accuracy, methods for automatic calibration and recalibration should be developed. In this project, improvements like better shadow removal, multi-object-tracking out of a crowd are under consideration.

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