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Automated Self Driving Car Using LIDAR Technology

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ABSTRACT: Autonomous driving has been a big fuss among companies because of the trap of the problem which has endless operations. Many international Companies such as Google, TESLA, UBER have applied algorithms to marketable automobiles and had some success. Numerous approaches have been presented for independent vehicle on last many times and most extensively used approach is using stereo vision or 2D/ 3D technology. One of the generally alternate-hand stereo Vision technology is by means of LIDAR (Light Imaging Discovery and Ranging) detector. LIDAR, a discovery detector which works on principle of radar, but uses light from a ray. LIDAR plays a veritably important part in handicap discovery and ranging and radar is used for parking the vehicle.

KEYWORDS: LIDAR, TESLA and UBER, stereo vision or 2D/3D technology

I. INTRODUCTION

A self-driving car or an autonomous car / driverless car by definition is a vehicle that is capable of sensing its environment and moving with little or no human input [2]. In this monocular vision based (single input) car, it will get its input from the pi camera. Raspberry Pi has been used as a processing unit in this project, which takes the input through the raspberry pi camera and drives the car by sending control signals to the L293d driver module, which in turn controls the car. The core of the project is the Convolutional Neural Network which maps the raw image pixels into features that detect objects and navigate the car. The self-driving car is one of the best inventions made by mankind and would relieve many problems such as driving. All self-driving cars are the same provided they are on the same level. Driverless cars are classified on

There are 5 different levels, starting from LEVEL1 where the driver has to have his hands-on, which means that driver assistance is mandatory. In LEVEL2, the driver can have his Hands off as it is a form of partial automation where the technology can simultaneously control steering and speed at the same time, without driver intervention for short periods. LEVEL3 form of automation enables the driver to have his Eyes off as the vehicle is capable of taking full control and operating during select parts of a journey when certain operating conditions are met. The LEVEL4 or the high automation technology doesn't need a human driver meaning that he can take his Mind off. The vehicle can essentially do all the driving, but the driver can intervene and take control as needed. Finally, the last level being LEVEL5 or the full automation is a technology which can take care of the driving scenario in all extreme conditions and the humans are just passengers.

EXISTING SYSTEM:

The existing system of accident prevention uses alcohol detector, neck & head movement, victim analysis, These technologies have their limitations which need to be eradicated. In alcohol detector the alcohol level in the blood is checked whereas in neck-head movement how much the driver is drowsy is seen. These technologies don't take into consideration the distance between the automobile and approaching automobile. Autonomous car with radar sensor is in existence in which there are some disadvantages. To overcome this, LIDAR is the best source.

II. RELATED WORK

The main focus was on Following Vehicle, which detects and avoids obstacles and it coordinates with lidar to follow the route. For another application, it checks vehicles around and automatically moves slowly behind the traffic until it



gets out of the traffic jam situation. When the vehicle enters the normal area its speed does not decrease and it goes normally no action is performed. It can be used by a large number of autonomous vehicles to navigate environments in real time. Its advantages include impressively accurate depth perception, which allows LIDAR to know the distance to an object to within a few centimeters, up to 60 meters away.

III. METHODOLOGY

An autonomous vehicle contains a LIDAR unit (it uses laser beams to generate), camera, and helps recognize moving objects, radar sensor (for measuring range of nearby obstacles or vehicles). Our main focus was on Following Vehicle, which detects and avoids obstacles, coordinates with route and follow the route.

BLOCK DIAGRAM

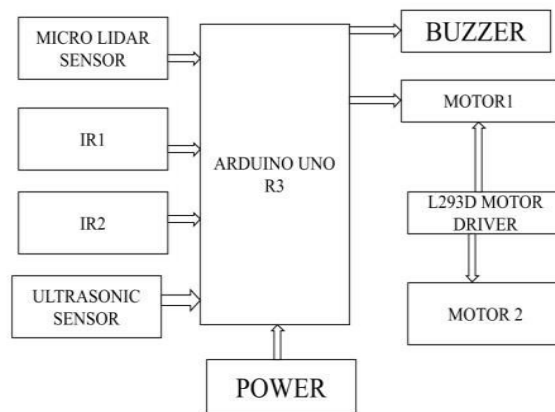


Fig.1 Block diagram of Proposed System

The system consists of three subsystems: input unit (LIDAR, IR) sensor, ultrasonic sensor), processing unit (Arduino) and RC car control unit.

Input unit: - Arduino UNO R3 attached with LIDAR module and an HC-SR04 ultrasonic sensor is used to collect input data.



Fig.2 Ultrasonic Sensor

Processing unit: - The processing unit handles multiple tasks: object detection, distance measurement monocular vision, and sending instructions to Arduino through serial connection.



Fig.3 Arduino Uno R3

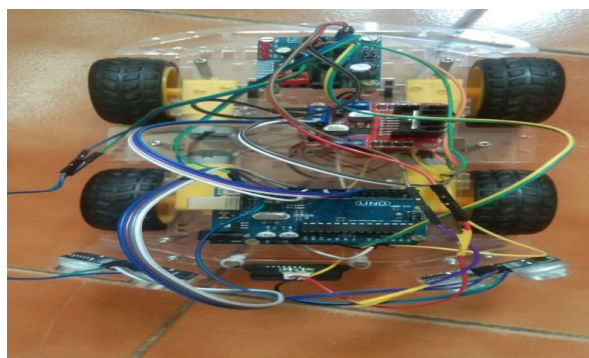
Control unit: - Four Arduino pins are chosen to connect four chip pins on the controller, corresponding to forward, reverse, left and right actions respectively. Arduino pins sending LOW signal indicates grounding the chip pins of the controller; on the other hand sending HIGH signal. The Arduino reads the commands and writes out LOW or HIGH signals, simulating actions to drive the RC car.



Fig.4 L293D Motor Driver

The system has implemented using the Arduino Uno (ATmega328P) platform. LIDAR works on the principle similar to electronic distance in which laser is emitted from the transmitter and the reflected energy is captured. Laser has time of travel capability in which distance between the transmitter and the reflector is determined. The input unit consists of a sensor which is also called as sensing unit in which it identifies the object and the distance between the objects. LIDAR works in serial communication process. It forms a laser beam which is allowed to transmit to the object and the reflected beam is used to calculate the distance by considering the reflection time taken. The processing unit is Arduino Uno R3 in which the input data is collected. The collected data's are processed in Arduino unoR3, which contains a set of programs that gives output as HIGH signal or LOW signal to control the RC unit. The control unit process for the command in three ways left, right and straight. When the object is detected in straight then the car turns towards left or right depending upon the surroundings around the car. When there is no space to move or the car is surrounded by objects then it will remain in same place. Arduino Uno R3 cannot drive the motor so, L293D motor driver is connected to Arduino board. This driver board amplifies the current to drive the motor. Hence the control unit works according to the processing unit.

IV. EXPERIMENTAL RESULTS





V. CONCLUSION

The main advantages are Autonomous cars prevent human errors from happening as system controls. It will give an accurate reading and the time taken to calculate the distance is fast.

In this paper, LIDAR automatic self-Driving cars are done. The car is controlled by the processing unit with the help of LIDAR. The LIDAR is used to detect the surroundings and drive the system. In future, when we add artificial intelligence along with a camera the processing will be more effective.

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