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Preserving LLM-Based Offline AI Tool for Academic and Commercial Natural Language Generation

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Abstract: One advancing technology that has been impossible to ignore lately has been the work with autonomus vehicles. These vehicles have gone from scientific curiosity to mainstream within a few short years and soon we'll be seeing them as regular traffic on our streets.
A very distinctive component in a self-driving vehicle is the spinning LIDAR sensor mounted on the top of the vehicle. This is one of the principal components in self-driving vehicles as it collects data regarding the surrounding area to allow the navigation systems to guide the vehicle safely.

Keywords: Arduino, Lidar, Colour Sensor.

1. INTRODUCTION

The main aim of this project is to offer a Self-Driving Car Using Lidar. Imagine a bus carrying passengers on its own, driving better than any bus driver could do. Imagine a taxi, which can be called through an app installed in your Smartphone, which carries you to your destination as fast and economically for you as possible. Imagine vehicles dedicating to agriculture on their own and without having to rest. Imagine vehicles travelling by themselves, mapping all the places they go by, not only on earth, but also on any rock out there in the universe. Imagine that your own car drives for you and you don't need to care about, while it drives better than you could ever do. Imagine the possibilities in a world where the vehicles are autonomously driven.

2. PROBLEM DEFINATION

The development and deployment of autonomous vehicles, commonly referred to as self-driving cars, have garnered significant attention due to their potential to revolutionize transportation systems. LiDAR (Light Detection and Ranging) technology plays a crucial role in enabling these vehicles to navigate and interact with their environment. However, there are several challenges and problem areas associated with the implementation of "Automatic Driven Vehicles Using LiDAR Technology".

OBJECTIVE

1. To design automatic driven vehicle using LiDAR technology for obstacles detection and avoidance.
2. To design automatic driven vehicle for monitoring and localization.
3. To design automatic vehicle using terrestrial LiDAR technology.

Block Diagram

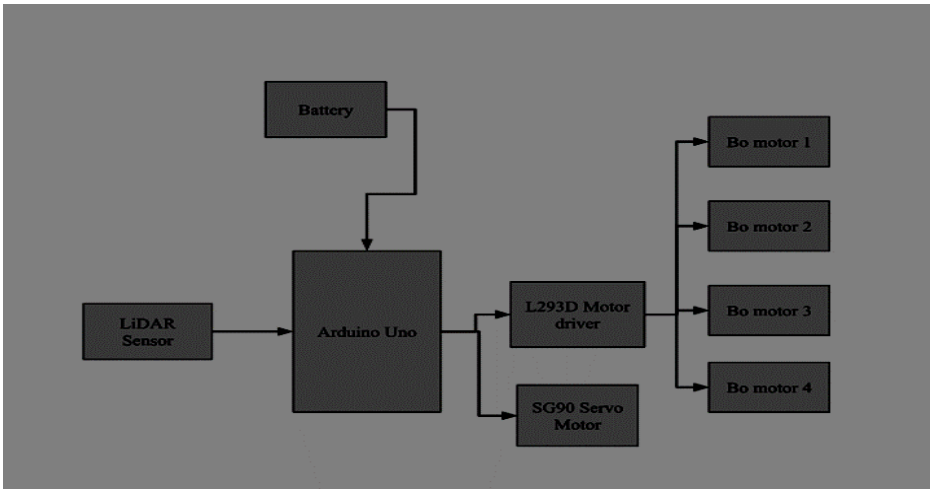

Fig 1-Block diagram of Automatic Driven Vehicle Using LiDAR Technology

Block diagram description:
When Car start Lidar and Colour Sensor send their input to microcontroller. With the received information from Sensors, microcontroller decide to take next decision like Start, Stop, Move Forward, Move Backward, Turn Right, Turn Left, etc. Microcontroller end instruction to the motor driver for controlling motors with respective input taken from sensor. Regulated power supply is connected to the microcontroller as well as motor driver.

Circuit Diagram

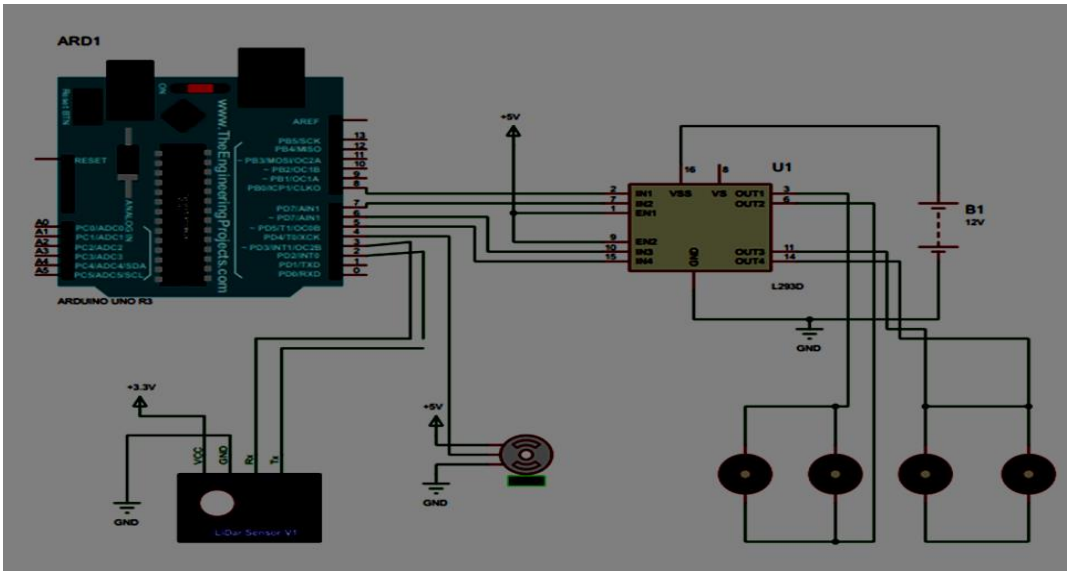

Fig 2:- Circuit Diagram of Automatic Driven Vehicle Using Lidar Technology

Circuit Diagram Description:
When we switch on the car then Lidar and Colour sensor get activated and send focused light beam aimed at an object and a sensor looks for its reflection. If beam is detected its intensity and angle is measured. There values are then plugged into an equation run by a microcontroller Atmega 328p.
Simultaneously, A Colour Sensor also emits light from a transmitter, and then detects the light reflected back from the detection object with a receiver. A Colour Sensor Can detect the received light intensity for Red, Blue and Green respectively making it possible to determine the colour of the target object. Their output values are also plugged into microcontroller Atmega 328p. With the help of outputs and value provided by Lidar and Colour sensor. Microcontroller instruct the vehicle for start, Stop, Move Forward, Slow Down, Turn Left and Right. Microcontroller Provide command to Motor Driver IC for Controlling Motors of a Vehicle.

Advantages:-
1. Enhanced Safety: LiDAR technology provides high-resolution 3D mapping of the vehicle's surroundings, enabling accurate detection of obstacles, pedestrians, and other vehicles.
2. Accurate Object Detection: LiDAR sensors can accurately detect and classify objects even in challenging conditions such as low light, rain, fog, or glare. This reliability in object detection is crucial for the safe operation of autonomous vehicles, especially in scenarios where traditional cameras might struggle.
3. Precise Localization and Mapping: LiDAR generates detailed and accurate maps of the environment, allowing the vehicle to precisely localize itself within its surroundings.
4. Obstacle Avoidance: LiDAR-equipped vehicles can rapidly identify and analyse the potential obstacles in their path.
5. Adaptive Driving Behaviour: LiDAR sensors provide continuous and real-time information about the vehicle's environment. This data allows the vehicle to adapt its driving behaviour based on changing road conditions, traffic patterns, and unexpected obstacles.

Disadvantages
1. Cost: LiDAR sensors are often expensive, which can significantly increase the overall cost of the project and limit its scalability.
2. Environmental Conditions: Adverse weather conditions such as heavy rain, snow, or fog can reduce the effectiveness of LiDAR sensors, affecting the vehicle's reliability.
3. Complexity: Integrating LiDAR technology into autonomous vehicles requires sophisticated algorithms and software, increasing the complexity of development and maintenance.
4. Limited Perception Range: LiDAR's range can be limited in certain scenarios, affecting the vehicle's ability to perceive objects at longer distances, such as high-speed highway driving.

Application
1. Obstacle Detection and Avoidance: The vehicle can use LiDAR sensors to detect obstacles in its path and autonomously navigate around them, enhancing safety and preventing collisions.
2. Parking Assistance: LiDAR technology assists in identifying available parking spaces and guiding the vehicle during parking, reducing the hassle of parking in tight spaces.
3. Mapping and Localization: LiDAR helps create detailed 3D maps of the vehicle's surroundings, aiding in precise localization and navigation, especially in urban environments.

4. Traffic Sign and Signal Recognition: The vehicle can utilize LiDAR to recognize and interpret traffic signs and signals, promoting adherence to traffic rules.
5. Autonomous Delivery and Logistics: LiDAR-equipped vehicles can efficiently navigate through complex environments to deliver goods, enhancing the logistics and delivery process.
6. Public Transportation: Autonomous vehicles with LiDAR technology can be employed in public transportation systems, offering efficient and reliable mobility options.

3. REFERENCE

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