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Self Driving Car Using Road LaneDetection

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Abstract
Our suggested self-driving car concept is a more cost-effective and simplified version of the real thing. Students' comprehension of how a real autonomous automobile operates will be aided by this model. Some difficulties in the real world can also be solved with the aid of this paradigm. Other vehicles,such wheelchairs, can be made autonomous and capable of being operated by the user without assistance by applying the same logic and algorithm employed in this model. There is also a description of the hardware architecture, which can be adjusted as needed.

Keywords: *Arduino, autonomous driving vehicle, motor, batteries, ultrasonic sensor, obstacle and object detection*

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I. Introduction

These days, every automaker is trying to develop their own autonomous vehicle concept. Many of them are succeeding in reaching some degree of autonomy, and many of them intend to begin production of autonomous vehicles in the coming years. As a result, autonomous vehicles are garnering huge attention and discussion. Individuals will either embrace or reject autonomous vehicles based on its effects on safety and other aspects, even though they are still unsure and experiencing a range of emotions related to the concept. Scholars and experts from several global institutions and corporations have commenced examining the implications of self-driving cars oncarbon emissions, the quantity of automobiles per capital, passenger safety.

II. Literature Review

An important advancement in the history of humanity toward vehicle automation was the creation of autopilot aircraft. Thefoundation for future developments in autonomous vehicles has been established by this invention. Researchers have been trying to find a solution to the problem of creating driverless, autonomous autos since 1920. Lihirrican Wonder employed radio antennas in 1926 to provide radio impulses that the antennae then further captured. The signal from the antenna is sent to circuit breakers, which run tiny electric motors that control the direction of the car's movements. This marked the beginning of the innovation of driverless automobiles. As of right now, Tesla has successfully brought the idea of driverless cars to reality

III. Methodology

Arduino

Basing over Tiny Chip ATmega328P µP, the open-source ArduinoMC board is developed. The board features sets of analog & digital input and output pins that can be interfaced to different extension boards (shields) and other framed circuits. The 14 digital and 6 analog I/O pins on the board can be configured using an Arduino IDE and a type B USB connector. Of these, six can be utilized for PWM output. It can withstand voltages of up to 20 volts, although it runs on 9-volt battery or a Universal Serial Board cable. It's like the Arduino Nano and Leonardo combined.

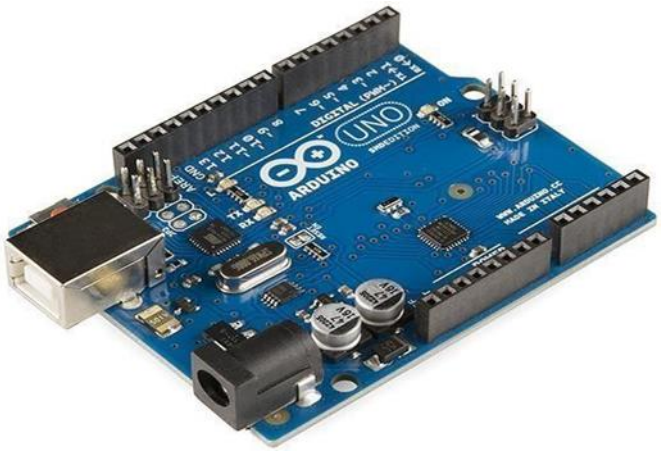

Fig .1 Arduino UNO R3

Servo Motor

A servomotor is a linear or rotary actuator it accepts exact control of acceleration, velocity, and angular position. It is made up of an appropriate motor connected to a position feedback sensor. This also requries a reasonably complicated command, which is regularly a undertaken module made just for servomotor applications.

While the word "servomotor" is extensively used for projecting a motor that can be applied in a controlled environment, servomotorsare niether a category of motor. Servomotors applications are of wide use few of which are in automated manufacturing, indusrial purposes, and CNC machinery.

For the purpose of providing place and speed feedback, the motor is linked with a position encoder. In simplest plot, measurement is limited to position only. The external input from the controller, the command position, is compared to the needed position of the output. If the output area deviates from the required place, an errorsignal is provide. This instructs the motor to rotate in any directionuntil the output shaft is correctly placed. The motor shuts off as thepositions get closer and the error signal goes to zero.machinery.

Fig.2 Servo Motor

Motor Driver Circuit

A common motor driver, or motor driver integrated circuit, that allows DC motors to run in any direction is the L293D. A set of two DC motors can be controlled concurrently in any direction by this 16-pin integrated circuit L293D. It indicates that a single L293D IC can be used to operate two DC motors. IC's for dual H-bridge motor driver (IC).

It utilizes the H-bridge principle. An H-bridge circuit allows voltage to pass in to either direction. Because voltage must changedirection to drive a motor clockwise or anticlockwise, H-bridge IC's are ideal for powering DC motors

Two independent h-Bridge circuits that can rotate two DC motors are present in a single L293D chip. Because of its small size, it is often utilized in robotic applications to regulate DC motors. The pin diagram for an L293D motor controller is shown below

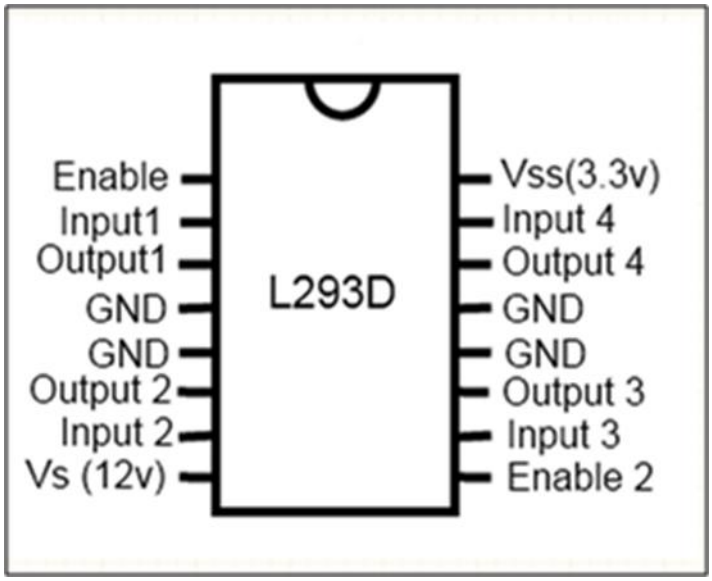

Fig. 3 Motor driver Circuit

UltraSonic Sensor

An ultrasonic sensor is a sensing device that measures the distance between two objects using ultrasonic waves.

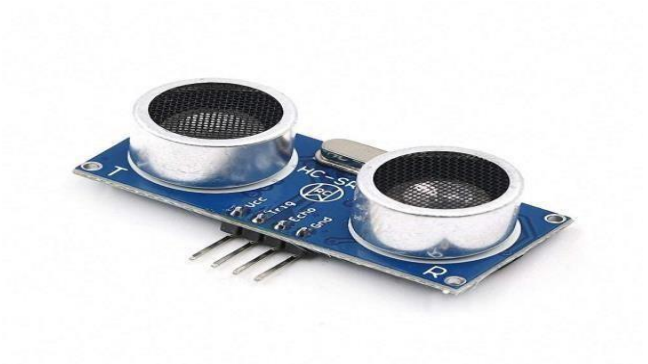

Fig.3 Ultrasonic Sensor

Working Principle

The idea behind this project is the use of ultrasonic sounds. The robot uses ultrasonic noises to sense obstacles and sends a signal tothe circuit whenever it comes into contact with one. The Arduino isthen given this signal. The Arduino then looks for the solution we wrote, burned into the Arduino, and included in our software. The Arduino then instructs the stepper motor to begin by gazing to the right side at an angle "a." As the motor turns and completes the "a"angle, this Arduino board sends a signal to the ultrasonic sensors toinitiate the waves and determine the distance. This servo motor is signaled by the Arduino to return to its starting position.

This servomotor is then instructed by the Arduino to look toward the left posture at an angle of a. Upon the servo reaching its destination, the Arduino initiates the ultrasonography to re transmit the waves and determine the distance space. This Arduino determines the maximum length in both directions once it has measured the distance in each direction, left and right.

The Arduino shall cause the left motor to move forward and the right motor to travel backward if it detects the left direction length as being at its maximum, and vice versa. This procedure will never end, eventually causing the robot to function and move.

Proposed System

This Project is an Arduino-based autonomous car system is to integrate hardware and software as simply and effectively as possible. To deliver thorough and up-to-date environmental data, the system will make use of a variety of sensors, including infrared,cameras, GPS modules, and ultrasonic ones. In order to enable the vehicle to move independently, make intelligent decisions, and optimize its path while taking traffic and

obstacle patterns into account, sophisticated algorithms for the interpretation of sensor data will be built.

The vehicle's smooth functioning will be ensuredby precise motor control utilizing Arduino, which also incorporates feedback systems for real-time modifications. In compliance with legal and ethical requirements, safety measures and fail-safe procedures will be put in place to handle unforeseen circumstances.The implementation of dependable communication protocols among system constituents would enable smooth communication.Furthermore, the system will give precedence to energy efficiency by employing tactics to maximize power usage.

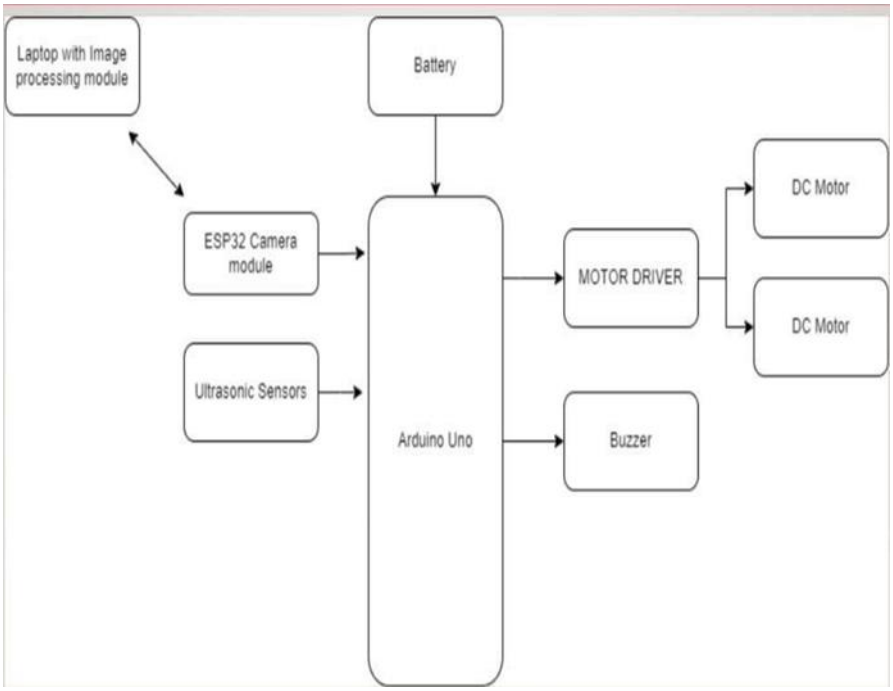

Fig. 5 Block Diagram

IV. Results And Discussion

After testing, the project was confirmed to be operating withouthiccups. The ultrasonic sensor begins gathering informationabout its surroundings and transmits it to the Arduino when the switch is turned on. The data is gathered and processed by the Arduino. It processes the data and then triggers the gear motors. The automobile is then able to move in accordance with the Arduino's directions thanks to the gear motors.

V. Conclusion

We conclude from all the data presented in this work that theautomobile employs an ultrasonic sensor to measure distance,identify nearby impediments, and make autonomous judgments on which directions to change in order to drive. Theultrasonic sensor provides input to the vehicle so that it may navigate independently. The ultrasonic sensor's input is sent to the Arduino for processing, and the Arduino then sends commands to the motors. The car functions and makes judgments to go in any direction in this manner.

VI. Future Scope

Future prospects for Arduino-powered autonomous vehicles provide fascinating opportunities for progress in the field of smart transportation. More advanced sensors and AI-driven algorithms may be integrated as technology develops,improving the vehicle's vision and decision-making abilities.