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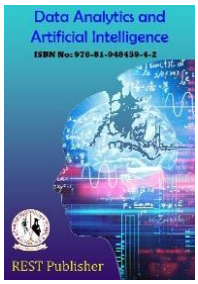

Self Driving Car

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Abstract: *Self-Driving car, a car capable of sensing its surrounding and moving on its own through traffic and other obstacles with minimum or no human input. This is the current upcoming technology in the automobile industry and even though it has been discussed and worked on for a long time, it was successfully manufactured by TESLA. n recent years, these cars began to roll out in foreign markets as private and public vehicles (taxis etc.). Many companies like Waymo, UBER, Nissan, and Nvidia are involved in this product development. With this type of car, the whole automotive transportation's safety, security, efficiency is increased and the human errors can be eradicated whilst the drive is made to its best. This project has infused the idea of traffic signal responding which is absent in the current models and the above mentioned advantages can be achieved with much more ease an data low cost. This type of system can bring a revolution in transporting for differently abled people and also help blind people travel independently.*
Keywords: *Self Driving Car, Human Input, Human Error, Traffic Signal Responding.*

1. INTRODUCTION

The concept of self-driving car is discussed since 1920s, however first semi auto-mated car was developed by Japan in 1977.A major landmark self-driving car was developed in 1980s with speed limited up to 31 kmph. And after some developments in 2013Tesla started their autonomous car project. In 2014 they released Tesla S with semi-autopilot mode. And further improvements in the autopilot software are released in following models like Tesla X etc .A survey of opinion from public about self-driving cars was conducted by Brandon Schoettle and Michael Siva k in top three major English speaking countries and initial response from the public is positive about upcoming technology in automobile industry. [1] But in our country there was no such development, this project analysed and took this as base. So with in this background we decided to develop a autonomous car at a low cost that could afforded by many citizens. And with the existing system we included Traffic signal response which is not present in Tesla and many other companies. With this the transportation quality and safety is improved as human errors made will be significantly reduced and road safety will be increased. And it also brings revolution in helping differently bled and blind people to travel independently.

2. EXISTING SYSTEM

After conducting experiments since 1920s, the first truly autonomous cars were developed in 1980s with Carnegie Mellon University's Navlab and ALV projects in 1984 and Mercedes-Benz and Bundeswehr university Munich's Eureka Promethe us Project in 1987. Following these, many companies likegeneralmotors, Nissan, Toyota, Audi, Volvo, Google, Tesla etc have started working on self driving vehicles project. After many years, in Dr.T. Manikandan, Dept. of ECE, Rajalakshmi Engineering College, Chennai, India. E-mail: Manikandan.T@rajalakshmi.edu.in J.S. Jayash wanth, Dept. of ECE, Rajalakshmi Engineering College, Chennai, India. E-mail: j.jaayshwaanth@gmail.com S.Harish, Dept. of ECE, Rajalakshmi Engineering College, Chennai, India. E-mail:harishsrikanth01@gmail.com K.N. Harshith Sivatej, Dept. of ECE, Rajalakshmi Engineering College, Chennai, India. E-mail: harshithtej1999@gmail.com1991, the United States Congress passed a bill ISTEA Transportation Authorization which stated that USDOT to demonstrate an automated vehicle and highway system by1997. The Federal Highway Administration with some companies close headway to operate in segregated traffic and free agent vehicle to operate

in mixed traffic. Following that in 1995 Navlab project completed 3100 miles where 98% was automated. In 2005 world's first driverless car, Park shuttle came out. It uses artificial reference points in road to verify its position.

FIGURE 1. Existing System

Three Military projects Demo I, Demo II, Demo III funded by US Government in 2000s is unmanned vehicle to navigate long difficult off road terrain. After some years the idea of autonomous car was brought into Grand Challenges but idea couldn't be implemented in first attempt but in following events they achieved it. In US partial automation system (Level2 Systems) is made available by several automobile companies but conditional automation with some human input was underdevelopment (Level3Systems).[2] The first complete disturbances for the self driving car was made in 2007. [3] Although many prototypes where introduced by many companies even Google and Nissan, the revolution was made by TESLA in 2014. They launched first version of Model S equipped with system capable of lane detection with autonomous steering, braking and speed limit adjustment based on signals image recognition. But it is made suitable only for limited highway access nit for urban driving. They accumulate dover1.2billion miles in Autopilot mode since 2015. [4] As of now in 2017 and 2018 Volvo and Audi launched their model of cars with autopilot.2017 Waymo One a self-driving car was launched which was owned by Google once. It was launched as a limited taxi service in Arizona.

FIGURE 2. Self Driving Car

Most of the models mentioned above are not fully autonomous since autonomous car are not made legal in US. So as of now, Tesla is yet to release their fully autonomous car which is expected in 2019 or in following years. But in India there are no developments of autonomous car models. Still they have partial features of self driving like starting from cruise control, self-parking, automatic emergency brakes, lane change assist

3. PROPOSED SYSTEM

This project plans to plan to provide a self driving car with a system that can navigate between two places on the map, detect any obstacles, lane detection [5], accident avoidance and emergency services. And our project's uniqueness is we are implementing traffic signal responding which is not present in Tesla and other company's car. Above figure is the basic block diagram of this project Components used in this project

3.1. Raspberry Pi: The below shown image is Raspberry Pi. It enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python

3.2. Specifications: Broadcom BCM2711, Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz,1GB, 2GB or 4GB LPDDR4-3200 SDRAM (depending on model),2.4 GHz and 5.0 GHz IEEE 802.11ac wireless, Bluetooth 5.0,

BLE, Gigabit Ethernet,2 USB 3.0 ports; 2 USB 2.0 ports. 2 × micro-HDMI ports (up to 4kp60 supported),OpenGL ES 3.0 graphics

FIGURE 3. Raspberry pi

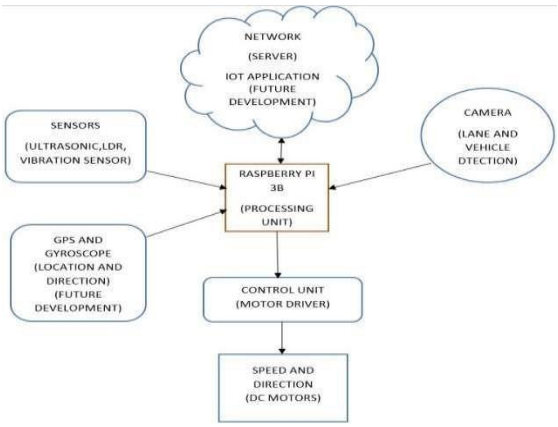

FIGURE 4. Raspberry pi Processing

3.3. Ultrasonic Sensor: The figure given below is Ultrasonic sensors. It measure distance by using ultrasonic waves. The sensor an ultra sonic wave and receives the wave reflected back from the target.

FIGURE 4. Ultrasonic Sensor

3.4. **LDR Sensor:** The figure given below is LDR Sensor. It is basically a photocell that works on the principle of photoconductivity.

FIGURE 5. Ultrasonic Sensor

3.5. Vibration Sensor: The Fig(g) is Vibration Sensor. It is a piezoelectric accelerometer that sense vibration. They are used for measuring fluctuating accelerations or speeds or for normal vibration measurement**.**

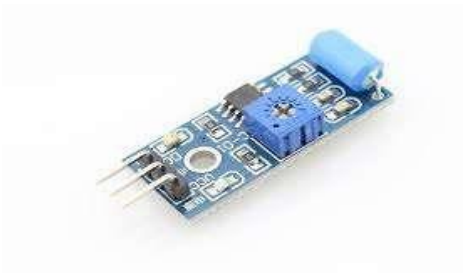

FIGURE 6. Vibration Sensor

3.6. Camera: Logitech c270, for lane and vehicle detection, Focus type: fixed focus, lens technology: standard, Built in mic: mono, Fov:60 degree, universal clip fiefs laptops, lcd or monitors.

FIGURE 7. Logitech c270

3.6.GPS: A GPS navigation system is a GPS receiver designed for a specific purpose such asa car-based or hand-held device or a smart phone app. The global positioning system (GPS) is a 24-satellite navigation system that uses multiple satellite signals to find a receiver's position on earth.

3.7. Gyroscope: A device used for measuring or maintaining orientation and angular velocity.

FIGURE 8. Gyroscope Sensor

3.8. Motor Drivers: The figure given below is Motor drives. It is used for motor interfacing. These drive circuits can be easily interfaced with the motor and their selection depends upon the type of motor being used and their ratings (Current, Voltage).

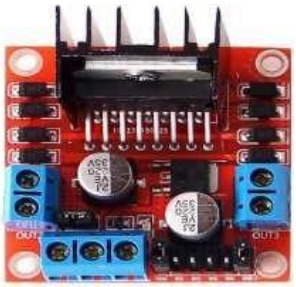

FIGURE 9. Motor Driver Circuit

3.9. DC Moto: The figure given below is DC Motor. It is used for speed and direction.

FIGURE 10. DC Motor

3.10. Network (IOT Application): Internet of Things(IoT) describes the large and growing set of digital devices – now numbering in the billions – that operate across networks of potentially global scale. As opposed to the regular Internet (of people), the IoT is comprised only of smart sensors and other devices. Its gathers operational data from remote sensors for collecting and controlling.

4. RESULT

The below figure is the output for Lane Detection from running the python code forour model in Compiler. The YELLOW LINES indicate the detection of lanes.

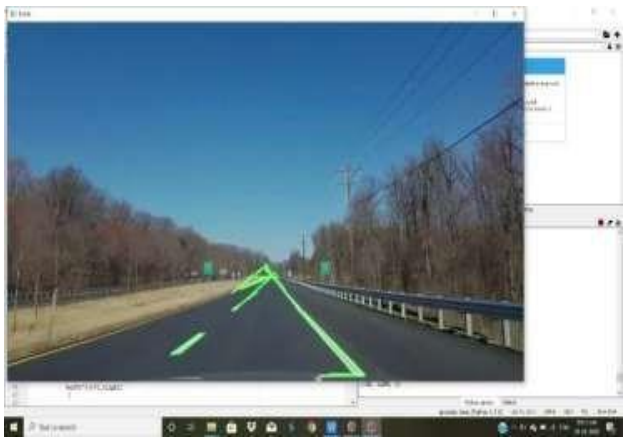

FIGURE 11. Lane Detection Output

The below figure in the picture captured via camera integrated in the model where the blue strip indicates lane and green line indicates the lane detection

FIGURE 12. Output from Camera Mounted in Model

The below figure is the output for Traffic signal responding from running the python code for our model in Compiler. With Hough gradient, the color of the light from signal is indicated whether it is red or yellow or green.

FIGURE 13. Output fot Traffic Signal Responding

The below figure is the complete model of self-driving car. With all the above mentioned components integrated and connected with chassis.

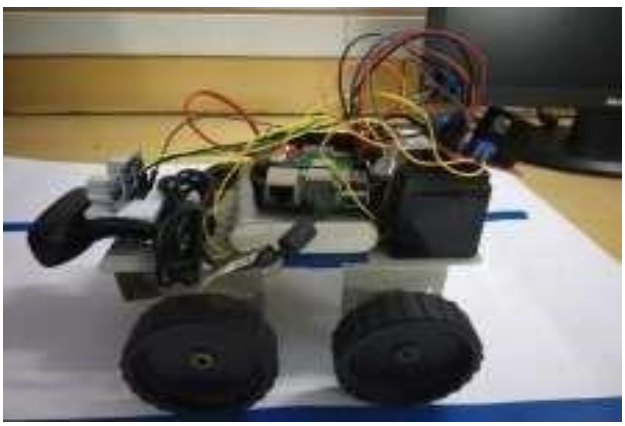

FIGURE 14. Self Driving Car Model

6. CONCLUSION AND FUTURE

Work To summarize this paper, The system aims to improve the safety of self-driving technology using new techniques .It is mainly about implementing a self- driving car that can make its own decisions accurately. The system is considered to be a prototype car that contains sensors and cameras to perceive the surrounding environment. The

methodologies used in the system are lane detection using image filtering methods along with Hough transform feature extraction technique, anomalies detection using SVM classification algorithm with radial basis function, and distance measurement using disparity map. The result of lane detection is that the accurately in its path according to the signals that are being sent to the motors from the road lane detection algorithm. For anomalies detection, the car is able to detect the road anomalies with an accuracy of 98.6%. Finally, for the results of the distance measurement, the car is able to make the right decisions either moving forward, slowing down, or stopping based on the disparity map algorithm output. The car was tested in an indoor and outdoor environment and its performance was very good. During the development process, we reached our goal which was to apply the idea on a small car prototype. So, we aim that our future work will consider applying this system in a real car.

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