Automated Cars Using Image Processing

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Abstract *- **In today's world self driving cars are a must needed development in automobile sector that various companies are currently conducting their research on. In this paper we give a complete overview of the current scenario of the self driving car system, the issues faced and the solutions to these issues.***

I. Introduction:

Self-driving vehicles are cars or transportation in which human drivers are never required to take control to safely operate the vehicular system. Self-driving also known as "autonomous" cars are the cars that combine sensors and uses software in order to control, navigate, and drive a vehicle. There are no completely legal operating, fully autonomous vehicles. There are autonomous vehicles, cars with different amounts of self-automation, right from conventional cars with brake and lane assistance to highly-independent, self-driving prototypes. although still, self-driving technology is becoming much more common and could completely transform our transportation system.

The segment of Computer Vision in cars is popularly known as Self-driving Cars. These are vehicles that perceive their environment and move without human requirements. The technology is still new and still budding. Indian roads are a bit more challenging when compared to roads in the western countries. The roads are infamous for being always occupied by traffic leading to highly congested roads. The number of road accidents due to them is skyrocketing at a very high rate.

These are the few major areas in which self driving vehicles can do wonders in. Autonomous-driving technology will not only boost the technology industry but also the automobile industry immensely.

II. Existing System:

There are three parts to the whole process of system:

1)Data generation for the system(car): With help of the cameras attached every camera records the data like the steering wheel's data and speed of the car and the recorded data is stored in CSV file as an relative path attachment.

2) Training of the system: Training the car clones how the human was driving depending upon the different road conditions.

3) Testing of the cars system: The center camera input is already fed to the neural network, the network outputs the steering wheel angle value, this value is further predefined or fed to the self driving car.

These are the basics of the existing system.

III. Problems In Existing System:

The existing system does not provide proper collision proof solutions and scene knowledge . The system model works for flat terrain and not for objects above the ground level like trees , buildings , poles etc. The visualization of the system is not properly implemented. Training for the car is providing only through human drivers. System also lacks and needs to improve the ability to withstand failures of the network. The current system provides very costly solutions to the problems resulting in making the system unavailable for common people.

IV. Proposed System:

The proposed system will be able to detect proper collision proof solutions and obstacle knowledge. The system will be able to detect not only flat terrain but also the objects above the ground level such as poles and tress no human training will be require. Proper lane detection can be done with the help of image processing and sensors that provide accuracy to the working of the system. The system developed will be cost effective and cheaper as compared to the present existing systems.

Following are the key components used for the working of the proposed system:

Raspberry Pi: The Raspberry Pi is a low cost, credit card sized computer that plugs into the computer monitor or TV, and uses a standard keyboard and a mouse. It is a capable little device that lets people of all ages to explore computing, and learn how to program in particular languages like Scratch and Python.

Raspberry Pi Camera Module: The Raspberry Pi Camera Module is a 5MP CMOS camera provided with a fixed focus lens that is capable of capturing still images as well as high definition video with decent resolution. The frames are captured at a resolution of 2592 x 1944, whereas video capture is supported at 1080p at 30 FPS, 720p at 60 FPS and 640x480 at 60 or 90 FPS. The camera is supported by the latest version of Raspbian, Raspberry Pi's preferred operating system.

Ultrasonic sensor: The ultrasonic sensor is an instrument that calculates the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic waves or signals that send back the information about the proximity of the object.

The Activity diagram represents the overall activities perform by the system. Here the obstacles are avoided by going around them, if present. If the obstacle is not present then it will over come the obstacle by overtaking it. The object detection is done using image processing. When the obstacle is detected the system will stop at a safe distance from the obstacle and then overtake the obstacle if there is space in the next lane.

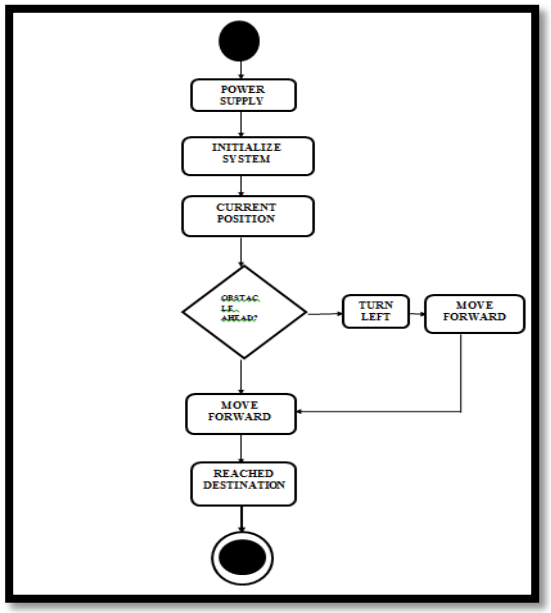

Figure 1: Obstacle detection activity diagram

The system introduced uses raspberry pi to enable the working of the system and explore various computing factors within the system using python language. The raspberry pi will be integrated with the raspberry pi camera for image processing. The raspberry pi camera will show the video of the environment or the surroundings of the entire system providing the system with the knowledge regarding the surroundings. The lane ends on the road are detected by the raspberry pi camera and depending on those results the model of the car starts moving forward by calculating the central bath between the lane ends that are detected by the camera and stays on the path of the road.

When a turning point occurs the car calculates the angle of deviation and accordingly co-ordinates the turn within the boundaries of the lane ends. The angle of deviation is considered because the system needs to calculate the central path present on the road.

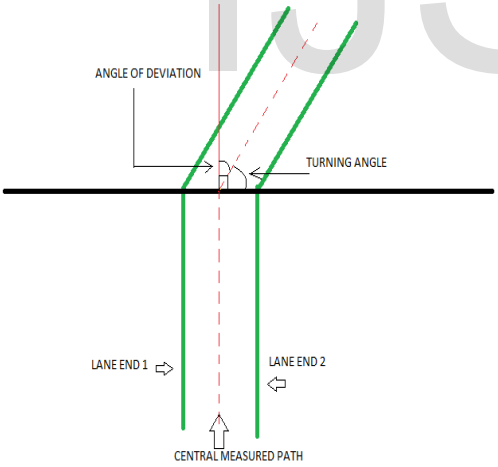

Figure 2: Turning diagram

The traffic light detection is done with the help of raspberry pi camera itself. The camera detects the lights of the traffic signals and the system stops if the light is red. It starts moving forward once the light turns green. In case if the light is already green then the system does not stop and continues moving forward along the path.

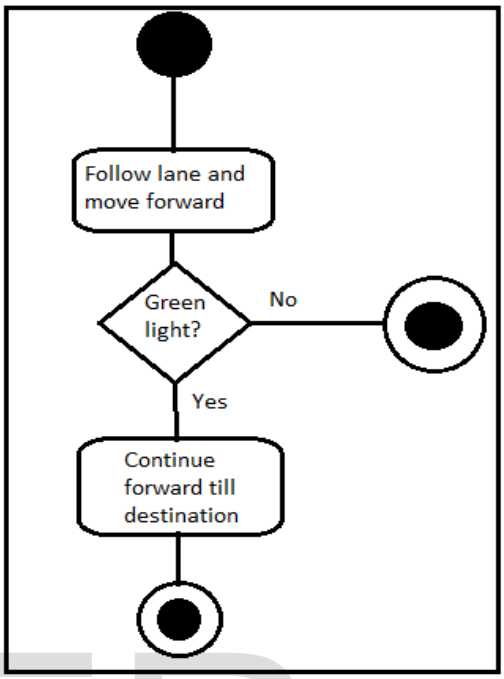

Figure 3: Activity diagram for traffic signals

The proposed system will run all these features and provide precise accuracy in the implementation.

V. Conclusion:

As per our initial research outcome we are trying to develop a system that can be used and implemented for the greater benefit of the autonomous vehicle at a large scale. We have implemented a self driving car with better visualization and better performance by using image processing. The developed system also helps in reducing many factors like the traffics , accidents , labor cost , etc.

VI. Reference:

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