Design of Autonomous Vehicle Control using IoT

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Abstract: A Prototype autonomous vehicle system is explained in this paper. A car has been driven using internet with more secured. There are three types of detection like Traffic light detection, Obstacle detection and Lane detection. It is most important features of this project. The main purpose of this concept is to reduce accident and human life. The important component are used a Raspberry Pi, a Picamera, a Web interface and Internet modem. It is based on Computer vision algorithm. Raspberry Pi is most important one to construct. The video has been pick and passed through internet. It has low cost and very efficient project.

Keywords- Raspberry Pi, Camera, Internet of Things, Open CV, Computer Vision, IR Sensor.

1. Introduction

With growth of technology, human life likes automation. Automated car is latest trend in our environment. It was recognized by people. It has most secured and drive safe during journey. Now days, road accidents are increased by human. The drivers can distracted and drowsy during driving the car. Drunken drive is the most important reason for road accident. The car was driven by using computer vision algorithm [1-3]. It uses sensor to detect the obstacle and reduce the accident. The project is based on Internet of Things.

In 1920, vehicle automation research has conducted and the first trial was conducted in 1950. The first autonomous car has been invented in Carnegie Mellon University. After the invention, many company worked on implementing autonomous vehicle [4-9]. Cities like Belgium, France, Italy and UK are
interested in driverless car. The countries like Germany, Netherland, Spain are testing robotic car in traffic.

The Google driving car algorithm was developed by Stanford University Professor [10-12]. Automation car of Google was most popular. Design of Google car was navigation purpose. There are different types of sensor are used to design the automation car. In 2020, the driverless car will be introduced [13-15]. It is fully operated through internet. There is no human needed to operate the car. It can drive itself. The above details are only developed in real time project.

But our project is fully based on prototype method. Prototype is the step by step process and finally reaches the real time work shown in Figure 1. It is one of the stages of automated car. This vehicle has six levels. The level 0 is not automation. The level 5 is fully automation and level 3 is fully conditional automation. Based on this level, the car can be driven safely. This method will become very popular within few years. It is very safe for environment since it reduces the rate of accidents. The Google car has been followed the rules and regulation of the land detection. The camera detects while driving the autonomous car.

Using image processing detection has been avoided. In traffic light detection, image processing is mainly used. Using sensor to identify the color and compare the color on the image processing data base and finally detect the traffic light. In this prototype method the car has completed these three detection after the car has been stopped automatically.

![Figure 1. Automatic Car model](image)

2. Existing method

Taking into account, the automation in vehicles one must be always aware of the various kinds of processes in it. The main idea is to collect the data from the real world and inform the status of the vehicle and path of motion in personalized computers or smart phones. The invention of Engine Control Unit (ECU) to serve many parameters of car and have a control over them. They also improve the engine efficiency and reduction of fuel usage and an overall reduction in expenses incurred.

The features enable the user to take decisions regarding the data captured using different sensor devices. Automation on home and as well as, vehicle automation pave ways to an integrated cloud controlled environment.
The existing IOT based vehicle automation systems are used mainly to have access of different parameters associated with the vehicle during loco-motion shown in Figure 2. A variety of parameters such as speed, temperature, humidity, distance and car locking are generally monitored.

3. Proposed method

The proposed method indicates the use of vehicle autonomy and creating a computerized path detection which requires an active internet connection. By using a web browser the car is controlled. The system shown in Figure 3 makes use of raspberry pi, a camera module, a motor and a driver circuit. The raspberry pi is used in streaming the video in the internet. It is a single board processing unit which has a very powerful processing unit with serial camera interface. The camera is generally used with this system to comparatively record the live motion of the vehicle along its route.
A powerful web server application like apache is generally installed on the raspberry pi to various web page by using scripting language. An additional sensor is included in the system which is mostly of ultrasonic or infrared sensor as the prototype is featured to work on low range on work. The wireless sensor acquires the obstruction that is prevailing along the path of movement of the vehicle and sends the information to the raspberry module. Based upon the information received by the raspberry pi it takes the corresponding action and turns the vehicle in prescribed direction. A DC motor of 100RPM (Revolutions per minute) is usually used to have proper control over the wheels.

Figure 4: Raspberry Pi module

Latest model of the third generation Raspberry Pi is shown in Figure 4. Raspberry Pi is a single board to perform many applications. Using this module we can transfer the digital parameters to cloud storage through internet. The saved data so obtain find a use for monitoring purpose and analyzing the information.

Figure 5: Automated car

4. Conclusion
In the rapid pace of urban development, the need for drivers is a challenging task and so, in the upcoming years, the autonomous driverless car shown in Figure 5 are set to become a rapid advancement in the field of automobile engineering. The presence of internet controlled automobiles in the urban world ensures faster compatibility and better user connectivity. However, the security and maintenance of inter computer communication is always a surmountable risk.

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