ZKG INTERNATIONAL

ISSN: 2366-1313

IOT-ENABLED AUTONOMOUS VEHICLE CONTROL DESIGN: NAVIGATING TOWARDS INTELLIGENT MOBILITY

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ABSTRACT: A system prototype for autonomous vehicles is detailed in this article. There has been an increase in safety while driving an internet-connected vehicle. Traffic light detection, obstacle detection, and lane detection are the three types of detection. As far as the project is concerned, it is paramount. Minimizing fatalities and injuries is a key objective of this proposal. The four most crucial components are a web interface, an Internet modem, a Picamera, and a Raspberry Pi.These are the computer vision algorithms that enable it to function.Working on the Raspberry Pi should not be stopped. Videos were uploaded to the internet so anyone could view them. Both the project's utility and its cost-effectiveness are outstanding.

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

1.INTRODUCTION

Life is becoming increasingly industrialized due to technological progress. Autonomous vehicles are the most recent social development. Everyone's attention was directed inward. This is the safest mode of transportation due to its highly advanced safety features. Presently, human error constitutes the predominant cause of automobile collisions. Vehicular operators are susceptible to developing vertigo and becoming distracted. Driving under the influence of alcohol constitutes the leading cause of the majority of traffic collisions. To operate the vehicle, a computer vision algorithm was implemented . By utilizing sensors, one can detect obstacles and avert accidents.

The Internet of Things serves as the fundamental element of the project. Despite automated vehicle research commencing in 1920, the inaugural test drive did not take place until 1950. The idea for the first fully autonomous vehicle in history originated at Carnegie Mellon University. As soon as the concept of fully autonomous vehicles surfaced, a multitude of companies commenced their development and promotion of such vehicles .

An increasing number of individuals in the United Kingdom, Belgium, France, and Italy are developing a keen interest in autonomous vehicles. Authorities report that driverless vehicles are undergoing testing on public roads in Spain, Germany, and the Netherlands. The algorithm that underpins Google's autonomous vehicles was developed by a Stanford University professor . One of the most popular autonomous vehicles was developed by Google. Navigation was an integral component of the Google Car's design process. Various categories of sensors were taken into account throughout the developmental phases of the autonomous vehicle. It is expected that autonomous vehicles will be operational by the year 2020 . It is completely at your discretion to do it online. The car is not required to be operated by an individual. This object possesses the capacity for independent motion. The information provided earlier should be utilized exclusively for ongoing projects. However, the prototype approach continues to be the most essential element of our undertaking. The process of developing a prototype is illustrated in Figure 1. Real-time work is achievable following the completion of a few steps. This signifies progress in the direction of fully autonomous vehicles. Six levels comprise the interior of the vehicle.

At Level 0 there is no automation. In contrast to level 3 automation, which merely executes the current tasks, level 5 automation handles every aspect autonomously. No risks are associated with operating the vehicle at this time. This particular approach is anticipated to be widely implemented

ISSN: 2366-1313

in the coming years. It provides substantial environmental benefits by reducing the frequency of accidents that transpire. Google's vehicle has successfully navigated to land by following the regulations. Obstacles are detected by the camera of the autonomous vehicle as it travels. Image processing could serve as a potential workaround for detection purposes.

Locating traffic lights is one of the most fundamental tasks in image processing. The status of a traffic light will be determined by the sensor through a comparison of the detected color with a database comprising processed images. Using this prototype methodology, the vehicle autonomously executes all three detections subsequent to reaching a complete stop.

Figure1.Automatic Carmodel

2. EXISTING METHOD

Automobile automation necessitates meticulous deliberation due to the multitude of processes entailed. The fundamental idea is to collect data from external sources and relay it to computing systems or mobile devices in order to ascertain the whereabouts and velocity of the vehicle. With the implementation of the Engine Control Unit (ECU), a number of vehicles' components became more manageable. In addition to enhancing engine performance, they decrease fuel consumption and the costs associated with it.

The user is empowered to make decisions by utilizing information gathered from numerous sensor devices. The integration of home and vehicle automation enables the creation of a cloud-controlled environment.

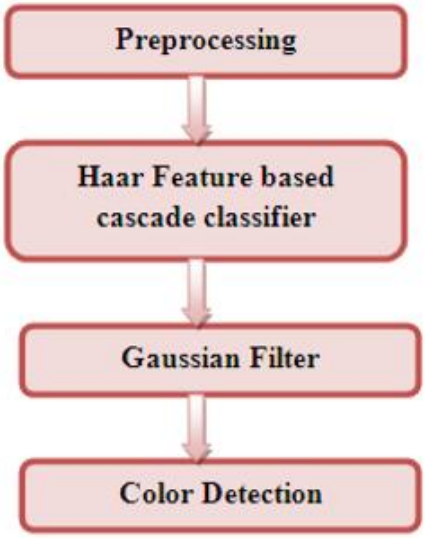

Figure 2: Process steps in Existing method

The ability to obtain real-time information on various vehicle parameters while the vehicle is in motion is a fundamental goal of modern vehicle automation systems based on the Internet of Things (IoT), as illustrated in Figure 2. Frequent monitoring is performed on a multitude of variables, encompassing distance covered, temperature, humidity, velocity, and vehicle locking.

3. PROPOSED METHOD

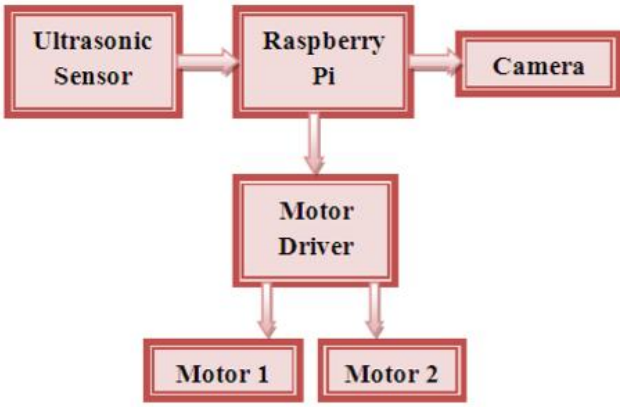

Figure 3 Block diagram of proposed model

The suggested course of action entails the integration of fully autonomous vehicles and the creation of computerized systems capable of discerning routes that necessitate uninterrupted internet access. The vehicle is interface-operable through a web browser. Figure 3 illustrates a system comprising motor components, a camera module, a Raspberry Pi, and a driver circuit. Videos are transmitted via the internet using a Raspberry Pi. This single-board computer is equipped with a serial camera interface and a

ISSN: 2366-1313

potent processor. By connecting this system to the camera, it is customary to capture live footage of the moving vehicle.

After configuring the Raspberry Pi with a dependable web server application, such as Apache, different web pages should be accessed using a scripting language. Since the prototype is designed to function exclusively at close proximity, an extra sensor, which is commonly an ultrasonic or infrared sensor, has been integrated into the system. The information obtained from the wireless obstacle-detection sensor is transmitted to the Raspberry Pi module. The Raspberry Pi controls the trajectory of the vehicle by means of data reception, processing, and utilization. In general, for optimal wheel control, a DC motor operating at 100 RPM is recommended.

Figure 4: Raspberry Pi module

Figure 4 illustrates the most recent Raspberry Pi model, which is the third generation. Raspberry Pi is a platform that is extraordinarily versatile. By utilizing this module, the process of uploading cloud-stored digital parameters is simplified. Data that is saved can be utilized for monitoring and analysis purposes.

Figure 5: Automated car

4.CONCLUSION

Identifying qualified drivers is becoming an increasingly challenging task in light of the rapid expansion of cities. Due to this rationale, the autonomous vehicles illustrated in Figure 5 possess the capacity to fundamentally transform the automotive sector in the coming years. Internet-enabled vehicle control in urban environments provides enhanced user connectivity and accelerated compatibility. However, the potential dangers linked to ensuring the consistency and security of computer-to-computer communication are consistently acceptable.

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ISSN: 2366-1313

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