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Smart Travel Automated Vehicle

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Abstract - *Automation is the 21st generation's preferred means of operation. With the IOT achieving demand there is a need for an automated technology which would be able to completely automate the process of traditional manual driving methodologies and the vehicles should have the vision to make their own decisions based on real time situation analysis to start or stop without any human interaction. This paper focuses on the possibilities which can be achieved by the automated vehicles and enlightens architecture, features and demerits of an Automatic vehicle. A research on detailed review on smart vehicle have been conducted at various places across the globe.*

Key Words: Smart Travel Automated Vehicle, Raspberry Pi, Ultrasonic, GPS

1. INTRODUCTION

The idea of a vehicle without any humans may seem impossible at first but the current development in the field of IoT have made such unrealistic ideas into efficient devices which we see and use in our mundane environment. Since past decade a number of ideas have been presented in which it has been portrayed that the vehicles have the possibility to be upgraded up to the level of being completely autonomous, not even a single decision has to be made by the humans. Providing the capability of making the decisions to the machine will lessen the risk human mistakes which cannot be made by the machines due to their strict algorithmic functionalities.

We hope to build a prototype vehicle which will be able to adapt to its surroundings and comprehend the necessary actions which are to be taken by the vehicle to provide an efficient and automated process. The conditions may contain various type of data such as the current time, location of the vehicle, speed at which the vehicle is moving, traffic regulations of the surrounding, real time object variables. The algorithm will provide the necessary actions which are to be brought into action by the vehicle by calculating the optimized method based on the conditions that are been recorded by the STAV. Thus, achieving a complete control over the vehicle will prevent the possibility of any unwanted accidents from occurring. It will increase the safety of the on boards as well as the surroundings. The level of safety can be increased by a number of times as compared to the current manual travelling vehicles.

The prototype will be build using Raspberry Pi as a processing and controlling unit of the system, the STAV will be accessing the geometric assets such as the distance between the objects which are vertically parallel to the vehicle with the help of sensor's data which will be received by the Pi. The sensors used for this purpose are ultrasonic sensor the STAV operates on the data received from the sensors and makes it so that it can foresee any potential hindrance in between the route while traveling.

2. LITERATURE SURVEY

The autonomous driving is a very prominent technology. As the vehicles in the surrounding are increasing, autonomous vehicle thrives on improving the driving mechanism by use of higher IoT and Computer Vision techniques.

Wireless Fidelity has the highest data transmission rate possible for IoT devices. In IoT internet connectivity is necessary for data communication and information exchange.

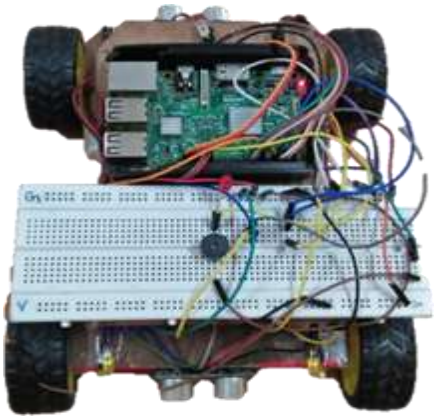

Fig -1: Functional Model of STAV

Broad utilization of IoT in Vehicle correspondence has affected the exploration work to grow new steering and information gathering conventions. It is fascinating to take note of that present intelligent vehicles have information detection and assembling modules and information merging models to improve the administrations gave to client network. The study delineates the progression in the IoT inclines exceptional till the year 2015. A concise outline of the IoT framework configuration is given some common issues that must be seen during sending stage. [1]

In the article "Self-driving and driver relaxing vehicle" they have a mechanism in which one car follows other car i.e. they have focused that one vehicle is manually controlled and another vehicle follows the manually driven car. The targeted car (car1) knows the route of the

destination, while the following car (car2) doesn't know the route, so it will follow the same route as the car1. People sitting in the car2 can just sit and relax in the car. [2] But, this vehicle cannot be considered as a safe vehicle because if the targeted vehicle meets with an accident then the following vehicle will also meet with an accident.

There must be controls at a more significant level which ensures that "autonomous" robots would not be able to harm themselves or even hurt humans. As a result, this kind of control leads to the application of Asimov's law [3], which can be stated as follows:

i. Humans shall not be harmed by the robots.

ii. As long as the first Law sustains the robot should follow instructions.

iii. Damage to another machines by the robot should not occur unless first and second laws are obeyed.

3. SYSTEM ARCHITECTURE

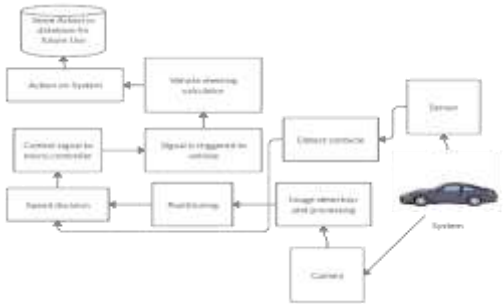

Fig -2: System Architecture of STAV

The system will start and check whether it is day or night. IF it is night it will start the headlight of the vehicle automatically and when it is day it will check whether it is dark environment or not, after recognizing the dark environment in day, headlight will automatically turn on. After that the ultrasonic sensors will be initialized to recognize the obstacles in front of vehicle and at the back of vehicle. If no obstacle such as pedestrians, vehicles etc. is present it will forward. This application will help the vehicle in easy parking and will help to reduce accident. The vehicle will detect stop signs on road and will stop automatically after detecting it. There is also a function that while turning left/right the car will give proper indicators to other vehicles whether it want to turn right/left. In case any accident happens, a mail will be send to family/friends alerting them the location of the vehicle using the GPS system. All the actions performed by the vehicle will be stored for future use and in updation of vehicle as per technology changes.

4. FEATURES

1. Automated Driving Process.
2. Faster Actions due to programmed algorithm.
3. Traffic Sign Detection.
4. Obstacle Avoidance.
5. Accident Alerts to the user.
6. Time period based light automation.

5. RESULT

Fig -3: Prototype of STAV

We made a vehicle which is capable of detecting different obstacles in its environment and can avoid accident between two vehicles. We have used ultrasonic sensors which have faster actions due to a programmed algorithm in raspberry Pi. STAV is also able to send Accident alerts and the location of vehicle to family members or friends in case of any accident happens. STAV also possesses the property of detecting real time traffic signs using computer vision technology and uses mobile camera to detect the signs. When the vehicle is started, a message on the users mobile is forwarded which specifies the location of the driver. Buzzer beeps when an obstacle is detected by STAV, and the vehicle stops at the same time. While turning right or left, proper indicators are given by vehicle to others. STAV have the property of time based headlight automation i.e. If it is day the headlight will not glow, if it is night or when its dark then the headlight will glow, hence it had automated light system.

Fig -4: Stop Sign detection

Fig -5: Alert Messages to family/friends

6. APPLICATIONS

Such type of vehicles can be implemented in environment with higher probability of human mistakes to avoid any collateral damages in the process. Implementation of autonomous vehicles reduces the human resources thus reducing the possibility of less effective work amount being done.

7. FUTURE SCOPE

Autonomous vehicles have been receiving an extreme amount of attention from IOT enthusiasts. Many International technology firms have displayed their interest in this topic and are initiating various projects to implement the idea and to bring forth a level four autonomous vehicle. The future holds onto the infrastructure where the vehicles do not need human interactions. This can be achieved by the continuous development in the field of automation and will lead to a world with the more secure and smart vehicles

8. CONCLUSION

Autonomous cars are on their brink of becoming a real experience which shall soon prove to be definite key to manual driving. Our paper shows a model that how an Autonomous vehicle should be able to work in heavy traffic conditions and will help prosper the advancement of future Autonomous vehicle of level 5 (Entirely Automated).We hope to provide a brief description on manual and future self-driving cars. With the modern lifestyle where almost, everything is preferred to be automated the scope and the possibilities are relatively high. While the practice of Autonomous driving unwraps, the alliance between man and machine shall be vital to allowing the cross-industry platform in instructing & developing an Autonomous/self-driving system.

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