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ARTIFICIALLY INTELLIGENT SELF-DRIVEN CAR WITH OBSTACLE AVOIDANCE

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Abstract: This Report is About Artificially Intelligent Self-Driven Car with Obstacle Avoidance. The aim of the Project is to design and create an automated self-Driven car that can also be controlled by desktop application via internet. The car can be controlled from any PC as long as it is connected to an internet connection. A camera will also be used to observe the motion of the car. The user will just set the destination by just clicking on the map, the car will drive itself and will reach to its destination without any human involvement.

Keyword: are missing please Add them

Introduction: This project is about self-driven car that can follow routes via predefined maps provided by the server using GPS device, without any human intervention. It describes independent vehicle benefits and costs, forecasts their likely development and achievements based on experience with previous vehicle technologies, and defines how they will affect developing decisions such as most favourable road, parking and local travel supply. enhanced security, power preservation and pollution decreasing, will only be important when independent vehicles become common and economical, probably in the 2040s to 2060s, and some benefits may require forbidding Human-driven vehicles on self-assured routes, which could take longer. This project is very helpful for everyone. Exponents of model based on independent cars say they would control misfortune caused by human error, all traffic accidents are basically caused by human errors. Furthermore, the prediction of this model can improve traffic flow and can low the traffic jam and erased the errors caused by humans, and can overcome on the expressway capacities other things like transportations around the global village, anything can be done via this effective model capacity prediction.

Corporations designing and developing, trailing Cars with no driver including some of international firms like Audi, BMW, and Volvo. Google is more aware about independent car with no driver can be useful in daily life.

Problem Statement: Self-driven vehicles is able to decrease the ratio of accidents and traffic jam, and can save time by doing something more important than driving. These are satisfaction usually assigned to maintain; as a result, independent vehicles can help for maintaining the ratio of self-driven cars in cities and can ensure security of passengers and durability with efficient level of maintenance.

Methodology:

[1] The User points a destination with the help of mapping tool by showing short distance to passenger or user destination. Special purpose tools calculates a route through Google Direction API and with the help of GPS and Compass and starts the car to go on its way.

Ultrasonic sensors help to avoid the obstacles during the drive. The ultrasonic sensors are placed on car right, left, front, and back and also at Ground to detect earth surface**.** We are using two Arduino Mega board for controlling the sensors and compass sensors and also a camera for video streaming.

It will be controlled by a desktop application. The logics for navigation system will be implemented in windows application the user will just click on the location where they want to drive the car, and the car will automatically be driven to that place. An override function is available to allow a human to take control of the vehicle. This option will be used for off-road places on the map.

Software Quality ISO-9126:

1) **Functionality:**

Avoid Obstacles using five ultrasonic sensors and Self-Drive the car to the destination. Moreover, Remotely Control the car, watch live camera streaming and also get live location via internet

2) **Reliability:**

As the car is connected to internet, we can remotely check out the faults of the car and also remove them remotely also the car uses server-side code (WCF) so we can debug it without disturbing the car software

3) **Usability:**

The front-end software which is designed for user to operate the car is so simple, any layman can operate this car. All you have to do is pickup destination location and click on submit button

4) **Efficiency:**

This car have solar panel over the roof so no need to recharge for day-time use

The car need no human intervention after the car gets the destination location. It is totally driverless environment. If the car lost internet connection in between going through destination it can move back to its previous location without internet

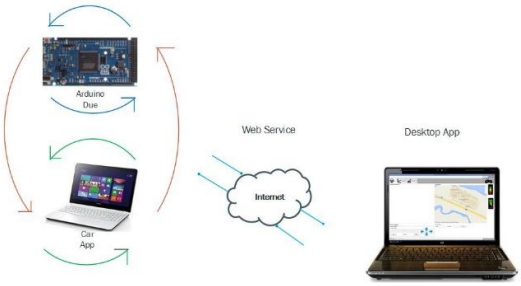
5) **Maintainability:**

The car can be modified easily, there are three types of code running in the system

- Arduino Code (Hardware)
- Front End Application
- WCF service

WCF Service and Front-End Application can easily deploy through remote desktop client

To update Arduino code, you may have physically connected the Arduino boards to system



6) **Portability:**

As this project uses WEB API so it is software interoperable, we can design software in any framework.

Defect Prevention

We can educate & train the end user through videos

We can provide user manuals to operate the front-end application. Use formal methods for development of application. We use formal specifications to specify the requirements. Then use formal verification to verify the requirements have been made or not. This project also used Information Hiding technique so the customer don't puzzle up in a lot of buttons/controls, only the required controls are shown to user.

Defect Reduction

Defect Prevention cannot be 100% accurate

So here is the need of Defect Reduction

Inspection

Testing

Defect Reduction: INSPECTION

1) Requirement specifications

Gathered all user requirements to operate the car.

2) Designs Design the software

Test plans and test cases

Different types of test cases like during heavy traffic or having obstacles we can test the car

3) User manuals, and other documents or software artifacts

Provide user manuals to the end-user so that user can understand and operate the system

Defect Reduction: TESTING

Testing is most important part for this type of system. In which user intervention is unavailable. It can cause serious accidents if system fails. We have to test each case and if failure occurs, we have to locate the fault and remove it. In this system Unit Testing and Integration testing is most important

Black-box testing

It will be on external functions for the car. The functions that are operate able by user. Giving destination location. Remotely operate as RC Car. Failures can occur and it can be removed

White-box testing

As this project has three types of programs running in the system. We have to use white-box testing on these three programs. Also, their integration with each other

Defect Reduction: When to Stop Testing?

We can make a checklist for different types of test cases and usage scenarios. Test cases can be included such as

- Traffic
- Internet connection problem
- Obstacles on road

Defect Containment

As this system is real-time control system and if failure occurs it can be so dangerous to the end-user and can cause serious injuries. We use these Defect Containment techniques

- Software fault tolerance
- Safety assurance and failure containment.

Defect Containment: Software fault tolerance

We need higher levels of reliability, availability, or dependability in this system. Primary software fault tolerance techniques:

Recovery blocks

Use repeated execution of the software of the car
Check local execution faults leads to system failures

N-version programming (NVP), and their variations

We can use N copies of the same program with different versions fulfilling the same requirements of our project
This will check local failures doesn't compromise global execution result.

Defect Containment:

SAFETY ASSURANCE AND FAILURE CONTAINMENT

As this system is safety critical system, our primary concern is the ability to prevent accidents from happening. Accident is a major failure in our case
A little type of failure can lead to an accident that can be major one. We can use hazardous lights when a failure occurs so that other car drivers can save themselves from accidents.

We can also use automatic brakes if any system failure detected.

Expected outcome:

- Reduction in car accidents
  Avoid human Errors
- Efficient use of highways.
  Two Seconds Rule
- Optimal Speed
  Fuel Efficient Drive (save 10-15 % fuel)
  Environment Friendly.
- Increases in productivity

Conclusion:

Upon addressing the mechanics of the driverless car as well as its benefits and potential issues, it is quite interesting to see how the world will actually become by the year 2040 to 2060. With the help of Google Maps, Hardware Sensors and Artificial Intelligence, this driverless car will definitely hit the roads and change the whole travelling concepts.

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