International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2019): 7.583

Robotic Control System Car Based on IoT

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Abstract: ***In recent The purpose of developing a robotic car is to achieve low cost and low power. This paper is based on designing a robotic car to give the user a calm and stress free driving. Here we have focused on the functions of a robotic car in which it will detect the obstacle, record the image for few seconds store it in cloud drop box for future use and also alert message is given to the user. It also navigates itself on the track, control the movements and also check the surroundings with the help of Ultrasonic sensors. The input is taken from the ultrasonic sensors it analyzes the objects and reports it to the raspberry pi. Further, raspberry pi gives commands to the motor driving accordingly to navigate.***

Keywords: Open CV, Video Surveillance, Cloud Drop Box, Alert Message.

1. Introduction

A robotic automotive is an automatic vehicle that's designed to travel between destinations with none human intervention. About 1.24 million individuals have been killed in roads each year throughout the planet due to accidents. The autonomous system could be an answer to the present drawback. Safety, congestion, value and parking problems are resolved by the designing of robotic automotive.

1) Safety – Unlike us, robotic cars can never get drunk, frustrated, dozed off. Hence, robotic cars are safer than humans.
2) Congestion –These days there is a huge traffic from one point to the other point. Driverless cars will travel on convoys inches apart with none unneeded dabs of the foot pedal to filter backward through traffic and make mysterious, pointless hold ups.
3) 3. Value-shopping for insuring and maintaining an automotive is pricey. Therefore why not let somebody else do it! The long run of cars is probably going to incorporate sharing schemes and reasonable leasing choices. Cars are additional productive instead of defrayment ninety nine% of their lives unmoving outside your moves.
4) Parking – A good traffic system always needs a good parking system. The aim of this paper is to automatically drive and park the vehicle without the driver.

2. Literature Survey

1. Parth Verma, did a research with the title "The Google Autonomous car". The Google autonomous automotive was fictional by Sebastian Thrum UN agency was the co-inventor of the road read mapping service. The advantage of this analysis was that it decreases human error whereas driving and end in reduced risk of accident occurring. The constraints of this analysis square measure once the automotive is traveling at high speed that over 100mph, the automotive can hardly be able to differentiate the objects on the roads.

2. Michal Ruziicka and Peter Masek, did a research with the title "Real Time Visual Maker Detector and huntsman supported pc Vision for Semi-autonomous Convoy Purpose". This analysis relies on dominant the semi-autonomous convoy by coming up with vision methodology. The benefits of this analysis are low power consumption and economical product value. The constraints of this analysis at victimization 320x240 low resolution of captured frames which can cause the result inaccurate. Higher resolution cannot be used because of low value power device that doesn't act in real time process thanks to low frame. However this downside is solved by OpenCV improvement.

3. M. Naveen Kumar did a research on "OpenCV for Computer Vision Applications". The purpose of picture getting ready is to help the PC with understanding the substance of an image. Open-CV contains different apparatuses to take care of PC vision issues. It contains low level picture preparing capacities and elevated level calculations for tracking location, highlight coordinating and following. Open-CV is a library of programming capacities with regards to the most part used for picture planning. It gives DE-fact standard API to PC vision applications. We can deal with various continuous issues using picture getting ready applications.

4. "The principle utilization of IR sensors in mechanical autonomy". IR sensor is for obstruction evasion. All things considered, their innately quick reaction is exceptionally alluring for upgrading the constant activity of a versatile Robot in, for example, map building undertakings. In this way, it appears that the improvement of extraordinary failure cost IR sensors ready to precisely Measure separations with decreased reaction times merits examining. In this paper, another IR sensor dependent on the light power Back-dispersed from articles and ready to gauge separations of up

to 1 m is depicted. Additionally, the sensor model is depicted and the normal mistakes in separation gauges are broke down and demonstrated.

5. Mirjana Maksimovic did an examination on "Raspberry Pi as Internet of Things equipment: Performances and Constraints". Entering the hour of Internet of Things, the usage of little, unassuming and versatile PC gear that license end-customer programming becomes present. One of them, considered in this paper, is the Raspberry Pi, totally customization and programmable little PC board. Comparative examination of its key segments and presentations with some of stream existing IoT model stages, the Raspberry Pi remains a practical PC with its adequately use in different extent of research applications in IoT vision.

6. Another analysis was through with the title "Autonomous machine robot with laptop vision system". The advantage of this analysis is that the project has several options like GPS, measuring device and compass which may use for information collections purposes higher accuracy results achieved with higher resolution and frequency. Aside from that, the robot cannot operate at dark surroundings. The root could have downside with the movement that cannot avoid the obstacles with correct turning angle of the robot.

3. Problem System

Keeping in view, the current autonomous car seems very limited as they too have many drawbacks. The imperative issues faced in extant system is namely sensing technology intervention, accident liability authority, less security, Wireless range is too small, No video surveillance system. It doesn't work safely in some weather condition and crowd navigation. Taking few of these flaws into consideration, here a system is designed to endure these flaws. This system detects obstacles and stops abruptly as it detects an obstacle. The provision of video streaming, alert message will also be present in the designed system.

4. Objectives

To analyze and design an automated car model, which endured few of the above stated flaws by using a GUI based control for movement of the automated car model and video surveillance so that the user gets an idea of what is present in the way of travel of the automated car. This paper aims to produce an automated car. The automated car navigates itself. When an obstacle is detected in forward motion a video is recorded and stored in cloud drop box and if an obstacle in detected at backward then an alert message is sent to user. The sub objectives are as below:

It helps to reduce the memory load, Video surveillance is implemented, Wireless range is increased, it also produce low cost and low power consumption autonomous car. The main goal of self-driving automated car is to avoid accidents.

5. Proposed System

In our proposed system, we implemented Video inspection. Where the video inspection is the process of auditing a situation, an area or a person. This generally occurs in a militant scenario where inspecting of borderlines and enemy sector is essential to a country's safety. With advances in technology over the years, robots are the only source to monitor remote areas in place of humans. So by considering this particular point, we are implementing a robotic car as robot is developed which is used for video inspecting & auditing which is controlled through a GUI interface. The control mechanism is given a video transmission facility. The video conveyance is practically achieved through high-speed video transposal. Initially, the robot will be rigged with an ultrasonic sensor which detects the obstacles, records the video via the camera for five seconds and transfer it to the cloud drop box. It is also rigged with IR sensor which allows it to detect the obstacles approaching the vehicle from behind. It will detect an object and it will change its direction. It requires a remote PC along with the internet facility at the remote locations. If internet connectivity isn't available still the unit can be used using Wi-Fi. It implements a system which is portable, low cost & having less maintenance.

Proposed System Architecture

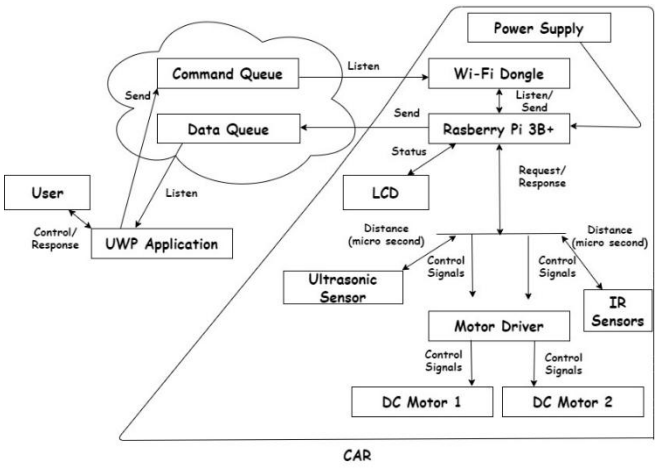

Figure: Proposed System Architecture

In our proposed architecture, the user uses the GUI which is developed by using the UWP application to give inputs and to obtain the outputs. The commands given by the user are firstly stored in the command queue. When the device is ready to receive, the commands are fetched by Raspberry Pi using the internet network provided by the hotspot. The respective execution occurs and the response is sent to the GUI by the Raspberry Pi through the data queue present in the cloud. Whatever may be the command sent to the car, for every command there is a specific response which either represents that the command has been fulfilled or it has failed to fulfill the command. Any update or data regarding to the car is shown in the user application. In this project ultrasonic sensor is being implemented at the front of the car and this helps to detect the obstacle in the forward motion of the car. IR sensor is being implemented at the back of the car, which helps to detect the obstacle approaching the car.

6. Methodology

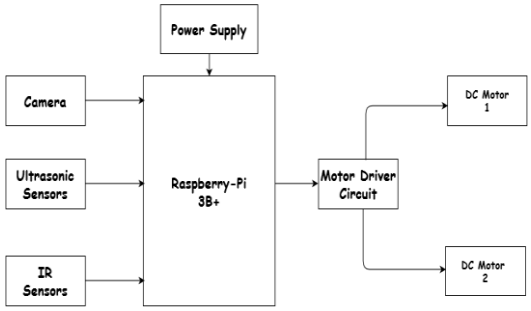

Figure: Block diagram

The combination of Raspberry Pi, web camera and ultrasonic sensors helps in getting the input. PC handles multiple tasks i.e., receiving data from Raspberry-pi, object detection, and sending instructions to the motor driver circuit to navigate. An ultrasonic sensor detects obstacles and helps in taking diversion via the motor driver circuit. The aim of this project is such that Camera should record the video for 5 seconds and stores in the cloud drop box. Once after an obstacle detected from IR sensor present behind the car, an alert message sent to the user's mobile number. OpenCV acts as trainer and detector.

Algorithm:

Step 1: start
Step 2: Forward motion
If (distance<15cm)
Obstacle detected
Stop car
Record video for 5 seconds
Upload video to cloud drop box
Step 3: turn right
Goto step 2
Step 3: turn left
Goto step 2
Step 4: IR SENSORS (detects obstacle from backwards)
If(distance<15cm)
Detects obstacle
Sends sms to mobile
Stops car
Goto step 2

This paper aims in detecting the obstacle when the car is in motion. The car automatically stops when it detects obstacle using the ultrasonic sensors, camera attached helps in recording the video for few seconds once the obstacle is detected and take diversion accordingly. The video which is recorded is stored in the drop box. Once the obstacle is detected either in forward or backward direction an alert message is sent to the user mobile number. The video is saved in could can be viewed by the user when he wishes for it.

Expected outputs:
1) Forward motion
2) Right motion
3) Left motion
4) Stops
5) Forward obstacle detection and video uploading.
6) Backward obstacle detection and sending sms to mobile.

7. Conclusion

In our project we have implemented an autonomous robotic car which helps in movement of the car automatically. The car moves in forward motion once the power is given. In the forward motion if an obstacle is detected then a video is recorded for 5 seconds. This video is stored in the pc as well as the video is uploaded to the cloud drop box. In forward motion for obstacle detection we have used ultrasonic sensors. In backward direction we have used IR sensor for obstacle detection. If the obstacle is detected by IR sensor then a sms is sent to the user's mobile number. In this way the motion of the autonomous car works.

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