Guidance System for Autonomous Vehicles

Ashutosh Raj[1], Vipul Vibhanshu[2]

[1,2]*Krishna Institute of Engineering & Technology, Ghaziabad, Uttar Pradesh, 201206*
[1]*mr.ashutoshraj@gmail.com*

Abstract: The automotive industry has been a force for innovation and economic growth. Now, in the early decades of the 21st century, the pace of innovation is flying up and the industry is on the edge of a new technological revolution, "self-driving or driverless" vehicles. The new technology could provide solutions to some of our most intractable social problems—the high cost of traffic crashes and transportation infrastructure, the millions of hours wasted in traffic jams, and the wasted urban space given over to parking lots, just to name. In present investigation a model has been developed initially for college campus for helping college personals to travel at different section of the premises by shortest route. A GPS is utilized as a solution for autonomous navigating vehicles which serve as a guide for the vehicle especially for differently abled persons as well as small kids while travelling. Google map is utilized, to facilitate several coordinates (resolution 1 coordinates per 1m). Furthermore, to store the latitude and longitude of a path in the google maps using html4, php, java script, xml and ajax language on linux platform and wamp server. The application takes input both in the form of latitude, longitude and name of the places and streets, which are there in the google maps. This input is used to extract the output using different classes and API of google which is stored in html format with the help of xml. This serves as a footmarks for the vehicle. Between two consecutive coordinates vehicle travels in straight lines or any curves, as per encoded in the program. Through google map an array of coordinates is extracted and stored. After extracting the continuous coordinates from google map, shortest path between two locations has been stored automatically. These coordinates are compared with the present or current coordinates of the vehicle using gps module. The specific difference between the present coordinate and google's coordinate determines the locomotion and the direction of the vehicle as provided in the program. This paper also addresses some enhancements that can be made for using this method more precisely and accurately.

Keywords: autonomous, module, linux, ajax.

1. INTRODUCTION

Thanks to advanced driver assistance systems (ADAS) ranging from adaptive cruise control to lane keeping assist and automated steering, today's automobile is very nearly autonomous. The driver remains in control, of course, but built-in sensors, cameras and radars make it possible for the vehicle to take over much of the actual driving task. Many vehicles already include various computer-operated safety functions, which operate independently of driver action. Even if there is some initial unease, or if the current higher cost of intelligent vehicles limits initial willingness to purchase them, demand for these technologies will likely expand in coming years.[1-9]

Driverless cars provide the possibility of fundamentally changing transport. Having autonomous guidance system with different vehicle can reduce the accidents, traffic, fuel by providing the shortest path without any further workout. This system can also be used in shared vehicles in college campus, construction sites. It can also facilitates the non-drivers to travel anywhere independently. This guidance system will be of cheaper as compared to the other systems in the market. This will also be helpful near tourist attraction places etc.

2. METHODOLOGIES

Google's coordinates are stored in the database as an array. One by one coordinates are retrieved from the database. Now one coordinate is hold by the one variable. And through the GPS module which is mounted on the vehicle gives the current location of the vehicle. And this current coordinate is stored in another variable. Now both the coordinates are stored in two variables. Now by getting the specific difference between the latitude and longitudes of the both variables, which is usually (<0.000020). After finding the difference between them it is decided, that if it is in range then a signal is generated for the hardware. In this system hardware is controlled through microcontroller board. Specific controlled motion is encoded for specific coordinates in the microcontroller board programming.

3. HOW THE COORDINATES ARE EXTRACTED FROM GOOGLE MAP

For collecting the coordinates from the google we have exploited various google apis like

1. Google.maps.driectiontravelmode.driving

2. Google.maps.directionstatus.ok

3. Maps.googleapis.com/maps/api/js
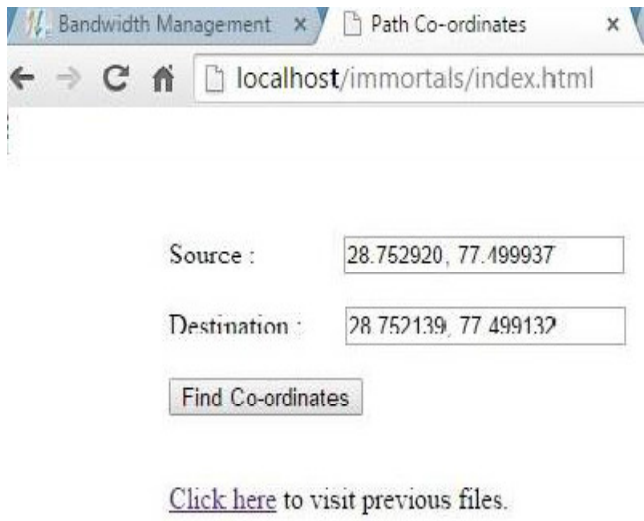
Fig. 1. Input is taken by the user

The application takes the input both in the form of latitude, longitude, and name of the places, which are there in the google maps. This input is used to extract the output using different classes and API which is stored in html format with the help of XML.
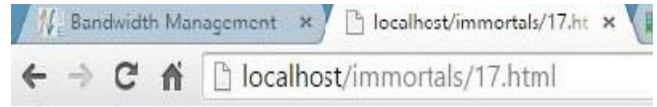
Source = 28.752920, 77.499937
Destination = 28.752139, 77.499132
Date/Time = 2015-04-03 13:25:16
Number of co-ordinates = 7

(Latitude,Longitude)
(28.752920000000003, 77.49995000000001)
(28.7524, 77.49994000000001)
(28.752170000000003, 77.49979)
(28.75212, 77.4997)
(28.752150000000004, 77.49923000000001)
(28.752100000000002, 77.49916)
(28.75213, 77.49912)

Fig. 2. Extracted coordinates in html format

The path can be seen as on google maps.

Fig. 3. Path seen on google map

These are some workout for extracting coordinates from our college campus.

3. HOW THE METHOD WORKS

Step 1: user enters the destination point from his location into the ui.

Step 2: now as the vehicle is connected through the internet. In the backhand the user's input is feed to the google maps.

Step 3: google map calculates the shortest path between two points and simultaneously the coordinates is store into database in html format.

Step 4: current coordinate is received by GPS module mounted on the vehicle.

Step 5: now the one by one stored coordinates are retrieved by database and it is compared with the current coordinate

Step 6: after comparing both coordinates, if it is in range the ARDUINO programming is called through which the movement of the vehicle is controlled.

Fig. 4.

4. TOOLS HARDWARES AND SOFTWARE USED

4.1 Programming Languages
1. JavaScript
2. Wamp server
3. Xml
4. ARDUINO programing language
5. Html4
6. Ajax
7. PHP

4.2 Operating Systems
1. Windows
2. Linux

4.3 Hardware
1. MDXKS-Synchronous-Servo-Motors
2. ARDUINO Mega ADK Development Board
3. Gps-Gy6mv2 Module
4. Raspberry Pi- B+ Model

5. CONCLUSIONS

In this paper we can equip all the conventional vehicles to autonomous vehicles. It can be helpful for both the user and environment. A GPS is utilized as a solution for autonomous navigating vehicles which serve as a guide. If all the cars will be GPS controlled navigated then traffic problem could be reduced, many lives can be saved. It can be used in big construction sites or in the college campus for small kids and college personals. As the GPS accuracy in this system is 3m. It can also be enhanced up to 1m accuracy by the further development as per takasu, t., kubo, n. And yasuda {3}.

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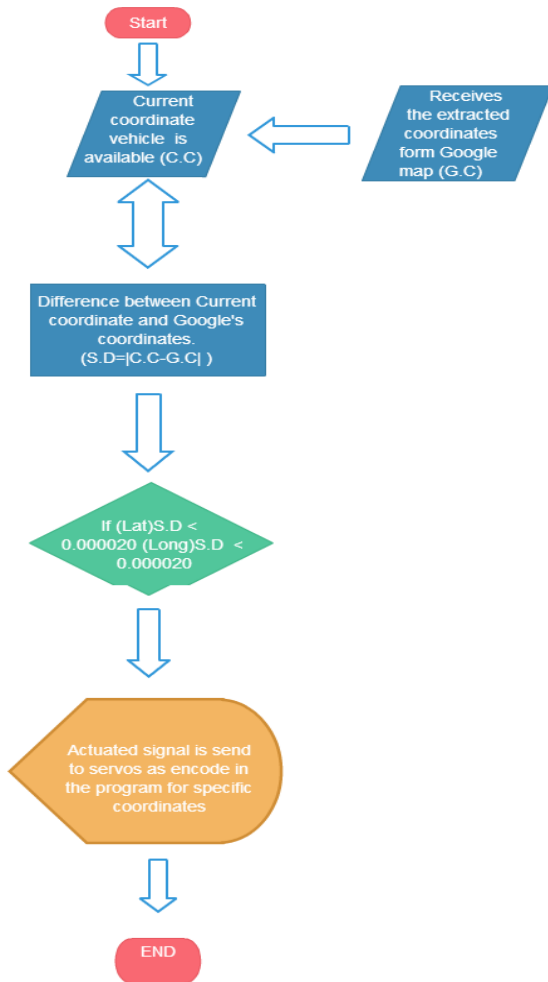
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