IOT BASED REAL-TIME AUTONOMOUS VEHICLE TRACKING SYSTEM

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Abstract— Vehicle Tracking System (VTS) is the technology used to determine the location of a vehicle using different methods. It also provides security to the vehicles. This technology is widely used for fleet management, asset tracking, surveillance, accident prevention etc. This paper proposes a design of an autonomous vehicle based on Internet of Things (IoT) using Raspberry Pi mini-computer. The vehicle contains sensors to detect the obstacle and fire and it stops automatically when detected. The location of the vehicle is updated on the web as it has GPS onboard. It also captures the video and sends it to web page through Internet. Once the owner logs in to internet, he can monitor the condition of the vehicle and its location. He can also control its directions using a web page. With this design it is easy to locate the vehicle and get accurate location of the vehicle on google map.

Keywords— IoT, Raspberry Pi, Controlling, Tracking, Web page

I. INTRODUCTION

Now a days, the number of vehicles are growing rapidly, vehicle theft has become a shared concern for all citizens. However, the present system lacks the tracking and monitoring function. Vehicle Security is a primary concern for all vehicle owners. The technologies like GPS/GSM systems, which enables the owner to closely monitor and track his vehicle in real-time and also check the history of vehicle movements. This new technology, popularly called Vehicle Tracking System has done wonders in maintaining the security of the vehicle[1].

The vehicle tracking hardware is fitted on to the vehicle. It is fitted in such a manner that it is not visible to anyone who is outside the vehicle. Thus it operates as a covert unit which continuously sends the location data to the monitoring unit.

When the vehicle is stolen, the location data sent by tracking unit can be used to find the location and coordinates can be sent to owner for further action. Some Vehicle tracking System can even detect unauthorized movements of the vehicle and then alert the owner. This gives an edge over other pieces of technology for the same purpose. Monitoring software helps the vehicle owner with a view of the location at which the vehicle stands. Browsing is easy and the owners can make use of any browser and connect to the monitoring software, to find and track his vehicle. This in turn saves a lot of effort to find the vehicle's position.

In this paper a IoT based vehicle using Raspberry pi is designed which includes monitoring as well as controlling through web page.

The rest of paper is organised as follows: section II discusses the related work, section III describes the implementation, section IV tells about the software and section V gives the results.

II. RELATED WORK

SeokJu Lee[2], proposed a vehicle tracking system for tracking the movement of any equipped vehicle from any location at any time. The proposed system made good use of a popular technology that combines a Smartphone application with a microcontroller. The designed in-vehicle device works using Global Positioning System (GPS). The drawback is this system can only track the location of the vehicle using the smartphone application.

Virginia Menezes[3], designed Surveillance and monitoring system, that has become very important for security reasons these days. Residential areas, government organizations,
commercial spaces, schools and hospitals, industries, banking and other challenging indoor and outdoor environments require high end surveillance systems, which are very expensive. This paper proposes the motion detection and tracking system for surveillance. The proposed system uses Raspberry Pi and computer vision using SimpleCV to detect moving objects in the surveillance area, switch on the lights to capture images and streams the camera feed online using MPJG Streamer, which can be viewed by any authorized person on the go. This surveillance system uses special framework called SimpleCV for computer vision and M-JPG for video streaming.

P. Anuradha and R. Sendhil kumar[4], proposed a zigbee based system architecture at the network level for tracking the vehicle information which has been sent to the centralized server. The aim of the design is to provide a simple and easy solution to track the location of the moving vehicle. Compared to the old systems, Zigbee based network architecture is able to provide information about the vehicle accurately. The vehicle will be having a unique RFID tag (Radio Frequency Identification). The RFID reader is placed in particular places. For the beneficial features of RFID, we integrate RFID readers into the Vehicle tracking Information System. This RFID reader can check or collect the data and the information is given to the control station through the Zigbee protocol. The Zigbee protocol is used for the messaging service between the control station and the vehicle. This system is complex and uses both zigbee and RFID to track the location of the vehicle.

Ryan Krauss[5], proposed a low-cost autonomous vehicle platform based on the combination of a Raspberry Pi, Arduino micro-controller, and a Zumo track-driven robot chassis. The synergistic combination of a Raspberry Pi and an Arduino allows to control the real-time execution of the control law, read the sensor signals, and send the PWM signal to the motors. The Raspberry Pi provides the web interface, the wifi connection, additional computational power, and captures data for tuning and educational purposes. The primary limitation of this approach is that the USB-to-serial connection limits the digital control frequency to 100-150 Hz. The drawbacks are design requires high cost and hardware used is complex as it uses both raspberry pi and arduino.

Based on the reviewed literature, This proposed system uses Raspberry Pi inbuilt wifi module to communicate over the router, that enables the owner to control vehicle movements, tract the location, live streaming and know the status of various sensor parameters on web page.

III. PROJECT IMPLEMENTATION

![Diagram of the proposed system](image)

**Figure 1 Design and Architecture of the proposed system**

The aim of the system is to create a autonomous vehicle driving control system using raspberry pi. It enables real-time tracking of vehicle’s location using Google maps via web page. Also it can continuously monitor the vehicle and stop the vehicle automatically if any obstacle or fire
occurs. By which the accidents can be avoided and environmental status can be known. The overall design of the system is shown in figure 1.

3.1 Working:
The main components are Raspberry Pi, GPS, Camera, IR sensor and Gas sensor. This paper gives the practical model of a vehicle tracking system which can track moving vehicles in large area.

It consists of two sections, first this system will be inbuilt in the vehicle which is having GPS in it and as the vehicle moves the location of the vehicle goes on changing continuously, the GPS finds the location in terms of two co-ordinates that are longitude and latitude. These co-ordinates are communicated to owner of the vehicle. This GPS is connected to the computer through Raspberry pi inbuilt Wifi module. So, that as soon as the co-ordinates are received, it can be located in the google maps.

Second the owner can also control the vehicle and continuously monitor the condition of the vehicle through web page. As represented in figure 1 the two sensors are used whose default value is 1 and changes to 0 when it detects. They are IR sensor and gas sensor that stops the vehicle automatically if any obstacle or fire or gas is detected. Figure 2 explains the process for a owner access.

**Figure 2 Owner Process**

**IV. SOFTWARE USED**

In Raspberry Pi, Linux debian operating system is installed. Now Raspberry Pi can be operated using the Linux commands[6]. The Putty software is used to communicate with the
Raspberry Pi. The Putty software uses Pi IP address to communicate with device. The putty configuration window is given below in figure 3.

**Figure 3 Putty Configuration window**

When the Raspberry is connected with modem, modem will assign the IP address to the Raspberry Pi, that IP is used in Host name in Putty configuration. The connection type is in SSH mode. The SSH or Secure Shell is a cryptographic network protocol for initiating text-based shell sessions on remote machines in a secure way.

After booting raspbian for the first time, login with default credentials and then run the files from the raspberry pi using linux commands on command window.

**V. RESULTS**

**Figure 4 Real-time autonomous vehicle system**

Figure 4 shows the implementation of the real time autonomous vehicle tracking system, Which consists all the required modules and sensors.

**5.1. Web page for controlling:**

As shown in below figure 5, vehicle can be controlled through webpage after execution of the respective file from Raspberry Pi using putty software.
5.2. Web page for monitoring:
Here vehicle owner can watch the continues live streaming using camera by typing the respective url with IP address on browser as shown in figure 6.

5.3. Web page for Vehicle tracking:
As shown in below figure 7, vehicle owner can find the exact location of the vehicle in the Google map and also know the latitude and longitude values by just entering the static IP assigned to the system in web browser.
5.4. Sensor parameters on Web page:

Here Vehicle owner can observe the sensor parameters on webpage by typing the respective url with IP address on browser. As shown in below figure 9, the default values are 1 and changes to 0 when detected.

![Implementation of Vehicle tracking system](image)

Figure 8 sensor parameters on web page

VI. CONCLUSION

The prototype of autonomous vehicle tracking system has been implemented using Raspberry Pi. It is tested for control, finding the location, viewing the video and checking the various sensor parameters. The results found are satisfactory.

REFERENCES

[1] Mrs Manasi Patil, Aanchal Rawat, Prateek Singh, Srishtie Dixit, “Accident Detection and Ambulance Control using Intelligent Traffic Control System”, International Journal of Engineering Trends and Technology (IJETT), Volume 34-Number 8, April 2016.

[2] SeokJu Lee., Electrical and Computer Eng., Display and Implementation of vehicle tracking system using Gps/Gsm Technology and Smart phone Application Kettering University, USA 2014.

[3] Virginia Menezes., Department of Electronics and Telecommunication, St.Francis Institute of Technology, Surveillance and Monitoring system using raspberry pi and Simple CV University of Mumbai, India 2015.

[4] P. Anuradha and R. Sendhil kumar, ‘Design and Implementation of Zigbee-RFID Based Vehicle Tracking’,Network Eng. Dr. M.G.R. University, Maduravoyal, Chennai, Tamil Nadu, India. July 2011.

[5] Ryan krauss,’Combining Raspberry pi and Arduino to form a low-cost,Real-time Autonomous vehicle platform’Boston Marriott Copley place,USA 2016.

[6] https://www.raspberrypi.org