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Synchronized Monitoring and Tracking System for water tanker and its driver using Raspberry Pi

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Abstract- **The proposed system is used for monitoring and tracking water tankers and the driver who drives the vehicle. This system is used to prevent water theft in urban areas. The tracking process is done with the help of GPS module. There is a fingerprint module used for authentication and monitoring driving routes, tanker opening-closing and change of driver in the vehicle. If anyone tries to drive the water tanker at any place it needs driver authentication. Location and authentication has to match to open the tanker otherwise alert issued to owner of the tanker. If any irregularities or mismatch happens then we can easily find out the root cause and theft by notification message to the water management controller room for the mismatched authentication using GSM Module. The overall process and control is done with the help of Raspberry Pi.**

Keywords- Raspberry Pi, Sensors, Embedded system, SIM900A Module, GPS Module

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1. INTRODUCTION

A propelled vehicle following framework is intended for observing water tanker for its area at continuous and gives alarms to the proprietor. The proposed framework takes a shot at worldwide situating framework (GPS)and Global System for Mobile Communication (GSM) which is utilized for vehicle following and observing instrument. For this reason SIM900A Module is utilized which incorporates all the three things in particular GPS, GPRS and GSM. Moreover this proposed framework utilizes unique finger impression security framework for the vehicle confirmation. The GPS gives current area of the vehicle; GPRS sends the following data to the server and the GSM is utilized for sending ready message to vehicle's proprietor versatile. The unique mark module is utilized to get to the water tanker and confirm driver for the tanker. In the proposed framework, there is examination between the present vehicle way and right now indicated way inside the document arrangement of Raspberry Pi. Subsequently if the driver drives the tanker on the wrong way then the alarm message will be sent from the proposed framework to the vehicle's proprietor versatile. The tanker gets its entrance for water tap for conveyance simply after its achieves the specific goal by means of GPS data. Change of driver in transit is outlandish as the tanker needs drivers unique mark for any entrance for tanker activity. The draw from is bolted at source station in the wake of loading with water with computerized bolt and it can be opened just at goal area with unique mark get to. The proposed framework is can likewise be utilized for any vehicles that is conveying any sort of fluids. i.e., fluids like oil based goods, chemicals, and so forth. Additionally if the vehicle's speed goes past as far as possible, at that point likewise a notice message will be sent from framework to the proprietor portable. The Linux based Raspberry Pi is best decision for the above usefulness and it best outcomes for this proposed framework with no imperfection. The proposed framework would gain power with the assistance of Raspberry pi which put inside the vehicle. The GPS GPRS GSM SIM900A module would get convey to raspberry pi board with USB interface. The longitudes and scopes of the present way got from GPS of GPS GPRS GSM SIM900A module get contrasted and the put away longitudes and scopes in the specific record arrange inside the database of raspberry pi. In the event that that longitudes and scopes not coordinate with the put away one at that point wrong way location ready back rub will motivate sent to water tanker proprietor versatile. Additionally the longitudes and scopes of the present way got from GPS will get sent to the server with the assistance of GPRS which tracks the vehicle's present area on the site page utilizing Smartphone. The water not utilized as a part of some other spots. In this proposition framework the water tanker tap is open by the GPS and the driver unique mark is coordinated then the tap is open.

2) EASY OF USE

Framework Objectives:

- Continuously checking and following the water tanker vehicle at constant condition utilizing site page in Smartphone and if the vehicle pick wrong way then framework give the alarm message to the proprietor's versatile.

- The arrangement of more wellbeing and secure voyaging utilizing the voyaging way office in view of the GPS portable tracker. Likewise give wellbeing condition to the water tanker with does not change the way. On the off chance that the water tanker is to be begun require driver's unique mark for confirmation.

- Storing and refreshing the database of the water tanker. Current area, Time, Speed, and Date is helpful in the event of vehicle burglary identification.

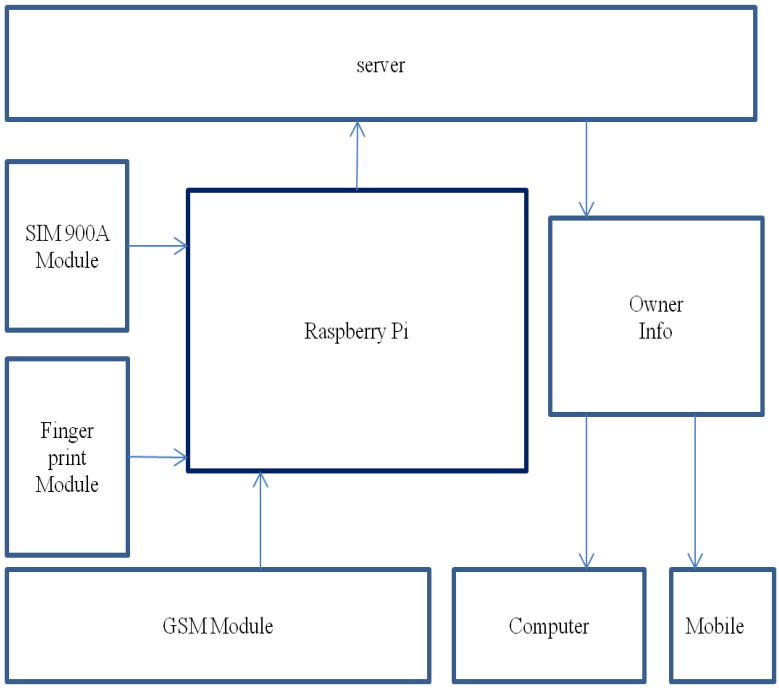

Fig: 1 system block diagram

The proposed framework is controlled with the assistance of Raspberry Pi is interface with the vehicle. The SIM900A module is associated with the Raspberry Pi utilizing the USB drive. The GPS module is utilized to track the vehicle and send longitude and scope estimation of the proprietor. The vehicle area and the database put away to the Raspberry Pi. On the off chance that the database the longitude and longitude esteem isn't coordinated and the vehicle isn't right way then the alarm message is send to the proprietor portable. On the off chance that the vehicle is change in the way to begin the motor need driver verification. At that point the vehicle database of speed, time, date is put away in the Raspberry Pi memory. Also, it is whenever to find in site page.

3) SYSTEM SPECIFICATION

1) Raspberry Pi

- 5V at 1A maximum power supply an adaptor.
- 700 MHz ARM1176JZF-S core (ARM11 family, ARMv6 instruction set).
- 1GHz operating speed.
- 4 USB ports for accessing mouse and key board.
- 40 GPIO pins.
- Ethernet port to connect internet.
- VGA connector and HDMI connector.
- 3.5mm stereo jack for audio out to amplifier.
- Micro SD card interface to boot the OS.
- 512MB of SDRAM.

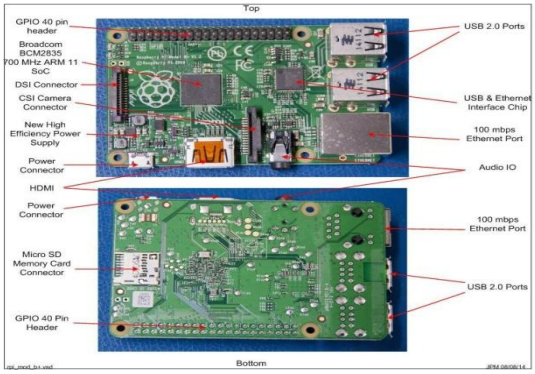

Fig: 2 Raspberry Pi

The proposed system would get controlled with the help of Raspberry pi which placed inside the

2) GPS Module:

Specifications:

- The GPS module is satellite based navigation system and it track the current location of vehicle.
- And it consists of network of 24 satellite located into one orbit.
- The GPS module is send the longitude and latitude value to the owners mobile.
- The system provides essential information to army and navy applications.
- And it is works in any weather condition.
- It measures the current location of the device.Measures temperature from -55 to +125 Degree C.
- It not need of any subscription fees or system changes for the GPS.

Fig: 3 GPS module

- The GPS receiver is locked on the at least three satellites to estimate 2D position and track moments.
- It data related to tracking the position of vehicle real time.

3) GPRS/GSM Module SIM900A:

MAIN FEATURES:

- Dual-Band GSM/GPRS
- Operating frequency at 900/ 1800 MHz
- TTL data (RX, TX, GND).
- ESD Compliance.
- Power controlled using 29302WU IC.
- SMA connector with GSM Antenna.
- Configurable baud rate.
- Inbuilt Powerful TCP/IP protocol stack for internet data transfer over GPRS.
- High quality PCB FR4 Grade with FPT Certified.

GPS Receiver PA6E-CAM Features:

- 33 tracking/ 99 acquisition-channel GPS receiver.
- Supports QZSS, SBAS (WAAS, EGNOS, MSAS, GAGAN*) ranging.
- Ultra-High Sensitivity: -165dBm.
- High Update Rate: up to 10Hz (SBAS can only be enabled when update rate is equal or less than to 5Hz.).
- 12 multi-tone active interference canceller (Some features need special firmware or command programmed by customer please refer to “PMTK Command List”).
- High accuracy 1-PPS timing support for Timing Applications (±10ns RMS jitter).
- AGPS Support for Fast TTFF.

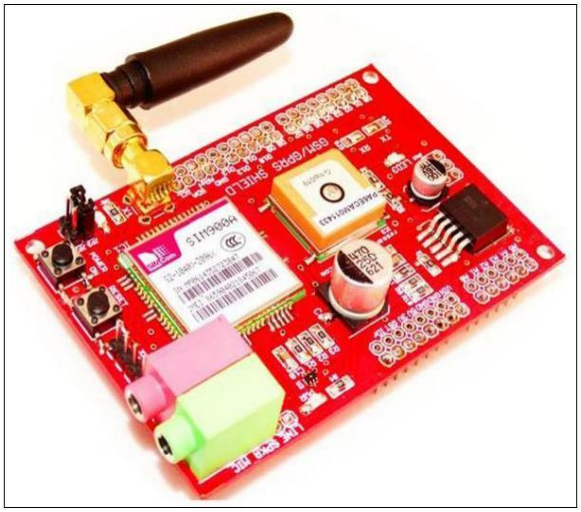

Fig: 4 SIM900A module

4) *Finger Print Module*

- Here the finger print module is used to identify the driver authentication.
- The finger print module is optical type sensor.
- The image capture size is 15 to 18mm.
- Speed of verification is 0.3 sec.
- 100 million times it can sense.
- The character file size is 256 bytes and the template size is 512 bytes.

Fig: 5 Finger Print Module

Servomotor is a rotating actuator or straight actuator that takes into consideration exact control of rakish or direct position, speed and increasing speed. It comprises of a reasonable engine coupled to a sensor for position criticism.

5) Servo motor

- Here the servo motor act as the water tanker lock opening and closing. The servo motor configure to travel at 0 to 180 degree only.
- If the destination reached then the driver is open the tanker tap half of the motor is opened.
- Peak to peak square wave is 3 to 5 volts.
- Operating voltage is 4.8 to 6

- Current drain at 4.8V is 8.8mA/idle and 400mA no load operating.
- Current drain at 6V is 9.1mA/idle and 500mA no load operating.
- Operating temperature range is -20 to +60 degree C.

Fig:6 Servo motor

4) System Design

1) Real time vehicle tracking using SIM900A module and Raspberry Pi

The SIM900A module is utilized to send the message of longitude and scope estimation of the vehicle current position. The SIM900A module is both the blend of GSM/GPRS. What's more, the SIM900A module is associated with the raspberry pi and GPS module. The longitude and scope estimation of vehicle current position is send to the proprietor portable utilizing GSM module.

In the framework the water tanker proprietor is set the situation of the goal to convey the water tanker with amend put. At that point the proprietor put the validation of the driver who works in the organization.

At that point the driver is begin the water tanker to convey the water he have to offer validation to begin the water tanker.

2) Vehicle tracking data base

If the GPS module is track the position of the vehicle and it is store the data base like the speed, date and time. It all the values are stored in the database of raspberry pi. These data are send to the water tanker owner and it is watch are help to see the position of the water tanker. If any misuse is done the refer the water tanker database to clarify the doubts.

3) Water tanker safety system using finger print module

If the water tanker safety purpose use the finger print module. Initially the finger print module stored the working drivers of that company. If the tanker is start need the driver authentication then only the water tanker is start. Then in between any misuse is done and any one drives the water tanker it does not start. If anyone tries to drive the water tanker at any place it needs driver authentication. Location and authentication has to match to open the tanker otherwise alert issued to owner of the tanker.

5) Testing and Result

A) Testing of the GPS module

The GPS module is connected on the raspberry pi. And the GPS is track the current position and it send the owner mobiles using the SIM900A module. The GPS is send the longitude and latitude value of the current position of the water tanker. The GPS module is first connected to the satellite then the GPS is any where it track the exact location of the vehicle.

Fig: 7 Testing Result Of GPS Module.

B) Testing of SIM900A module

The SIM900A module is both the combination of GSM/GPRS it using the mobile network to send the location of the water tanker and the alert message of any issue in vehicle.

Then the GSM module use any subscriber identification module and the number is linked with the Raspberry Pi. Then the vehicle reached the destination and take is opened in unwanted place the alert message is send to the owner mobile.

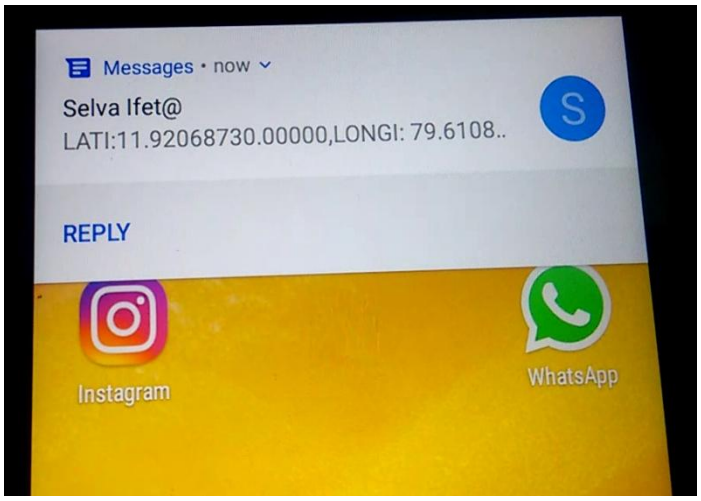

Fig: 8 Testing Result Of SIM900A Module

C) Testing of finger print module using Raspberry Pi

The finger print module is stored the authentication of the driver info and the finger prints in the Raspberry Pi. Then the tank engine is start and open in any place it need the diver authentication.

The finger print module stores some finger print they only access the water tanker any other people is drive the vehicle the module is Denny the access and the tanker does not start.

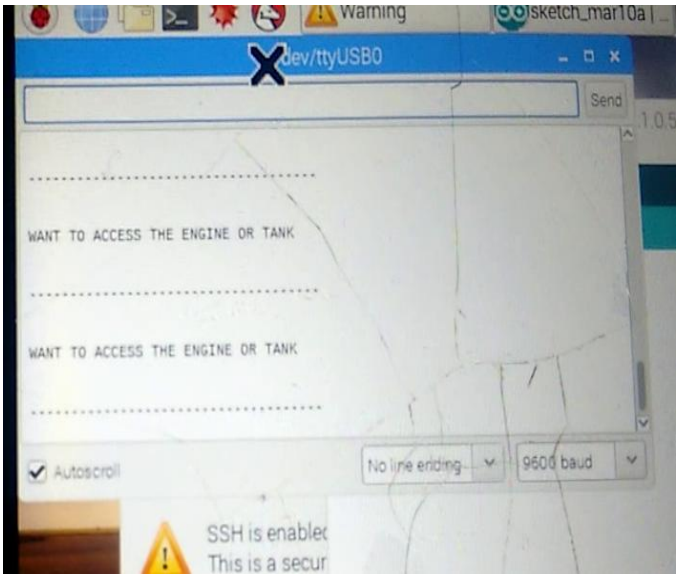

Fig: 9 Testing Result of R305 Module

5) Conclusion:

The proposed system hence made of good use of smart phone technology by providing safety and secure of the water tanker for destination. And the proposed system is continuously monitoring. And the finger print module is used to identify the driver. The water tanker is who drives and which place the tanker tap is opened identified by using this system. Then the water tanker engine start and closing need the finger print authentication. This proposed system the tanker is delivered correct place without any water theft.

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