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IOT BASED POLLUTION DETECTION AND VEHICLE SECURITY SYSTEM

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Abstract

The project consists of two applications. First is the safety of vehicles. Hence a vehicle locking system and tracking system is essential which is installed in the vehicle. The location of the vehicle is identified using GPS, and the coordinates will be sent on the owner's cell phone with the help of GSM. Simultaneously the image of the thief is captured and is sent to email of owner. When the authorized person gets to know about the theft, he can send a password from his mobile to stop the engine. In this when the emission is beyond the standardized value, which is due to improper maintenance of vehicles, hence a threshold value is set and this will intimate the driver by giving warnings to get the vehicle serviced, if he fails then the engine is stopped and to restart the vehicle he needs to get the vehicle serviced by the authorized person. Simultaneously the levels of the carbon emission will be uploaded to the net via IoT (Internet of Things) using ubidots, which then can be monitored by the officials of the RTO. Emission is tested using MQ-2 gas sensor. By this we will be able to monitor the conditions of each vehicle.

Keywords: GPS _ Global Positioning System, GSM - Global System for Mobile communication, IOT - Internet of Things (Ubidots), MQ-2

INTRODUCTION

Our project has two applications. First is the theft detection and tracking of the vehicle. In the normal condition the vehicle can be locked and unlocked by a password which is given by the owner. When the vehicle is parked it is secured by a password, if the vehicle is at theft or any unauthorized person tries to unlock the vehicle, then the vibration sensor is activated and a message is sent to the owner along with which the tracking of the vehicle also starts through the GPS and GSM module and timely the coordinates of location is sent to the owner. Simultaneously image of the thief is captured and sent through an e-mail to the owner using the RASPBERRY-PI controller over the internet. When the owner gets to know about the theft, he can send a password through his mobile phone to lock down the vehicle.

The second application is the IoT based Emission detection of the vehicle. In this application we are using a gas (carbon) sensor (MQ-2) to detect the emission of the vehicle. The output of the sensor is taken and processed in the controller using predefined threshold values and accordingly the messages like, "System is ok", "Warning: Please check your emission", "Your Vehicle will shut down in few days, please get is serviced" will be displayed on LCD. If the vehicle is not serviced on or before the deadline the engine of the vehicle is seized. After this to start the vehicle it has to be serviced. The detected emission values of each vehicle are uploaded on the web page using IoT (Internet of Things). This updated information about the vehicles can be viewed by the RTO (Regional Transport Office) to keep track of the pollution footprints of each vehicle.

LITERATURE SURVEY

[1] K. A. Mamun, Z. Ashraf, published a paper entitled "Anti-theft vehicle security system with preventive action". In this an ATV2S (Anti-Theft Vehicle Security System) has been designed and implemented utilizing sensor-network system which employ GPS (Global Positioning System) and GSM (Global System for mobile communication) technology to track the vehicle.

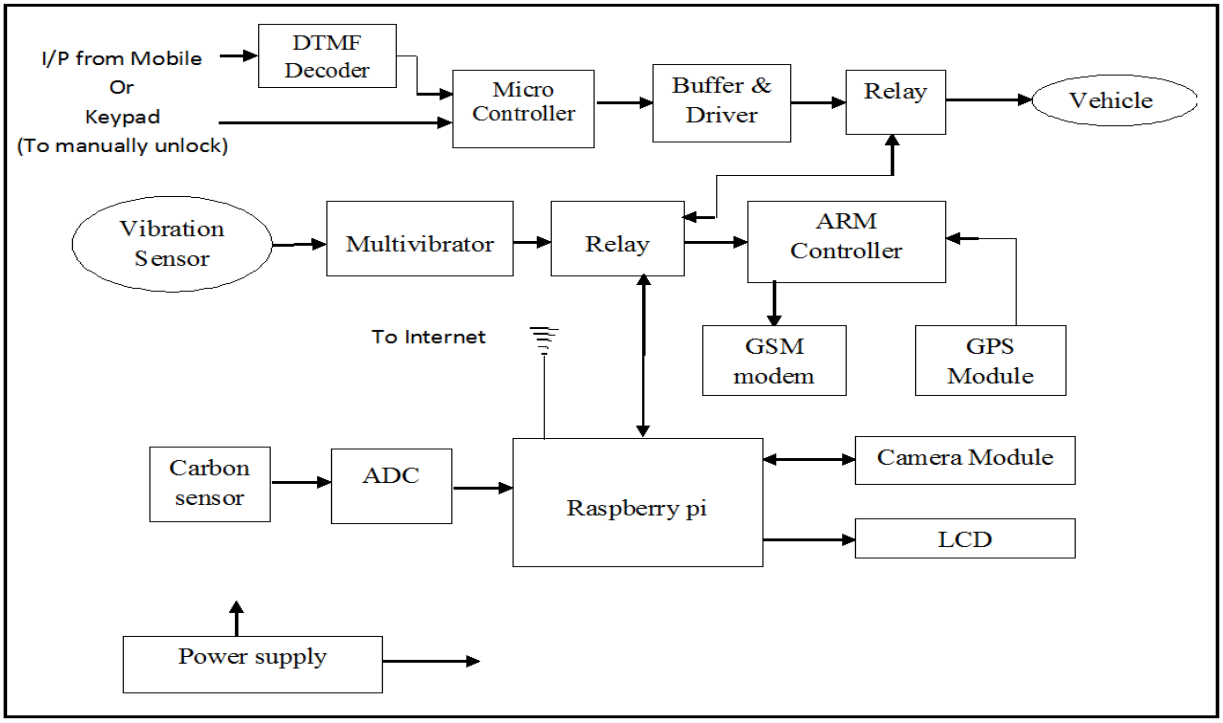
[2] Pritpal Singh et al, presented a paper entitled "Advanced Vehicle Security System". The system contains GSM modem, GPS module, IR (Infrared) sensors, DTMF (Dual Tone Multi Frequency) tone decoder, relay switch, paint spray, high voltage mesh and 8051 microcontroller. GPS system tracks the current location of the vehicle with the help of coordinates received which are sent by the satellites. GSM system in the vehicle is used for sending the information

to the user use AT Commands.

[3] Dr. D. K. Sreekantha, Kavya. A. M published a paper entitled "Agricultural Crop Monitoring using IOT - a study". Internet of Things (IOT) leverages farmers to get connected to his farm at anytime and from anywhere. WSNs (Wireless sensor networks) are used for monitoring the farm conditions and micro controllers are used to control and automate the farm processes. Wireless cameras have been used to view remotely the conditions in the farm.

[4] Yash Mehta et al, presented a paper entitled "Cloud enabled Air Quality Detection, Analysis and Prediction – A Smart City Application for Smart Health". A CCTV (Closed-circuit Television) footage of some strategic locations road traffic is sent to the cloud for analyzing the density of the pollutants in air with respect to the road traffic. Along with this, the DB (database) from the Computerized Pollution Check Centre's and the Regional Transport Office (RTO) provide a basis for a comparative analysis of the variances in the spectrum of emissions from vehicles and sensor-based data coming from strategic locations.

BLOCK DIAGRAM



Block Diagram

As shown in the above figure.1 we have two applications. First is the emission control system. Here we make use of a carbon sensor which detects the amount of carbon emitted by the vehicle. This value is given to the Raspberry-Pi through the ADC and the values are displayed on the LCD. In the second application that is the Anti-theft Vehicle tracking system. In this we have two conditions, the first condition is the normal condition where the user enters the password and the vehicle is turned ON. In the second condition, when the vehicle is at theft and the vibration sensor triggered, the ARM controller turns on through relay and the GPS sends the coordinates through GSM to the registered user.

METHODOLOGY

Our project has two applications. First is the IOT based Emission detection of the vehicle. The second application is the theft detection and tracking of the vehicle. In first application, we are using carbon sensor to detect the carbon emission and a raspberry pi module to take the decisions whether the emission is within or beyond the threshold levels. The 16x2 character LCD display is used to give the various messages to the driver. We are going to set three threshold levels for the detection of emission of carbon as the driver must get the time to get his vehicle repaired. If the emission of carbon

sensed by the sensor is within the threshold level the LCD will display condition of the engine. If the emission of the carbon is beyond the 1st threshold level the raspberry pi will display a message on LCD saying "emission is increasing" .If the emission is beyond the 2nd level the microcontroller will display the message on LCD saying "emission increased get the vehicle serviced". If the emission is beyond the 3rd threshold level the raspberry pi will display a message saying "get the vehicle serviced today" and if the driver ignores the message, then the module will stop the motor (engine) after certain period of time. To restart the engine the vehicle must be serviced. The emission levels of the vehicle which were detected by the carbon sensor will also be uploaded on the webpage. This webpage will be monitored by RTO officials to keep track of the pollution footprints of the vehicle. This will be done by using raspberry pi controller.

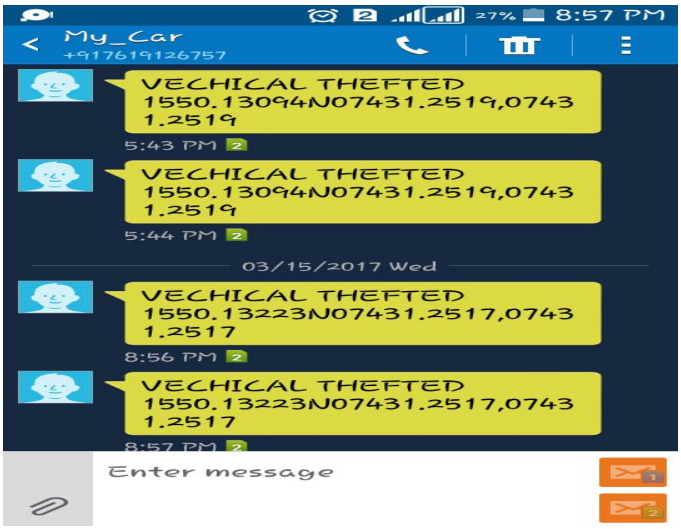
In second application, the authorized person can access vehicle by sending password through his mobile to vehicle. We are going to implement this using a DTMF decoder which will be placed inside the vehicle and will be connected to another mobile to which the owner is going to send the password. The DTMF decoder will then decode the password and will be verified by the controller and it will then start the vehicle. When an unauthorized person tries to break in or steal the vehicle, a piezoelectric vibration sensor will be activated and will further trigger the GPS and GSM modem through ARM controller. The GSM will continuously send the coordinates of the vehicle to the owner by which he/she can track the vehicle. Simultaneously the images of the theft will be captured using raspberry pi camera and images will be sent to email of the owner using raspberry pi 3 controller. The owner can take preventive measures after knowing about the theft by sending the password through his mobile to lock down the vehicle.

RESULT

Below we can find the results of the implemented prototype.

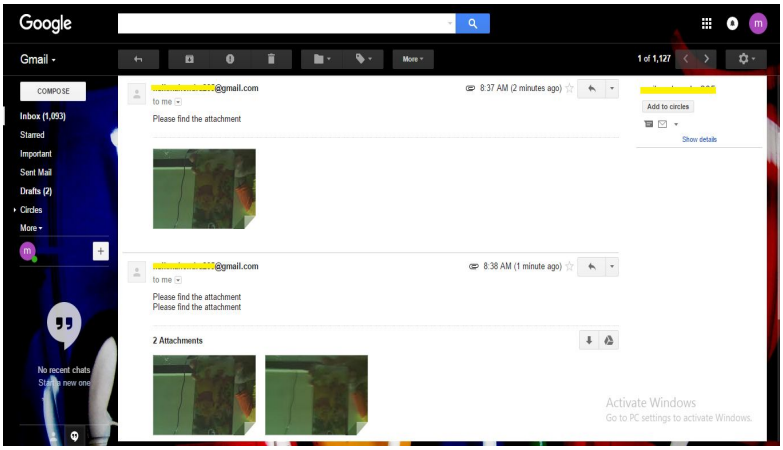
Turning on and off the vehicle

In the first application, here we come across two situations where the first is the normal condition as shown in the fig. 2. We see the keypad through which we can access the vehicle by a giving a proper password to lock and unlock it. This can be done by placing a manual keypad around the locking system of the vehicle and also by giving the password through the owner's mobile phone. By giving the password as "#43219" we can remove the lock and turn on the vehicle and by pressing "#" we can turn the vehicle off and stop the vehicle.



Functonal working of vehicle under theft

The second condition is as shown in Fig. 3. Shows the message on the user's cell phone when the vehicle is stolen. Where we see the vehicle is at theft and the vibration sensor is hit and that further will activate the GPS and GSM modules which will trace the location of the vehicle and starts sending the coordinates to the owner of the vehicle. Simultaneously when the piezoelectric is triggered the same signal is given to the camera (Raspberry Pi Camera) which will start capturing the images of the driver and that will be sent to the owner through an e-Mail as shown in Fig. 4.



Snapshot Sent to the e-Mail

CARBON SENSOR

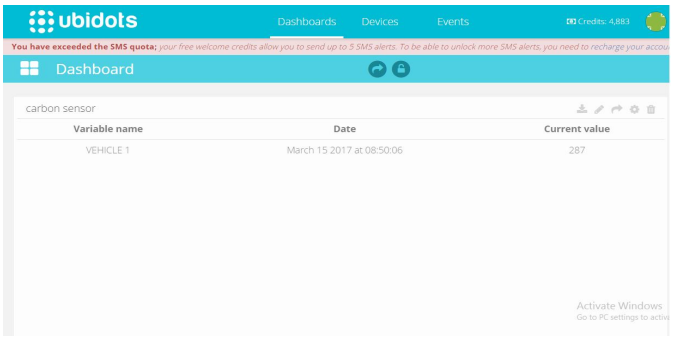
MESSAGE 1

MESSAGE 2

MESSAGE 3

Different emission condition

In the second application the emission of vehicle is monitored by using a carbon sensor. In this we have kept three predetermined levels which displays the different emission conditions. When the vehicle is running at normal condition and is not emitting any carbon (where the emission of the carbon is below the predetermined level) then the message 1 is displayed as shown in Fig. 5. When the emission of the carbon is increased to level 2 we see a message 2 and when the emission of the carbon is increased to level 3 we see a message 3 on the screen as shown in Fig. 5.



IoT Platform for Connecting Sensors

Hence if the owner does not get is vehicle serviced within the specified time, the engine of the vehicle will be locked. Therefore until the vehicle is serviced the lock of engine cannot be removed. Here we are using a IoT based platform Ubidots as shown in Fig. 6. It is a free server for storing the various sensor values which will be monitored by the RTO officials. Therefore these sensor values are updated on a web page which is under the surveillance of the RTO and necessary actions can be taken when the emission is increasing.

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