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Traffic Signal based Control of Vehicle Ignition System

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Abstract:

The idea of the project is to control the ignition system of vehicles using RF signals to turn on and off the vehicle in idle condition when in signals. This also involves the use of ultra sonic sensors to indentify the traffic congestion in that particular signal and send the corresponding data to the previous signals which in turn give the information of traffic ahead to the vehicle present in that signal. The existing system for traffic detection involves GPS, internet connection, infotainment system or a smart phone, But our system involves the use RF signals to transmit data and all the vehicles including bike can be integrated with this system. Another main feature of this system is to indicate the vehicles on prior to the ambulance reaching the vehicles and signals automatically turns on the vehicles.

1. INTRODUCTION:

As the survey taken by Indore on the fuel consumption in India, it is been noted that about litres of fuel is been wasted in India due to the traffic jam problems. Since all the major metropolitan cities consume more of petrol, the wastage of these fuel cost is very high. The cost of wastage is not only from burning to petrol, diesel or LPG but also their cost of production.

These are produced by making holes in the earth and affecting the nature to extract crude oil and making soil erosion, earth degradation and cost of fractional distillation of crude oil. So indirectly this affects the Indian economy by the wastage of fuel and again processing the process to get the fuel for consumers use. Thus increasing the fuel cost very frequently. So we have come up with a solution to reduce this wastage.

In any metropolitan city the traffic conjunctions cause a problem for ambulance to reach the hospitals and there is no system to intimate about it. The only way to know is by the ambulance sound. The delay of ambulance may cause a major problem to the patient.

The traffic jams are major cause for the wastage of burning of fuel in any automobiles. In India all the major metropolitan cities suffer traffic problem. In China it took about 12 days to clear traffic jam which began to form on August 14, 2010. This kind of traffic jam may cause wastage of lots of fuel.

So we have come up with a solution to stop the burning of the fuel in automobiles when the automobiles are in the traffic or during the red signal and starting during the yellow signal, intimating the drivers about the ambulance behind and traffic jam ahead by three signals. In any metropolitan city this method may make the automobile to use their fuel for some more hours of their usage compared to their normal usage.

2. EXISTING SYSTEM:

The government order is to switch of the vehicle during the red signal. This would help to conserve the fuel wastage. But the problem arises where the vehicle undergoes starting problem. So this method is not conventionally adopted.

There is no system to indicate the ambulance other then siren in the road. Traffic jam is also a major project for the wastage of fuel. Android apps like “INRIX”, “Waze” and “Waze: The cons” required smart phone along with internet connections. So the system is costly and the traffic densities are needed to be checked in the middle of drive to take diversion to skip the traffic path.

3. LITERATURE SURVEY:

In the literary papers there are various approaches which are being made use of in the control of fuel wastage in traffic signals. In a literature paper[1], " Design and Implementation of a microcontroller-based ignition system", the system totally controls the operation of the ignition system, with the help of the PIC16F877 microcontroller and the power electronic technologies to identify the piston position and to control the ignition system accordingly.

Another literature paper[2], " Validation Process and Development of Control Strategy of Electronic Control Unit for the Injector and Ignition Coil Drivers", the system deals with the Electronic Control Unit's validation process using the crank sensor and PWM pulses. Using the PWM pulses, the injector and injector coil characteristics are observed.

The next literature paper[3], "Idealing of Vehicle at Traffic Signals leas to Fuel Wastage and Emission", deals with the computation of the pollution rates and the amount of various toxic pollutants occurs from the vehicle standstill at various traffic signals.

The next literature paper[4], "Density based Traffic Signal System" , observes the density of the vehicles in the traffic signals with the help of Image Processing tools and the MatLab software in order to observe the pattern and to operate the traffic signals based on the various simulations.

The next literature paper[5], "Predictive use of Traffic Signal State for Fuel Saving" makes use of the predictive solution of obtaining the traffic signal status well in hand and send the status to the front-line vehicles. Here the concept of V2V occurs, where the vehicle communicates the status to the other vehicles following behind to reduce the fuel consumption, minimum ignition and less braking. Taking the overall idea of every literary paper into account, we propose a system unique to the literary papers, which includes a mixture of various applications which consists of Signal Unit and Vehicle Unit respectively.

4. PROPOSED SYSTEM:

4.1. HARDWARE DESIGN:

SIGNAL UNIT:

In our solution we have used RF transmitter and receiver from the signal-post to send the command to all the automobiles to stop and resume the burning of the fuel. The signal-post consists of transmitter used to send signal during red and yellow conditions there by making all automobile to stop during the red signal and automobiles gets ignition during the yellow signal so that they can move during the green signal. The signal unit is shown in Fig (i) and Fig (ii)

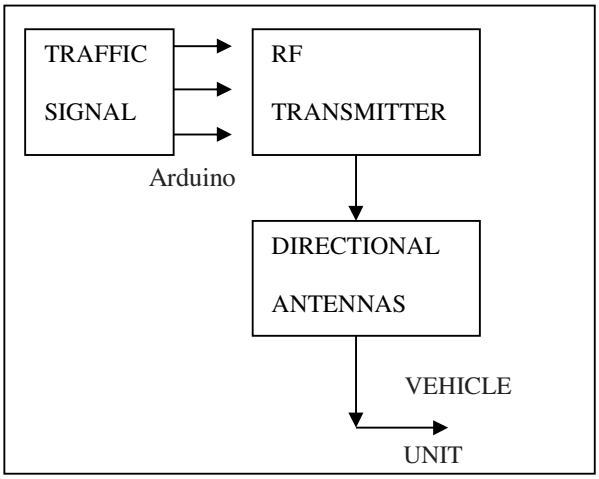


Fig (i) Transmission of signals to vehicles

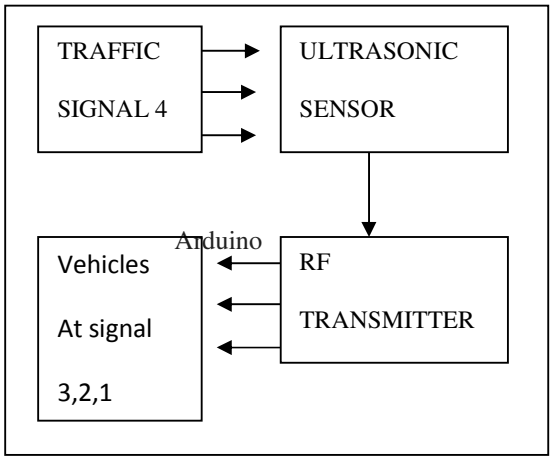


Fig (ii) Transmission of the traffic density to the further signals

VEHICLE UNIT:

The receiver gets activated only when the automobiles come to halt state. The RF receiver gets the signal from the post and their corresponding action is done by the microcontroller. This is demonstrated using the block diagram in Fig (v)

The ignition system is controlled by the self start and engine kill switches governing this operation. Both the switches are operated with the help of relay, as the Microcontroller gets the signal from the signal unit.

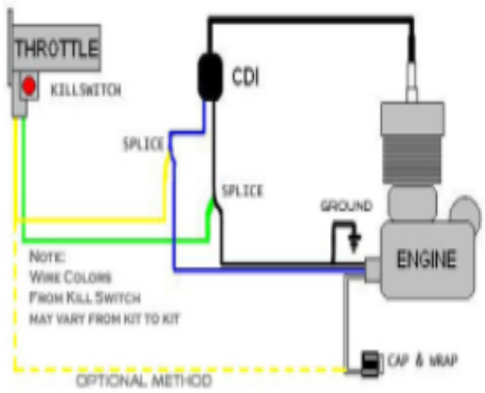


Fig (iii) Engine Kill Switch of Vehicle

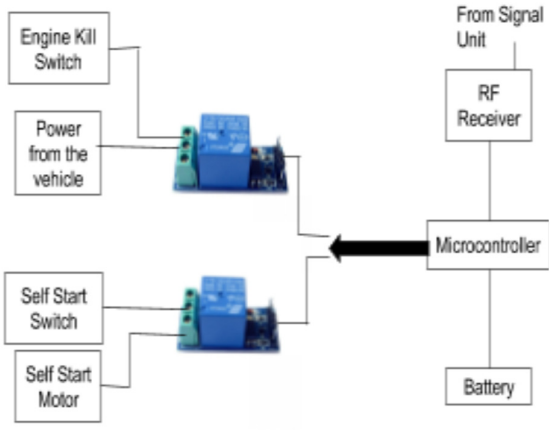


Fig (iv) Block Diagram of Proposed System-Vehicle Unit

During the red signal the relay circuit cuts the ignition system and allows the battery backup for lighting and other purpose and intimated in LCD module as "STOPPING". During the yellow signal the microcontroller allow the ignition process to resume and cuts the battery. Thereby making the automobile to be ready during green signal and intimating it as "STARTING" in the LCD module. We have used directional antennas to specify specific direction the signals must travel. This is demonstrated in Fig (vi)

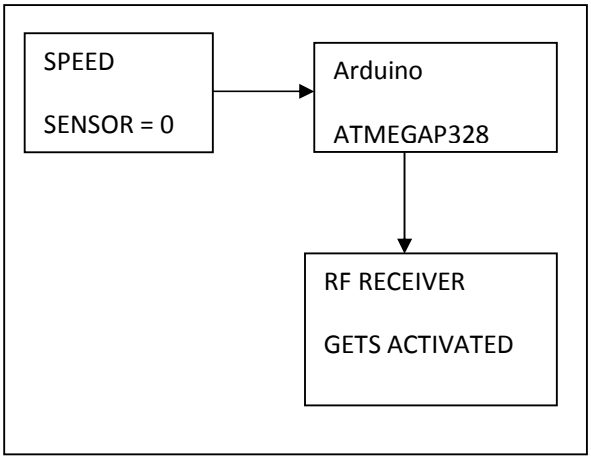


Fig (v) Process of activating the RF Receiver

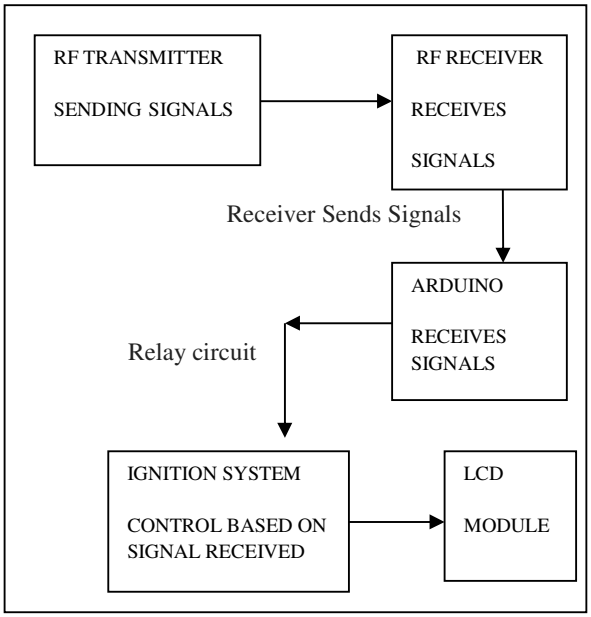


Fig (vi) Operation of the Ignition System based on Received Signal Status

During the ambulance condition all automobile will be in on state. The ambulance is

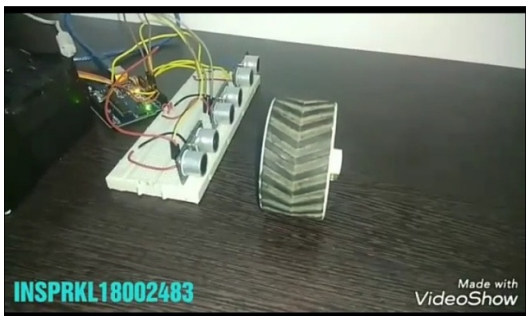
coupled with Google map and the ambulance traces its path and the traffic control room gets to know about the path and it disables all the signal-post for this ignition system. All the vehicles needs to be moved to provided the path for the ambulance to pass through. Once the path traced removed, the ignition system is again activated for the specific path.

4. CONCLUSION:

The problem of fuel wastage is being reduced to a considerable extent with the use of our system. This leads to saving the cost of the fuel. Our system also has a predictive system to obtain the traffic signal status of signals which are ahead of 2-3 signals, thereby to alert the drivers about the traffic ahead. We also provide a solution to ease the ambulances to move through the traffic halts in case of emergency.

5. RESULTS:

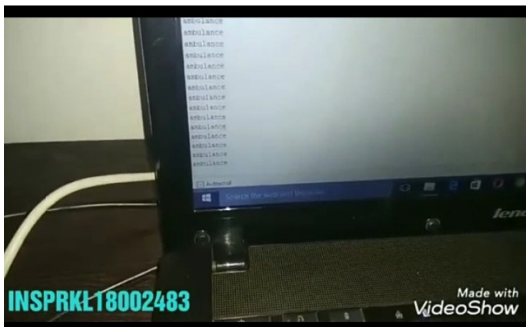
The above picture depicts the prototype model of the RF Transmitter section along with the directional antennas. The directional antennas will help in sending the signals in a particular direction.



The traffic density is obtained by using the ultrasonic sensor across the medians. When the traffic density is near the first ultrasonic sensor the traffic level is “LOW”, if the traffic density is near the second ultrasonic sensor the traffic level is “MEDIUM”, and if the traffic density stands near the third ultrasonic sensor the traffic level is “HIGH”.

This picture shows the Receiver Section and the prototype module of the Vehicle Unit. It consists of the Relay circuit which is used to switch between the engine kill switch for the control of the ignition system, according to the traffic signal sent from the RF Transmitter sections.

The traffic signal status is sent to a LCD Module which is being set inside every vehicle setup, which displays “STOP” for the “RED” signal, and some common characters for the “YELLOW” signal and displays “START” for the “GREEN” signal.



The display setup displays the presence of "AMBULANCE" to the drivers around and helps in giving proper assistance to the ambulances well in hand.

6. REFERENCES :

[1] Anwar -" Design and Implementation of a microcontroller-based ignition system", 2007

[2] Mansi K. Ajudia –" Validation Process and Development of Control Strategy of Electronic Control Unit for the Injector and Ignition Coil Drivers"- 2014

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[4]K.Vidhya – "Density based Traffic Signal System", 2014

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