

A Low Cost Device for Anti Fuel Theft Alarm Control System

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Abstract

In modern days diesel/petrol theft of vehicles, which has been parked outside the office/home, is quite common. In this work we are presenting a new electronic design for an anti fuel theft protection system that is simple and inexpensive solution to protect vehicle fuel from being stolen and from unauthorized users by exploiting microcontroller based system. The two major parts of this circuit are transmitter and receiver section. Transmitter is fitted in the vehicles near the fuel tap and the receiver in room of your office/house. An audio indication will be received when someone goes near to fuel tap.

Keywords: Anomaly Detection, Edge Detection, Hough Transformation, Motion Object, Object Tracking, Optimum path

1. Introduction

In recent years many survey companies revealed that parked vehicle theft and fuel theft are increasing at appalling rate across the whole world, then people commenced to make use of theft control system in their vehicle and vehicle owner's relay on alarm system to protect their vehicle from being theft, but even the most enlightened alarm was not capable enough to prevent auto theft and also they were very expensive. Here we put our effort to develop and design a very simple and low cost anti fuel theft control system. We start of exploring the circuit analysis and then we move further to the proposed architecture to describing working methodology, various component details and finally we will present result and conclusion. On the basis of the perception of this paper a prototype model is practically implemented to test the model and has been realized.

2. Proposed System

The two major parts of this circuit are transmitter and receiver section.

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Transmitter: The transmitter part should be mounted at top of the fuel tank and receiver section in our common room of office/house. The primary section has been built to transmit the detected and it contains some prerequisite component such as photodiode, an infrared light emitting diode, a comparator (IC-741) and phase lock loop circuit (IC-567). To make the device compatible and compact so that it can be easily fitted at typical required places near the vehicle fuel tap the power needed for the device is given by vehicles battery 9-12V through switch (S1). Whenever the communication between photodiode and IR LED is broken then signal get transmitted by the antenna from transmitter, then that signal will be received by the receiver and then the buzzer gives an audio indication. Here we are using radio frequency transmitter operated at 434MHz because it is suitable for long range, approximate up to 500 feet in open space operated at 9-12V. Higher the voltage greater will be the range. An IC 741 is used as a 'comparator' and it compares two voltages, given to its input terminal (i.e. input voltage is compared with a prefixed reference voltage) and A photodiode is connected to pin2 with 10kΩ resistor and a variable resistor of 10kΩ between pin3 and pin4 of IC-741.



Figure 1. Transmitter section

The output of the IC- 741 i.e. pin6 is connected to an LED and to base of transistor (BC-547) via $1K\Omega$ resistor. Emitter of transistor is grounded and collector is connected to the pin7 (ground) of PLL (IC-567). The transistor works as an amplifier for sound reproduction, radio transmission, and signal processing. Now this arrangement of PLL producing high frequency oscillation, which has to be suitably fixed with transmitter circuit so that it can properly transmit the signal over long distance, which is being received by the receiver at distance point .

Receiver: This section is basically to receive the electrical signal effectively that was transmitted from primary section of the device after detection of the IR radiation near the fuel tap. In order to accomplish this task efficiently the receiver section is comprised of n-p-n transistor, IR receiver module, and phase lock loop interfaced with 8051 microcontroller development board along with a buzzer to produce sound. Here the primary roll of using 8051 microcontroller development board is to produce some delay by means of dumping a specific code in it.



Figure 2. Receiver section.

3. Working Methodology

Initially the detected signal is converted in to electrical signal that is being transmitted, by a radio transmitter which is been used in transmitter section and it can operated over the range of radio frequency, here it is precisely 434 MHz. The originated wave having high frequency is deemed as carrier wave to transmit over distant point and in nearly all the transistor it is done by make use of crystal oscillator.

In crystal oscillator the frequency is literally controlled by the vibration of quartz crystal. The information/data transmitted by the transmitter can have the different form like; it can be video signal, audio signal, or a binary digital signal for any kind of data. The message signal getting modulated with high frequency carrier signal and mode of modulation here is ASK modulation. Amplitude shift keying is a kind of amplitude modulation; it represents digital information in form of fluctuation in the amplitude of carrier wave. In ASK modulation system the binary state '1' reveals that it transmitting the carrier wave and fixed frequency of T_b bit duration. Carrier wave will be transmitted if signal value is logically high, else will not be transmitted, i.e. for 0 value signal nothing is done. Here we are using 433MHz transmitter for transmitting the signal and this work well to create a wireless data link which is being received at receiving end.

A radio frequency receiver is an electronic device used to recognize and accept the RF signal from a bunch of carrier frequencies. They are widely used in electronic circuit design to avoid the complexity of designing a radio circuitry. Practically it is highly challenging to design a electronic radio with high-fidelity of radio circuits also due to the sensitivity of components and outline required to achieve operation on specific frequency. There are two type of receiver module's one is super heterodyne and other one is super regenerative receiver. Super regenerative receivers are economical and consume less power incorporating a series of amplifiers to emerge modulated data from carrier wave. They are also more often estimated as their operating frequency varies substantially with power supply voltage and temperature. On the other hand super heterodyne module better performance over super regenerative they offer high accuracy and stability over a wide range of temperature and supply voltage. These advantages come out from a prefixed crystal design which tends to a comparatively more expensive product.

The transmitter part is escalated close to the fuel tank and the receiver section in either our room or office. The moment when anyone comes in range close to infrared light emitting diode it would sense and get detected by photodiode. Some potential difference come into view at inverting pin 2 of comparator and then its output pin goes high consequently at the same time, n-p-n transistor starts conducting. As soon as comes in saturation region it enables the phase lock loop circuitry to transmit a signal of prefix frequency. Here PLL is used to produce stable high frequency oscillation which is being fed to the transmitter.

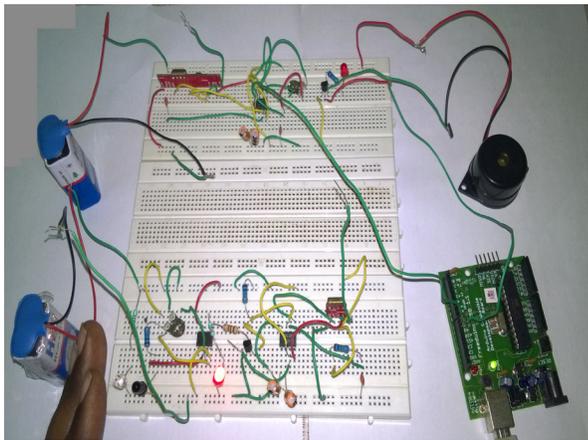


Figure 2. Working model demonstration.

At the receiver section the transmitted electrical signal from the transmitter is now being received by the RF receiver module and then is decoded by phase lock loop circuitry. Now suitably join the switch S2 on the face side of the receiver unit in conjunction with second LED and buzzer. Encapsulate the receiver section at your residence.

Every time the receiver module receives a signal transmitted by transmitter having precisely prefixed frequency, then immediately second LED will glow and at the same time buzzer will produce sound.

4. Conclusion

Hence, here an attempt is made to bring an inexpensive and effective vehicle fuel theft control system. The major advantage of this system is that the entire can be made with a meager amount investment and can be used in any automobile, in this way we can bring in the device with simple technology and less sophisticated. The system which is obtained is the standard one (an anti-theft protection System) because of its easy implementation and inexpensive in cost. A cost effective, long life workable, anti fuel theft system is designed and has been practically realized.

5. Acknowledgement

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6. References

1. American Journal of Applied Sciences. 2012; 9(5):709–16. ISSN 1546-9239, © 2012