

Mobile Avoidance for Safe Driving using Embedded System Design

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Abstract: In our daily life, people meet or see many accidents around them. Most of the accidents occur due to the usage of a mobile phone while driving. In order to avoid those problems, a different type of mobile jamming device is used. Existing mobile jammer jams the signal of the network operator and this type of jammer is used in almost all confidential areas. But the major disadvantage is that emergency calls from relevant members cannot be noted. Our project uses different jammer that will disable the keypad function of mobile phones. And this jammer will be able to receive all calls but the calls will not be able to attend while the vehicle is in ON condition. The mobile keypad will get work and can attend the receiving calls only if we stop the ignition status of the vehicle.

Keywords: RF transmitter and receiver, relay, Automatic Jammer ON and OFF, disabling the mobile keypad.

1. Introduction

Jammer is the device used to jam signals. Which make our mobile phone to disable its signal by generating a similar frequency that mobile receives and remove the contact between the mobile phone and its base station.

Here we prefer this type of jammer in a vehicle application, where we see many accidents around us in our daily life. Most of the vehicle accident occurs due to using a mobile phone while driving. We cannot avoid completely using a mobile phone while driving because, many jobs depend only on mobile phones and a vehicle like Travels, Call-Taxi, School Bus, Autos, Food deliveries, etc. In order to have safe driving even receiving calls, we must use this type of mobile jammers.

Here we use mobile jammer which enables the mobile call notification but we cannot attend the receiving call that is, we may not be able to press the keypad of the mobile phone and allow us to see only the notification. This device work with the principle of RF Receiver and transmitter.

Even many features come into existence in avoiding vehicle accidents like obstacle sensing, Electronic stability control, lane departure warning and preventing, Automatic emerging brake, etc. The major cause of the accident is a mobile phone and no device is found to avoid using a mobile phone while driving. Therefore, we use mobile jammer which jams the mobile keypad that helps to avoid attending the receiving calls. In the future, this project can be developed in Android mobile phone by manufacturing special receiver and app which help

preventing from attending the calls automatically while driving the vehicle.

2. Existing methodology

The existing method has some advantage as it jams the signal by removing mobile contact between receiver and base station. This jammer is basically applied to areas like Colleges to avoid mobile phone during exams, Prisons where the criminal can share their details, and Other public disturbing places like temples, restaurants, cinema halls etc.

These are some of the reasonable areas where the mobile jammer is useful, but places like a conference room, high confidential meetings, cinema hall, Hospitals, Temple are some of the areas where people meet with some emergency situations and they can they are only able to know about those emergency by phone calls. Here the signal jammer becomes a major drawback because it totally disables the mobile signals and keeps the mobile phone in almost off state.

3. Proposed methodology

Driving is a complex task. Where a driver has to perform many tasks while driving like seeing the nearby vehicle, concentration on lanes, Potholes etc. This multiple tasks can make a driver be more concentrated towards driving. So, using a mobile phone while driving is a major problem that might divert the driver's concentration. Another important electronic device is a Mobile phone where this is not just a device it is almost a part of our daily life. Avoiding Mobile phone while driving can be a major part of avoiding accidents. But the mobile phone is important in an emergency, in this situation the driver has to stop and park the car safely without disturbing other vehicle and continue his calls.

But in real time this situation is not possible. So we use a different type of mobile jammer which disables keypad of the mobile phone using a microcontroller and generating a frequency. We use frequency of 433MHZ which has a public license and there is no need for licensing. This proposed system has benefits such as the call can be notified and we can attend the calls only when we go out of the coverage area of the vehicle, easy to implement, no need for licensing, 100% safety for drivers. As we are using microcontroller it will be easy to have a modification in the device.

4. Hardware description

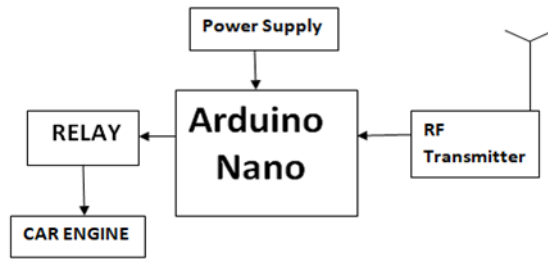


Fig. 1. Block diagram of jammer transmitter

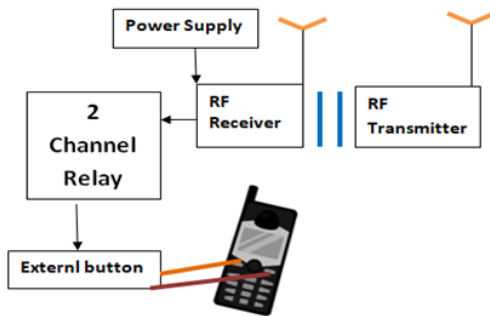


Fig. 2. Block diagram of jammer receiver

A. Two channel relay

The relay is an electrical switch because the operation is exactly related to the normal switch we use. The main use of the relay is to control circuits by using a low power signal. Older the relay was used for long distance telegraph circuits as an amplifier because, they regulate the signal they received from one circuit and transmit the signal into another circuit, this kind of relays were also used in early computers which help to perform logical operations. The Arduino relay module is designed for a wide range for microcontrollers such as the Arduino board, AVR, PIC, ARM, with digital outputs. This module incorporates 2 relays they are:

- Input: VCC, connected to the 5V current,
- GND, connected to the ground.
- 2 digital inputs. (In1 & In2).

Output: 2 channel relay module is assumed like a series switches,

- 2 Normally Open (NO),
- 2 normally closed (NC),
- 2 common Pins (COM).

The input in the circuit is made to OFF condition and no current flows through it until something that makes the circuit ON condition. The output of the circuit is also switched off. When a small current flows in the input of the circuit, it activates the electromagnet of the circuit, which produces a magnetic field all around it. This energized electromagnet pulls the metal bar in the output circuit toward it, closing the switch and allowing a bigger amount of current to flow through the output of the circuit. Then the output of the circuit operates a

high-current appliance such as a lamp or motor.

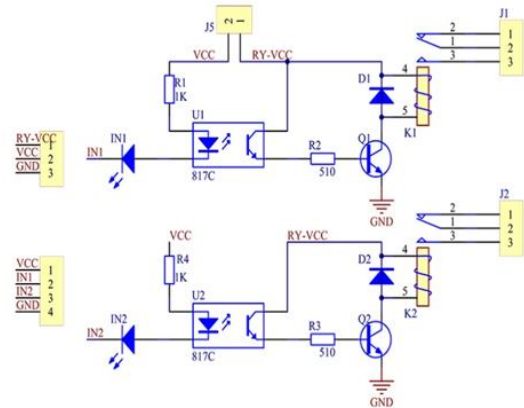


Fig. 3. Two channel relay circuit

B. RF module

A radio frequency module is an RF module which is a tiny electronic device that works between two devices which helps to transmit and receive two radio signal. Normally an embedded system is often desirable to exchange with another device wirelessly. This wireless communication may be made highly possible by the help of optical communication or through radio frequency (RF) communication. For many applications, the medium of choice is RF because this module does not require line of sight. RF communications contain two terms they are a transmitter and a receiver. This both transmitter and receiver are of various types and various ranges. Some of the transmitters can transmit up to 500 feet.

RF modules are mostly used in electronic design due to the difficulty of designing radio circuitry. Good electronic radio design is highly complex due to the sensitivity of radio circuits and the accuracy of the circuit components and its layouts are required to achieve operation on a specific frequency. Additional to that the reliable RF communication circuit needs careful monitoring of the manufacturing process and also ensures that the RF performance is not adversely affected. At last the radio circuits are subjected to limits on radiated emissions, and require testing and also certification by a standardization organization. The organization such as ETSI or the U.S. Federal Communications Commission (FCC). All these reasons that help the design engineers which will often design a circuit for an application which requires radio communication and then "drop in" a pre-made radio module rather than try a discrete design, that helps saving time and money on development.

C. Types of RF module

RF modules are applied to many different types, size, and shapes of the small electronic subassembly circuit board. This circuit can also be applied to modules across a large variety of functionality and capability. RF modules typically incorporate a PCB that is, printed circuit board, transmit or receive circuit, antenna and another serial interface for communication to the

host processor. Their well-known types are:

1. Transmitter module
2. Receiver module
3. Transceiver module
4. System on chip module

1) *Transmitter modules*

An RF transmitter module is a small assembled PCB designed module which is capable of transmitting a radio wave and modulating that wave which is used to carry data. Transmitter modules are usually enabled alongside a microcontroller which makes the module to provide data to the module which data can be transmitted. RF transmitters are generally subject to manage the essential requirements which provide the maximum allowable transmitter power output, harmonics, and band edge requirements.

2) *Receiver modules*

An RF receiver module is used to receives the modulated RF signal and demodulates it. The RF Receiver module is of two types they are super heterodyne receivers and super-regenerative receivers. Super-regenerative modules are the module which is usually of low cost and low power designs this module using a sequence of amplifiers to extract modulated data from a carrier wave. Super-regenerative modules are usually indefinite as their frequency of operation changes greatly with temperature and power supply voltage. Super heterodyne receivers have Associate in Nursing execution performance advantage over super-regenerative; they provide exaggerated accuracy and stability over an oversized voltage and temperature range. This stability comes from a fixed crystal design which in the past tended to mean a comparatively more expensive product. However, advances in receiver chip style currently mean that presently there's a very little worth distinction between super heterodyne and super-regenerative receiver modules.

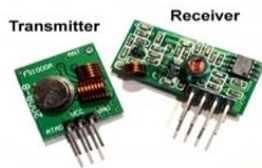


Fig. 4. Transmitter and receiver module

D. *Arduino*

Arduino is an open-source electronics platform based on easy to use hardware and software. Arduino boards are able to read inputs light on a sensor, finger, on a button, or a twitter message and turn it into an output activating a motor turning on a LED publishing something online. Arduino Nano is a small, complete and breadboard-friendly board based on the ATmega328 or ATmega168. It has the more or less same functionality of the Arduino Duemilanove but in a different package. It lacks only a DC power jack and works with the mini USB cable instead of standard one. The Nano was designed and

is being produced by Gravitech.

E. *Encoder*

HT12E is a 212 series encoder Integrated Circuit which is used for remote control applications. This encoder is commonly used for (RF) radio frequency applications. In the paired HT12E encoder and HT12D decoder, it is very easily transmitted and received 12 bits of parallel data serially. HT12E converts 12-bit parallel data into serial output which is easy and it can be transmitted through an RF transmitter. In this encoder, the 12-bit parallel data is separated into 8 address bits and 4 data bits. By using these separated address pins we will be able to provide 8-bit security code for data transmission and multiple receivers may be addressed using the same transmitter.

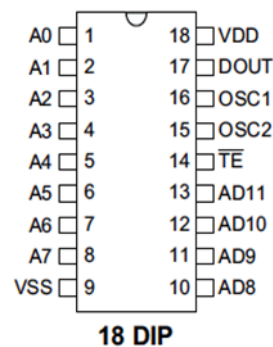


Fig. 5. HT12E encoder

F. *Decoder*

HT12D belongs to 212 series of decoders integrated circuit. This type of series decoders is mostly used for an application such as remote control systems like a burglar alarm, car door controller, security system etc. This type of decoder is mainly used to interface RF and infrared circuits. And these decoders are paired with 212 series of encoders also the chosen pair of encoder/decoder should have the same number of addresses and data format.

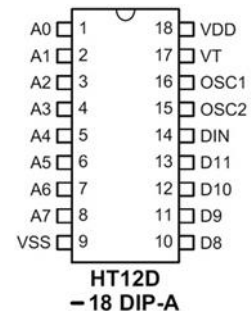


Fig. 6. HT12D decoder

In easy explanation, HT12D converts the serial input into parallel outputs. This decoder helps to decode the serial addresses and data which is received that is, RF receiver. And send those address and data to the output data pins. Three times continuously the serial data is compared with the local

addresses. The input data that is decoded, when no error or unmatched codes are found. A valid transmission in VT pin is indicated by a high signal.

HT12D is capable of decoding 12 bits, separated into 8 and 4 bit of which 8 are address bits and 4 are data bits. The data on 4-bit type output pins remain unchanged until new is received.

G. Power supply

A power supply we use here is the 12v power adapter. Basically, the power supply is used to step down the mains electricity at 240 volts AC down to more usable energy that is, 12 volts DC. The power supply is of two types they are, linear and switch mode.

First, linear power: the linear power supply reduces the voltage by using a transformer. Here the ratio of primary windings which is connected to the mains to the number of secondary windings which is connected to the output would give the ratio of how much the voltage reduced by. According to our connection, a ratio of 20:1 reduces the 240 volts AC input into 12 volts DC on the secondary windings.

Second, switch mode: switch mode power supply reduces the voltage by turning the mains electricity on and off very quickly. In this switch mode, the reduction in voltage is based upon the ratio of the on time and off time. Here the switching takes place very fast, at 10,000 times a second. By using this mode the bulky transformer which is found in a linear supply can be replaced with a smaller one.

According to safety, external power adapters can free product designers from worrying about some safety issues. Much of this type of equipment uses only low voltages power which is enough not to be a safety hazard internally, although the power supply must out of necessity use dangerous mains voltage. If we use an external power supply that is, a power connector, often of coaxial type, power supply need not be designed with concern for hazardous voltages inside the enclosure. This type of adapter generally reduces the heat where the alternate power supply may cause more heat and cause the sensitive circuits to become inaccurate or malfunction.

H. Regulator

At the stage of the power supply which produce 12v may have some small amount ripple at the required voltage in the output in order to avoid the ripple in the output, we use regulator connected next the input of the power supply.



Fig. 7. 7805 IC

The regulated power supply uses an IC, where the IC will continuously monitor the output voltage relative to a reference voltage and make some adjusts to the output accordingly. Regulators in power supply have a much lower ripple and often

include over current and over temperature protection so that they make an automatic shut down and the rest of the supply indestructible. We use in our circuit is 7805, a common 5-volt regulator.

5. Software description

Embedded program using C++ language is dumped in nano Arduino using Arduino software.

6. Hardware used



Fig. 8. Transmitter portion

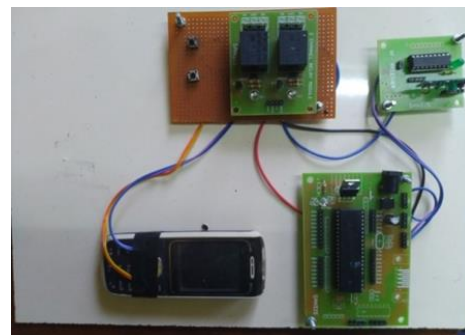


Fig. 9. Receiver portion

7. Result shows in the hardware module

As we had tested our jamming device, the result of our project is a full success. The device was able to jam our mobile phone keypad. The effective jamming range was around 5 meters. The accuracy of our project is good when the transmitter turns into ON condition the vehicle get started and the jammer starts working by receiving the signal from the transmitter and gets OFF when transmitter turned OFF.

8. Conclusion

Cell phone jammer effectively jams the keypad of cell phone such that providing high safety to mankind. It is flexible for future expansion also. Cell phone jammer can be effectively used in all vehicles for the safety of humans. Cell phone Jammer is an instrument used to prevent cellular phones from receiving signals from or transmitting signals to the input of the mobile phone. The jammer must have all technical components equal to a cell phone and the output power should be more than the signal available in that area. In case of emergency, we can get

notification of the calls and we can go out from the coverage area and use our mobile as it is.

9. Future work

- The jammer can also be made to disable the speaker and mic.
- This jammer can be developed in Android phones by developing an inbuilt software.
- By using a VLSI technology, a new receiving IC is developed with a certain frequency and it is get attached with android phones.
- In the future, we can make the mobile input to be jammed without any external connection from the mobile.

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