

Smartphone based Accident Avoidance System while Driving

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ABSTRACT

Every year, innumerable road accidents and deaths take place due to distracted driving. Large number of studies shows mobile phone usage while driving was the major reason for distracted driving. With the aim of preventing road accidents due to mobile phone usage while driving, we propose a highly efficient automatic electronic system for early detection of incoming or outgoing call, an antenna located on the top of driver seat used for detecting when the driver uses mobile phone and a low range mobile jammer with its range covers only driver seat which prevent drivers mobile phone from receiving signals from base stations.

Due to distracted driving, countless road accidents and fatalities occur each year. Large amount of research show utilization of mobile phones while driving was the main cause of distracted driving. In order to avoid road accidents due to the usage of mobile phone while driving, we proposed a highly efficient automatic electronic system for early detection of outgoing or incoming call, an antenna situated at the top of driver seat used for detection when the driver uses a mobile phone and a small range mobile jammer that preventsto receive signal in driver mobile phone from base stations. A wireless jammer is an instrument used to prevent cellular phones from receiving signals from base station. Jammer effectively disables cellular phones. Jammer can be used practically in any location, but are found primarily in place where a phone call would be particularly disruptive where silence is expected. In the existing system when the jammer is in "ON" state, the signal from the base station to the particular mobile phone will be blocked where in the proposed system a message notifying who has been tried to contact the user is send to the user as a notification when the jammer is in "ON" state. So it is a kind of anti- jamming technique. This kind of technique can be implemented in vehicles such that accidents happened due to usage of mobile phones during driving can be avoided. In general, mobile phones statistics, the national safety council reports that mobile phone usage while driving leads to 1.6 million crashes every year, most of the crashes was because of two wheelers and car. In this new design, we had disabled the working of keypad, microphone and speaker by using MICROCONTROLLER to avoid crashes in two wheelers and car. Ignition setup which consists of DC motor was designed for vehicle implementation.

KEYWORDS: Mobile Phone, Mobile Jammer, Accident, Antenna Microcontroller, RF transmitter and receiver, Encoder, Decoder.

INTRODUCTION

In this modern world for the purpose of emergency, having a cell phone can allow people to reach quickly and it has become reliable and of high quality by means of advance wireless technology. When the mobile phones are equipped with GPS technology, it is used to find the lost person in case of emergency. However, the importance of mobile phones goes beyond personal safety. For those who are tired of hearing endless mobile phone conversation or constantly being interrupted by continuous mobile phones ringtones, a mobile phone jammer is a perfect device to stop these problems. But usage of jammer in an area, the user doesn't even come to know who had tried to call the person. So in the proposed system a message notifying When the car/two wheelers get started the jammer also automatically goes to the "ON" state. If the user wants to contact any person they should stop the vehicle and he can contact the person beyond in the jammer coverage area. This technique can be made with the use of microcontroller and ignition system.

Over the past 20 years, hand-held mobile telephones have emerged as a road safety problem. Research (1, 2) has shown that the reaction time of drivers increases by 0.5 to 1.5 seconds when they are talking on handheld phones, and drivers have difficulty maintaining the correct positions in their lanes, maintaining appropriate speeds and judging and accepting safe gaps in traffic. Some evidence indicates that drivers who use hand-held phones face a risk of crash four times higher than risk faced by other drivers, imperiling themselves and other road users (3). Hands-free phones can also distract drivers, but the current evidence suggests that hand-held phones pose a greater problem (4). Many different studies have shown that when drivers use a cell phone while driving increases the accident risk (5, 6, and 7). This risk also extends to pedestrians (8, 9). For example, it is estimated that mobile-phone use for one hour a month increases accident risk by 400–900%. Other studies show that a high percentage of accidents among youngsters are due to mobile phone use (10). The increased accident risk is due to the fact that drivers using the phone are distracted from their main task, resulting in slower reaction time which leads to accidents.

Working of Proposed System

The circuit is primarily intended to activate the low-range portable jammer (covers the driver seat region) for a while whenever the driver receives an incoming call or attempts to create an outgoing call[4]. An electronic circuit shown was intended to detect incoming and outgoing call on the driver's phone automatically. Although there are different systems for identifying indoor use of mobile phones, these could be introduced in a vehicle theoretically. When the car starts, this circuit will be switched ON. Two power supplies are needed in this circuit. Most ICs are working with GND on controlled DC energy 5v. While the Relay drive was working with GND on DC 12v. This power supply unit is made up of a transformer, rectifier, filter & controller[5]. Typically, AC voltage 230v RMS is linked to a transformer that steps the AC voltage down to the required AC voltage point. Then a Diode rectifier offers a rectified voltage bridge that is originally filtered to generate a DC voltage by a straightforward condenser filter[6].

Usually this resulting DC voltage has some differences in ripple or AC voltage. The capacitor output voltage is more filtered and lastly controlled using voltage regulator, which retains the steady output voltage regardless of changes in differences in supply, variations in load and changes in temperature. Here we use a set voltage controller namely LM7805[7]. Even if the mobile phone is kept in silent mode, the RF amplifier circuit can detect incoming and outgoing calls, SMS and video transmission. The moment the bug detects the RF signal from an enabled mobile phone, the LED flashes and continues until the signal is transmitted. Here the circuit utilizes a disk condenser of 0.22 μ F to capture mobile phone RF signals. Together with the leads, the disk condenser functions as a tiny gigahertz loop antenna to collect the mobile phone RF signals. When a caller initiates a call by dialing a number in his phone, he sends a request signal to the BTS that he receives[8]. By sending the request to the BSC to which it is connected, BTS will send the request to the MSC from the BSC. MSC then sends an application to the HLR to verify the caller's data such as account balance (if prepaid), caller's region, etc. The HLR sends an acknowledgement signal to the MSC after reviewing all the information that the caller is O.K. to call or not to call. Once MSC receives the message, it creates an air connection between the two sides and connects the call. When the phone starts ringing it activates a jamming machine that transmits on the same radio frequencies as the cell phone, disrupting the tower communication between the phone and the base station of the cell phone[9]. Since the voltage recorded by the circuit of energy capture exceeds the limit value, it is a denial-of-service attack.

Works Related To Accident And Jamming

Accident Avoidance and Detection [1] An automatic accident prevention and reporting system is designed and implemented using technologies like to prevent accident, GPS modem for finding the location of vehicle in terms of latitude and longitude. In this method there is an automatic detection of accident through sensors provided in the vehicle.

Blocking the mobile phones signals with the help of jammer[2]. In this method, mobile jammer is used and it is used to prevent mobile phones from receiving or transmitting signals from the base stations. Accident Prevention via Bluetooth

[3] in this method with the help of Bluetooth technology the speed of the car is tracked and appropriate actions can be taken to avoid accidents. Compared with other it operates in the same frequency band. Distance based Accident Avoidance System using Arduino UNO [4]. Ultrasonic Sensor is used to track the distance between two vehicles. If the distance between two vehicles is 10 meter then green LED starts to glow which refers to safe state of the vehicle. Automatic

Speed Control and Accident Avoidance Of vehicle using Multi Sensors [5].As the name indicates multi sensors, the sensors used are eye- blink sensor, smoke sensor and ultrasonic sensor. Speed is controlled automatically when obstacle is detected by means of ultrasonic sensor for up to 4 meters.

Detection Of Driver Using Mobile Phone

The circuit is mainly designed to activate the low range mobile jammer (covers area of the driver seat) for a while whenever the driver gets any incoming call or he tries to make outgoing call. An electronic circuit shown in figure 2 was designed for automatic detection of incoming & outgoing call on driver's phone. Though various commercial systems do exist for detecting mobile-phone use indoors, and these could theoretically be implemented in a car. The trouble is that these Commercial systems are not able to discriminate mobile-phone use by a passenger instead of the actual driver.

The biggest problem for the system is posed when phones are used by all passengers except the driver. In this case, the detection system was able to discern that it is not the driver who is using the mobile phone. This circuit will get triggered ON when the vehicle gets started. In this circuit

we need two power supplies. Majority of the ICs are worked on regulated DC power 5v with GND. While Relay drive worked on DC 12v with GND. This power supply unit consists of transformer, rectifier, filter & regulator. AC voltage typically 230v RMS is connected to a transformer which steps that AC voltage down to the level of the desired AC voltage. A Diode rectifier then provides a bridge rectified voltage that is initially filtered by a simple capacitor filter to produce a DC voltage.

This resulting DC voltage usually has some ripple or AC voltage variations. The output voltage from the capacitor is more filtered and finally regulated using voltage regulator, which maintains the output voltage constant irrespective of the changes in supply variations, load variation and temperature changes. Here we use one fixed voltage regulator namely LM7805. The IC 7805 is a +5 voltage regulator. The RF amplifier circuit can detect both the incoming and outgoing calls, SMS and video transmission even if the mobile phone is kept in the silent mode. The moment the bug detects RF transmission signal from an activated mobile phone, the LED blinks and it continues until the signal transmission ceases. Here the circuit uses a 0.22 μ F disk capacitor to capture the RF signals from the mobile phone. The disk capacitor along with the leads acts as a small gigahertz loop antenna to collect the RF signals from the mobile phone.

The combinations of both antenna and rectifier produce a direct current. Op- amp IC CA3130 is used in the circuit as a current-to-voltage converter with capacitor connected between its inverting and non-inverting inputs. The rectified DC voltage is stored in a large capacitor and is digitized by an analogue– digital converter (ADC) for subsequent storage and processing using a microcontroller. The voltage obtained with this system depends, among other factors like, Signal strength, on the distance of the phone from the antenna and the relative orientation between antenna and phone.

Incoming Call Handling Operation

When a caller initiates a call by dialing a number in his mobile it directly send a request to the BTS which he comes under. BTS there by sends the request to the BSC to which it is connected and from the BSC, the request is made to the MSC. Subsequently MSC sends a request to the HLR to check the information about the caller like account balance (if pre paid), area of the caller etc. After checking

all the details the HLR sends a acknowledgement message to the MSC that the caller is O.K. to

make a call or not. Once the message received by MSC it establishes an air link between the both parties and the call gets connected. When the phone started ringing it activate a jamming device which transmits on the same radio frequencies as the cell phone, which disrupt the communication between the phone and the cell-phone base station in the tower as shown in figure 4. Since the voltage captured by the energy capturing circuit exceeds threshold value it's a called a denial-of-service-attack.

Outgoing Call Handling Operation

Once the driver dials the number and press call button the mobile device will start transmitting more voltage. The energy capturing circuit captures voltage above the threshold value which results in activation of mobile jamming device which squeeze the RF signal as shown in figure 5. Which forces the driver not to use mobile phone while drive.

Encoder And Decoder

The encoder used here is in HT12E series. Encoders are used to encode the information of data which consists of N address bits. The operating voltage encoder/decoder is 2.4V ~12V. It basically encodes the 4-bit data into serial data which then transmitted to RF transmitter. By means of radio signals RF transmitter transmits this serial data to the receiver. Decoder used here is

HT12D. The decoder receives serial data from the RF receiver it converts the 4- bit serial data into 4- bit parallel data. It is capable of decoding 12 bits of information.

Antenna

Antenna is a tool used to transmit signal produced by the jammer. The antenna used here is made of 26-guage the Hardware implementation of this project in which keypad will be disabled when the vechicle gets started.

Conclusion

This paper presents a low-cost, non-invasive, small-size system and a jammer which helps to detect the driver's use of mobile phone not the phone used by the fellow passenger in the vehicle. It also helps in preventing the road

accident due to distraction to a large extent. Though Engineers, researchers or scientist innovate

various new technologies, methods or system to prevent road accident, but still road accident continues. To overcome this type of situation all people must educate, realize and give more attention along with newly innovated technology to decrease the rate of road accident.

References

- [1] Alm H, Nilsson L. Changes in driver behaviour as a function of handsfree mobile phones: a simulator study. *Accident Analysis and Prevention*, 26:441– 451.
- [2] An investigation of the safety implications of wireless communication in vehicles. Department of Transport, National Highway Traffic Safety Administration, Washington
- [3] Redelmeier DA, Tibshirani RJ. Association between cellular-telephone calls and motor vehicle collisions. *New England Journal of Medicine*, 336:453–458.
- [4] The risk of using a mobile phone while driving. Birmingham, Royal Society for the Prevention of Accidents.