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# Design and Implementation of an Interactive Road Safety System for Young Bikers

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**ABSTRACT:** Nowadays accidents are increasing day by day due to the motorcycle. This system is implemented by using Embedded system to reduce the number of accidents. If the rider wears the Helmet, only then, the bike will be turn on manually. If the rider will not wear the helmet the Ignitions cannot able to start. The Alcohol sensor is used to check whether the rider is drunk (or) not. If the rider is drink the ignitions cannot turn on. Call detector circuit which detects when a incoming call in a mobile phone by means of flashing LED and frequency. It can detect and the engine will be turn off.

**KEYWORDS:** Proximity sensor, Alcohol sensor, MEMS sensor, Fire sensor

## I. INTRODUCTION

Many accidents occur due to the wrong indication. Wrong indication at the night time causes the many accidents. This is very simplest and cost effective method to avoid the two wheelers accidents. The idea of developing this paper is to save and help the society. According to the survey, 698 accidents take places due to the bike crash per year. This is the situation we observed in our regular (or) day today life. A thought of finding some solution to resolve this problem at time. If everything is done in time at we can save half the lives that are first due to Two wheeler we accidents. The idea of this work is to give information about the wider he wear a helmet (or) not, Drunk and drive are not, while driving he use a mobile phones (or) not finally the right indication to avoid the accidents and save the human lives.

## II. EXISTING METHOD

In the existing system, the bike has only alcohol detection at the same time vibration sensor is fixed in the helmet whether the rider get accident the information goes through GPS and GSM to the neighboring or relatives. At the same time if the rider drunk a alcohol the ignition will automatically suddenly turn off. If the rider will not wear the helmet the ignition get started this will leads to the accidents. The demerits of existing system are, only one system is implemented, RF Transmitter and RF Receiver have minimum range of frequency and Alignment and polarization with respect to the transmitting antenna.

## III. WORKING METHODOLOGY

*Transmitter section:* The RF transmitter section is fixed in the Helmet. It consists of the gas sensor, Accelerometer, helmet sensor. If the rider will not wearing the helmet the LCD will display the warning and then the engine will be automatically turnoff. Gas sensor which is used to sense whether the rider consumes alcohol, if the rider consumes alcohol the engine will be automatically turn off. Accelerometer is used for the automatic indication.

*Receiver section:* Receiver receives the entire signals from the transmitter section. The call detector circuit is used to detect whether the mobile is ringing .whether the rider try dial a call or attend a call the engine will automatically turn off. The merits of proposed system are safe for journey and cost effective.

IV. BLOCKDIAGRAM

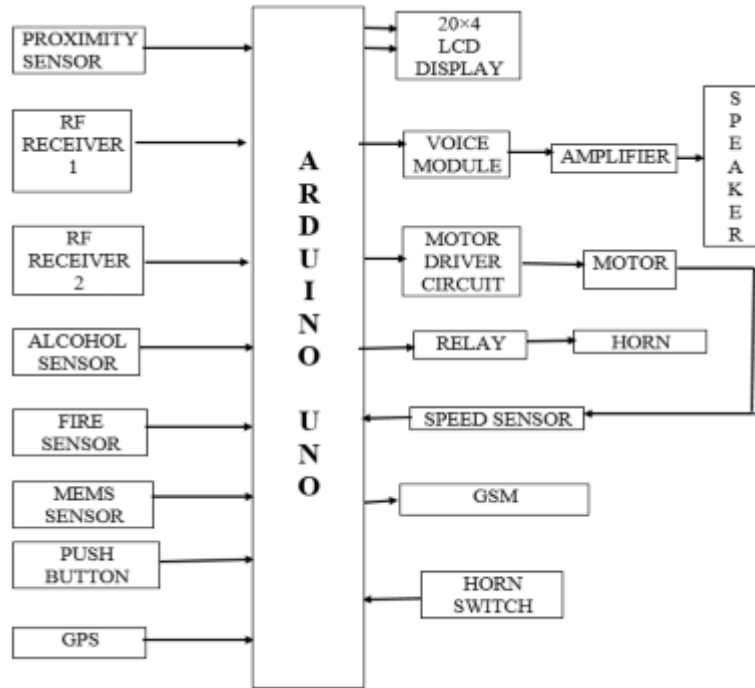


Figure No.1: Block diagram

V. BLOCK DIAGRAM DESCRIPTIONS

(i) RF Transmitter Module:

From the circuit, the power supply +5V is connected to the 40 pin of microcontroller and ground is connected to 20th pin. Here, we got two switches which are duly connected to microcontroller with pulled up to 5V and this two switches form the input command to the microcontroller. We also got an LCD display for displaying the data to be transmitted. We also have an arrangement for a computer key board to be connected for positive and negative part from clock and data pin which is connected as input to the microcontroller from the output of key board and that data is ultimately displayed in the LCD. We also have one RF transmitter that is shown. It has VCC supply, GND. Data pin which goes to microcontroller. Once the key board is made active by pressing the buttons then the keyboard entry can take place which is displays in LCD. Here every press is advancing as per the code from 0 to 9 and ultimately when we press one of the push button for sending it will go to microcontroller and then to the RF transmitter module over a 433 MHz frequency transmitted from antenna.

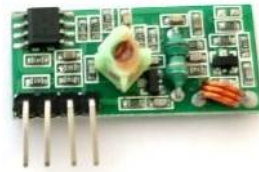


Figure No.2: RF Transmitter Module

(ii) RF Receiver Module:

At receiver end we have similar connections for power supply as microcontroller needs +5V. Similarly to transmitter, here also we are using two push buttons with 10k pull up resistors through 5V supply for RF Module. We are using pin 3.0 to connect data pin of RF module and 1 and 2 pins of RF module is used for GND and Vcc. We also have two buttons for selection of code and for receiving the data. Once the data is received by the receiver module that data is demodulated and goes to the receiver pin 10 of microcontroller as per the program. It then displays the message

on LCD display.



**Figure No.3: RF Receiver Module**

*(iii) Atmel ATmega328/P:*

The Atmel AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in a single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers. The ATmega328/P provides the following features: 32Kbytes of In-System Programmable Flash with Read-While-Write capabilities, 1Kbytes EEPROM, 2 Kbytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, Real Time Counter (RTC), three flexible Timer/Counters with compare modes and PWM, 1 serial programmable USARTs, 1 byte-oriented 2-wire Serial Interface (I2C), a 6- channel 10-bit ADC (8 channels in TQFP and QFN/MLF packages), a programmable Watchdog Timer with internal Oscillator, an SPI serial port, and six software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, SPI port, and interrupt system to continue functioning.

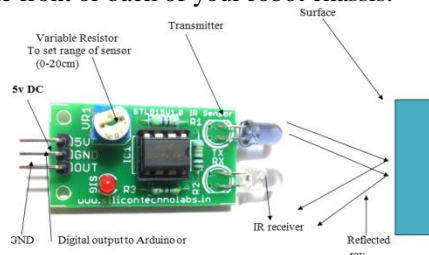
The easy-to-use QTouch Suite tool chain allows you to explore, develop and debug your own touch applications. The device is manufactured using Atmel’s high density non-volatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional non-volatile memory programmer, or by an On-chip Boot program running on the AVR core. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write operation. By combining an 8-bit RISC CPU with In-System Self-Programmable Flash on a monolithic chip, the Atmel ATmega328/P is a powerful microcontroller that provides a highly flexible and cost effective solution to many embedded control applications. The ATmega328/P is supported with a full suite of program and system development tools including: C Compilers, Macro Assemblers, Program Debugger/Simulators, In-Circuit Emulators, and Evaluation kits.

*(iv) LCD:*

Preparation for an LCD has to dine properly before the character we need, has to be displayed. For this a number of commands have to be provided to the LCD before inputting the required data. LCD doesn’t know about the content (data or commands) supplied to its data bus. It is the user who has to specify whether the content at its data pins are data or commands interfacing with PIC. For this, if a command is inputted then a particular combination of 0s and 1s has to be applied to the Control lines so as to specify it is a Command on the other hand if a data is inputted at the data lines then an another combination of 0s and 1s has to be applied to the control lines to specify it is Data.

*(v) Proximity Sensor:*

The Multipurpose Infrared Sensor is an add-on for your line follower robot and obstacle avoiding robot that gives your robot the ability to detect lines or nearby objects. The sensor works by detecting reflected light coming from its own infrared LED. By measuring the amount of reflected infrared light, it can detect light or dark (lines) or even objects directly in front of it. An onboard RED LED is used to indicate the presence of an object or detect line. Sensing range is adjustable with inbuilt variable resistor. The sensor has a 3-pin header which connects to the microcontroller board or Arduino board via female to female or female to male jumper wires. A mounting hole for easily connect one or more sensor to the front or back of your robot chassis.



**Figure No.4: Proximity Sensor**

(vi) MQ-135 Gas Sensor:

The boost converter of the chip MQ-3 gas sensor is PT1301. The operating voltage of this gas sensor is from 2.5V to 5.0V. The MQ-3 gas sensor has a lower conductivity to clean the air as a gas sensing material. In the atmosphere we can find polluting gases, but the conductivity of gas sensor increases as the concentration of polluting gas increases. MQ-135 gas sensor can be implementation to detect the smoke, benzene, steam and other harmful gases. It has potential to detect different harmful gases. The MQ-135 gas sensor is low cost to purchase. The basic image of the MQ-135 sensor is shown in the below figure.



Figure No.5: Gas Sensor

(vii) Cell Phone detector:

*Cell Phone Detector:* We are most familiar with cell phone active detectors. The cell phone detectors are mostly hand and pocket-size mobile transmission detectors. It can sense the presence of an activated mobile phone from a distance of one and a half meters. So it can be used to prevent use of mobile phones in examination halls, confidential rooms, etc.

*Use of Cell Phone Detector:* It is also useful for detecting the use of mobile phone for spying and un-authorized video transmission. Certain places where use of mobile phones are not allowed like exam hall, temple, offices and theaters, in those places to detect and restrict the use of mobile phones this proposed system is very helpful. This must detect the incoming and outgoing calls, SMS and video transmission even if the mobile phone is kept in the silent mode. The illegal use of cell phones is a growing and dangerous problem in correctional institutions worldwide. These devices are a significant threat to prison security and circumvent the monitoring processes in prisons, while helping inmates commit new crimes both inside and outside the facility.

*How Cell Phone Detector Works:* The moment the bug detects RF transmission signal from an activated mobile phone, it starts sounding a beep alarm and the LED blinks. The alarm continues until the signal transmission ceases. An ordinary RF detector using tuned LC circuits is not suitable for detecting signals in the GHz frequency band used in mobile phones.

*Working of Cell Phone Detector:* The circuit uses a 0.22 $\mu$ F disk capacitor to capture the RF signals from the mobile phone. This part should be like an aerial, so the capacitor is arranged as a mini loop aerial. In short with this arrangement the capacitor works like an air core with ability to oscillate and discharge current. The output of transistor is within 10 mV of either supply voltage terminal. The lead inductance acts as a transmission line that intercepts the signals from the mobile phone. An ordinary RF detector using tuned LC circuits is not suitable for detecting signals in the GHz frequency band used in mobile phones that's why circuit detecting gigahertz signals is required for a mobile bug.

*Frequency Range of Detector:* The transmission frequency of mobile phones ranges from 0.9 to 3 GHz with a wavelength of 3.3 to 10 cm. So a circuit detecting gigahertz signals is required for a mobile bug. The lead length of the capacitor is fixed as 18 mm with a spacing of 8 mm between the leads to get the desired frequency. The disk capacitor along with the leads acts as a small gigahertz loop antenna to collect the RF signals from the mobile phone.

Op-amp IC CA3130 (IC1) is used in the circuit as a current-to-voltage converter with capacitor C3 connected between its inverting and non-inverting inputs. It is a CMOS version using gate-protected p-channel MOSFET transistors in the input to provide very high input impedance, very low input current and very high speed of performance. The output CMOS transistor is capable of swinging the output voltage to within 10 mV of either supply voltage terminal.

Capacitor C3 in conjunction with the lead inductance acts as a transmission line that intercepts the signals from the mobile phone. This capacitor creates a field, stores energy and transfers the stored energy in the form of minute current to the inputs of IC1. This will upset the balanced input of IC1 and convert the current into the corresponding output voltage.

Capacitor C<sub>4</sub> along with high-value resistor R1 keeps the non-inverting input stable for easy swing of the output to high state. Resistor R2 provides the discharge path for capacitor C4. Feedback resistor R3 makes the

inverting input high when the output becomes high. Capacitor C5 (47pF) is connected across ‘strobe’ (pin 8) and ‘null’ inputs (pin 1) of IC1 for phase compensation and gain control to optimize the frequency response.

When the cell phone detector signal is detected by C3, the output of IC1 becomes high and low alternately according to the frequency of the signal as indicated by LED1. The low-value timing components R6 and C9 produce very short time delay to avoid audio nuisance the pin diagram of the entire circuit as given in the figure 6.

Assemble the cell phone detector circuit on a general purpose PCB as compact as possible and enclose in a small box like junk mobile case. As mentioned earlier, capacitor C3 should have a lead length of 18 mm with lead spacing of 8 mm. carefully solder the capacitor in standing position with equal spacing of the leads. The response can be optimized by trimming the lead length of C3 for the desired frequency. You may use a short telescopic type antenna.

Use the miniature 12V battery of a remote control and a small buzzer to make the gadget pocket-size. The unit will give the warning indication if someone uses mobile phone within a radius of 1.5 meters.

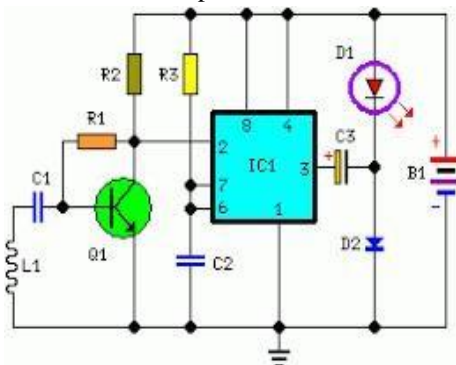


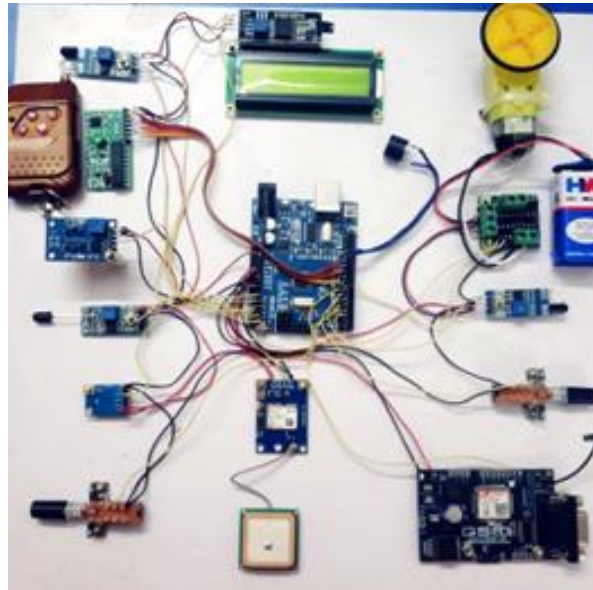
Figure No.6: Call Detector circuit

(viii) Software:

A program for Arduino may be written in any programming language for a compiler that produces binary machine code for the target processor. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio. The Arduino project provides the Arduino integrated development environment (IDE), which is a cross-platform application written in the programming language Java. It originated from the IDE for the languages Processing and Wiring. It includes a code editor with features such as text cutting and pasting, searching and replacing text, automatic indenting, brace matching, and syntax highlighting, and provides simple one-click mechanisms to compile and upload programs to an Arduino board. It also contains a message area, a text console, a toolbar with buttons for common functions and a hierarchy of operation menus.

## VI. RESULT

The RF transmitter section is fixed in the Helmet. It consists of the gas sensor, Accelerometer, helmet sensor. If the rider will not wearing the helmet the LCD will display the warning and then the engine will be automatically turnoff. Gas sensor which is used to sense whether the rider consumes alcohol, if the rider consumes alcohol the engine will be automatically turn off. Accelerometer is used for the automatic indication. Receiver receives the entire signals from the transmitter section. The call detector circuit is used to detect whether the mobile is ringing. Whether the riders try dialing a call or attending a call the engine will automatically turn off.



**Figure No.7: Photo of the Proposed system**

## VII. CONCLUSION

This system is very useful to reduce the number accidents in the day today life. At the same time suppose the accident takes place the accidental bike will be captured. The bike theft should be reduced due to the Smart Helmet. The major reasons for the accidents such as drunk and drive, using mobile phones while driving, wrong indication are mostly avoided by this project. “Without proper action at proper time, danger awaits us with a bigger face”. According to that “prevention is better than cure “so everyone should prevent their life and valuable lives so try to save it.

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