Accident Detection With Alert System & Helmet Safety Monitoring System

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Abstract: Autonomous vehicles want reliable and strong sensor suites and alert systems. This paper discusses the improvement position and performance of a sophisticated monitoring and alert system for automobile vehicle parameters. The number of automobiles has also grown quickly to meet the enormous population. Additionally, this resulted in an increase in accidents. The accident prevention strategies now in use are all static and dated. Additionally, there is no reliable accident detection system. Automobile vehicle parameters are continuously monitored by a microcontroller which stores the data logs containing vehicle parameter data into a sheltered digital memory card and in the cloud storage. The system doesn’t solely record the vehicle parameters data of the automobile periodically, but also actively monitors for any sudden vehicle accident detection. The sensor may facilitate folks to analyze the accident quickly and lawfully when a collision happens to alert the emergency services to that location. The system will update the information whenever an abnormal system event happens. The accelerometer is used to detect fall, and Threshold Algorithms (Sign-Signal) are used to detect accident. Short- Messages will contain GPS coordinates, which help in finding the vehicles.

Keywords: Temperature sensor, Mems sensor, GSM, Relay Pin, LCD, ARDUINO

1. INTRODUCTION

In recent times helmets have been made compulsory for both persons in bike. Traffic accidents in India have increased year by year. As per Section 129 of Motor Vehicles Act, 1988 it is compulsory that the rider should wear helmet which is of ISI standard. In India drunken drive case is a criminal offence according to Motor Vehicle act 1939. Which states that the bike rider will get punish. In spite of this bike rider easily get escaped from law. These are the key issues which motivates us to develop this smart helmet. The first step is to identify whether rider is wearing helmet or not. The ignition gets on if he is wearing helmet otherwise it remains off until he wears it. For detecting this we use pressure sensor (force sensor flexible type). The second step is alcohol detection. Alcohol sensor is placed in front of the mouth which detect the presence of alcohol in rider breathe if it is exceeds permissible range ignition cannot start. MQ-5 sensor is used as alcohol sensor. When these two conditions are satisfied then ignition will start. The third main issue is accident and late medical help. If the rider met accident with him he cannot receive medical help instantly, its big reason for deaths. Around every second people die due to late medical help or the accident place is not known. Pressure sensor is used to detect accident occurred. The aim of this project is to make a protection system in a helmet for a good safety of bike rider. The smart helmet that we made is fixed with sensors which act as to detect wear helmet or not.
Rider safety is a paramount concern in the field of transportation, especially for motorcycle riders. Smart helmets have emerged as a technological innovation to address this concern by integrating advanced features and functionalities into traditional helmets. These smart helmets leverage IoT (Internet of Things) technology to provide real-time monitoring, communication capabilities, and enhanced safety features. The introduction of smart helmets has revolutionized rider safety by incorporating various sensors and connectivity options. These helmets are designed to collect and analyze data in real-time, offering valuable insights and timely notifications to riders. By leveraging IoT technology, smart helmets can communicate with other devices, such as smartphones or vehicle-to-vehicle communication systems, to enhance overall safety and situational awareness. This study aims to analyze the existing smart helmet solutions available in the market and propose a cost-effective solution for designing an IoT-based smart helmet. The proposed smart helmet aims to address the limitations of existing options and provide a comprehensive set of safety features while considering affordability for widespread adoption. The benefits of smart helmets are numerous. They enable real-time monitoring of vital signs, such as heart rate and oxygen levels, allowing for early detection of health issues and timely intervention.

**TEMPERATURE SENSOR:**
- Programmable Digital Temperature Sensor
- Communicates using 1-Wire method
- Operating voltage: 3V to 5V
- Temperature Range: -55°C to +125°C
- Accuracy: ±0.5°C
- Output Resolution: 9-bit to 12-bit (programmable)
- Unique 64-bit address enables multiplexing
- Conversion time: 750ms at 12-bit
- Programmable alarm options
- Available as To-92, SOP and even as a waterproof sensor

The DS18B20 is a 1-wire programmable Temperature sensor from maxim integrated. It is widely used to measure temperature in hard environments like in chemical solutions, mines or soil etc. The construction of the sensor is rugged and also can be purchased with a waterproof option making the mounting process easy. It can measure a wide range of temperature from -55°C to +125°C with a decent accuracy of ±0.5°C. Each sensor has a unique address and requires only one pin of the MCU to transfer data so it a very good choice for measuring temperature at multiple points without compromising much of your digital pins on the microcontroller.

**GAS SENSOR**

- Programmable Digital Temperature Sensor
- Communicates using 1-Wire method
- Operating voltage: 3V to 5V
- Temperature Range: -55°C to +125°C
- Accuracy: ±0.5°C
- Output Resolution: 9-bit to 12-bit (programmable)
- Unique 64-bit address enables multiplexing
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**Relay module:**

- Relay module:
- Relay is one kind of electro-mechanical component that functions as a switch. The relay coil is energized by DC so that contact switches can be opened or closed. A single channel 5V relay module generally includes a coil, and two contacts like normally open (NO) and normally closed (NC). This article discusses an overview of the 5V relay module & its working but before going to discuss what is relay module is, first we have to know what is relay and its pin configuration.

- A 5v relay is an automatic switch that is commonly used in an automatic control circuit and to control a high-current using a low-current signal. The input voltage of the relay signal ranges from 0 to 5V.

- **5V Relay Pin Configuration**
- The pin configuration of the 5V relay is shown below. This relay includes 5-pins where each pin and its functionality are shown below.
- **Pin1 (End 1):** It is used to activate the relay; usually this pin one end is connected to 5Volts whereas another end is connected to the ground.
- **Pin2 (End 2):** This pin is used to activate the Relay.
- **Pin3 (Common (COM)):** This pin is connected to the main terminal of the Load to make it active.
- **Pin4 (Normally Closed (NC)):** This second terminal of the load is connected to either NC/ NO pins. If this pin is connected to the load then it will be ON before the switch.
- **Pin5 (Normally Open (NO)):** If the second terminal of the load is allied to the NO pin, then the load will be turned off before the switch.

**Lcd module**

The LCDduino board enables users to create many applications/projects that require a 16×2 LCD display and Arduino. The board has the exact size of 16×2 LCD and can be installed on the backside of the LCD. This is a low-cost solution that has onboard Arduino + LCD so no extra Arduino Nano or Arduino board is required. The Arduino compatible hardware includes onboard programming and boot-loader connectors,
Atmega328 microcontroller, and 16×2 LCD interface. Each Arduino I/O Pin including the VCC and GND is exposed to the connectors for easy connection with sensors and other devices. The board enables the easy interface of many devices and sensors. The operating power supply is 7 to 15V DC.

CONCLUSION
In conclusion, the intelligent helmet represents a noteworthy advancement in guaranteeing rider safety. Modern techniques for detecting alcohol, identifying accidents, tracking whereabouts, and detecting falls are all seamlessly combined, it enhances the protective capabilities of a traditional helmet. The wireless RF module simplifies the transmission of information and control commands between the bike unit and the helmet unit. Furthermore, the intelligent helmet requires the rider to wear it before the bike can be started, augmenting safety protocols. The standout feature lies in its capacity to identify alcohol levels, effectively preventing riders from operating their bikes under the
influence. If the rider is found to be intoxicated, the intelligent helmet automatically immobilizes the bike’s ignition system. Moreover, the helmet’s ability to send notifications containing the rider’s precise location to designated contacts adds an additional layer of security. In the unfortunate event of an accident, the intelligent helmet promptly utilizes the GSM and GPS modules to transmit distress messages, promptly notifying emergency services of the rider’s location and ensuring timely assistance. Its focus on prioritizing rider well-being, mitigating risks, and enabling prompt assistance underscores its vital role in ensuring a secure and enjoyable riding experience.

REFERENCES


3. HARDWARE DESCRIPTION

3.1 Power Supply

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. Power supplies for electronic devices can be broadly divided into linear and switching power supplies. The linear supply is a relatively simple design that becomes increasingly bulky and heavy for high current devices; voltage regulation in a linear supply can result in low efficiency. A switched-mode supply of the same rating as a linear supply will be smaller, is usually more efficient, but will be more complex.

![Fig-1 Power Supply](image1)

3.2 Potentiometer

A potentiometer is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider. If only two terminals are used, one end and the wiper, it acts as variable resistor or rheostat. The measuring instrument called a potentiometer is essentially a voltage divider used for measuring electric potential (voltage); the component is an implementation of the same principle, hence its name.

![Fig-2 Potentiometer](image2)

Potentiometers are commonly used to control electrical devices such as volume controls on audio equipment. Potentiometers operated by a mechanism can be used as position transducers, for example, in a joystick. Potentiometers are rarely used to directly control significant power (more than a watt), since the power dissipated in the
potentiometer would be comparable to the power in the controlled load. Liquid Crystal Display (LCD)

A liquid crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements. An LCD is a small low cost display. It is easy to interface with a micro-controller because of an embedded controller (the black blob on the back of the board). This controller is standard across many displays (HD 44780) which means many micro-controllers (including the Arduino) have libraries that make displaying messages as easy as a single line of code.

![Fig-3 LCD Display](image)

LCDs are used in a wide range of applications including computer monitors, televisions, instrument panels, aircraft cockpit displays, and signage. They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones, and have replaced cathode ray tube (CRT) displays in most applications. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they do not suffer image burn-in. LCDs are, however, susceptible to image persistence.

3.3 Buzzer

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise). Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board.

![Fig-4 Buzzer](image)

Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Son alert which makes a high-pitched tone. Usually these were hooked up to “driver” circuits which varied the pitch of the sound or pulsed the sound on and off. In game shows it is also known as a “lockout system,” because when one person signals (“buzzes in”), all others are locked out from signaling. Several game shows have large buzzer buttons which are identified as “plungers”. The word “buzzer” comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles. Other sounds commonly used to indicate that a button has been pressed are a ring or a beep.
3.4 Servo Motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servomotors are not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system.

![Servo motor](image)

**Fig-5** Servo motor

2. SOFTWARE DESCRIPTION

4.1 Arduino IDE

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo.

![Arduino IDE](image)

**Fig-6** Arduino IDE

4.2 Proteus Design

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards. Proteus is a simulation and design software tool developed by Lab center Electronics for Electrical and Electronic circuit design. It also possess 2D CAD drawing feature. It deserves to bear the tagline “From concept to completion”. It is a software suite containing schematic, simulation as well as PCB designing. ISIS is the software used to draw schematics and simulate the circuits in real time. The simulation allows human access during run time, thus providing real time simulation. ARES is used for PCB designing. It has the feature of viewing output in 3D view of the designed PCB along with components. The designer can also develop 2D drawings for the product.
3. FINAL OUTPUT IN HARDWARE

CONCLUSION
After developing this project, we conclude following points. This project is most useful for handicap persons those who cannot drive the two wheelers because due to gear shifting problem. Hence the gear shifting mechanism is developed and modified according to their requirement. The application of this gear shifting mechanism leads to make the driving process for driver easier, reduces the risk of destabilizing, the chance of miss shifting. Due to this mechanism driver can concentrate on road rather giving concentration of gear shifting and easily drive in traffic areas. The system is cheap and can be implemented in any bikes available in market. Smooth rides in all city conditions. No need for internal modification in bikes. Less human intervention in riding bike. Gear limits can be changed by optimizing the program in microcontroller. The vehicle can be switched to automated as well as manual by easy switch. Due to its low cost and easy manufacturing, companies can implement this system and increase their sales.

REFERENCES