AUTOMATIC SECURITY SYSTEM FOR AUTOMOTIVE APPLICATION USING ARDUINO CONTROLLER

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Abstract : In our project, we have implemented the smart seat belt system for minimizing the accidental injuries in automobiles and to enhance the security of human beings. Seat belts play a vital role in the safety of passengers. The structure of the seat belt system consists of flex sensors, pressure sensors and Arduino micro controller. This method is and advanced version of seat belt system. The flex sensor and pressure sensor are used to detect the human presence

IndexTerms **- Smart seat belt, Flex sensor, Pressure Sensor, Arduino, Automobile key**

I. INTRODUCTION

We are crossing many news read that the people were not wearing their seat belts in the time of their travel. So if accident occurs it may lead to fatal injuries or death. Many researchers also say that even small injuries may lead to critical ones when they fail to buckle up their seat belts. Our project will help in reducing these kinds of issues since it makes people to fasten up their seat belts. Hence wearing seat belt is mandatory for the occupants. Smart seat belt is connected with flex sensor and pressure sensor which are used to detect human presence. The vehicle gets started only if it gets the signal to the arduino board from these sensors. If any sensor does not get the flex or pressure ,the signal will be sent to the LCD Display and alarm buzzes. This system will operate on driver seat as well as passengers seat.

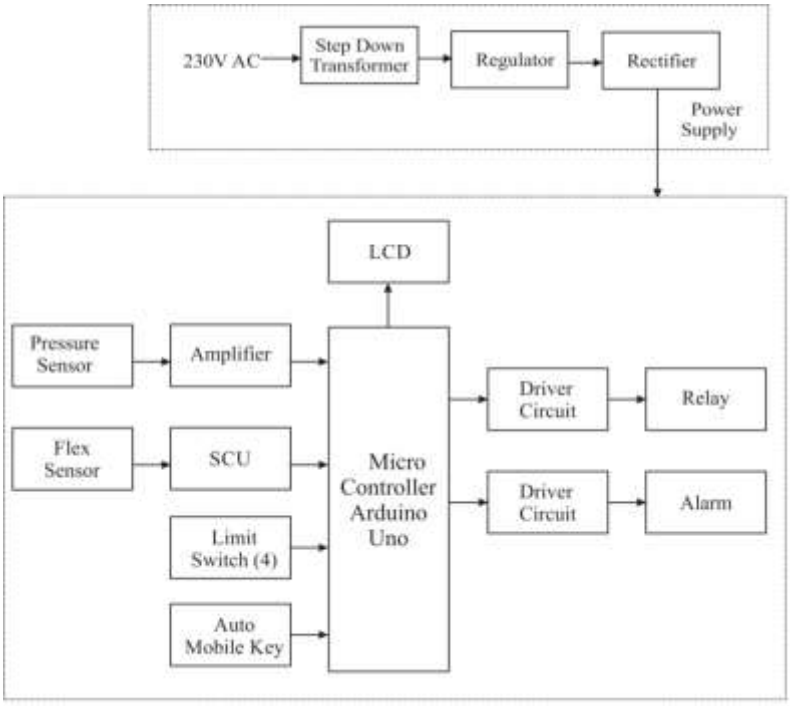
II. EXISTING SYSTEM

1.A Smart Vehicle For Accident Prevention Using Wireless Blockbox And Eyeblink Sensing Technology Along With Seat Belt Controlled Ignition System --C.Mohamedaslam,Ajmal Roshan.T,Mohamed sahal.M.T,Najeeb.N.A. This project reduces the accidental injuries using GSM/GPRS system sends the SMS to the nearest traffic police and the controller room with the details of vehicle position. Here they used the speed sensor, seat belt sensor and various sensors are connected to microcontroller which detects the abnormal condition during accidents. 2. Seat Belt Safety Features Using Sensors to Protect Occupant --S.D. Rahall Bhardwaj , Shraddha R. Jogdhankar. This project is about seat belt safety mechanism. The safety feature with an intension to decrease accidental injuries to occupants. They developed seat belt safety feature using sensor. In case of accidents occurs, passenger lives can be saved by use of seat belts and airbags in the cars. 3. Seatbelt Sensors to Fight Drowsy Driving . It is used to measure our heartbeat and breathing patterns when the person drives the car during drowsiness. Because of the symptoms like yawning or rash driving. The most common cause of driving accidents are death and disability. 4. Development of Helmet Detection System & Smart Seat Belt --S. Anil Babu,Sumathi Ayyalusamy,Rejin Ramjet Singh, Seeming Dharmarijan, Jason James, Mohamed Anas. This project is on smart helmet detection system and seat belt detection system to avoid or reduce the accident . Without wearing seat belt and helmet the vehicle won't be started. If the driver unfastens their seat belt or helmet is removed after starting off vehicle, the control unit will disengage the power input to the ignition switch after 30 seconds resulting in halt position.5. Smart Car for the Physically Challenged.In this paper, the mechanism of a smart car for a physically challenged people. The use of sensors for direction control and automatic sensing of the presence of any hurdle. To alert the driver using of buzzer and LED. The smart car is designed to complete safety of the driver on seat and helps him to drop down the car. 6. Automatic Seat Belt for Passenger Vehicle --R.Prakash, K.SaiKrishna, C.Sathishkumar, S.Vivekanandan. The project is based on the ring gear mechanism. The occupant occupies the seat, the motor is switched on in the clockwise direction. The belt is carried by the curved ring gear and locked with the buckle. Once the seat belt is locked with the buckle, the motor runs in the counter clockwise direction till the ring gear is brought back to its initial position. 7. Developing safety system for monitoring seat belt and controlling speed accordingly to avoid fatal injuries --Priyal N Sheth, A.D Badgujar. This paper explains the safety system which ensures that the driver and co-passenger wear safety seat belt while driving a car. The driver assistive safety system works on the concept of 'ignition interlocking" and "speed control". 8. Attitudes of commercial motor vehicle drivers towards safety belts --Karl Kim, Eric Y. Yamashita.The major aim of this project is cited for non-use of belts was "frequent stops/inconvenience" (29%), and "not safety conscious" (23%). The self-reported use of safety belts is highest among operators of vans (88), followed by buses (87%), and lowest among truck drivers (60%). Some of the differences between self-

reported users and non-users are explored and a multivariate logic model was developed to predict the odds of belt use as a function of various factors

III. PROPOSED SYSTEM

The purpose of developing our project is to design alternate method of seat belt safety mechanism without changing the available space in the automobile and also to provide safety to occupants in those cars in which air bags could not be implemented due to increase in cost. The actuating system design includes three point seat belts, limit switch, ARDUINO micro controller based locking mechanisms.



3.1 Block diagram

3.1 COMPONENTS USED

The smart seat belt system consists of flex sensor, pressure sensor, limit switches and ARDUINO controller.

3.2 ARDUINO UNO

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P . It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

3.2 Arduino board

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

3.3 FLEX SENSOR

Force-sensing resistor(flex sensor) is a material whose resistance changes when a force or pressure is applied. They are also known as "force sensing resistors" or "force-sensitive resistor", and are sometimes referred to by the initialism "FSR".[1] But note that FSR and "Force Sensing Resistor" are trademarks of Interlink Electronics, Inc.

3.4 PROPERTIES

Force-sensing resistors consist of a conductive polymer, which changes resistance in a predictable manner following application of force to its surface.[2] They are normally supplied as a polymer sheet or ink that can be applied by screen printing. The sensing film consists of both electrically conducting and non-conducting particles suspended in matrix. The particles are sub-micrometer sizes, and are formulated to reduce the temperature dependence, improve mechanical properties and increase surface durability. Applying a force to the surface of a the sensing film causes particles to touch the conducting electrodes, changing the resistance of the film. As with all resistive based sensors, force-sensing resistors require a relatively simple interface and can operate satisfactorily in moderately hostile environments. Compared to other force sensors, the advantages of FSRs are their size (thickness typically less than 0.5 mm), low cost and good shock resistance. However, FSRs will be damaged if pressure is applied for a longer time period (hours). A disadvantage is their low precision: measurement results may differ 10% and more.

3.5 USES

Force-sensing resistors are commonly used to create pressure-sensing "buttons" and have applications in many fields, including musical instruments, car occupancy sensors, and portable electronics.

3.6 PRESSURE SENSOR:

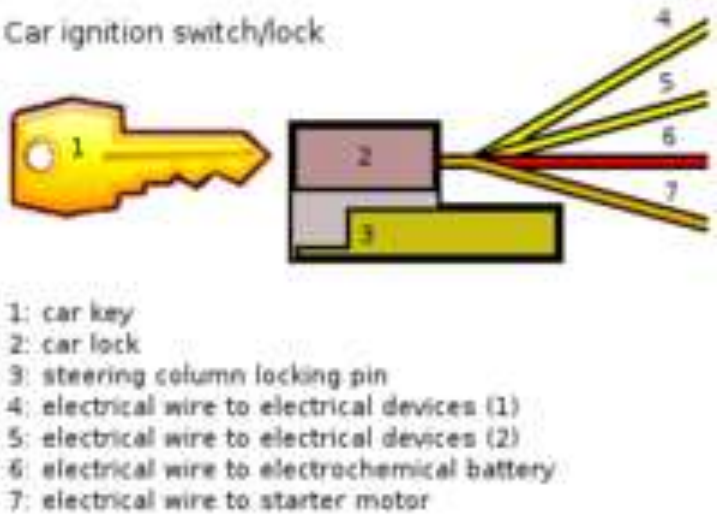
A pressure sensor measures pressure, typically of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in terms of force per unit area. A pressure sensor usually acts as a transducer; it generates a signal as a function of the pressure imposed. For the purposes of this article, such a signal is electrical. Pressure sensors are used for control and monitoring in thousands of everyday applications. Pressure sensors can also be used to indirectly measure other variables such as fluid/gas flow, speed, water level, and altitude. Pressure sensors can alternatively be called pressure transducers, pressure transmitters, pressure senders, pressure indicators and piezometers, manometers, among other names. Pressure sensors can vary drastically in technology, design, performance, application suitability and cost. A conservative estimate would be that there may be over 50 technologies and at least 300 companies making pressure sensors worldwide.There is also a category of pressure sensors that are designed to measure in a dynamic mode for capturing very high speed changes in pressure. Example applications for this type of sensor would be in the measuring of combustion pressure in an engine cylinder or in a gas turbine. These sensors are commonly manufactured out of piezoelectric materials such as quartz. Some pressure sensors, such as those found in some traffic enforcement cameras, function in a binary (on/off) manner, i.e., when pressure is applied to a pressure sensor, the sensor acts to complete or break an electrical circuit. These types of sensors are also known as a pressure switch.

3.6 AUTOMOBILE KEY

A car key or an automobile key is a key used to open and/or start an automobile. Modern key designs are usually symmetrical, and some use grooves on both sides, rather than a cut edge, to actuate the lock. It has multiple uses for the automobile with which it was sold. A car key can open the doors, as well as start the ignition, open the glove compartment and also open the trunk (boot) of the car. Some cars come with an additional key known as a valet key that starts the ignition and opens the drivers side door, but prevents the valet from gaining access to valuables that are located in the trunk or the glove box. Some valet keys, particularly those to high-performance vehicles, go so far as to restrict the engine's power output to prevent joyriding.[2] Recently, features such as coded immobilizers have been implemented in newer vehicles. More sophisticated systems make ignition dependent on electronic devices, rather than the mechanical key switch. Ignition switches/locks are combined with security locking of the steering column (in many modern vehicles) or the gear lever (such as in Saab Automobile vehicles). In the latter, the switch is between the seats, preventing damage to the driver's knee in the event of a collision.

Keyless entry systems, which use either a door-mounted keypad or a remote control in place of a car key, are becoming a standard feature on many new cars. Some of them are hands free.

3.7 CAR KEY



3.3 Key model

3.8 CAR IGNITION AND STEERING WHEEL LOCK

3.8.1 DRIVER CIRCUIT

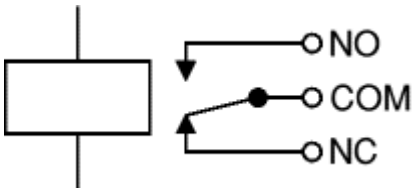
The following circuit will allow you to drive a 12V relay using logic voltage (an input of 4V or greater will trip the relay). The circuit has its own 12V power supply making it self contained but the power supply portion can be left out if an external supply will be used. The circuit shows an output from the power supply that can be used to power other devices but it should be noted that the supply is unregulated and not particularly powerful with the parts stated. The 12V DC output is suitable for powering a few LEDs or low voltage lights but should not be used to power other electronic boards or motors.

3.8.2 RELAY:

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification.

Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available. Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay. The animated picture shows a working relay with its coil and switch contacts. You can see a lever on the left being attracted by magnetism when the coil is switched on. This lever moves the switch contacts. There is one set of contacts (SPDT) in the foreground and another behind them, making the relay DPDT. The relay's switch connections are usually labeled COM, NC and NO:



3.4 Key model

- **COM** = Common, always connect to this, it is the moving part of the switch.
- **NC** = Normally Closed, COM is connected to this when the relay coil is **off**.
- **NO** = Normally Open, COM is connected to this when the relay coil is **on**.
- **ALARM:**
- An **alarm** gives an audible or visual warning about a problem or condition.

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. 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 Sonalert which makes a high-pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed sound on and off.

3.9 ADVANTAGES

- The system brings more safety to driver and occupants of the vehicle.
- This system makes seat belt wearing mandatory.
- This system can be installed in any existing car without making major changes.
- It has warning system which alerts driver.

IV. CONCLUSION

The Smart Seat belt system works as a safety feature reduces chances of major injuries or even loss of life in an accident, hence to make sure that people wear seat belt. Occupant safety has been a subject of intense debate for nearly as long as automobiles have been on the roads. The advantages of the proposed system over other methods include prevention of accidental injuries, to improve safety of driving to Discourages careless driving,

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