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SEATBELT BUG ALERT SYSTEM

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ABSTRACT: The current seat belt alarm system can be bugged by buckling it behind the passenger instead of placing it over the passenger. The belt buckle can also be bugged by placing an extra attachment over it which are available in custom shops to avoid the warning sound. Hence there is a possibility to overrule this safety system. To avoid this bug, a proximity sensor is used to find out the amount of length of the seat belt that is pulled out from the retractor. When the average seat belt length is pulled out from the retractor the warning sound is stopped completely. This system avoids the harsh impact between the passenger and the airbag in case of accidents when they overrule the safety system.

Keywords: **Seat belt, Sensors, Ardunio**

INTRODUCTION:

A seat belt (also known as a safety belt) is a vehicle safety device designed to secure the driver or a passenger of a vehicle against harmful movement that may result during a collision or a sudden stop. A seat belt reduces the likelihood of death or serious injury in a traffic collision by reducing the force of secondary impacts with interior strike hazards, by keeping occupants positioned correctly for maximum effectiveness of the airbag (if equipped) and by preventing occupants being ejected from the vehicle in a crash or if the vehicle rolls over.

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LITERATURE SURVEY:

The objective of this study was to determine the effect of Enhanced Seat Belt Reminder Systems (ESBRs) in non-commercial passenger cars, pickups, SUVs, and passenger vans on seat belt use rates relative to the same vehicles without ESBRs. An observational study measuring seat belt use by drivers and right front seat passengers of these vehicles was conducted in eight urban centers across the United States to determine the effect. ESBRs provide a more conspicuous or persistent seat belt reminder display than systems that meet only the Federally-mandated minimum requirements to alert passenger vehicle occupants when they are not belted. The analysis assessed the overall effects of each of the various ESBR systems on seat belt use, relative to the base 4-8 second system required by the Federal Motor Vehicle Safety Standard (FMVSS). A secondary research objective was to examine the relative effectiveness of different ESBR system characteristics, such as warning sound duration, interval between displays, change in amplitude and icon versus text. Controlling for a number of characteristics of the occupants and vehicles that tend to influence seat belt use in general, the study found that belt use rates of drivers in vehicles with most types of ESBR systems was about 3-4 percentage points higher than drivers in vehicles without ESBRs (whose observed belt use rate of 85% in the present study is similar to the national average reported by NHTSA1). The following are estimated effects of ESBR on belt use among drivers and right front seat passengers. There are estimates for ESBR effects overall, and for groupings of largely similar ESBR systems. The estimates were controlled for the potentially.

Front seat occupants The overall effect of ESBRs was to increase front seat occupant seat belt use by 3.3 percentage points compared to vehicles without ESBRs. Most ESBRs increased the rate of belt use by about 3-4 percentage points over the non-ESBR rate of belt use. Depending on ESBR system, the increases ranged from 2.6 to 4.1 percentage points.

Drivers: The overall effect of ESBRs was to increase driver seat belt use by 3.2 percentage points compared to vehicles without ESBRs. Depending on ESBR system, the increases ranged from 2.5 to 3.9 percentage points. Front right passengers: The overall effect of ESBRs was to increase front passenger seat belt use by 3 percentage points compared to vehicles without ESBRs. Depending on the ESBR system, the increases ranged from 1.8 to 4.1 percentage points. ESBR system characteristics Relative to vehicles without ESBRs ESBR features (icon, sound, text) and the characteristics of each feature (e.g., interval between displays, change in amplitude, etc.) were found individually and in various combinations to have significant

Introduction and background The use of a seat belt increases survivability and reduces injury severity for motor vehicle occupants involved in traffic crashes. Although studies have shown that the vast majority of drivers are using seat belts, with observed usage rates as high as 83 percent in 20052 , those who do not wear their seat belts are overrepresented in fatal crashes. In 2004, of the 20,446 passenger vehicle driver fatalities for which restraint use was known, an estimated 11,031 (54%) were unrestrained . The reasons drivers indicate most often as to why they do not use a seat belt include short trips, forgetfulness, in a rush, and discomfort. Congress and the National Highway Traffic Safety Administration (NHTSA) have initiated a number of activities to develop in-vehicle technologies to increase belt use. One method to increase seat belt use is installation of various types of seat belt reminders in vehicles to prompt occupants to use their belts. Currently, Federal standards require all new vehicles be equipped with a "basic" seat belt reminder system – a warning light and a tone activated immediately after the vehicle is started and continues for 4 to 8 seconds if a driver is not belted, with the light persisting for at least 60 seconds. The extent to which the basic seat belt reminder increases seat belt use is unknown. However, the basic belt reminder is believed to be relatively ineffective because motorists tend to ignore the brief system display. With the goal of further increasing seat belt use, a number of automobile manufacturers have designed enhanced seat belt reminders (ESBR) that exceed the Federally mandated basic system by providing a more persistent warning to alert drivers when they are not belted. These ESBR systems have proven to be effective and are an important tool in the campaign to increase seat belt use. Public attitudes towards the ESBR are generally positive, as those drivers whose main reasons for non-use of seat belts relate to forgetfulness or trip type say that the ESBR alerts are beneficial. In order to further develop and increase the penetration of ESBR in motor vehicles, NHTSA has contacted all the major vehicle manufacturers encouraging the installation of systems that extend beyond the basic four- to eight-second requirement. NHTSA also continues to compile information on each ESBR system since each manufacturer has designed a unique system with distinctive acoustic and or visual displays. The observational belt use study described in this preliminary report was undertaken to investigate the effectiveness and acceptability of all known ESBR systems and to better understand which ESBR characteristics are the most effective in influencing occupants to use seat belts. Additional related studies of ESBR acceptability and effectiveness presently being conducted by Westat include a field study of driver acceptance and potential effectiveness of different reminder system design features, and a study focused specifically on teen drivers. This report summarizes only the findings of the observational survey of seat belt use; the other reports will be released at the conclusion of those studies. A synthesis report for this task and the acceptability task is also underway.

SURVEY:

In 2017 – 26896 people died due to non usage of seatbelt in India, an exponential increase of over 377 percent. The year ratio also around 16876 passengers killed and 61942 passengers injured due to non use of seatbelts.

India don't not wear seatbelt leading 15 deaths every day according to study of India largest carmakers like Maruti Suzuki compliance 98%. Europeans wear seatbelt, whereas the US has a compliance rate of 85%.among drivers in Indian seatbelt usage stood at a disappointing 28%.

Road accidents in fact are the leading causes of deaths in the country. According to the ministry of road transport and highways in 2016, 1.5 laths people died in road accident. A total of 5.638 people died in 2016 due to non usage of seat belts.

PRINCIPLE

Arduino board is used in this project powered by battery.

The weight sensor and proximity sensor are connected to aurdino board.

The proximity sensor detects the metal strip placed in the seat belt to identify the average extension of seat belt.

The weight sensors used to measure the presence of the passenger.

If the presence of the passenger is detected and the seat belt is not properly used, the vehicle's engine is automatically turned off.

The buzzer is also turned on to alert the passenger.

The sensors are placed in such a way that they cannot be bugged anymore.

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Block drawing

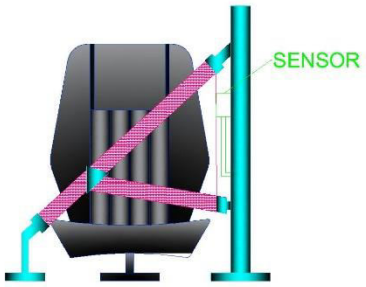

Figure 1: CAD model

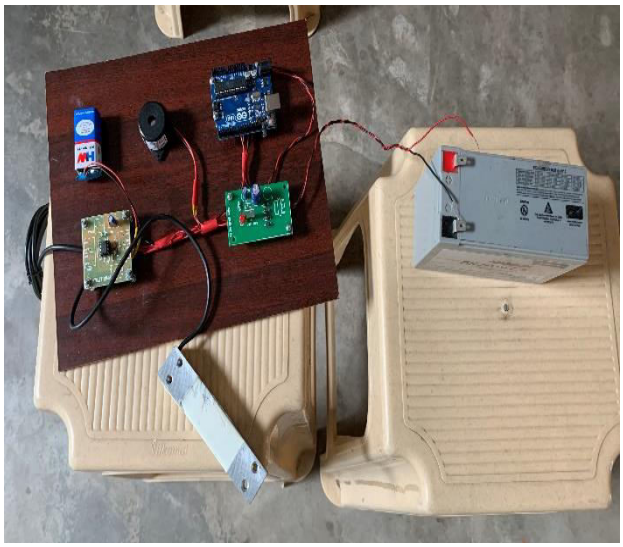

Figure 2: circuit model

COMPONENT DESIGN

Arduino

Arduino is an open-source hardware and software company, project and user community, manufactures single-board microcontrollers and microcontroller kits for building digital devices. Its hardware products are licensed under a CC-BY-SA license, while software is licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially from the official website or through authorized distributors.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and Analog input/output (I/O) pins that may be interfaced to various expansion boards ('shields') or breadboards (for prototyping) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs. The microcontrollers can be programmed using the C and C++ programming languages, using a standard API which is also known as the "Arduino language". In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) and a command line tool (arduino-cli) developed in Go.

The Arduino project began in 2005 as a tool for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats and motion detectors.

Figure 3: Ardunio

METAL DETECTOR SENSOR:

Metal detectors are able to and do detect iron, copper, Aluminium, tin, nickel, brass, and lead. However, excitingly, these detectors are also able to locate bronze, silver, and especially gold! We can set our devices to only emit a specific electromagnetic field to find target metals.

Metal detectors work by transmitting an electromagnetic field from the search coil into the ground. Any metal objects (targets) within the electromagnetic field will become energised and retransmit an electromagnetic field of their own.

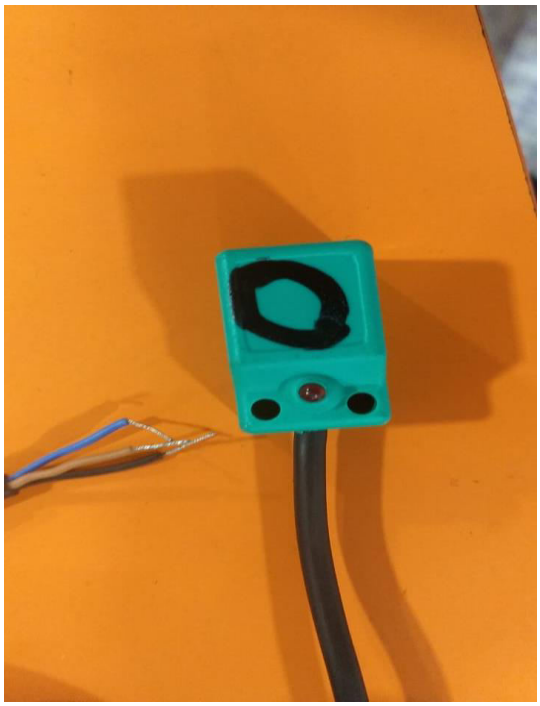

Figure 4: Metal Detector sensor

Weight sensor:

A weight sensor is another term for a load cell. They are sometimes referred to as weight sensors as one of their main uses is weighing.

Weight sensors are available in different sizes and capacities which enables them to suit different kinds of weighing applications.

Types of weight sensors:

Some of the most popular different types of weight sensors we offer are;

Single point – single point load cells or weight sensors are the most common type. They are used for common types of scales and weighing devices including kitchen and bathroom scales, industrial cooking scales, counting scales, bag fillers, applications in retail and many more.

Single point load cells have the ability to measure off-centre loads which makes them very diverse.

S-Type – S-type load cells are well suited to tension and compression applications. They are well suited to applications in tight spaces. They take their name from their shape and are sometimes called z-type load cells or weight sensors.

Shear beam and Dual Shear Beam - these have a low profile and are very cost-effective. Most of these types of weight sensors are constructed of corrosion-resistant materials. They are suitable for use in OEM applications and industrial process control

Compression – Most load cells can be referred to as compression load cells. Therefore, this type of weight sensor covers lots of different types. They tend to be compact and have the ability to carry high capacities. They are also known for being highly accurate and are well suited to truck scales and electronic weighing devices.

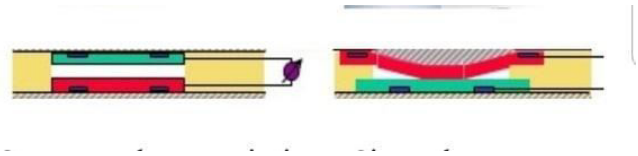

Figure 5: Weight sensor

POWER SUPPLY BOARD: CONVERT (12V-5V)

You can run two LEDs in series across the resistor R2 while taking input from 12V lead-acid battery or a 12v adaptor as an input. Components required: One 12v battery, 1.8k resistor, 1.3k resistor, connecting wires. This circuit is a voltage divider schematic.

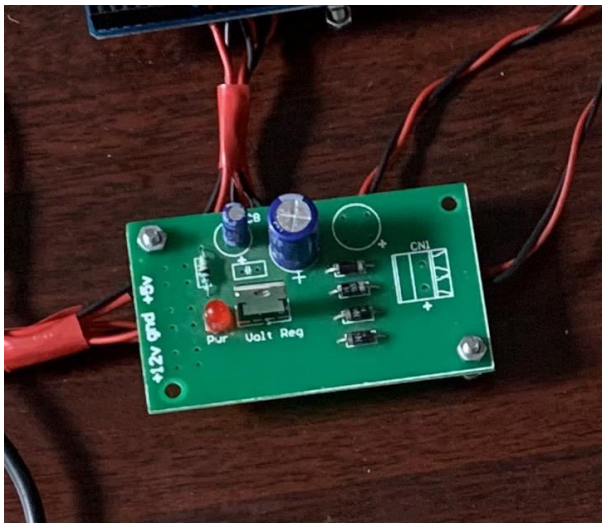

Figure 6: Power supply board

AMPLIFIER

An amplifier, electronic amplifier or (informally) amp is an electronic device that can increase the power of a signal (a time-varying voltage or current). It is a two-port electronic circuit that uses electric power from a power supply to increase the amplitude of a signal applied to its input terminals, producing a proportionally greater amplitude signal at its output. The amount of amplification provided by an amplifier is measured by its gain: the ratio of output voltage, current, or power to input. An amplifier is a circuit that has a power gain greater than one

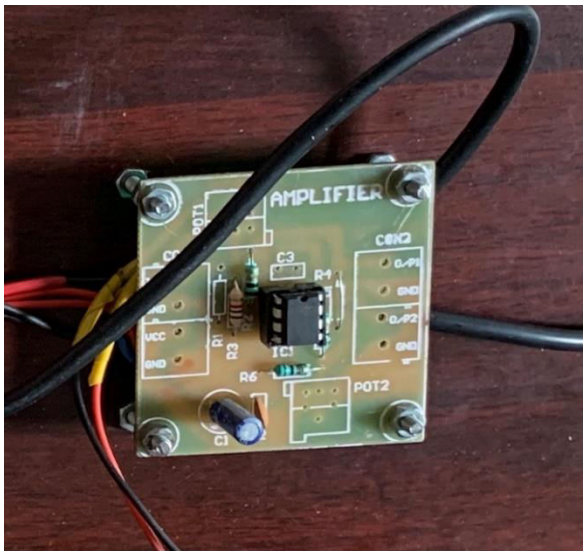

Figure 7: Amplifier

Buzzer or Beeper:

A joy buzzer is an example of a purely mechanical buzzer and they require drivers. Other examples of them are doorbells A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

Early devices were based on an electromechanical system identical to an electric bell without the metal gong. Similarly, a relay may be connected to interrupt its own actuating current, causing the contacts to buzz (the contacts buzz at line frequency if powered by alternating current) Often these units were anchored to a wall or ceiling to use it as a sounding board. The word "buzzer" comes from the rasping noise that electromechanical buzzers made.

A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep. A piezoelectric buzzer/beeper also depends on acoustic cavity resonance or Helmholtz resonance to produce an audible beep.

Figure 8: Buzzer

FABRICATION WORK

STEEL ROD:

A steel metal rod is use for fabricate to hold the structure of the seat belt and its mechanism to operate

Steel rod is connected by means of welding process

WELDING**:**

The principle of tig welding is the same as arc welding. In the tig welding, the high-intensity arc is produced between the tungsten electrode and workpiece.

In the TIG welding, the workpiece is connected to the positive terminal and the electrode is connected to the negative terminal

CONCLUSION

This project is concluded by solving the technical problems occurred during the overruling of seat belt safety system.

The severe injuries or deaths occurred during the accidents can be prevented

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