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Life saving smart Safety bus

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ABSTRACT

An Embedded system is a combination of computer hardware and software, fixed in capability or programmable, designed for a specific function or functions within a larger system. Embedded system hardware may be chip or microcontroller primarily based. In either case, associate computer circuit is at the guts of the merchandise that's usually designed to hold out computation for real-time operations. Embedded software is computer software, written to control machines or aren't usually thought of as computers, unremarkably referred to as embedded systems. In existing developments or systems, Pressure pad and pressure detection circuit have been used for tracking the person who stands on the foot board. There are many shortcomings present in these existing systems. This proposed paper has an idea of preventing the foot board accidents on the bus using IR sensors. This proposed system uses a GSM technology for sharing the information about the persons who are traveling in the foot board to transport office. We can simulate the output through the Arduino software.

Index Terms: Arduino; Buzzer; Embedded system; GSM Technology; IR Sensor

INTRODUCTION

Bus plays an essential role in carrying most of passenger's everyday all over the world. While there are several problems that might disturb the parents when their kids going school; the paper aspires to look into initiating the safety with respect of buses through bus tracking and security system that will help the transportation in a protected and more secure way. An article [1] published in India says in every eight minutes a child goes missing as data published by national crime records bureau. Statistical report says that around 50,000 children go missing every year from which 42% children are not found. This system, through entry and exit recordings, intends to create an appropriate environment via following certain set of criteria of security and wellbeing for the school transport that will have a positive impact on the student and their family. Also drunken driving is a major factor for road accidents. Recently an article [2] was published in The Indian Express newspaper titled "Five children injured after drunk driver ran school bus into railing of bridge". Road accidents are rising day by day. Major parts of these happenings occur due to rash driving or over speeding of the vehicle. The speed control mechanism will help in limiting the speed of the bus. The system is designed using single microcontroller which will reduce the hardware size and so the cost. The paper also suggests a bus safety mechanism which is designed to give an alert when person standing on the footboard and close the door automatically if the person stand on the footboard for some seconds. It will send the alert message using GSM technology to transport office, if a person continues to stand on the footboard for long time. Thus prevents the accidents while a person stands on the footboard.

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Life Saving Smart Safety Bus is an Automated Accident Prevention system to prevent the accidents occurring due to footboard travelling in buses. A major portion of the population depends upon the public transport system especially buses for their daily commute and a large number of accidents take place almost every day. Every year a large number of passengers die due to accidents caused by footboard travelling in buses. The negligence of either driver or passenger can result in a tragedy. So by developing a Smart Safety system in buses, the passenger safety is assured. With the help of sensors placed on the footboard, the presence of passenger is detected by the microcontroller. When the passenger presence is detected on footboard by the sensor, the alert is given to the passenger using Buzzer. When the passenger stays on the foot board for long time, the doors are closed. The GSM technology is used to send the message to the transport office. Thus the speed of the bus gets gradually reduces, when passenger stands on the footboard. On analysis of existing reference paper, it is concluded that the pressure sensors and pressure pads are placed at foot board to avoid accidents, which is vulnerable. The information is not secured. Filter circuits are needed to reduce noise so this becomes uncomfortable for users.PIR sensor near foot board to measure radiation and it is difficult to control brake system on detection.

Existing method

On analysis of existing reference paper, it is concluded that the pressure sensors and pressure pads are placed at foot board to avoid accidents, which is vulnerable. The information is not secured. Filter circuits are needed to reduce noise so this becomes uncomfortable for users.PIR sensor near foot board to measure radiation and it is difficult to control brake system on detection. Many accidents are occurring due to standing on the foot board and many people lose their lives [1-5]. The existing system can detect the location only at low speed and the information is not secure and the handling the bus on highways is tough. The location detection of the vehicles takes places at low speed and sometimes it may create an unexpected delay which leads to accidents. On analysing the existing method, some of the common faults and errors are:

- Use accelerator pedal locking system, whose cost is high
- Filter circuits are required to reduce noise
- Arrival time of the bus detection becomes a problem
- Speed cannot be reduced immediately
- Creates unexpected delay in the bus detection

PROPOSED METHOD

The proposed method aims to develop a system, which prevent the accidents occurring while travelling on the footboard.Tragedies resulting from travelling o then footboard are one of the prominent examples of road accidents. The first component in the system is the IR sensor. There are two IR sensors which will sense when a person stands on the footboard. Then it interact with Arduino, which leads to siren alert inside the bus .If the person persists to stay on footboard for certain seconds then the door will be closed then again person continues to stay there means an SMS alert is given to the transport office through GSM and the speed of the vehicle gets slowdown. The code was implemented on the software Arduino IDE then the code was compiled and dumped into the microcontroller of Arduino.

BLOCK DIAGRAM

Fig. 2.1 explains the system diagram. The microcontroller is the heart of this system. It communicates with various other components and carriers out the relevant operation. The block diagram consist of components like IR sensor, 5V DC Power supply, Atmega 328p,GSM MODEM SIM 900/800,siren,12V DC Fan.

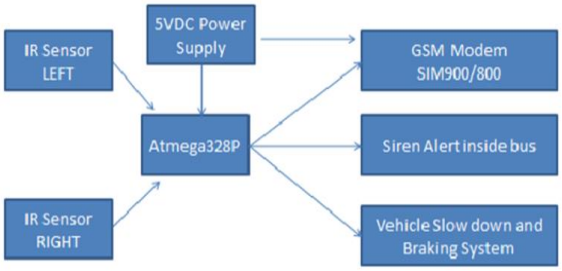

Figure 2.1 Block Diagram

Arduino UNO (ATmega328)

The Arduino 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. Simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. It contains everything needed to support the microcontroller; simply connect it to a computer (or appropriate wall power adapter) with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features an ATmega16U2 programmed as a USB-to-serial converter. This auxiliary microcontroller has its own USB boot loader, which allows advanced users to reprogram it .The Arduino has a large support community and an extensive set of support libraries and hardware add-on "shields" (e.g. you can easily make your Arduino wireless with our Wixel shield), making it a great introductory platform for embedded electronics [6-10]. Note that we also offer a SparkFun Inventor's Kit, which includes an Arduino Uno along with an assortment of components (e.g. breadboard, sensors, jumper wires, and LEDs) that make it possible to create a number of fun introductory projects. This is the 3rd revision of the Uno (R3), which has a number of changes: The USB controller chip changed from ATmega8U2 (8K flashes) to ATmega16U2 (16K flash). This does not increase the flash or RAM available to sketches. Three new pins were added, all of which are duplicates of previous pins. The I2C pins (A4, A5) have been also been brought out on the side of the board near AREF. There is a IOREF pin next to the reset pin, which is a duplicate of the 5V pin. The reset button is now next to the USB connector, making it more accessible when a shield is used.

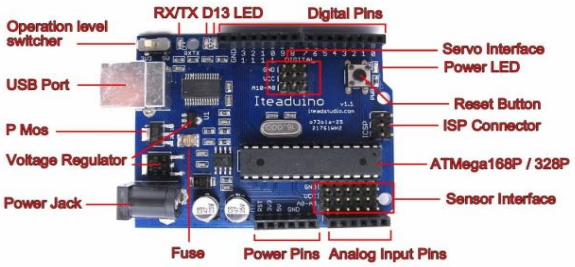

Figure 2.2 Arduino Uno

GSM MODEM

A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection. The GSM modem has wide range of applications in transaction terminals, supply chain management, security applications, weather stations and GPRS mode remote data logging. From the below circuit, a GSM modem duly interfaced to the MC through the level shifter IC Max232. The SIM card mounted GSM modem upon receiving digit command by SMS from any cell phone send that data to the MC through serial communication. While the program is executed, the GSM modem receives command 'STOP' to develop an output at the MC, the contact point of which are used to disable the ignition switch. The command so sent by the user is based on an intimation received by him through the GSM modem 'ALERT' a programmed message only if the input is driven low. The complete operation is displayed over 16×2 LCD display [11].The features of GSM MODEM are:

- Improved spectrum efficiency
- International roaming
- Compatibility with integrated services digital network (ISDN)
- Support for new services.
- SIM phonebook management
- Fixed dialing number (FDN)

Figure 2.3 GSM MODEM

IR SENSOR

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of radiations are invisible to our eyes,that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, The resistances and these output voltages, change in proportion to the magnitude of the IR light received. An IR sensor consists of two parts, the emitter circuit and the receiver circuit. This is collectively known as a photo-coupler or an opt coupler. The emitter is an IR LED and the detector is an IR photodiode. The IR photodiode is sensitive to the IR light emitted by an IR LED. The photo-diode's resistance and output voltage change in proportion to the IR light received. This is the underlying working principle of the IR sensor. The type of incidence can be direct incidence or indirect incidence. In direct incidence, the IR LED is placed in front of a photodiode with no obstacle in between. In indirect incidence, both the diodes are placed side by side with an opaque object in front of the sensor. The light from the IR LED hits the opaque surface and reflects back to the photodiode.

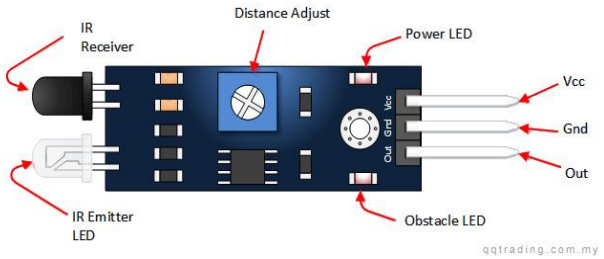

Figure 2.4 IR Sensor

POWER SUPPLY

5V power supplies (or 5VDC power supplies) are one of the most common power supplies in use today. In general, a 5VDC output is obtained from a 50VAC or 240VAC input using a combination of transformers, diodes and transistors. 5V power supplies can be of two types: 5V regulated power supplies, and 5V unregulated power supplies. Linear regulated 5VDC power supplies regulate the output using a dissipative regulating circuit. They are extremely stable, have very low ripple, and have no switching frequencies to produce EMI. Unregulated 5VDC power supplies are basic power supplies with an AC input and an unregulated 5VDC output. The output voltage changes with the input voltage and load. These power supplies are inexpensive and extremely reliable. Switching regulated 5VDC power supplies, sometimes referred to as SMPS power supplies, switchers, or switched mode power supplies, regulate the 5VDC output voltage using a complex high frequency switching technique that employs pulse width modulation and feedback. Acopian switching regulated power supplies also employ extensive EMI filtering and shielding to attenuate both common and differential mode noise conducted to the line and load. Galvanic isolation is standard in our 5VDC switchers, affording our users input to output and output to ground isolation for maximum versatility. Acopian switching regulated power supplies are highly efficient, small and lightweight, and are available in both AC-DC single and wide-adjust output and DC-DC configurations. Our Low Profile wide a just output switchers can be voltage or current regulated and are externally programmable.Typical applications for 5VDC power supplies are:

- Industrial automation
- TTL circuit power
- Precision control circuits
- Research projects

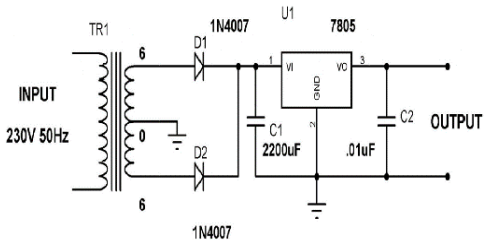

Figure 2.3 Power Supply

SIREN

The piezo buzzer produces sound based on reverse of the piezoelectric effect. The generation of pressure variation or strain by the application of electric potential across a piezoelectric material is the underlying principle. These buzzers can be used alert a user of an event corresponding to a switching action, counter signal or sensor input. They are also used in alarm circuits. The buzzer produces a same noisy sound irrespective of the voltage variation applied to it. It consists of piezocrystals between two conductors. When a potential is applied across these crystals, they push on

one conductor and pull on the other. This, push and pull action, results in a sound wave. Most buzzers produce sound in the range of 2 to 4 kHz. The Red lead is connected to the Input and the Black lead is connected to Ground. Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices.

Figure 2.4 Buzzer

METHODOLOGY

The connection of the system in the paper is initially deals with IR sensor are placed on the foot board to detect whether the passengers stands on the footboard. The Arduino is interfaced with the IR sensors, whenever the person stands on the footboard a buzzer or siren alert is provided and the door will be automatically closed to prevent accidents. After certain count value the same person persists to stands on the footboard, location will send be send to the transport office with help of the GSM technology. Then the speed of the vehicle gets slow down. Thus the accidents due to the person standing on the footboard are prevented. The flowchart of the project has been illustrated on figure 3.1.The flow chart checks initially whether the bus is moving or not by setting the count value as zero, then it checks the sensor value is high or not .If the sensor value is low, then count value is incremented and it gives a buzzer sound. The count value is gradually raised which lead the GSM technology to report an SMS alert to the transport office.

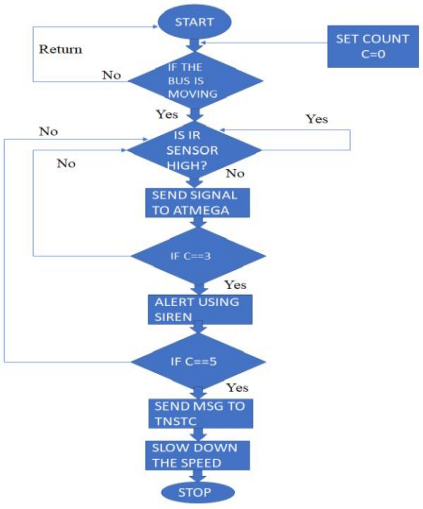

Figure 3.1 Flow Chart

SOFTWARE SIMULATION

ARDUINO IDE

Arduino integrated development environment (IDE) is a cross platform application. It is used to write and upload programs to Arduino board. The source code for the IDE is released under the GNU (General Public License), version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the wiring project, which provides many common input and output procedures. Programs are written using Arduino Software (IDE) is called sketches [12-15]. These sketches are written in the text editor and are saved with the file extension .ino. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right hand corner of the window displays the configured board and serial port. The Arduino IDE employs the program to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

SIMULATION RESULTS

We have simulated the proposed work of the project in the ARDUINO software. **Versions of the Arduino Software (IDE) prior to 1.0 saved sketches with the extension .pde. It is possible to open these files with version 1.0, you will be prompted to save the sketch with the .ino extension on save.** The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor. The code was developed and the errors were rectified by compiling it on the Arduino software. The compiled code was uploaded on the Arduino no board with all other hardware components. The passenger stands on the footboard, an SMS alert is given to the transport office using GSM MODEM. Thus the speed of the vehicle is slow down and doors are closed to prevent accidents.

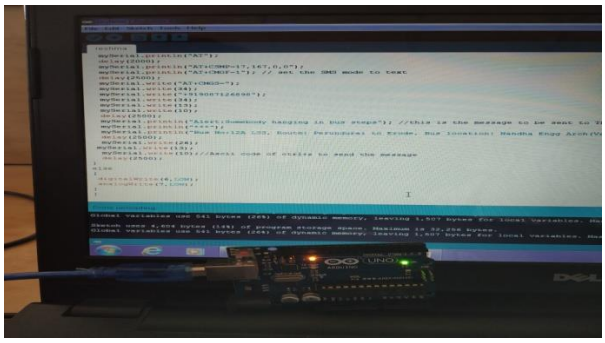

Figure 4.1 Simulation Result

CONCLUSION AND FUTURE ENHANCEMENT

The system will be used to monitor when a person stands on the footboard. It is very useful to send the information of the bus to the transport office. The accidents are avoided by giving an alert to the passengers and the doors are automatically closed to prevent footboards accidents. Finally, the speed of the vehicle is gradually slows down on the roads. We can also use the GPS technology to find out the current location of the bus at remote areas. Io T makes this project very dynamic; efficient in future thereby it can be used to generalize the monitoring of different parameters of the vehicles. Usage of the IR counter, it is very easy for everyone to board into the bus, which prevents overcrowd into the bus.

REFERENCES

[1]. Abid Khan, Ravi Mishra, "GPS-GSM Based Tracking System," International Journal of Engineering Trends and Technology, 3(2), 2012

[2]. Dhivya M. and Kathiravan S., "Hybrid driver safety, vigilance and security system for vehicle," Innovations in Information, Embedded and Communication Systems, 2015 International Conference on, Coimbatore, 2015, 1-6.

[3]. S. Gharge, M.Chhaya, G. Chheda and J. Deshpande, "Real time bus monitoring system using GPS," An International Journal of Engineering Science and Technology, 2(3), 2012.

[4]. JaunZambada, Ricardo Quintero, Ramon Isijara, Ricardo Galeana, Luis Santillan, "An IoT based scholar bus monitoring system", IEEE 2015.

[5]. Khaled Shaaban, AbdelmoulaBekkali, Elyes Ben Hamida, Abdullah Kadri,"Smart Tracking System for School Buses using Passive RFID Technology to Enhance Child Safety," Journal of Traffic and LogisticsEngineering,1(2), 2013.

[6]. S.Kotadia, "RFID based tracking system", International Research Journal of Engineering and Technology (IRJET), 02(6), 2015.

[7]. M. Kumbhar1 and Meghana," Real Time Web Based Bus Tracking System", International Research Journal of Engineering and Technology (IRJET) 3(2), 2016

[8]. M. Manikya Kumar, K. Rajesekhar, K. Pavani, "Design of punctually enhanced bus transportation system using GSM and Zigbee," International Journal of Research in Computer and Communication Technology, 2(12), 2013.

[9]. Nitin Shyam, Narendra Kumar, Maya Shashi, Devesh Kumar, " SMS Based Kids Tracking and Safety System by using RFID and GSM," International Journal of Innovative Science, Engineering and Technology, 2(5), 2015.

[10]. R.K. Pateriya, Sangeeta Sharma, "The Evolution of RFID Security and Privacy:A Research Survey," in IEEE International Conference on Communication Systems and Network Technologies, 2011

[11]. Ravi and Rohitaksha,"An Innovative Approach for City Bus Location with Route Navigation System using Android", European Journal of Advances in Engineering and Echnology,2(3),2015, 38-45.

[12]. SeokJu Lee, Girma Tewolde, Jaerock Kwon, "Design and Impementation of Vehicle Tracking System Using GPS/GSM/GPRS Technology and Smartphone Application", IEEE World Forum, 2014.

[13]. Sun Jianli, "Design and Implementation of IoT based Logistics Management System", IEEE Symposium on Elecrtical and Electronics Engineering (EEESYM), 2012

[14]. Thiyagarajan Manihatty Bojan, Umamaheswaran Raman Kumar and Viswanathan Manihatty Bojan, "Designing Vehicle Tracking System – An Open Source Approach", IEEE International Conference on Vehicular Electronics and Safety (ICVES), 2014.

[15]. ZHIAN LV, HU HAN, "A Bus Management System Based on Zigbee and GSM/GPRS", International Conference on Computer Application and System Modeling (ICCASM), 2010.