BUS MONTIORING AND CONTROLLING SYSTEM USING GSM MODULE

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Abstract

The security in traveling is primary concern for everyone. In this project we have to discuss about the Bus Monitoring and Controlling System using GSM module. The road accident will be increased due to the bad construction of road and the careless driving. Why these problems are occurred? Because sometimes drivers are not used seat belt, driver removes his hand from the staring during driving, not maintain safe distance from the other vehicle. To remove such problems we have used number of sensors. Seat belt sensor and Touch sensor are fitted with the staring. And Sharp IR sensor is used to maintain the safe distance between two vehicles. Another problem are also occurred during the travelling. The temperature of bus engine will be increased in great extent and driver could not worry about the fuel level. To overcome this problems we can used sensors like temperature sensor and fuel level detector. What is the need of these sensors in today's vehicle? Without this sensor vehicles are able to run from one place to other. Then why the need of use of sensors arises? The answer is to reduce the number of accidents that happen due to human error or technical error in the vehicle. The threshold of all sensors is set to their respective range. If it gets cross the set range then buzzer will be activated and the message is displayed on the LCD screen in the bus. And message will send to the number which is saved in the GSM module.

Index Terms: Bus Monitoring and controlling, various sensors, GSM.

1 Introduction

There is no question that there is a continuing need to improve the attractiveness of transit services. For an existing service, there are basically two ways that this can be accomplished. One is to provide better vehicles and facilities, and the other is through improved operations. In the last two decades the main emphasis with respect to bus services has been to improve the fleet,

and today's bus fleets are undoubtedly far superior to their predecessors-air conditioning, advanced suspensions, and attractive interiors now being common place.

However, relatively little has been done to improve the operations of bus systems, primarily because the technology to do so was not available. The use of public streets and the difficulty of controlling vehicle movements there on did not permit the use of sophisticated monitoring and control systems like those of rail transit, for example. However, technologies for monitoring and controlling bus operations are now readily available- indeed already in use, in Europe and Canada and to a lesser extent the U.S. Thus the opportunity to make comparable improvements in bus operations is now at hand.

Yet, as this report will make clear, the Automatic Vehicle Monitoring and Controlling system is not complete with only hardware and software. The technological subsystems are really only a decision support system; the complete system includes the personal (dispatchers drivers, and others) their training and ability and willingness to use it.

The benefits of this type of system can be very far reaching. First of all, these systems provide up to the minute (or even second) information on exactly how the system is performing- where the buses are, how many passengers are on the buses, and the condition of various mechanical and the condition of various mechanical and electrical parts of the system. This information can then be used by dispatchers to anticipate problems or monitor problem situations as they occur, such as buses becoming overcrowded or beginning to fall behind schedule. The dispatcher can then device a plan for recovery of the system to schedule, and communicate instructions directly to the driver and other field personal. Thus operations are improved substantially from the standpoint of customers, through higher quality transit service. This system basically completes the information loop between the drivers and others who actually provide the service and the dispatchers and others in the central office who need to know what is happening in order to provide system-wide quality control.

Problem Statement

In today's date the accidents are one of the most important problems in our country. Therefore we are now going to talking on them. The bus driver has not keeping their seat belt during driving, because of that their balance on staring become untouched sometimes. The distance between two vehicles does not maintain. Due to that accident will be occurred. Sometimes the temperature of bus engine will be increased in great extent and driver could not worry about the

fuel level. That means the driver does not think about the passengers and other public safety. It is must to driver keep his seat belt and his one hand is always on the staring during the driver. Also it is most important to maintain the safe distance between two vehicles as per the protocols of traffic department during driving the vehicle. But due to the careless driving of driver these problems will be occurred. And due to that chances of accident will be increased.
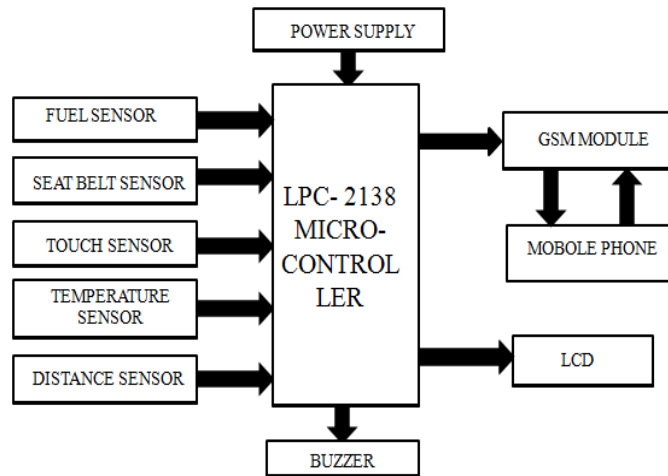
Bus monitoring and controlling system using GSM module

Fig.1 Bus Monitoring & controlling system

GSM

The GSM modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that we can use is RS232 port to communicate and develop embedded applications. Applications like a SMS control, data transfer, remote control, and logging can be developed easily. The   modem can either be connected to PC serial port directly or to any microcontroller through MAX 232. It can be used to send or receive SMS or make or receive voice call. It can also be used in GPRS mode to connect to internet and do many applications for data logging and control. In GPRS mode you can also connect to any remote FTP server and upload files for data logging.

This GSM modem is highly flexible plug and play quad band SIM900A GSM modem for direct and easy integration to RS232 applications. Supports feature like voice call SMS data or fax GPRS and integrated TCP/IP stack.

GSM module interfacing with microcontroller for SMS control of industrial equipments. The sending SMS through GSM modem when interface with microcontroller or PC is much simpler as compare with sending SMS through UART.
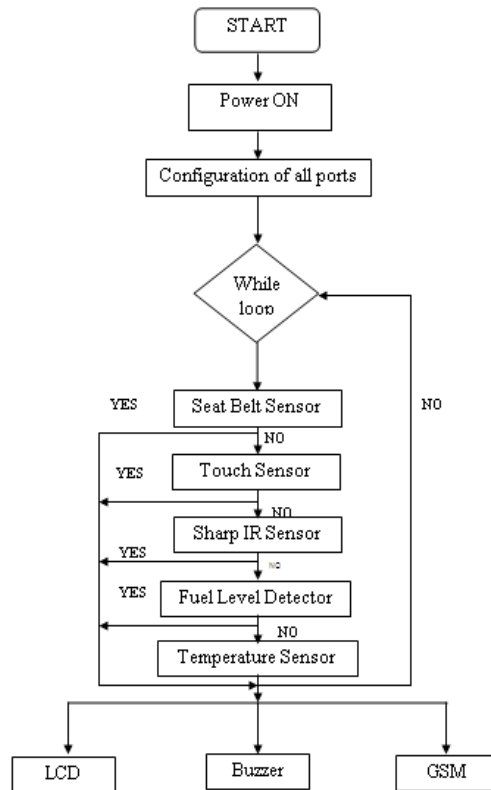
Features

- Status of modem indicated by LED.

- Simple to used and low cost.

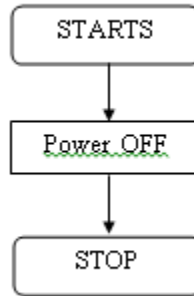- On board switching type power supply regulator.

- RS 232 output.

Applications

- SMS based remote control and alerts.

- Sensor monitoring.

- Security applications.

- GPRS mode remote data logging.

Flowchart

1. **When power is ON**

2. When power is OFF

```
┌─────────────┐
│   STARTS    │
└─────────────┘
       │
       ▼
┌─────────────┐
│  Power OFF  │
└─────────────┘
       │
       ▼
┌─────────────┐
│    STOP     │
└─────────────┘
```

Micro-controller Information

System-on-chip solutions based on ARM embedded processors address many different market segments including enterprise applications, automotive systems, home networking and wireless technologies. The ARM Cortex family of processors provides a standard architecture to address the broad performance spectrum required by these diverse technologies.

LPC2138

Description: The ARM LPC2138 Quick Start Board is a Low Cost ARM Development Board that can be used to quickly evaluate and demonstrate the capabilities of NXP LPC2138 (ARM7TDMI) microcontroller. The QsLPC2138 board is designed to work as a Project board with access to all Port pins for external connection. The ARM LPC2138 Quick Start Board consists of a base board and a header board with microcontroller. The ARM Development board is populated with optimum components and is ideally suitable for Students as well as professionals.

Base Board Features:

- Compact and Ready to use design
- Professional EMI/RFI Complaint PCB Layout Design for Noise Reduction
- High Quality Two layer PTH PCB
- Supports ARM LPC2132 / LPC2138 / LPC2129 / LPC2148* Header Boards
- Includes ARM LPC2138 Header Board

- Screw terminal for External power Supply

- Power Supply range of 7V to 20V

- RS-232 Interface (MAX3232) for direct connection to PC's serial port (COM 0)

- On Board TTL to RS232 Converter (COM 1)

- On Board Power LED Indicator

LPC2138 Header Board Features:

- Easy to use DIP Package

- Includes ARM LPC2138 Microcontroller

- On Board Power LED Indicator

- On Board ARM JTAG Jumper

- On Board 10 MHz Crystal Oscillator

- On Board 32.768 KHz Crystal for RTC

- On Board 3.3V Regulator

LPC2138 Chip Specification

- NXP LPC2138 with 10 MHz Crystal Oscillator (With Boot loader Software)

- High Performance 32-bit ARM7TDMI-S™ CPU

- 512 KB Programmable Flash Memory provides minimum of 10,000 erase/write cycles and 10 years of data-retention.

- 32 KB Data Memory (SRAM)

- In-System/In-Application Programming (ISP/IAP) via on-chip boot-loader software.

- Single Flash sector or full chip erase in 400 ms and 256 bytes programming in 1 ms.

- Up to 47 of 5 V tolerant general purpose I/O pins.

- Up to nine edge or level sensitive external interrupt pins.

- 60 MHz maximum CPU clock available from programmable on-chip Phase-Locked Loop (PLL) with settling time of 100us.

- On-chip integrated oscillator operates with external crystal in range of 1 MHz to 30 MHz or with external oscillator from 1 MHz to 50 MHz.

SENSORS

1. Seat Belt Sensor

The Seat belt sensor is not actually any type of sensor. In that we have to used plastic buckle and complete the loop. That's not an "expansion" loop. It's a completely separate piece of

material from the lap belt. As was stated elsewhere it's just there to keep the "male" part of the buckle from sliding all the way down to the anchor point on the side of the seat. Some manufactures use little plastic buttons in the same place, for the same reason. It's just a convenience so the passenger doesn't have to reach as far.

2. Capacitive Touch Sensor

Increase in capacitance is produced with the introduction of a touch from the user.

- Very simple construction
- Proximity sensor

Capacitive touch sensing is a way of human touch sensing, that requires little or no force activate. It may be used to sense human touch through more than a quarter of an inch of plastic, wood, ceramic or other insulating material (not any kind of metal though), enabling the sensor to be completely visually concealed. This sensor is very expensive. Basically the arduino measures how much time the capacitor takes to charge, giving it an estimate of the capacitance. Capacitive touch sensor require little or no force to activate.

3. Sharp IR Sensor

Sharp infrared detector and rangers boast a small package, very low power consumption and a variety of output options in order to maximize each sensor potential it is important to understand how this types of IR sensors work ,there is effective ranges, and how to interface to them **Theory Of Operations**

There are two major types of sharp infrared sensor based on there output : analog rangers and digital detector analog ranges provide information about the distance to an object in the ranger's view. Digital detector provided a digital (high or low) indication of an object at or closer than a predefine distance. The incident angle of the reflected light varies based on the distance to the object.

Which detector to use?

the table below characterizes each sensor by minimum and maximum rangers, as well as whether the sensors returns a varying distance value or a digital detection signal.

Mechanical dimension

All the sharp IR ranger are approximately the same size except the OA710. This sensor is larger in order to accommodate larger lenses and circuitry required for its superior range of 5.5 meter's.

the table below summaries the overall mechanical dimensions of each sensor's. Be sure to review the datasheet for detailed dimensional drawings.

Range of Sharp IR sensor

MODEL	OUTPUT	MINI RANGE	MAX RANGE
GP2D12/GP2YO41	Analog	1.5"	11.8"
GP2YOA20	Analog	8"	59"
GP2YOA21	Analog	4"	30"
GP2YOA710	Analog	36"	216"

4. Fuel Level Detector

In that sensor we have used two wires which can give us low, high and middle level. Fuel level sensors are the accurate fuel level instruments designed to measure fuel level in the storage tank or in the tank of the vehicle. The sensors are connected to the telemetric terminal and provide the fuel level values.

All fuel level sensors are accurate and stable in performing fuel level data. These sensors operate within wide range from -40 to 60 C degree and bear reliable circuit protection.

5. Temperature Sensor

The LM35 series are precision integrated circuit temperature devices with an output voltage linearly proportional to the centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of $\pm$ ¼ degree centigrade at room temperature and $\pm$ 3/4 degree C over a full -55 ° C to 150º C temperature range.

The device is used with single power supplies, or with plus and minus supplies. As the LM35 device draws only 60 µA from the supply, it has very low self-heating of less than 0.1º C in still air. The LM35 device is rated to operate over a -55 ° C to 150 ° C temperature range, while the LM35C device is rated for a -40 ° C to 110 ° C range (-10 ° with improved accuracy.) The LM35-series devices are available packaged in hermetic TO transistor packages, while the LM35C, LM35CA, and LM35D devices are available in the plastic TO-92 transistor package.

Features

- Calibrated Directly in Celsius (Centigrade)

- Linear + 10 mV/ °C Scale factor

- 0.5 °C Ensured Accuracy (at 25° C)

- Rated for Full -55 ° C to 150 C range

- Suitable for remote applications

- Low cost due to wafer level trimming

Conclusions

The proposed system "Bus monitoring and controlling system using GSM module" hence made good use of GSM module, ARM controller, sensors. This system provide the security and safety to the passengers as well as driver and other public also. Due to the use of various sensors the driver will be alert and hence the driver will be control the system. By this system we can monitor and control the seat belt, touch to staring of vehicle, distance between the two vehicles, fuel level and the temperature of the engine of the vehicle.

Future Scope

This project Bus monitoring and controlling system using GSM module provides the security and safety of the passengers. We have add GPS and GPRS system. With the help of GPS system we have to monitor and track the actual position of the vehicle. Also this system will be built by using the android application. This android application also used to online ticketing and also shows the bus arrival and departure time. Also this system provide the Google map to the driver.

Acknowledgement

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