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An Intelligent GSM & GPS Based Novel Approach to Thwart Catastrophe in Railways

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ABSTRACT: An intelligent device advanced Vigilance control device in train loco is used to check the alertness of the loco pilot. It is the Microcontroller based multi -resettable device which is used to monitor the loco pilot's action. This device is used to apply the emergency brake automatically by cyclically generating the warning signals. It reduces the error caused by the loco pilot if the driver is unconscious, dead or fast asleep and ensures the safety to the passengers by automatically stopping the train. It stores the actions carried out by the loco pilot periodically which can be used as the reference to find out the courses of action done by the pilot. The information during the events can be used for future analysis. This paper also informs the position of the loco mob to the higher authorities and tracks the position of the train where it is stopped by using Global System for Mobile communication (GSM) and Global Positioning System (GPS) technologies.

KEY WORDS: Loco pilot, AT89S52 microcontroller, VCD, GPS, GSM, Penalty brake system.

I. INTRODUCTION

In Indian Railways, major accidents occur because of unseemly act or inattention of Railway Staff. Higher incidence of human failures surface as technical safeguards and backups do not always replace the human effort. Though an accident occurs only when both fail but it usually gets logged as 'human error' with a tendency of glossing over technical failure. A human being is likely to commit a mistake from time to time, under optimum field conditions and with the best of intentions. Hence operating rules included many redundancies in safety procedures and operating practices involve number of checks and balances. More and more automation is resorted to prevent human errors. This paper provides a method to cyclically alert the driver for the safety of passengers. This paper is proposed to introduce a new technology to prevent the accidental condition in Indian railways when driver is incapacitated, Sleepy or dead with signal to emergency braking system in the engines.

In this paper we have four sections, by which we can explain the paper. The four sections are organized as follows. The block diagram and its description are explained in II, the result explains in III and conclusion given in IV section.

I.I Block Diagram and its description:

The system is made up of different components interfacing to a microcontroller. We are using The AT89S52 microcontroller; it is the heart of the system. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters [6]. The AT89S52 microcontroller is a low-power, high performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable flash memory and the device is manufactured using Atmel's high-density nonvolatile memory technology it is a cost-effective microcontroller [4]. And we are using the input power is step down to 5v DC from 230v AC power line.

The block diagram is shown in Figure 1.

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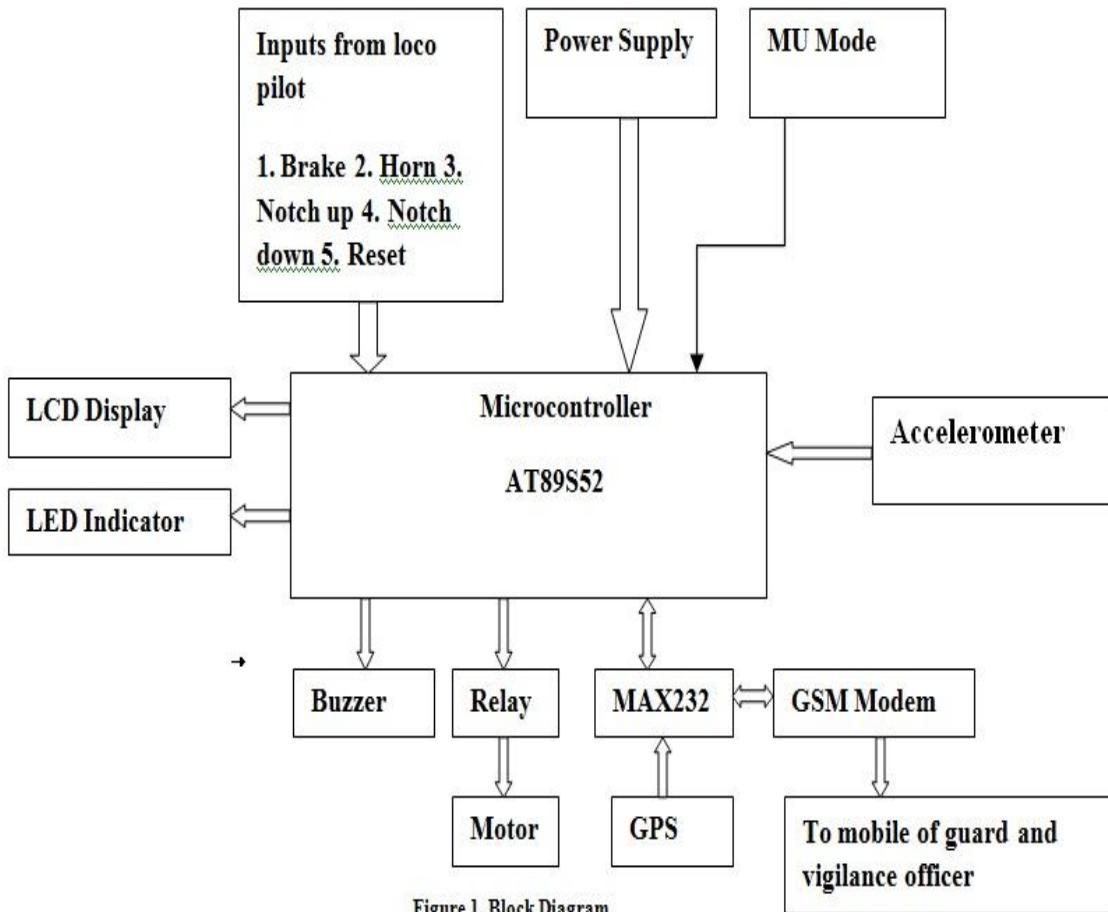


Figure 1. Block Diagram

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LCD display is an inevitable part in almost all embedded projects. Liquid Crystal Display (LCD) screen is an electronic display module which provides many applications. in this paper we are using a 16x2 LCD. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines similarly a 16x2A LCD displays each character in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data, of which the commands are stored by command register and data is stored by data register. LCD display connected at output port of the microcontroller. Microcontroller can communicate with the serial devices using its single serial port. A serial driver is used. A MAX232 is a serial line driver used to set up communication between modem and microcontroller. In this paper we are also using LED. The LED is interfaced to the output port of micro controller as the first indication to alert the loco pilot.



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In this Paper it is proposed to design an embedded system which is used for tracking and positioning, velocity and time of vehicle, 24 hours a day, in any weather conditions by using Global Positioning System (GPS) and Global system for mobile Communication (GSM).



Figure 2.(a) GSM Modem

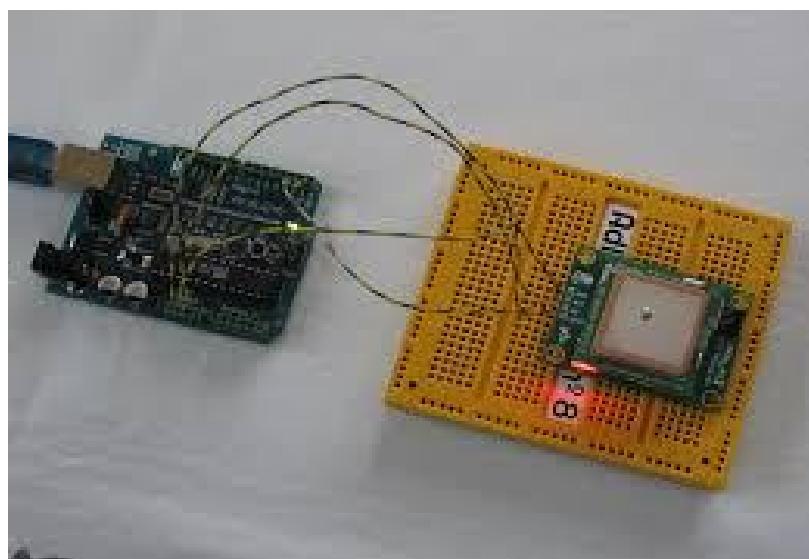


Figure 2 . (b) GPS Receiver



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II. WORKING

An intelligent advanced VCD is design based on AT89S52 microcontroller and manufactured to intensify the safety of the locomotive operation by alertness of the mob all the time. The system operates in a fail-safe manner. AVCD will give cyclic warnings to the driver. Based on the drivers action to these warnings, the system will automatically reset the alerting cycle [3]. In this system we are also using accelerometer. Accelerometers are useful for sensing vibrations in systems or for orientation applications.

Accelerometers are electromechanical devices that sense either static or dynamic forces of acceleration. Static forces include gravity, while dynamic forces can include vibrations and movement. Accelerometers can measure acceleration on one, two, or three axes. 3-axis units are becoming more common as the cost of development for them decreases.

The locomotive driver control train for releasing the breaks. The controls breaks have been operated by the driver in a 30-second time period. In case the driver has not operated any controls, the VCD send warning signal by activating a flashing light for 8 seconds. If acknowledgement is not received, an additional audio alarm is given for 8 sec. If driver does not send the signal, a message is send to guard and to signal inspector through GSM modem as “DRIVER IS NOT ALERT”, here guard is provide break to control the VCD. If guard is not applying break within 8 sec then message is sent to signal inspector as “LOCO PILOT AND GUARD NOT ALERT” and VCD will apply the automatic brakes and it informs the position of the train where it is stopped in the form of latitude and longitude through GSM by using GPS module. MU mode is the multiple unit used when the one engine is not sufficient for pulling the trains in hilly areas then it is provided for utilizing the efficiency of the second engine it is required.

III . RESULT

It is a different way of progress towards the problem. The proposed system not only vigilant the loco pilot but also informs the position of the pilot and also the train where it was stopped by using GSM and GPS technologies. The hardware implementation of the modern vigilance control device is shown in figure 3.





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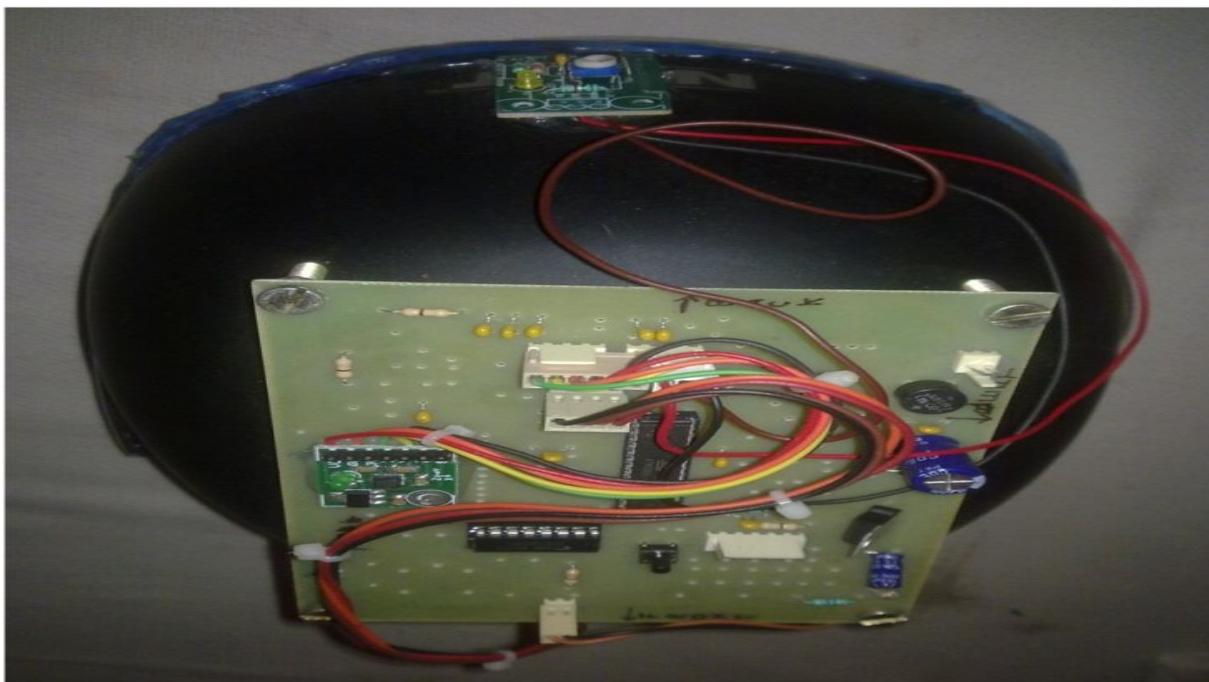


Figure 3. Hardware Implementation of intelligent GSM & GPRS based AVCD

IV. CONCLUSION

Each and every day the people who prefer to travel in trains have been increased if compared any other transportation means. In order to ensure the safety of the passenger is necessary. so the vigilance control device can be used to avoid the accidents. This device helps to alerting the loco pilot of the train cyclically. if the loco pilot does not send any signal then a vigilance control device improves vigilance and sends a warning signal and brake application signals in a predefined manner an ensure the safety of the passengers. By the help of this device we can find that whether the accident is due to loco pilot or due to failure of locomotive. So we can inform the deed of the driver to the higher authorities if he fails to respond the cyclic warnings. The high priority is given to the lives of people. It is a practicable solution to bring down accidents due to human failure.

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