Automatic Derailment And Railways Crossing Detection Based Train Security System

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Abstract-*In this project we proposed that the train's each compartment will joined by electromagnetic coupler we will some threshold value of temperature if fire or compartment can distract will produced in any compartment of train then temperature has been crossed threshold value then automatically cut the supply to the electro magnet then it will leaves that compartment. If any crack detection occurs will be present in the railway track then it will buzzer indication to the train through RF transmitter/receiver.*

I. INTRODUCTION

The Railways provide a good alternative to other modes of transport by being energy efficient since they can carry large number of people and goods at the same time. In the recent years, number of accident due to trains and the losses also high. The main reason for these accidents is irresponsibility of driver and signalling problems which results severe damage to life and property. We have proposed the new method called Intelligent Collision Avoidance System (ICAS) for avoiding frontal collision. This system avoids the collision in an efficient way by notifying the status of two train in the same track when they separated by three kilo meters. This is done by strictly the driver both visually and by giving a sound alert. The ICAS will manage situations efficiently then notify the opposite train which is on the same track. We have designed a new vibration sensor for sensing the train on the track.

Wireless Communication:

Radio frequency Transmitter-Receiver - a set of devices for establishing two-way radio communication between several points. Such devices are used to receiving and transmitting telegrams then facsimile images, in conducting telephone conversations, in providing not highlevel radio communication and the remote control of systems and mechanisms, and in other area. Basic components of a radio transmitter-receiver include an antenna, a radio transmitter and a radio receiver, a feeder that connects the transmitter and receiver to antenna, and an electric-power supply.

Couplings are used to connect sections of long transmission shafts. Couplings are also used to join the shaft of a driving machine to the shaft of a separately built machine so as to provide an effect of continuous shaft.

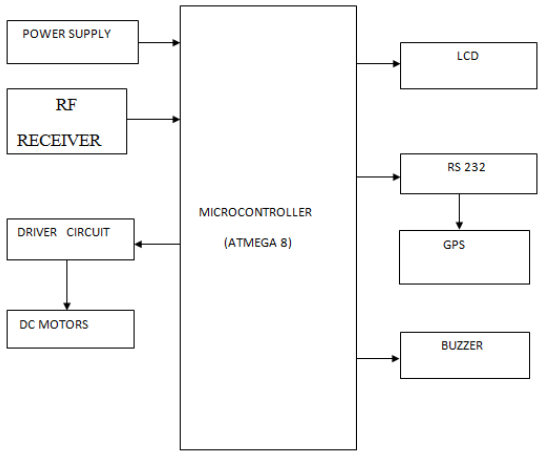
Temperature sensor and magnetic coupling which are the sensing elements to find the temperature range and magnetised then demagnetised by magnetic coupler.

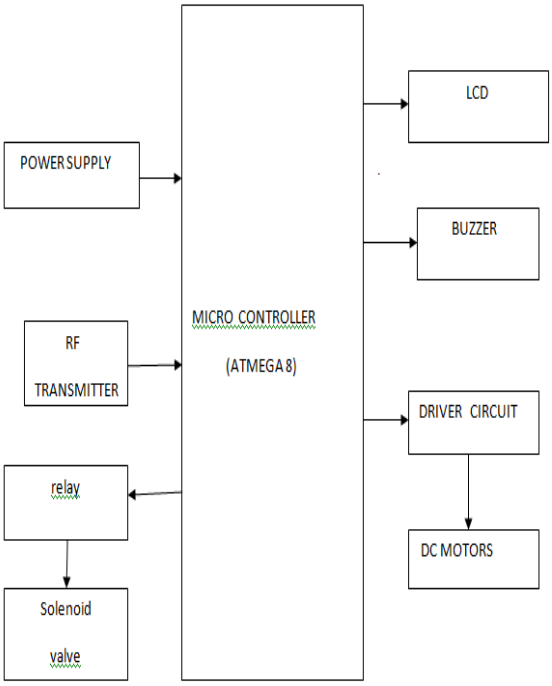
The embedded system is combination of hardware and software, either fixed in capability, programmable, that is specifically design for a particular kind of application device. Industrial machines, automobiles, medical equipment, cameras, household appliances, airplanes, vending machines, then toys are among the myriad possible hosts of an embedded system. The Embedded systems that are programmable are provided with a programming interface, and embedded systems programming is specialized occupation.

The Certain operating systems, language platforms are tailored for the embedded market, such Embedded Java and Windows XP Embedded. However, some low-end consumer products use very inexpensive microprocessors and limit storage, with the application and operating system both part of a single program. The program is written permanently into the system's memory in this case, rather than being loaded into RAM as programs on a personal computer are.

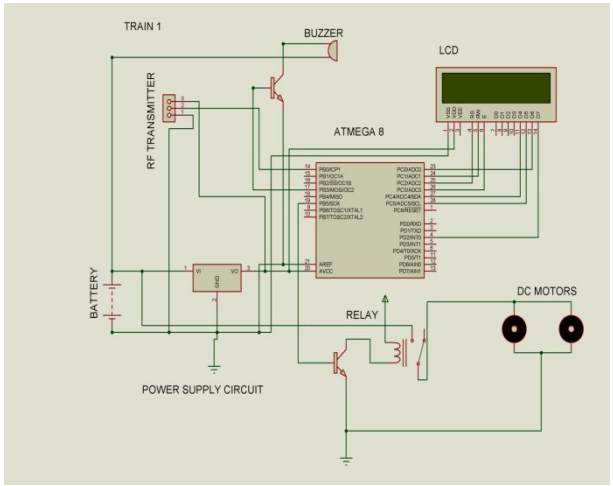
TOSC2

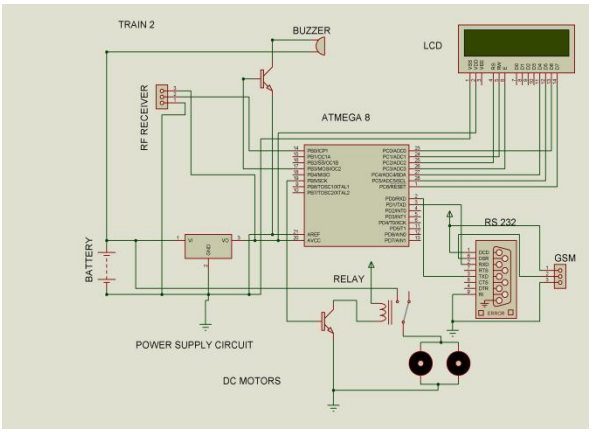
The Port B is 8-bit bi-directional I/O port with internal pull-up resistors . The Port B output buffers have symmetrical drive characteristics with both high sink then source capability. As inputs, Port B pins are externally pulled low will source current if the pull-up resistors are activated. The Port B pins are tri-stated when a reset condition becomes active, even the clock is not running. Depending on clock selection fuse settings, PB6 can be used input to the inverting Oscillator amplifier and input to the internal clock operating circuit. Depending on the clock selection fuse settings, PB7 can be used to output from the inverting Oscillator amplifier. The Internal Calibrated RC Oscillator is used to chip clock source, PB7..6 is used as TOSC2..1input for the Asynchronous Timer/Counter2 if the AS2 bit in ASSR is set.



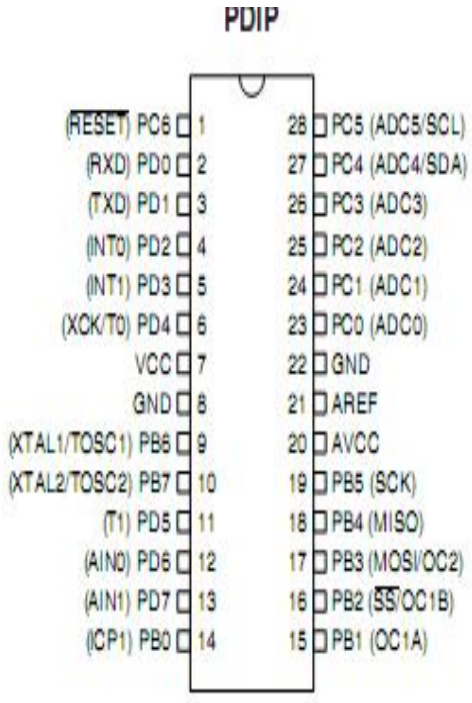


Circuit Diagram





II. PROPOSED SYSTEM



TOSC2

The Port B is 8-bit bi-directional I/O port with internal pull-up resistors. The Port B output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port B pins that are externally pulled low will source current the pull-up resistors are activated. The Port B pins are tri-stated when a reset condition becomes active, the clock is not running. Depending on the clock selection fuse settings, PB6 can be used input to the inverting Oscillator amplifier and input to internal clock operating circuit. Depending on the clock selection fuse settings, PB7 can be used to output from the inverting Oscillator amplifier. The Internal Calibrated RC Oscillator is used to chip clock source, PB7..6 is used to TOSC2..1input for

the Asynchronous Timer/Counter2 if the AS2 bit in ASSR is set.

Port C (PC5..PC0)

Port Port C is an 7-bit bi-directional I/O port with internal pull-up resistors . The Port C output buffers have symmetrical drive characteristics both high sink and source capability. The inputs, Port C pins that externally pulled low will source current the pull-up resistors are activated. The Port C pins are tri-stated a reset condition becomes active, the clock is not running.

PC6/RESET

The RSTDISBL Fuse is programmed, PC6 is used to an I/O pin. Note that electrical characteristics of PC6 differ from those of the other pins of Port C. The RSTDISBL Fuse is un programmed, PC6 is used to a Reset input. A low level on this pin for longer than the minimum pulse length will generate a Reset, the clock is not running. Shorter pulses are not guaranteed to generate a Reset.

Port D (PD7..PD0)

Port D is an 8-bit bi-directional I/O port with internal pull-up resistors. The Port D output buffers have symmetrical drive characteristics with both high sink then source capability. As inputs, Port D pins that are externally pulled low will source current if the pull-up resistors are activated. A Port D pins are tri-stated when a reset condition becomes active, even if the clock is not running.

RESET

Reset input. The low level on this pin for longer than the minimum pulse length will generate a reset, even the clock is not running. Shorter pulses are not guaranteed to generate a reset.

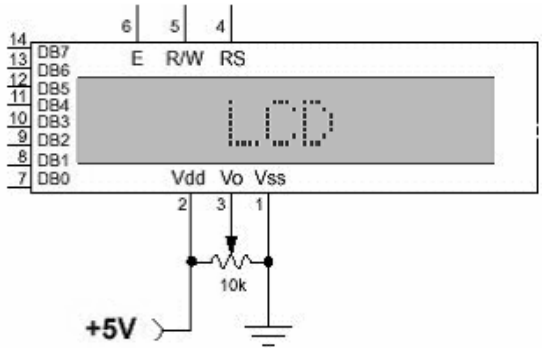
AVCC

AVCC is the supply voltage pin for A/D Converter, Port C (3..0), and ADC (7..6). It should be externally connect to VCC, even the ADC is not used. the ADC is used, it should be connected to VCC through a low-pass filter. Note that Port C (5.4) use digital supply voltage, VCC.

AREF

AREF is the analog reference pin for the A/D Converter.

III. EXISTING SYSTEM



Pin Diagram of LCD

GSM is cellular network, which means mobile phones connect to searching for cells in the immediate vicinity. They have five different cell sizes in a GSM network—macro, micro, pico, femto and umbrella cells. A coverage area of each cell varies according to the implementation environment. Macro cells can be regarded as cells where the base stationantenna is installed on a mast , a building above average roof top level. Micro cells are cells whose antenna hight is under average roof top level; they are typically used in urban areas. Picocells are small cells whose coverage diameter is few dozen metres; they are mainly used indoors. Femtocells are cells designed for use in residential , small business environments and Join to the service provider's network via a broadband internet connection. Umbrella cells are used to cover shadowed regions of smaller cells and search in gaps in coverage between those cells.

GSM carrier frequencies

Main article: GSM frequency bands

GSM networks operate in a number of different carrier frequency ranges with most 2G.The GSM networks operating in the 900 MHz or 1800 MHz bands. Where these bands were already allocated, the 850 MHz and 1900 MHz bands were used instead (for example in Canada , the United States). In rare cases the 400 and 450 MHz frequency bands are assign in some countries because they were previously used to first-generation systems.

Most 3G networks in Europe operate in the 2100 MHz frequency band.

Voice codecs

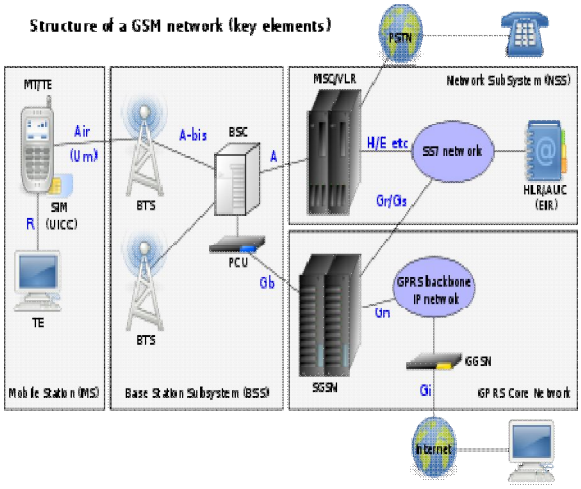
GSM is used a variety of voice codecs to squeeze 3.1 kHz audio in to between 5.6 and 13 kbit/s. Originally, two codecs, named after the types of data channel they is

allocated, were used, called Half Rate (5.6 kbit/s) and Full Rate (13 kbit/s). These used to system based upon linear predictive coding (LPC). In addition to being efficient with bitrates, these codecs also made it is easier to identify more important parts of the audio, allowing the air interface layer to prioritize and better protect these parts of the signal.

Network structure

The network is structured into a number of sections:

- The Base Station Subsystem (the base stations , controllers).



The structure of a GSM network

TheNetwork then Switching Subsystem (the part of the network most similar to fixed network). This is known as core network.

Phone locking

Main article: SIM lock

- Sometimes mobile network operators restrict handsets that they sell for use with their own network.

locking and is implemented by a software feature of the phone. Because the purchase price of the mobile phone to the consumer may be subsidized revenue from subscriptions, operators must recoup this investment before a subscriber terminates service. A subscriber may usually contact the provider to remove the lock for a fee, utilize private services to remove the lock make use of free , fee-based software and websites to unlock the handset themselves.

Buzzer

A **buzzer** or **beeper** is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.

Mechanical

Thejoy buzzer is an example of a purely mechanical buzzer.

Electromechanical

Early devices were based on the electromechanical system identical to theelectric bell without the metal gong. Similarly, a relay may be join to interrupt its own actuating current, causing the contacts to buzz. Often these units were anchored to a wall , ceiling to use it a sounding board. The word "buzzer" comes from the rasping noise that electromechanical buzzers made.

Piezoelectric

Piezoelectric disk beeper

The piezoelectric element may be driven by an oscillating electronic circuit, other anjudio signal source, driven with thepiezoelecjhjtric audio amplifier.

RF Transmitter

The electronics and telecommunications a transmitter or radio transmitter is aelectronic device which, with the aid of an antenna, produces theradio waves. The transmitter itself generates a radio frequencyalternater current, which is applied to an antenna. When excited by this alternating current, the antenna radiates radio waves. The addition to their use in broadcasting, transmitters are necessary component parts of many electronic devices that communicate by radio, such as cell phones, Wifi thenBluetooth enabled devices, garage door openers, two-way radios in aircraft, ships, and spacecraft, radar sets, and navigational beacons.

The term transmitter is use limited to equipment that generates radio waves for communication purposes; or radiolocation, such as radar and navigational transmitters.

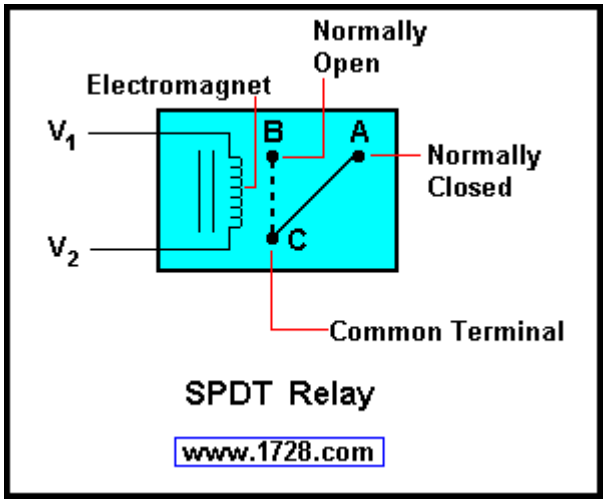
How it works

The radio transmitter is an electronic circuit which transforms electric power from a battery , electrical mains into a radio frequencyalternater current, which reverses direction millions to billions of times per second. A energy in such a rapidly-reversing current can radiate off a conductor as electromagnetic waves (radio waves). The transmitter also "piggybacks" information, such as the audio or video signal, on to the radio frequency current to be carried by the radio waves. When they strike the antenna of a radio receiver, the waves excite similar radio frequency currents in it. The radio receiver extracts a information from the received waves. The practical radio transmitter usually consists of these parts:

- The power supply circuit to transform the input electrical power to the high voltages needed to produce the required power output.
- The electronic oscillator circuit to generate the radio frequency signal. They usually generates a sine wave of constant amplitude often called the carrier wave. In most modern transmitters this is a crystal oscillator in which the frequency is precisely controlled by the vibrations of a quartz crystal.

The modulator circuit to add the information to transmitted to the carrier wave produced by the oscillator. This is done by varying some aspect of the carrier wave. A information is provided to the transmitter either in the form of a audio signal, which represents sound, a video signal, for data in the form of a binarydigital signal.

RELAY



The relay is a electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles also used. Relays are used where it is necessary to control the circuit by a low-power signal , where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming from one circuit then re-transmitting it to another. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

RF Receiver

A RM-433 is a radio frequency receiving device its operates at 433 MhZ. It is designed to receive signals that are transmitted by RTI universal system controllers.

The RM-433 contains a microprocessor that monitors all received signals so that RF noise then data from non-RTI transmitters is filtered out. When valid RTI data is detected, the RM-433 passes the signal through its output driver which allows a data to travel long distances over wire. The output driver is compatible with industry standard infrared repeating systems, then can be wired together with those systems , with additional RM-433 units. This allows RTI control systems to be control from almost any location with either IR , RF transmitters.

IV. CONCLUSION

IN the project “ELECTROMAGNETIC COUPLING TRAIN” has been successfully designed and tested.

It has to been developed by integrating features of all the hardware components used. Presence of every module has to been reasoned out and placed carefully thus contributing to the best working of the unit.

Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented

REFERENCES

[1] Knorr Bremse. EDT101 Derailment Detection System, accessed onFeb. 2, 2016. [Online]. Available: http://www.knorrbremse.de/en/

[2] C. Ung, S. D. Moss, L. A. Vandewater, S. G. Galea, W. K. Chiu,and G. Crew, "Energy harvesting from heavy haul railcar vibrations,"in Proc.IEEE 8th Int. Conf. Intell. Sensors, Sensor Netw. Inf. Process., Melbourne, VIC, Australia, Apr. 2013, pp. 95-98, doi: 10.1109/ISSNIP.2013.6529771

[3] G. De Pasquale, A. Somà, and N. Zampieri, "Design, simulation, and testing of energy harvesters with magnetic suspensions for thegeneration of electricity from freight train vibrations," J. Comput. Nonlinear Dyn., vol. 7, no. 4, p. 041011, 2012.

[4] European Railway Agency. (2009). Impact Assessment on the Use of Derailment Detection Devices in the EU Railway System, ERA/REP/03-2009/SAF, accessed on Feb. 2, 2016. [Online]. Available: http:// www.era.europa.eu/Document-Register/Pages/final-report-on-derailment-detection-device.aspx

[5] A. V. Vostroukhov, A. V. Metrikine, A. C. W. M. Vrouwenvelder,V. I. Merkulov, V. N. Misevich, and G. A. Utkin, "Remote detectionof derailment of a wagon of a freight train: Theory and experiment," Arch. Appl. Mech., vol. 73, pp. 75-88, Aug. 2003.

[6] Knorr Bremse. EDT101 Derailment Detection System, accessed onFeb. 2, 2016. [Online]. Available: http://www.knorrbremse.de/en/railvehicles/products/trainsafety/edt101.jsp

[7] M. G. Tehrani, G. Gatti, M. J. Brennan, and D. J. Thompson, "Energyharvesting from train vibrations," in Proc. 11th Int. Conf. Vibrat.

[8] M. Kato and K. Terada, "Development of an evolution type train protection system to prevent secondary accidents," in Proc. Int. Rail Safety Conf., Dublin, Ireland, 2006, pp. 1-10.

[9] [Energy Harvester PMG37 by Perpetuum Ltd. (Feb. 2, 2016). PMG37.[Online]. Available: http://www.perpetuum.com

[10] A. Rahimi, Ö. Zorlu, A. MuhtaroĞlu, and H. Külah, "Fully self-poweredelectromagnetic energy harvesting system with highly efficientdual rail output," IEEE Sensors J., vol. 12, no.6,pp.2287-2298, Jun. 2012.

[11] C. Ung, S. D. Moss, L. A. Vandewater, S. G. Galea, W. K. Chiu,and G. Crew, "Energy harvesting from heavy haul railcar vibrations,"in Proc.IEEE 8th Int. Conf. Intell. Sensors, Sensor Netw. Inf. Process., Melbourne, VIC, Australia, Apr. 2013, pp. 95-98, doi: 10.1109/ISSNIP.2013.6529771.