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Involuntary Train Collision and Prevention System Using Miwi Communication

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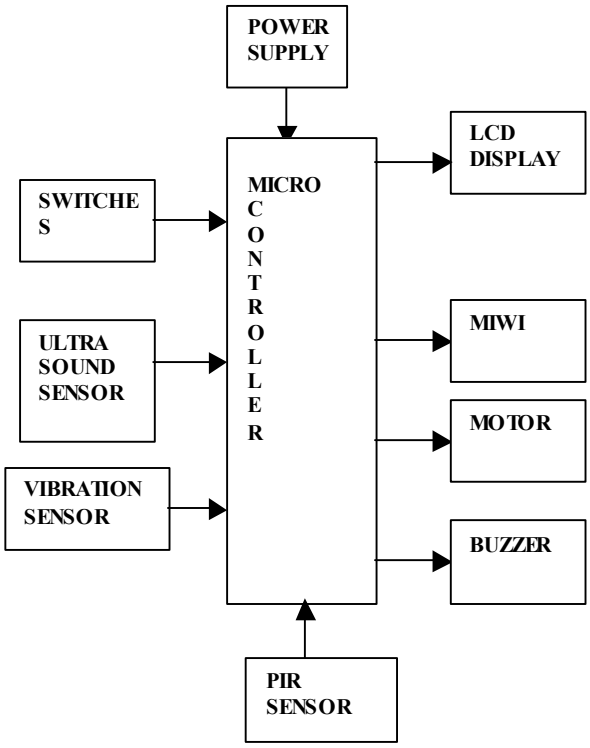
Abstract: Now a day we know that train collision may occur due to many reasons. This project is aimed to avoid the train collision by giving an alert system to the driver.. In this project we are going to prevent the train collision using MIWI communication. The embedded technology is used in this project.

Key words: MIWI Communication · Colllision

INTRODUCTION

In this project we are going to prevent the train collision using MIWI communication. MIWI is a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4-2003 standard for wireless personal area networks such as wireless headphones connecting with cell phones via short-range radio. [1] MIWI is targeted at radio-frequency (RF) applications networking. Transmitter will send a data (track1) from transmitter side and receiver receives the same data at receiver side. If the receiver is in another track the engine driver will send a data (track2) through transmitter and received by the receiver. So no problem will occur. If both the trains in the same track means, both the transmitters and receivers will send the same track no and immediately buzzer will give alert on both the sides. [2] In case of no engine drivers, after a certain time period (5 or 10 sec) of the buzzer alert both the train motors will stops automatically. Thus the train collision is prevented. More over there is vibration sensor that will be passed over the track if there is over vibration there is a signal once again to inform the engine driver about the crack to avoid the accident. There is also a PIR sensor which is fixed to the train to stop the engine if there is any human being or any other obstacles [3].

Block Diagram



Explanation: In our project we have microcontroller, vibration sensor, PIR sensor, switches, power supply unit, MiWI, LCD and buzzer. Microcontoller is the entire controlling unit. The data's are transmitted and received through MiWi protocol.

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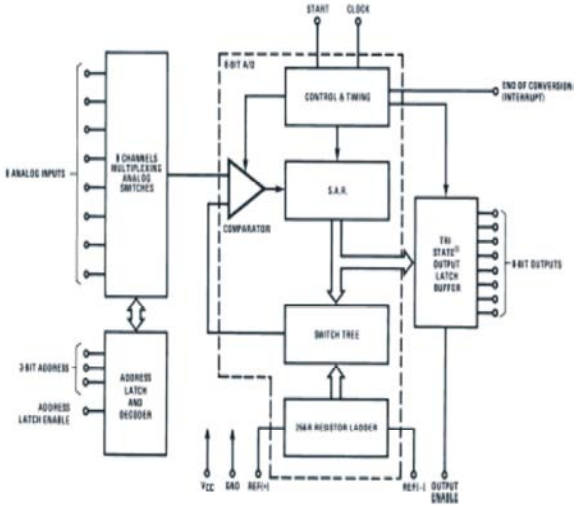
In this project switches are used to select the track, the selected track information will be send to the train that will be passing nearby through the MiWi protocol. [4] Thus the train's will be getting an alert signal regarding the track selection. Next we use ultrasonic sensor to monitor the objects in front of the train. Ultrasonic sensor has two section, one is transmitter and the next is the receiver. Transmiiter will send a sound signal if it touches any object, it will reflect and received by the receiver thus it will give the information weather any object is there or not. Vibration sensor is used to check the breakage in the track, if breakage is there then a buzzer alert will be there to the driver. Pir sensor will monitor the humans, if there is no humans in the compartments then the lights and fans will be switched off.

ADC: The ADC0808, ADC0809 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and microprocessor compatible control logic. The 8-bit A/D converter uses successive approximation as the conversion technique. The converter features a high impedance chopper stabilized comparator, a 256R voltage divider with analog switch tree and a successive approximation register. The 8-channel multiplexer can directly access any of 8-single-ended analog signals. The device eliminates the need for external zero and full-scale adjustments. Easy interfacing to microprocessors is provided by the latched and decoded multiplexer.



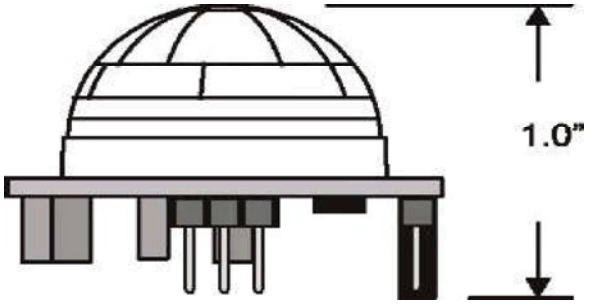
Multiplexer: The device contains an 8-channel single-ended analog signal multiplexer. A particular input channel is selected by using the address decoder. Table 1 shows the input states for the address lines to select any channel [5]. The address is latched into the decoder on the low-to-high transition of the address latch enable signal.

Ultrasonic Distance Sensor: Ultrasonic distance sensor provides precise, non-contact distance measurements from about 2 cm to 3 meters. It is very easy to connect to BASIC Stamp or Javelin Stamp microcontrollers, requiring only one I/O pin.

The ultrasonic sensor works by transmitting an ultrasonic burst and providing an output pulse that corresponds to the time required for the burst echo to return to the sensor. By measuring the echo pulse width the distance to target can easily be calculated [6-19].

Buzzer: A buzzer or beeper (BUZZERS)is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed and usually illuminates a light on the appropriate button or control panel and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder which makes a high-pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off.

PIR Sensor (#555-28027):



The PIR (Passive Infra-Red) Sensor is a pyroelectric device that detects motion by measuring changes in the infrared levels emitted by surrounding objects. This motion can be detected by checking for a high signal on a single I/O pin.

CONCLUSION

The paper presented a new method, based on the use of an switch, vibration sensor, ultrasonic sensor for the detection of transiting trains and to find the obstacles in front of the train. In particular, the method proved to be capable of detecting in several tests. To this aim, a specific frequency range has been pointed out as the best one for monitoring the train arrival. The power content associated with this range is continuously measured and compared to proper thresholds for alarm activation.

Ongoing activities are mainly focused on the realization of an automatic track warning system based on a digital signal processor capable of implementing the proposed method. A performance assessment mainly mandated to evaluate system reliability and accuracy. This project will be a useful one to avoid the train collision.

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