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TRAIN DISTANCE INDICATOR FOR UNGUARDED LEVEL CROSSING

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Abstract:

It consists of a vibration sensor and ultrasonic sensor in the railway track. In each and every un guarded level crossings, there is a display and a siren arrangement.

When the train is coming over the track, a vibration is produced in the track. The sensor connected near the un guarded level crossing senses the vibration. The ultrasonic will measure the distance of train coming, when the train comes closer the gate will be closed.

The signal from the sensor is given to a microcontroller. The microcontroller converts the analogue signal to digital signal and according to the signal, it sends signal to the display and siren. Thus, the user can easily know the distance of the train and will be alert.

I. INTRODUCTION:

Level crossings account for nearly half of the catastrophic train accident risk on Britain's railways. ORR believes that the safe design, management and operation of level crossings can reduce the risks, have a positive effect on user behaviour and so reduce the number of fatal and serious incidents. What is ORR's policy on level crossings?

2. ORR seeks to influence duty holders and others to reduce risk at Britain's level crossings. It does this through a variety of means ranging from advice to formal enforcement action. ORR checks that preventive and protective measures are implemented in accordance with the principles of prevention set out in the Management of Health and Safety at Work Regulations 1999. Risk control should, where practicable, be achieved through the elimination of level crossings in favour of bridges, underpasses or diversions. Where elimination is not possible, ORR aims to ensure that duty holders reduce risk so far as is reasonably practicable and in accordance with the principles of protection.

3. As the safety regulator for Britain's railways, ORR's role is to provide clear advice and enforce relevant legislation – including that which relates to level crossings. We also exercise the powers of the Secretary of State in making level crossing orders under the Level Crossings Act 1983. The Agency Agreement made between the Secretary of State for Transport and the Office of Rail Regulation relates to functions which ORR has agreed to perform on behalf of the Secretary of State.

4. ORR believes that it is neither effective nor efficient for only rail companies to be responsible for managing safety at level crossings. Decisions about level crossings should involve rail companies, traffic authorities and other relevant organisations as early on as possible. Relevant authorities should recognise the wider benefits that safety improvements at level crossings (for example, replacing them with bridges) can bring about, particularly for road users. If wider benefits can be achieved, the appropriate funding bodies should agree on how the costs of making safety improvements will be met.

5. ORR is also committed to helping people understand the importance of the safe use of level crossings. The 'Using Level Crossings Safely' guidance is available on ORR's website

II. POWER SUPPLY

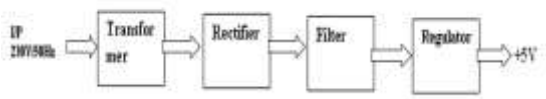


Figure.1. Power Supply

III. HARDWARE

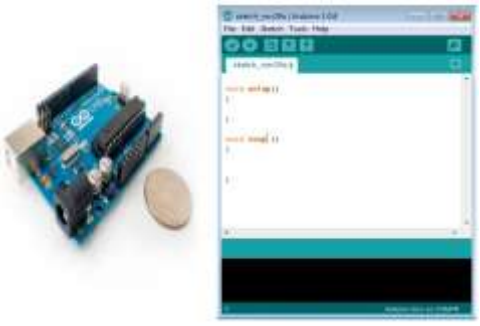
Arduino

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and

software. It consists of a circuit board, which can be programed (referred to as a microcontroller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.

The key features are −

- Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.
- You can control your board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).
- Unlike most previous programmable circuit boards, Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. You can simply use a USB cable.
- Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.
- Finally, Arduino provides a standard form factor that breaks the functions of the micro-controller into a more accessible package.



Liquid Cristal Display

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. Each pixel consists of a column of liquid crystal molecules suspended between two transparent electrodes, and two polarizing filters, the axes of polarity of which are perpendicular to each other. Without the liquid crystals between them, light passing through one would be blocked by the other. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other.

A program must interact with the outside world using input and output devices that communicate directly with a human being. One of the most common devices attached to an controller is an LCD display. Some of the most common LCDs connected to the contollers are 16X1, 16x2 and 20x2 displays. This means 16 characters per line by 1 line 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

Many microcontroller devices use 'smart LCD' displays to output visual information. LCD displays designed around LCD NT-C1611 module, are inexpensive, easy to use, and it is even possible to produce a readout using the 5X7 dots plus cursor of the display. They have a standard ASCII set of characters and mathematical symbols. For an 8-bit data bus, the display requires a +5V supply plus 10 I/O lines (RS RW D7 D6 D5 D4 D3 D2 D1 D0). For a 4-bit data bus it only requires the supply lines plus 6 extra lines(RS RW D7 D6 D5 D4). When the LCD display is not enabled, data lines are tri-state and they do not interfere with the operation of the microcontroller.

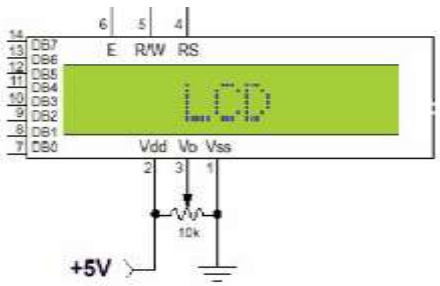


Figure.2.Pin diagram of 1x16 lines LCD

Relays

A relay is an electrically operated switch. These are remote control electrical switches that are controlled by another switch, such as a horn switch or a computer as in a

power train control module, devices in industries, home based applications. Relays allow a small current pin, 4-pin, 5-pin, and 6-pin, single switch or dual switches. Relays are used throughout the automobile. Relays which come in assorted sizes, ratings, and applications, are used as remote control switches. A typical vehicle can have 20 relays or more.

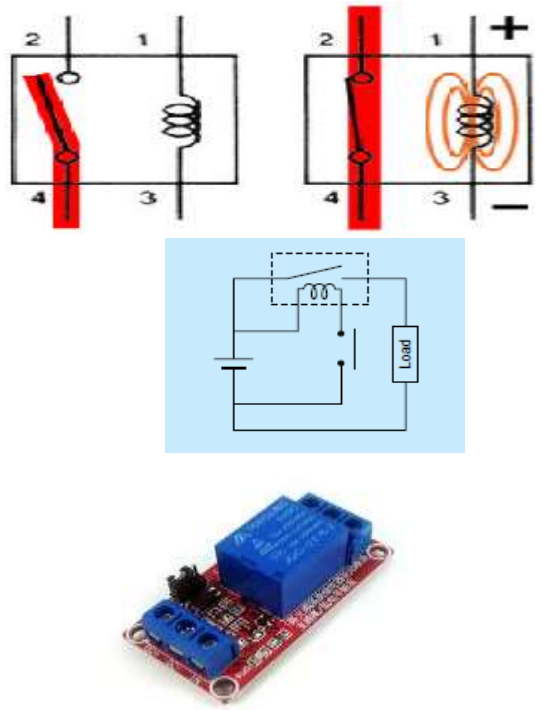
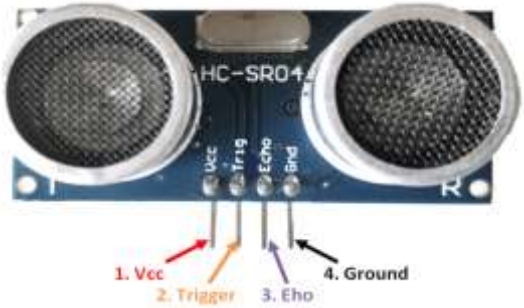


Figure.3. Relay

Ultrasonic Sensor:



Ultrasonic Sensor Pin Configuration

Pin Number	Pin Name	Description
1	Vcc	The Vcc pin powers the sensor, typically with +5V
2	Trigger	Trigger pin is an Input pin. This pin has to be kept high for 10us to initialize by sending US wave.
3	Echo	Echo pin is an Output pin. This pin goes high for a period of time which wil time taken for the US wave to return back to the sensor.
4	Ground	This pin is connected to the Ground of the system.

L293D

L293D is basically a high current dual motor driver/controller Integrated Circuit (IC). It is able to drive load having current up to 1A at the voltage ranging from 4.5V to 36V. Motor driver usually act as current amplifier because they receive a low current signal as an input and provides high current signal at the output.
Motors usually operates on this higher current. L-293D has to builtin H-Bridge driver circuits and is able to control two DC motors at a time in both clockwise and counter clockwise direction. It has two enable pins and they should be kept high in order to control the motor. By changing the polarity of applied signal motor can be rotated in either clockwise or counter clockwise direction. If L 293D enable pin is high, its corresponding driver will provide the desired out. If the enable pin is low, there will be no output. L-293D has different features including internal ESD protection, large voltage supply range, large output current per channel, high noise immunity input etc. L 293D plays a vital role in electronics era and has several different applications e.g relay drivers, DC motor drivers, stepping motor drivers etc. The further detail about L 293D motor driver/controller will be given later in this tutorial.

BUZZER:

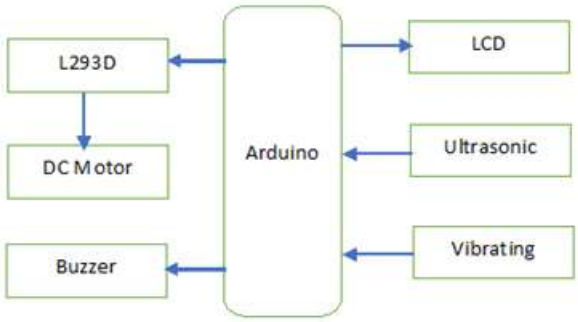
Magnetic transducers contain a magnetic circuit consisting of a iron core with a wound coil and a yoke plate, a permanent magnet and a vibrating diaphragm with a movable iron piece. The diaphragm is slightly pulled towards the top of the core by the magnet's magnetic field. When a positive AC signal is applied, the current flowing through the excitation coil produces a fluctuating magnetic field, which causes the diaphragm to vibrate up and down, thus vibrating air. Resonance amplifies vibration through resonator consisting of sound hole(s) and cavity and produces a loud sound.

Vibrating Sensor:

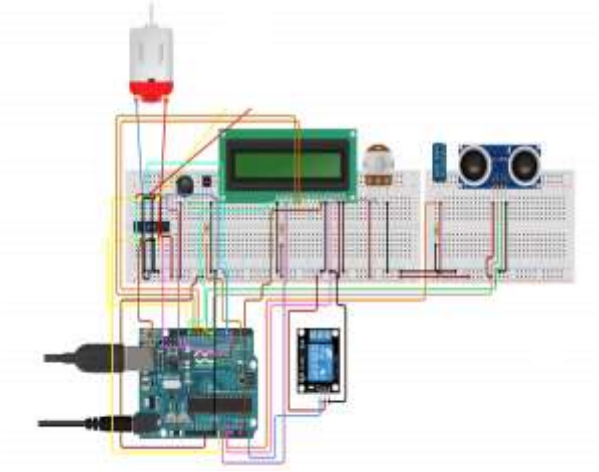
Vibration sensors are utilized in a number of applications to measure acceleration and/or vibrational activity. Vibration sensors can be useful for monitoring the condition of rotating machinery, where overheating or excessive vibration could indicate excessive loading, inadequate lubrication, or bearing wear. Such sensors are also utilized in geophysical and applications requiring accelerometers. Vibration sensors are used as knock sensors in internal combustion engines. In order to assure that an engine is operating under optimum conditions, it is necessary to accurately monitor its actual operating state. One device known to be highly useful for this purpose is the engine vibration sensor. Vibration or shock sensors are commonly used in to activate an alarm whenever the devices to which they are attached are touched, moved, or otherwise vibrated. For example, vibration sensors are commonly placed in windows of buildings to sense glass breakage and in car alarm to detect vehicle tampering. Commercial vibration sensors use a piezoelectric ceramic strain transducer attached to a metallic proof mass in order to respond to an externally imposed acceleration. Piezoelectric vibration sensors used for detecting vibration from various vibration sources are generally classified into two large types, resonant type and non resonant type. A capacitive vibration sensor or an accelerometer is formed from a capacitor one plate of which is a proof mass, with the other plate fixed to a substrate. Vibrations are typically measured using analog vibration sensing elements, such as analog accelerometers, positioned on machinery at strategic locations.

IV. RESULT

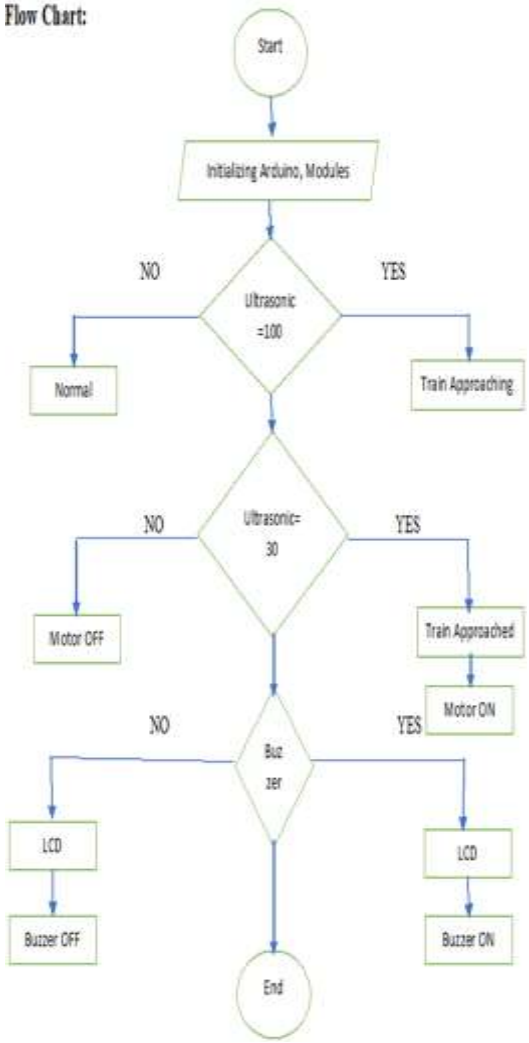
BLOCK DIAGRAM



Schematic Diagram:



Flow Chart:



Working:

This system works on the bases of distance measuring. This can be achieved by using ultrasonic sensor and a mechanism for barrier gate is implemented with help of a motor. This motor is controlled using l293d driver. All this system is controlled using a controller in continuous manner. When ever the distance from ultrasonic sensor detected less then a single is given to motor by controller then the acts as closing system like barrier gate and a buzzer will indicate that train is approaching.

V. Conclusion:

Using this project automatic railway crossing system we improve the rail road transportation facility and this technique has fast operation thane oldest system and we reduce the accident. This technique is most suitable in rural and suburban area. These techniques do not require any gatekeeper at the railway crossing.

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