Railway Track Monitoring and Accident Avoiding System

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Abstract **- Railway is the most popular and friendly transportation system of the largest part of the cities in the world. Train is widely used for comfortable and safe journey in a reasonable fare. People from different professions can effort it. Almost 10,000 billion freight tonne-Kilo-meters and more than 5 billion Passengers of rail transport have been travelled around the world per years. The railway transportation system plays an important role for business as well as for leniency and safe travelling in modern life. But at every turn, the train is facing unexpected situation in travelling because of wrong signal, wrong track switching, insecure level crossing etc. for which collision have been occurred. As a result, lot of damages has been done in economic sector with lot of causalities which affect our progress. But we can avoid this unexpected collision and take prevention from the accident dynamically by using the collision detection technology which can be made by ultrasonic sound with a special embedded system. By using this technology can detect the obstacle and gradually slow down the speed by initiating the air brake to stop the train before the collision takes place.**

Keywords : IOT, Ultrasonic Sensor, Arduino UNO, Radar Screen, Monitoring Object, Object Detection.

INTRODUCTION

Railway is the most popular and friendly transportation system in the world. Rail transports are facing major challenges in our day to day life. Rail transport systems first appeared in England in 1820s. From 1820-2016 many evolutionsare occurred. At present railways is one of the most widely used transportation system in the world. Approximately 10,000 billion freight tonne-Kilometres are travelled around the world every year and more than 5 billon passengers travelled per year as per Railway statistic report. Economists have argued that the existence of modern rail infrastructure is a significant indicator of a country's economic advancement.But till now railway transportation system are not safe. Many countries railway faces many collisions during travelling in every year as a result happened lot of damages and casualties. But if we add Anti Collision Technology (ACT) in railway then we can prevent any types of collision. It is an innovative technology which can be detect collision object from specific distance of train and avoid collision dynamically and efficiently by using ultrasound and embedded system.The train accident is one of the most dangerous accidents ever. The common reason of the train collisions are malfunctioning train signals or lights, failing mechanics, safety gates not in place,crossings that are unprotected, negligence of train conductor and lack of awareness of the people.

COMPONENTS

The proposed system is an enhanced technique for monitoring the object which uses Arduino microcontroller, ultrasonic sensor, and radar module. The radar will get the distance from the object and ultrasonic sensor will ensure to avoid the accidents that may occur by the clash between the train and objects.

Ultrasonic sensors work by emitting sound waves at a frequency too high for humans to hear. They then wait for the sound to be reflected back, calculating distance based on the time required. This is similar to how radar measures the time it takes a radio wave to return after hitting an object.

Block Diagram

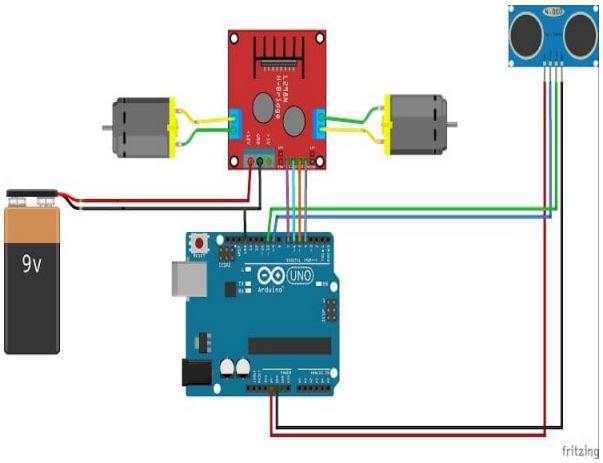


Fig 1: ultrasonic sensor and radar used railway track monitoring and accident avoidance system

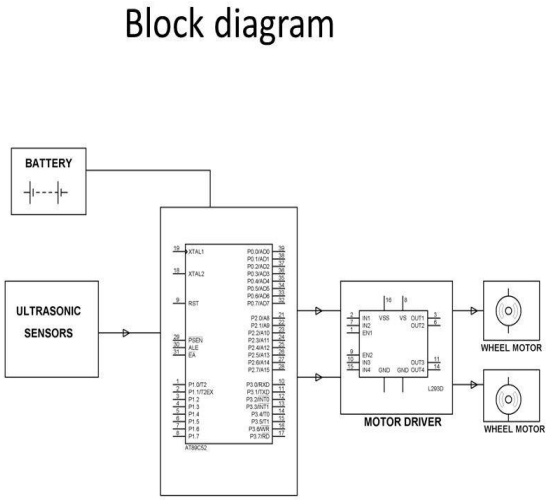


Fig 2: Object Monitoring System

ARDUINO MICROCONTROLLER

A Micro controller comprises of an incredible CPU firmly combined with memory, different I/O interfaces, for example, sequential port, parallel port clock or counter, intrude on controller, information procurement interfaces-Analog to Digital converter, Digital to Analog converter, coordinated on to a solitary silicon chip. In the event that a framework is created with a chip, the originator needs to go for outside memory, for example, RAM, ROM, EPROM and peripherals. In any case, controller is given every one of these offices on a solitary chip. Advancement of a Micro controller lessens PCB size and cost of plan.

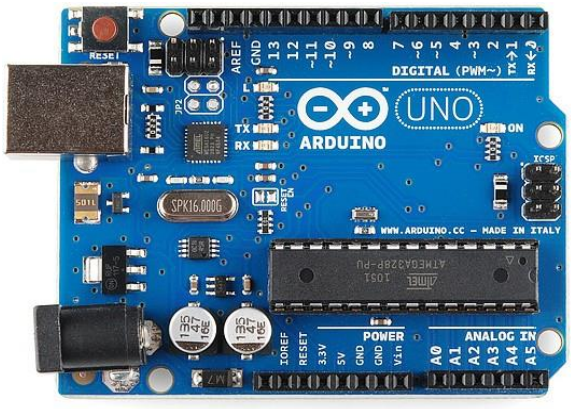
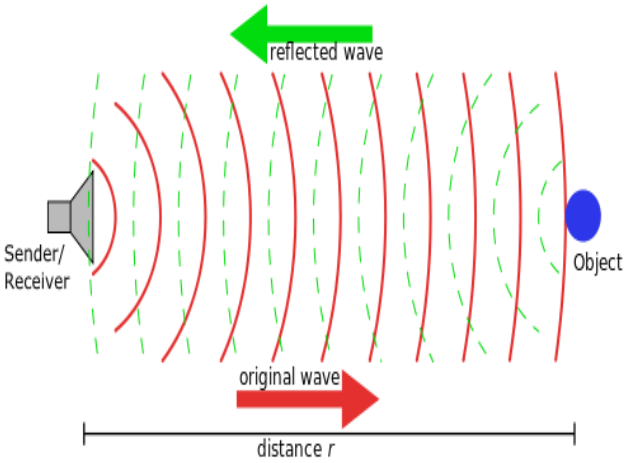


Fig 3:Arduino UNO

RADAR SCREEN

This Arduino Radar Project is implemented with the help of Processing Application. Radar is a long-range object detection system that uses radio waves to establish certain parameters of an object like its range, speed and position. Radartechnology is used in aircrafts, missiles, marine, weather predictions and automobiles.Even though the title says Arduino Radar Project, technically the project is based on Sonar technology as I will be using an Ultrasonic Sensor to determine the presence of any object in a particular range.



Fic 4: Result of Radar Processing

ULTRASONIC SENSOR

An ultrasonic sensor transmits ultrasonic waves into the air and detects reflected waves from an object. There are many applications for ultrasonic sensors, such as in intrusion alarm systems, automatic door openers and backup sensors for automobiles. Accompanied by the rapid development of information processing technology, new fields of application, such as factory automation equipment and car electronics, are increasing and should continue to do so. Using its unique piezoelectric ceramics manufacturing technology developed over many years, Murata has developed various types of ultrasonic sensors which are compact and yet have very high performance. As the name indicates, ultrasonic sensors measure distance by using ultrasonic waves.The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception.

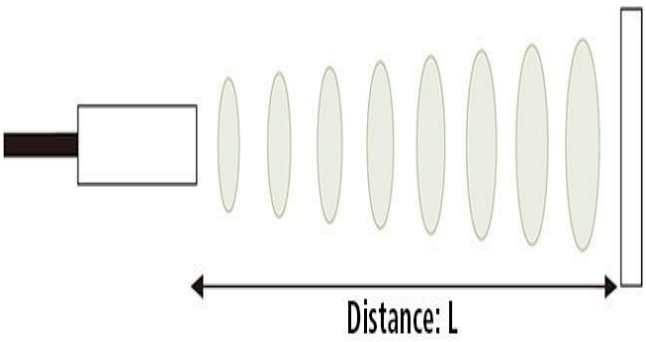


Fig 4: Ultrasonic Sensor

An optical sensor has a transmitter and receiver, whereas an ultrasonic sensor uses a single ultrasonic element for both emission and reception. In a reflective model ultrasonic sensor, a single oscillator emits and receives ultrasonic waves alternately. This enables miniaturization of the sensor head

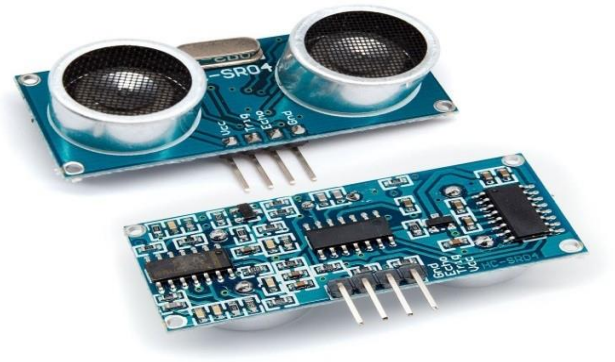


Fig 5:Ultrasonic Sensor

. *Distance Calculation.*

Distance L = 1/2 × T × C

where L is the distance, T is the time between the emission and reception, and C is the sonic speed. (The value is multiplied by 1/2 because T is the time for go-and-return distance.)

RESULTS:

In the proposed system we are usingUltrasonic sensor. The sensor is attached in the train path. In the receiver side.In the transmitter side the sensor the signals and converts into electrical energy.

Ultrasonic sensors (also known as transceivers) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively.Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor.

Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal.This higher current signal is used to drive the motors L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction.

This gives a clear description of the working of the collision avoiding system. All the components of the system are connected with the control unit. The power supply supplies the power to the control unit. In this project we can design an automatic accident preventing system

for train. The ultrasonic sensors are used to detect the obstacles in the train path.

Ultrasonic sensors work on a principle similar to sonar which evaluates distance of a target by interpreting the echoes from ultrasonic sound waves. This ultrasonic module measures the distance accurately which provides 0cm - 400cm with a gross error of 3cm. Its compact size, higher range and easy usability make it a handy sensor for distance measurement and mapping. The module can easily be interfaced to micro controllers where the triggering and measurement can be done using two pins.

The sensor transmits an ultrasonic wave and produces 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 and also detects the obstacles in the path. If any obstacles are found in the path of the train the message will be conveyed to the monitoring unit of the TRAIN.

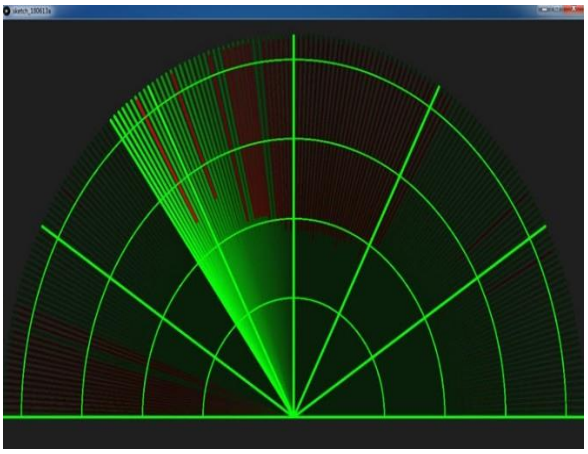


Fig 6: Radar Screen

CONCLUSION

In this project, railway track monitoring and accident avoidance. The simulation has been done using proteus and testing has been carried out using the establishedmodel. It has remainedprojected that if the system is applied in railways, trains accidently on the International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 4, Issue 1, January 2015 71 ISSN: 2278
– 909X All Rights Reserved © 2015 IJARECE track errornotices automatically stops train, train collision can be barred and human life saved if this scheme is implemented.The automatic railway gate controller thus can be used in unmanned level crossings to reduce the occurrence of coincidences. Then the scheme is completely automatic it can be used in remote villages where no station master or line man is present. Also, it saves lot of times as it is automated whereas manual systems take time for the line man to inform the station master to close and open the gate which will consume a considerable amount of time. Also, since it is completely automated there are fewer chances for error to occur. Thus, this design is very useful in railway applications.

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