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Detection of Change in Distance Below Railway Track for Accident Avoidance

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“Detection of change in distance below railway track for accident avoidance.”

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ABSTRACT-

In our project we are going so solve the problem of change distances below the railway track The principal problem has been the lack of cheap and efficient technology to detect problems in the rail tracks and of course, the lack of proper maintenance of rails which have resulted in the formation of hollow space due to rat or other wild animal in the rails and other similar problems caused by antisocial elements which jeopardize the security of operation of rail transport.

In the past, this problem has lead to a number of derailments resulting in a heavy loss of life and property. To solve this problem we introduce this vehicle by using ultrasonic sensor . Basically, the ultrasonic sensor detect the change in distances below the railway track and If the distance is more than predefined data in the program file then give output signal to the signal control room at present the signal in signal room with period of time maintenance of this track done . Also

In our project if the train is passing on this track where vehicle has running for the vehicle signal is provide from the signal to clear track as per predefined program servo motor moves its arm and clear the track when train is goes from this location from signal control room provide data to vehicle come on the track.

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. At present railways is one of the most widely used transportation system in the world. 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.

It is an innovative technology which can be detect collision object from specific distance of train and avoid collision dynamically and efficiently by using Distance sensor. the ultrasonic sensor detect the change in distances below the railway track and If the distance is more than predefined data in the program file then give output signal to the signal control room at present the signal in signal room with period of time maintenance of this track done . Also In our project if the train is passing on this track where vehicle has running for the vehicle signal is provide from the signal to clear track as per predefined program servo motor moves its arm and clear the track when train is goes from this location from signal control room provide data to vehicle come on the track. As per the project objectives minimize accident,

minimize time of maintenance schedule and improve the overall performances of railway system.

LITERATURE SURVEY

- **Image analysis for train track for bring down accidents (2006) :**

In this project image processing technique is used of analysis level of ballast. For take from the camera CMOS sensor and fed into a software then this software analysis on this image and gives output of depth . The features can be computed easily and the procedures preserve the spatial information by simply fusing local features at multiple levels; each level in the spatial pyramid presents different information and hence new features. Moreover, this method has the ability to characterize the entire image with a single vector, and hence, it is more sensitive to complex disturbances such as occlusion and small track. Also, this image partitioning scheme is expected to generate more useful and salient features, and consequently, classification methodologies can be implemented in a space with vastly reduced dimension and reasonable time. Though the above techniques are effective in track detection, these techniques are very complex. Therefore to reduce this complexity.

- **RAILWAY TRACK DERAILMENT INSPECTION SYSTEM USING SEGMENTATION BASED FRACTAL TEXTURE ANALYSIS (2015):**

The input image is decomposed by Gabor filter and texture features were extracted using Segmentation based Fractal Texture Analysis (SFTA) and the features are classified as defect and defect free classes using AdaBoost Classifier. The detection of cracks in the railway track plays a major role in the derailment inspection system. The results obtained from this algorithm indicate that the pre-processed image is subjected to Gabor filter and it is decomposed into different scales and orientations have a significant effect in improving the detection accuracy. The Gabor filter is invariant to rotation and robust from the effect of variations in the frequency domain. It was found that the classification of defected and defect free samples from the samples were done by extracting the fractal features and hence it resulted in the highest correct classification rate (CCR) of 100% using collected dataset samples.

- **Advancements in Railroad Track Inspection Using Machine-Vision Technology (2009):-**

Railroad engineering practices and Federal Railroad Administration (FRA) regulations require track to be inspected for physical defects at specified intervals, which may be as often astwice per week. Currently, most of these inspections are manual and are conducted visually by railroad track inspectors. Inspections include detecting defects relating to the ties, fasteners, rail, special trackwork and ballast section. Enhancements to the current manual inspection process are possible using advanced technologies such as machine vision, which consists of recording digital images of track elements of interest and analyzing them using custom algorithms to identify defects or their symptoms. Based on analysis of FRA accident data, discussion with railroad track engineering experts and consultation with Association of American Railroads (AAR) researchers, this project focuses on using machine vision to detect irregularities and defects in cut spikes, rail anchors, turnout components and the crib ballast.

- **Machine Vision Inspection of Railroad Track (2011) :-**

Railroads conduct regular inspections of their track in order to maintain safe and efficient operation. In addition to internal railroad inspection procedures, periodic track inspections are required under Federal Railroad Administration (FRA) regulations. Although essential, track inspection requires both financial and human resources as well as consuming track time. The objective of the research described in this paper is to investigate the feasibility of using machine-vision technology to make track inspection more efficient and effective. The initial focus of this project is inspection of Class I railroad main and siding tracks, as these generally experience the highest traffic densities. Heavy traffic leads to more frequent inspection and maintenance requirements but less time to accomplish it. The cost associated with removing track from service due to inspections or the repair of defects is most pronounced on these lines, making them the most likely to be cost-effective locations for investment in new, more efficient but potentially more capital-intensive inspection technology.

PROBLEM STATMENT

The principal problem has been the lack of cheap and efficient technology to detect problems in the rail tracks and of course, the lack of proper maintenance of rails which have resulted in the formation of hollow space due to rat or other wild animal in the rails and other similar problems caused by antisocial elements which jeopardize the security of operation of rail transport. In the past, this problem has lead to a number of derailments resulting in a heavy loss of life and property.

PROJECT OBJECTIVES

- To minimize accident in railway system.
- To minimize time of maintenance schedule.
- To improve the efficiency of railway system.

BLOCK DIDGRAM

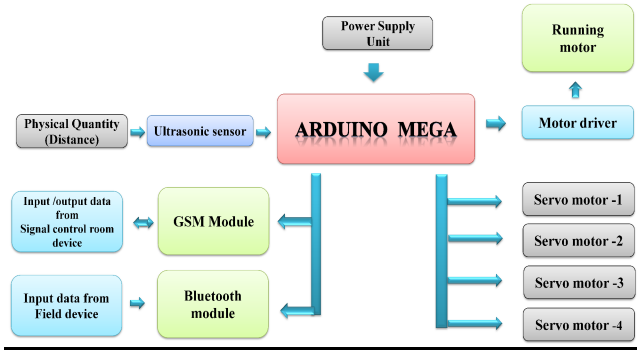


FIG . – BLOCK DIAGRAM OF ELECTRONIC COMPONENT USED IN VEHICAL

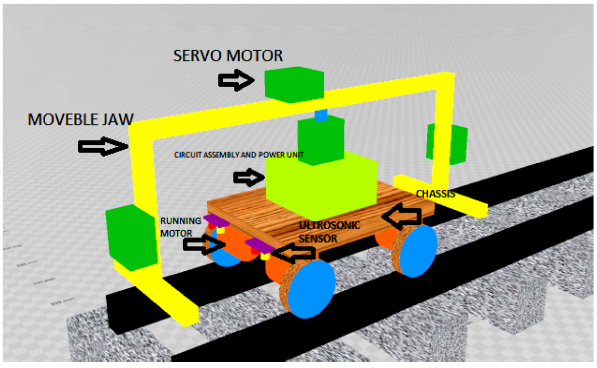


FIG – VEHICAL VIEW

Arduino mega is used to control all

component there are two wireless data providing connectivity for small distance Bluetooth module (1- 8 meter) and for long distances GSM module (Several kilometers). In case of Bluetooth output is not reflected only its provide input to the vehicle but in case of GSM module they gives output as well as input all the value of the GMS module is predefinf in the program algorithm but in case of Bluetooth all value is provided by the toggle switch. Motor driver is used to drive the motor as defined in the program algorithm as per the requirement or input data from GSM module. There are four servo motor servo motor 1 in place vertical axis to move jaw along with vehicle servo motor 2 to slide movable jaw servo motor 3 and servo motor 4 to lift the vehicle upward. There are two ultrasonic sensor to measurement of change distances below railway track that is very useful sensor for the data providing of measurement of distances in left as well as right side of the vehicle. For operation we used four command START, STOP, BACK and CLEAR. START (It is used to stat the vehicle means Arduino board provide signal to the motor driver that is high.) STOP (It is used to stop the vehicle means Arduino board provide signal to the motor driver that is low.).CLEAR (It is used to clear track, if the train is coming front as well as back track side of the track. This command is used in GSM that cause all servo motor program is predefined in the program algorithm.). BACK (It is used to vehicle back on track, if the train is coming front as well as back track side of the track. This command is used in GSM that cause all servo motor program is predefined in the program algorithm.).

CIRCUIT DIAGRAM

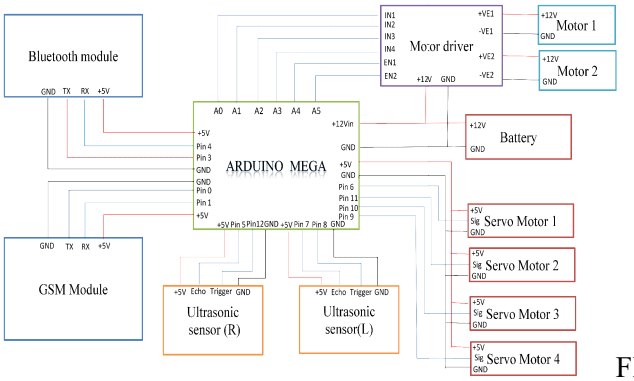
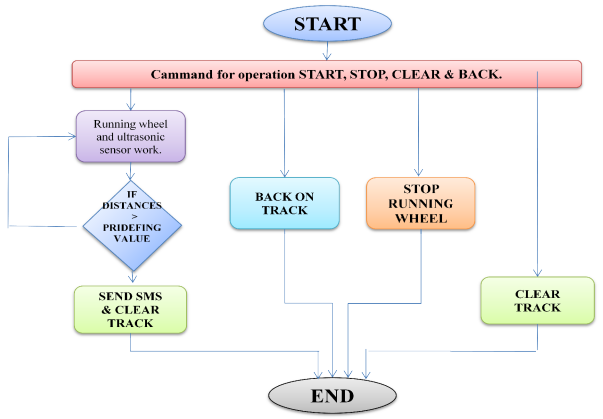


FIG . – CIRCUIT DIAGRAM OF ELECTRONIC COMPONENT USED IN VEHICAL

Algorithm

At starting switch statement is used for the operation of command there are four command in the program which is received from the GSM module send by user via SMS. At per the command START, STOP, BACK and CLEAR. START (It is used to stat the vehicle means Arduino board provide signal to the motor driver that is high.) STOP (It is used to stop the vehicle means Arduino board provide signal to the motor driver that is low.).CLEAR (It is used to clear track, if the train is coming front as well as back track side of the track. This command is used in GSM that cause all servo motor program is predefined in the program algorithm.). BACK (It is used to vehicle back on track, if the train is coming front as well as back track side of the track. This command is used in GSM that cause all servo motor program is predefined in the program algorithm.). It gives to user friendly interface in the app. For control all servo motor.



CALCULATION

distance = (duration * 0.034) / 2

Where ,

Duration - Time required to pass sound wave in milisec

0.034 - Sound wave constant in cm

2 – transmit and receives sound wave.

Example -

distance = (300* 0.034) / 2

distance = 5.10 cm

DESCRIPTION OF THE PROPOSED WORK

We collect all component required for our project like ultrasonic sensor, arduino mega board, GSM module, Bluetooth module , servo motor , gear motor, rack and pinion gear, Battery, etc online as well as offline market. Also we completed the work of assembly of component. For establishment of blue tooth connection with vehicle ,we are developed app that is easy to control the vehicle from the field side. And also going the work main program file our vehicle.

For algorithm there are four key word " START", "STOP", "CLEAR" and "BACK"

- START :- It is used to stat the vehicle means Arduino board provide signal to the motor driver that is high.
- STOP :- It is used to stop the vehicle means Arduino board provide signal to the motor driver that is low.
- CLEAR :- It is used to clear track, if the train is coming front as well as back track side of the track. This command is used in GSM that cause all servo motor program is predefined in the program algorithm.
- BACK :- It is used to vehicle back on track, if the train is coming front as well as back track side of the track. This command is used in GSM that cause all servo motor program is predefined in the program algorithm.

PROTOTYPE MODEL

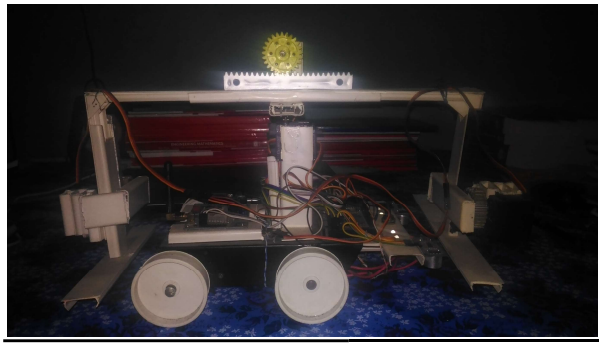


FIG MODEL

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