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Railway Track Fault Detection System using Robot Car

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Abstract - *Railway is that the most well liked and friendly transportation of the most important a part of the cities within the world. Train is wide used for snug and safe journey during a cheap fare. Folks from completely different professions will effort it. Almost 10,000 billion freight tonne-Kilometers and over five billion Passengers of rail transport are traveled round the world per years. The railway transportation plays a very important role for business also as for leniency and safe traveling in fashionable life. However at each flip, the train is facing surprising state of affairs in traveling due to wrong signal, wrong track change, etc. that collision are occurred. As a result, heap of damages has been wiped out economic sector with heap of causalities that have an effect on our progress. However we are able to avoid this surprising collision and take hindrance from the accident dynamically by exploitation the collision detection technology which may be created by unhearable sound with a special embedded system. By exploitation this technology will notice the obstacle and step by step block the speed by initiating the air brake to prevent the train before the collision takes place.*

Key Words: Transportation, Safe Travelling, Accidents, Collision Detections, Embedded System

INTRODUCTION

In all transport systems, significantly within the case of railways, safety and reliableness are extremely thought of. In recent years, with the event of high speed railway, speed and capability of the trains perpetually improved, and traffic density gets additional and additional serious. The ever increasing operation velocities cause associate increasing degree of the grave consequences each in loss of human life and severe injury to the train and different railway instrumentation. Within the technical literature only a few numbers of publications may be found that are coping with investigations into the train collision processes to predict the amount of forces and deformations realizing within the course of accidental collisions/crashes. The shortage of the literature sources may be explained by the extraordinarily difficult character of the dynamics of train crashes. The paper takes a trial to develop associate unvaried computation methodology for predicting the dynamics of train collisions/crashes.

The train safety has been a difficulty with the increasing range of incidents being reportable that has caused death and injury. Majority of deaths on the railway involve third parties with the incursion onto the amount crossings. Average train accident would price immeasurable Indian rupees and these may be avoided if there's a mechanism to trace the train location and speed and warn the locomotive drivers concerning potential questions of safety. The answer may be a comprehensive GPS/GSM based mostly train trailing system, that provides correct, dependable and timely data to the controller. The intrinsic GPS module identifies the train location with a highest accuracy and transfers the knowledge to the central system via GSM. The provision of this data permits the Train Controller to require correct selections as for the train location. Location information may be any processed to produce visual positioning exploitation maps granting a wholesome read on train location. Positioning information along the side train speed helps the administration to spot the potential questions of safety and react to them effectively exploitation the communication strategies provided by the system.

LITERATURE SURVEY

Sandeep Patalay in gave a basic approach of however the sensing element network may be utilised in railways. The sensing element node reports the events to the bottom station that may any take actions that depends on the applications. For e.g. In closing of railway gates mechanically once arrival of train is detected. during this state of affairs the event is that the arrival of train and a vibration sensing element that was set within the track may notice this event and will report it to the near base station that then The sensing element nodes are fitted to the carriages at a distance of 4 hundred meters apart that communicates to the motive force node at the engine that then transmits the knowledge to the entranceway node.

A wired backend may function the communication medium for the communication between the entranceway node and also the Base station. The bottom station will then remit the commands to the motive forced node. Zeinab guided missile Daliri, et.al., in have given the strategy for providing security in railways through wireless sensing element networks supported formal logic that non inheritable the fundamental sensing element specifications and multi-layer routing from that of paper and includes unhearable broken flaw detection system. this method includes a transmitter that sends out high energy waves in 2 directions at calculable intervals. The break in rails are going to be indicated by the amendment within the amplitude of the waves. it's a system for trailing any materials in tracks that employs either image process by analyzing the photographs captured by the cameras or leaky cable methodology for areas wherever there are chance of landslides.

CIRCUIT DESCRIPTION

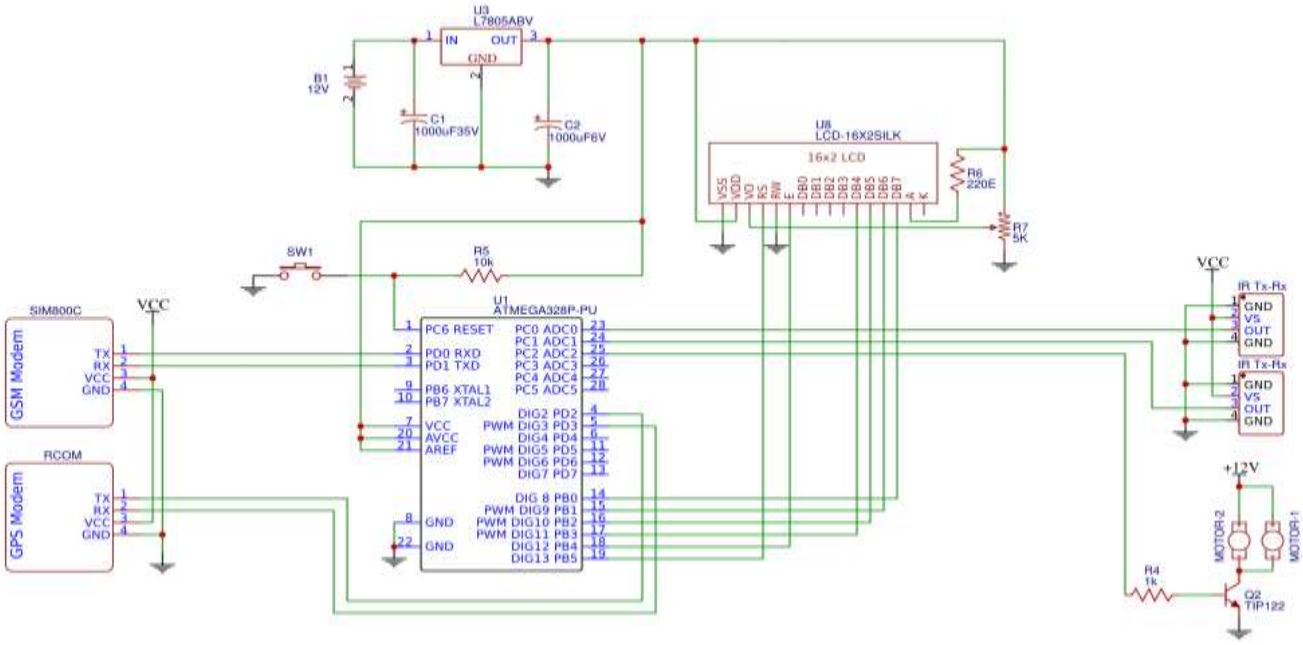

Fig.1-Circuit Diagram for Railway accident detection system

In this system a 12v battery is employed to produce needed power to the circuit for its desired operation. A microcontroller employed in this method and different parts within the circuit need a continuing 5v offer. This 5v offer is obtained from the regulated IC 7805. This regulator provides constant and controlled power of 5v. The electrical condenser filters are wont to eliminate the ripples gift within the offer. Before the beginning of the rail-method line scan the mechanism has been programmed to self calibrate the IR Transmitter-Receiver. once activity, the mechanism waits for a preset amount of your time so the aboard GPS module starts reading the right geographic coordinate. The principle concerned during this crack detection is that lightweight reaching the IR receiver is proportional to the intensity of crack i.e. once most lightweight transmitted by transmitter reaches the receiver the crack intensity is additional. The IR transmitter are going to be connected to at least one facet of the rails and also the IR receiver to the alternative facet. Throughout traditional operation, once there aren't any cracks, the sunshine from transmitter doesn't fall on the receiver and thus the set price is low As a consequence, once lightweight from the transmitter deviates from its path thanks to the presence of a crack or an opening, a increment within the price may be ascertained. This alteration in price indicates the presence of a crack or another similar structural defect within the rails.

In order to notice this location of the device just in case of detection of a crack, we have a tendency to create use of a GPS receiver whose perform is to receive this latitude and meridian information. The GPS employed in the project is employed to notice the situation of the crack within the track of the train and also the GSM is employed to send the text message. we've got interfaced the GPS electronic equipment with the microcontroller, the American state and RX pins of the electronic equipment is connected to the DIG2 and DIG3 of the controller IC severally as shown within the circuit diagram of the system. The GSM electronic equipment is interfaced with the microcontroller. American state and RX of the GSM electronic equipment are connected to the RX and American state of the controller IC. In this system we've got used 2 motors to maneuver the vehicle in forward direction.

During this system a relay is employed to prevent the engine of the vehicle. This motor is operated by the microcontroller through a relay circuit. This relay is connected with the microcontroller through a semiconductor as shown within the circuit diagram. The semiconductor is connected to the identification number twenty five of the controller for relay operative. In this system the unhearable sensors are interfaced with the microcontroller for the detection of obstacle or animal on the track. This unhearable sensors are pulse breadth modulation out sensors to live the gap between 2 vehicles. unhearable Distance sensing element provides vary from terribly short (2 Centimeters) to long-range (5 Meters) for applications in detection and go. The sensing element provides precise and stable non-contact distance measurements from concerning a pair of cm to five meters with terribly high accuracy. The unhearable sensing element will simply be interfaced to microcontrollers wherever the triggering and measure may be done exploitation 2 I/O pin.

Also because the liquid crystal display shows all the knowledge of the train which has the signal indication, crack location, animal detection etc. the information pin D4, D5, D6, D7 of the liquid crystal display is connected to pin no fourteen, 15, sixteen and seventeen of the controller. The cathode and RW pin, VSS pin of the alphanumeric display are grounded. A 5v offers provided at the anode terminal of the liquid crystal display through a 220E resistance and additionally this offer is provided to the VDD pin. The RS and alter terminal of the alphanumeric display is provided to the pin no eighteen and nineteen of the controller severally. A offer is provided to VCC terminal of the alphanumeric display through a resistance. it's wont to regulate the brightness of the alphanumeric display. the information pins are wont to offer the information to be displayed. The RS pin is employed to reset the alphanumeric display and also the alter terminal is employed to alter the alphanumeric display.

CIRCUIT WORKING

In our project, there are 2 set of IR sensing element units fitted to the 2 sides of the train. The IR transmitter and IR receiver circuit is employed to sense the cracks. it's mounted to the front sides of the train with an acceptable arrangement. When the system is power-driven On, it moves on the model track. The IR sensors monitor the condition of the tracks. once the battery provides the ability to the microcontroller it starts the motor rotation to maneuver in forward direction. once a crack is detected by the IR sensing element the vehicle stops quickly, and also the GPS receiver triangulates the position of the vehicle to receive the Latitude and meridian coordinates of the vehicle position, from satellites. The Latitude and meridian coordinates received by GPS are regenerate into a text message that is finished by microcontroller. This message is then forwarded to the licensed person by means that of SMS.
The practicality of the paradigm starts with the Infrared sensing element

a. Once the vehicle is begin, it moves on its path. The Infrared Obstacle sensors sense the circumstance of the tracks.

b. Once a determination of crack is detected by the Infrared sensing element the vehicle stops quickly, and also the get the coordinates of auto location through the world Positioning System (GPS), this position of the vehicle is received and also the Latitude and meridian coordinates of the vehicle position from satellites.

c. The Latitude and also the meridian coordinates of auto is received with the help of Global Positioning System (GPS) and are regenerate into a message that is finished by microcontroller.

d. Once the message has been with success sent, the vehicle restarts its movement forward looking on the kind of crack.

At traditional condition:

The IR transmitter sensing element is sending the infrared rays. These infrared rays are received by the IR receiver sensing element. The Transistors are also used as an alternative associate electronic equipment section of system. At traditional condition semiconductor is OFF condition. At that point relay is OFF, so the vehicle running unceasingly.

At Crack Condition:

At crack detection conditions the IR transmitter and IR receiver, the resistance across the Transmitter and receiver is high thanks to the non-conductivity of the IR waves. once the track is in continuous with none cracks then output of IR light-emitting diode and Photodiode are going to be high. As before long because the crack detected by the system the TSOP sensing element reflection are also going to be capable zero and also the mechanism of system are going to

be stopped mechanically. Another TSOP sensing element is employed to watch perdition on the method of the railway track. once this output is high then it's over that there's no pit within the track. however if any pit is detected by the sensing element the output of the sensing element given to the microcontroller are going and once more the microcontroller can stop the mechanism. once a crack is detected by the IR sensing element the vehicle stops quickly, and also the GPS receiver triangulates the position of the vehicle to receive the Latitude and meridian coordinates of the vehicle position, from satellites

The system consists of associate unhearable sensing element for the detection of animals gift on the track throughout the traveling of the train. The sensing element transmits associate unhearable wave associated produces an output pulse that corresponds to the time needed for the burst echo to come back to the sensing element. By mensuration the echo pulse breadth, the gap to focus on will simply be calculated. This unhearable sensing element is enforced on the front facet of the train for the detection of the animals. As before long because the sensing element detects the presence of the animal it sends signal to the microcontroller. The mic rocontroller receives the signal from the sensing element and stops the train now and additionally permits the Buzzer to form therefore and so because the animal can run removed from the track.

ADVANTAGES

a. Establish management structure supported performance analysis and observation method.

b. Enhance the proportion of potency.

c. Facility to send alerts/warnings to explicit train drivers on potential collisions, misadventure through the system.

d. Functionality to come up with time-distance graph for trains which may be wont to management and arrange the train movements.

APPLICATIONS

a. At gift the examination is finished manually. Our project its application here. The examination is finished additional accurately and saves time.

b. Our mechanism may be used for path following additionally by dynamic the wheels and sensors.

CONCLUSION

This paper discusses the crucial safety techniques for high-speed train operation setting supported the train system. so as to confirm safe operation of trains, we have a tendency to propose a wireless network access framework in keeping with the observation network of encompassing setting and also the readying of transition network to avoid collision of trains and obstacle detection. System has ability to pin purpose the situation associated different attributes of an operational train in a cheap correct manner. The goal of this work is to style and implement a price effective and intelligent full-fledged and wireless based mostly Train opposed Collision and detection System to avoid accident.

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