

**ADVANCED RAILWAY SIGNAL SYSTEM FOR SAFETY**Prashant Patil¹, Gayatri Suryawanshi², Dipali Patel³, Monika Ahire⁴, Puja Tamboli⁵¹Department of Electrical Engineering, D.N.Patel COE, Shahada²Department of Electrical Engineering, D.N.Patel COE, Shahada³Department of Electrical Engineering, D.N.Patel COE, Shahada⁴Department of Electrical Engineering, D.N.Patel COE, Shahada⁵Department of Electrical Engineering, D.N.Patel COE, Shahada

Abstract — Railway is the most popular and sociable 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 quite five billion Passengers of rail transport are multi-ethnic round the world per years. Railway facility plays a very vital role for business furthermore as for leniency and safe move in trendy life [1]. however at each flip, the train is facing surprising state of affairs in move due to wrong signal, wrong track shift, insecure grade crossing etc. that collision are occurred. As a result, lot of damages has been drained economic sector with ton of causalities that have an effect on our progress. But we can avoid this astonishing collision and take interference from the accident dynamically by exploitation the collision detection technology which might be created by inaudible sound with a special implanted system. By exploitation this technology will find the obstacle and bit by bit block the speed by initiating the air brake to prevent the train prior to the collision takes place.

Keywords—Railway, Signal, Safety, IR sensor, microcontroller.

I. INTRODUCTION

In recent years, with the event of high speed railway, speed and capability of the trains perpetually improved, and traffic density gets a lot of and a lot of serious. As a result the wants to the responsibleness and safety of the high speed train operation enhances increasingly [2]. The paper takes an attempt to develop an iterative computation method for predicting the dynamics of train collisions/crashes. The train safety has been an issue with the increasing number of incidents being reported that has caused death and injury. The answer may be a comprehensive GPS/GSM primarily based train pursuit system that provides correct, dependable and timely info to the controller [3]. The intrinsic GPS module identifies the train location with a top accuracy and transfers the data to the central system by means of GSM. The availability of this data permits the Train Controller to require correct choices as for the train location. Location information may be more processed to produce visual positioning victimization maps granting a decent read on train location. Positioning information alongside train speed helps the administration to spot the attainable questions of safety and react to them effectively victimization the communication ways provided by the system. In addition, this work proposes a system that monitors the track ahead of a train for obstacle detection victimization multi sensing element setup. If an obstacle is detect, the inherent GPS module identifies the train location with a maximum accuracy and transfers the knowledge to the central system by means of GSM. The supply of this info permits the Train Controller to require correct choices as for the train location [4].

II. LITERATURE SURVEY

Sandeep Patalay in gave a basic approach of however the device network may well be utilised in railways. Use of sensing element nodes with a special node known as driving node at the engine, entryway node Associate in Nursing a Base station might reach a design required for this situation. The sensing element nodes might sight the events occurring and will be triggered. The sensing element node reports the events to the bottom station that might more take actions that depends on the applications. [5].

III. CIRCUIT DIAGRAM

In this paper, there are two set of IR sensor units fitted to the two sides of the train. The IR transmitter and IR receiver circuit is used to sense the cracks. It is fixed to the front sides of the train with a suitable arrangement. When the battery provides the ability to the microcontroller it starts the motor rotation in forward direction. Once a crack is detected by the IR detector the vehicle stops quickly, and therefore the GPS receiver triangulates the position of the vehicle to obtain the Latitude and great circle coordinates of the vehicle position, from satellites. The Latitude and great circle coordinates received by GPS are regenerate into a text message that is completed by microcontroller. This message is then forwarded to the authorized person by means of SMS [7].

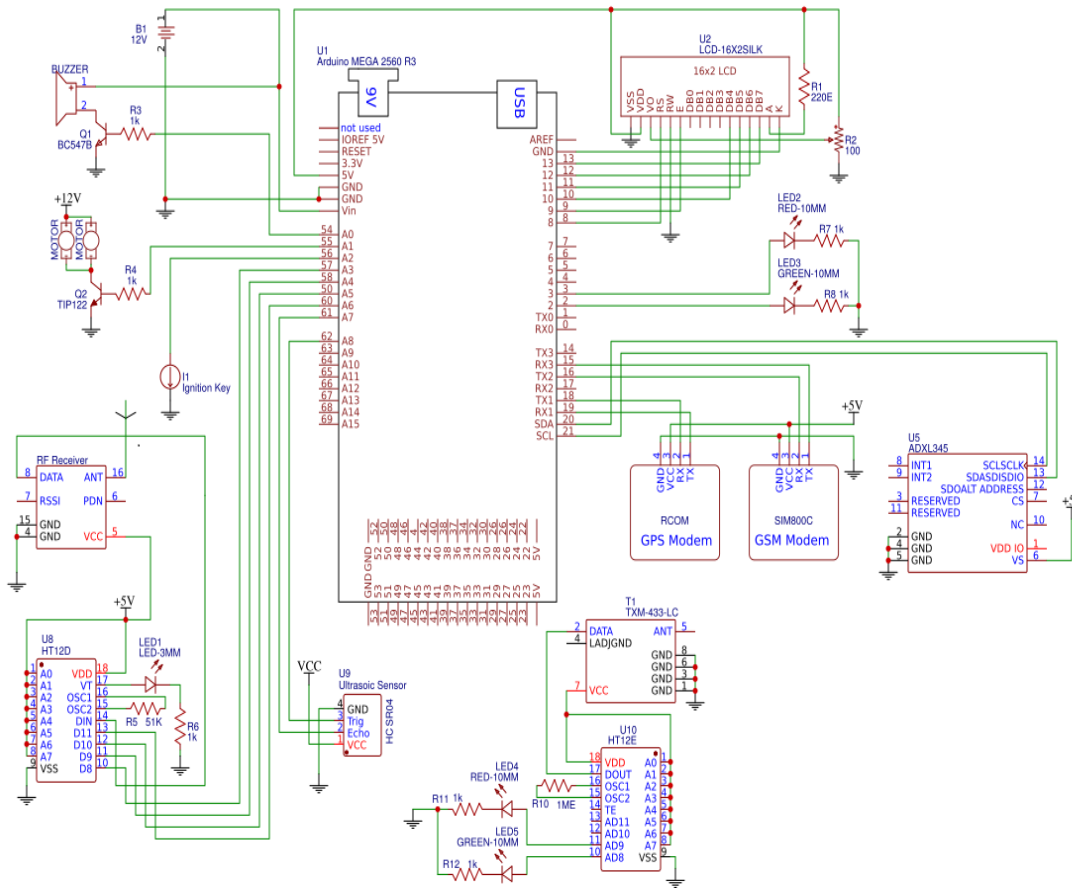


Fig-circuit diagram of Railway Signal System

1. The functionality of the paradigm starts with the Infrared sensor.
2. Once the vehicle is begin, it moves on its way. The Infrared Obstacle sensors sense the condition of the tracks.
3. Once a determination of crack is detected by the Infrared detector the vehicle stops quickly, and also get the coordinates of auto location through the global Positioning System (GPS), this position of the vehicle is received and also the Latitude and meridian coordinates of the vehicle position from satellites.
4. The Latitude and meridian coordinates of auto is received by international Positioning System (GPS) and square measure born-again into a message that is completed by microcontroller. iv. The GSM module sends the message to relevant authority and controller show the message on LCD additionally.
5. Once the message has been effectively sent, the vehicle restarts its movement forward depending on the type of crack.

At Normal Condition:

The IR transmitter sensing element is transmittal the infrared rays. These infrared rays area unit received by the IR receiver sensing element. The Transistors area unit used as Associate in nursing electronic equipment section. At traditional condition semiconductor device is OFF condition. At that point relay is OFF, in order that 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 because of 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 soon as the crack detected by the system the TSOP sensor reflection will be equal to zero and the engine will be stopped automatically. Another TSOP sensor is used to examine the pit on the way of the railway track. When this output is high then it is concluded that there is no pit in the track. But if any pit is detected by the sensor the output of the sensor given to the microcontroller will be zero and again the microcontroller will stop the robot. When a crack is detected by the Infrared detector the vehicle stops quickly, and also the GPS receiver triangulates the location of the vehicle to receive the Latitude and great circle coordinates of the vehicle position, from satellites. The Latitude and great circle coordinates received by GPS area unit reborn into a text message that is completed by microcontroller and it sends SMS of the location to the authorized person as an alert.

Also an accelerometer is interfaced in the system used to monitor the X and Y position of the train. This is used to check the falling condition of the train due to slipped of tier. The ADXL335 gives complete 3-axis acceleration measurement. This module measures acceleration at intervals vary ± 3 g within the x, y and z axis. The output signals of this module are unit analog voltages that are unit comparative to the acceleration. The accelerometers provide its output to the Arduino where the Arduino converts and compares the info with threshold price and makes the choice the vehicle has fallen on that facet and sends SMS to the predefined mobile variety through GSM electronic equipment. The system consists of an ultrasonic sensor for the detection of animals present on the track during the travelling of the train. The sensor transmits associated unbearable wave associated produces an output pulse that corresponds to the time needed for the burst echo to come to the device. By measure the echo pulse breadth, the space to focus on will easily be calculated. This ultrasonic sensor is implemented on the front side of the train for the detection of the animals. As soon as the sensor detects the presence of the animal it sends signal to the microcontroller. The microcontroller receives the signal from the sensor and stops the train immediately and also enables the Buzzer to make sound so as the animal will run away from the track.

In case of foggy environment the driver of the train unable to see the signals clearly due to which the serious problem may be occurred. To avoid this condition we have designed a different signalling system using RF transmitter receiver pair. In this system a RF transmitter is connected to the signals of the train on the track. And the receiver is connected to the train. The RF transmitter sends signal continuously. Once the receiver connected to the train comes in the range of the transmitter, it starts receiving the signal. The transmitter sends particular binary code for each Red and Green colour. The receiver receives the data and decodes it. This data then fed to the controller, the controller compares the data with predefined code and enables the Green LED if code received for Green or enables Red LED if received code is for Red one. The moment the Red indication is enabled by the system the train will stop automatically by the system [8].

III. ADVANTAGES, DISADVANTAGES

3.1 ADVANTAGES

1. Establish management structure supported performance analysis and observance method.
2. Enhance the share of potency.
3. Facility to send alerts/warnings to explicit train drivers on potential collisions, misadventure through the system.
4. Practicality to get time-distance graph for trains which might be won't to management and set up the train movements.

3.2 DISADVANTAGES

1. Delay may occur in sending message due to network problem sometimes.

IV. CONCLUSION, FUTURE SCOPE

4.1 CONCLUSION

This paper discusses the significant safety techniques for high-speed train operation environment based on the train control system. In order to confirm safe operation of trains, we tend to propose a wireless network access framework in line with the observation network of close atmosphere and therefore the preparation of transition network to avoid collision of trains and obstacle detection System has capability to pin purpose the placement associated different attributes of an operational train in a cost-effective correct manner. The goal of this work is to style and implement a value effective and intelligent full-fledged and wireless primarily based Train opposing Collision and detection System to avoid accident.

4.2 FUTURE SCOPE

1. We can convert whole this system IoT based to monitor all the parameters live through internet.

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