International Journal of Research Studies in Science, Engineering and Technology
Volume 6, Issue 2, 2019, PP 54-60
ISSN 2349-476X
DOI: https://doi.org/10.22259/2349-476X.0602008

Recognition of Train Collision Evasion Based on Sensor

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ABSTRACT

Train collisions are on the rise as a result of a lack of intelligent procedures in the trains and faulty control signalling from the Train Traffic Control Station (TTCS). To detect the presence of trains on the same track, the Train Tracking Chip (TTC) and Train Identification Chip (TIC) modules are used. The signals from the moving train are sent to the TTCS and the stopped trains on the same track via the GSM network. This method can be used to determine if the trains were headed for a rear-end or head-on collision. The TTCS sends out control signals that cause trains to stop or move. Collisions caused by the above steps can be foreseen and controlled using the proposed model. Those who collided head-on

Human negligence causes rear-end collisions, thus these conditions are more prevalent in our country. The Rail Safety Act governs the safety of most rail systems, such as heavy and light rail, as well as most public and private sidings, tramways, and tourism and historical rail activities. The Melbourne heavy rail system, Melbourne tram and light rail networks, Victoria's regional standard and wide gauge rail networks, and regional tourism and historical railroads are all covered by the Act. Railroads in mines, amusement and theme park railways, and slipways are thus excluded from coverage under the Act. This railway has significant responsibilities in terms of protecting and preventing destruction in its path. However, there is still a significant amount of train traffic. Collisions occur as a result of a lack of awareness.

INTRODUCTION

The Railway network is the world's biggest transport system. The Indian Railways is one of the largest railway networks in the world. Now days, we saw number of accidents occurred in railways. The accidents were occurred due to track cracking and not identified the opposite trains on the same track at the right time. When the train met with an accident maximum people lose their lives. Most of the accidents were occurred with negligence of humans and without proper communication from Train Traffic Control Station (TTCS).to prevent this problem we identified a sensors which will Identify the railway track cracks and identify the opposite train in the same track within a short time. The purpose of the project is to develop and design a low-cost system with high integrity and reliability for enhancing to prevent the train‘s collision in adverse weather situations, such as a foggy or rainy and identify the track problems. In India railway network communication is the largest transport network. In 1853 railways are first introduced and it is nationalized in 1951.Most of the people travel by train daily. Annually 11 million passengers travel by train. But the journey is not safe, because lot of the accidents happened in railway network. There are 2 types of collisions.

- Head - on collisions
- Rear- end-collisions

The two types of collisions occurred because of human errors. A head-on collision means front end of two trains hit each other. Head-on collisions occur on the same track only. Rear-end collisions means a train hits the train in front of it. On an average for every minute at least one person dies in train crash. Annually 3 million people were seriously injured by these train accidents. The accidents were happened due to human and equipment failures, leads to safety violations. The railway board of India has referred last train accidents to implement an efficient and cost effective anti collision system. Kankan railways implemented an anti collision device. But it fails on taking active inputs and lack of communication. To provide safety to human lives and to reduce the accidents we developed a new product. Using this proposed system we can identify the both head –on and rear- end collisions and can be controlled. In this paper the scope of study which is needed for the completion of this

project involves the following criteria:

- Architecture of LPC2148 knowledge
- ARM7 programming in C language.
- The study of modem functions which involves Wi-Fi commands.
- The circuitry and devices that is needed to construct the devices and establish the necessary communication between the devices.
- The study of Wi-Fi module along with its commands.
- The communication between Wi-Fi modem, train module and the microcontroller will be taken by the serial communication.

In this paper chapterII study the problem statement of this paper and chapterIII shows the proposed system and chapter IV shows results and chapterVI shows the conclusion of the paper. human error or carelessness may lead to severe disasters as noticed in the past. IR sensors have limitations due to the geographic nature of the tracks. The ACD system also is found to be ineffective as it is not considering any active inputs from existing Railway signaling system, and also lacks two ways communication. Capability between the trains and the control centers or stations, hence has been later decommissioned the system is costly and complicated to implement.

PROBLEM STATEMENT

Implementaion of Zigbee Based Train Anti-Collision and Level Crossing Protection System for Indian Railways

Implementation of an efficient ZIGBEE based Train Anti-Collision and Level Crossing Protection System for Railways is being proposed in this paper. The system has four sub modules namely, Train Module, Control Centre Module, Signaling Post Module and Level Crossing Gate Module. A safe distance of 1 Km has been maintained between the trains after applying the emergency brake in case of collision detection. Based on the studies, it is observed that even for two trains travelling at 140kmph, the safe distance after automatic braking under normal conditions is approximately 920m. All sub modules have been designed and simulated using Proteus electronic simulation package and the prototype is implemented. It is expected that if this system is implemented widely, train collisions and accidents at the Manned/Unmanned level crossing gate can also be avoided in the future. Railway is an Eco-Friendly and Popular mode of Transport in most major cities of the World. Train accidents occur normally due to safety violations resulting from _human errors or limitations‘ and _equipment failures‘ loosing precious lives. The Ministry of Railways (Railway Board), Govt. of India has referred Ten Train Collisions in the past for development of an efficient Train Anti-Collision system and the need for research in this field. Konkan railways have proposed and implemented an Anti – Collision System.

The system did not take any active inputs from existing Railway signaling system, and also lacked two ways communication capability between the trains and the control centers or stations, hence was later decommissioned. The goal of this work is to design and implement a cost effective and intelligent full-fledged Train Anti Collision System to prevent the train collisions. It aims to efficiently integrate into the existing signaling system and avoid accidents in manned as well as unmanned level crosses, without changing any of the existing system implemented in Indian Railway. Presently, emergency may be passed through traditional telecommunication systems like Walkie-Talkies or other communication devices, Collision avoidance systems on same track using IR modules and ACD by Konkan Railway. But each of these systems has its own advantages and disadvantages. In the traditional communication method

Prevention of Train Accidents Using Wireless Sensor Networks

This method is concentrated on predicting the major cause of railway accidents that is collision on the same track. The primary goal of this anti-collision system is to identify collision points and to report these error cases to main control room, nearby station as well as grid control stations. So that if any collision likely to occurs then this system will help to avoid such conditions by giving an alarm to concern units. Implementation of an efficient ZIGBEE based Train Anti-Collision for railways are being proposed in this paper. A safe distance of 1 Km has been maintained between two trains after applying the emergency brake in case of collision detection. Based on the studies, it is observed that even for two trains traveling at 140kmph, the safe

distance after automatic braking under normal conditions is approximately 920m. All sub modules have been designed and simulated using Proteus electronic simulation package and the prototype is implemented .It is expected that if this system is implemented widely, train collisions and accidents can be avoided. The up-gradation is also done by following the idea of checking cascaded connection of the compartments in sequence manner. Zig-Bee is used in applications that require a low data rate, long battery life, and secure networking. Zig-Bee has a defined rate of 250 kbit/s, best suited for periodic or intermittent data or a single signal transmission from a sensor or input device. Applications include wireless light switches, electrical meters with in- home-displays, traffic management systems, and other consumer and industrial equipment that requires short-range wireless transfer of data at relatively low rates. The technology defined by the Zig-Bee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth or Wi-Fi.

Train Tracking and the Signaling System Using Infrared and Radio Frequency Technology

This paper considered the secured level crossing Signaling system and Train tracking system. It is adopted a switching logic methodology to meet the challenges of the tracking system. This work also focused to map the train on the display screen. If the train moving close to the level crossing system the signaling system causes to release the green signal that causes to close the rail gate to avoid the unauthorized entry on the rail track. The open state of the gate is influenced by the signaling system by means of a Red‘ colour signal. The train is allowed to move on the track only by considering the green signal. The rail track is organized with four stop positions. Stop 1, stop 2, stop 3 and stop 4. The locations of the train at various stop positions are sensed by using IR sensors. The detected signal is transmitted to the control room using RF transmitter operating at 433 MHZ. An Atmel micro controller is used to regulate the entire process to meet the desired state of the work. This proposed methodology had been successfully implemented on the 30 feet length of the scaled model of the rail track in the laboratory.

The system results progressive response while tracking the position of the train. The results are recorded and analyzed. The proposed system may keep alert the monitoring mechanism. So, the collision of the train and unexpected human errors can be minimized. Indian railways daily transporting 14 million passengers by 2 million kilometer rail track per day. Safety is outstanding significance to Indian railways. Safety and reliability are closely linked components. Deterioration in the safety mechanism is preceded by increasing the number of failures. A man machine interface system inherently may enhance the reliability of the equipment. This is the most significant factor in the safety of the rail transport system. Collision avoidance mechanism, Secured level crossing system and signaling system having significance importance in railway system. Tracking the position of the train using Global position receiving system is proposed to be implemented in motor transport system. Indian railway system is looking forward to adopt the tracking methodology to have prior state of the train before arriving to the station. This component is having wide scope of research specifically for Indian rail system.

Railway Disaster Prevention System using GIS and GPS

The proposed system contains two major components of Geographic Information system. The static data contains detailed mapping of the rail net work as a spatial database in GIS platform. The Dynamic data regarding the movement of rail traffic collected through the GPS equipment installed in train, signaling cabin and station supervisor‘s cabin. The GIS enabled ―Rail tracing system‖ takes the input signals from the nearby GPS installed in trains and continuously displays the positions of the trains in the vicinity of the interested area to enable the decision makers of signaling to view the realistic situation. The real time data can be obtained by using internet services and centralized through which all the station are linked. This dynamic viewing of realistic position of the trains avoids dependency of the signaling crew only on the oral communication. Thus the human error in communication can be minimized. For further enhancement of the system the signaling decisions taken by the crew can be crosschecked with the continuous monitoring of real time data available within the system by any superior prior to implement the

decision. This can be done by digitizing the tracks which will help us in locating the real time position of the train, using Arc View Gis software.

Locating the site of accident becomes very simpler as inputting the approximate Latitude and Longitude can do it, or the site can be searched by the names of the locations nearby. © GIS Development Map World Forum Hyderabad, India. The accessibility can be analyzed more realistically with aid of the road net work maps in the vicinity of site of accident. Finding out the required resources becomes simpler, speedy and accurate as the data base contains the information about almost all the resources available like Police, Administration, revenue authorities, medical facilities with details about the number of beds, specialization etc, fire fighting facilities with available infrastructure, and other resources like voluntary organizations and special police forces etc. Finding out optimum routes between different resource locations to accident site. The system also helpful in topographic and demographic analysis to improve the effectiveness in the planning and implementation activities. The system also provides buffer analysis to facilitate effective planning and utilization of the available resources in the required buffer zones of the affected areas. • The system also provides very easy means to add and update the records of the database so that the regular updating can be simpler task.

Train Collision Avoidance by Using Sensors

In the proposed system we are using sensor based identification system to prevent these accidents. The proposed model contains Ultrasonic sensors (UV sensors), Infrared sensors (IR sensors), microcontroller and GSM technology.GSM technology is used for communication purpose. Using this GSM we can provide wireless communication. UV sensors are used to identify the presence of objects. IR sensors are used to identify the track cracks. DC Motor acts as a train. This model also have one 16* 2 LCD (Liquid Crystal Display) display. It displays the information on the screen. All these components are connect to the micro controller. This is the main controller. It belongs to the ARM7 architecture. Here we are using serial communication. In serial communication we transfer one bit at a time. For more distances serial communication is better.

Railway Anti-Collision System Using Dslr Sensor

Railway collision is a major problem so this work is concentrated to avoid major and small causes of train collision on same track. Proteus software helps to route mapping and direction for the railway. The primary goal of our anti-collision system is to identify such collision points and to report these error cases to main control room and substation .using this electronic software and ultrasonic /DSLR (Digital Single-Lens Leflex) sensor defense a fog problem because of ultrasonic distance sensors range. To build this system, advanced sensing technology, long distance communication system (RS 485 protocol), microcontroller (AVRAT8Mega) and wireless Communication protocol has been used.

PROPOSED SYSTEM

In the proposed system the Train Identification Chip (TIC) inbuilt with GSM (Global System for Mobile Communication) module is used to communicate between the train and the Train Traffic Control Station. The TIC in the train and TTC on track at certain distances can make the assurance of train safety at each check point crossings. In the TTC [Train Tracking Chip] we have fixed the scratch pad. This scratch pad is the sensor which will give necessary signals to tracking of the train. The scratch pad is done by defining 9 pins, this pins are spring type will access the moving train. The pin holds the data about the checkpoint, train track number and direction of the moving trains. The total TTC module is placed in the railway track. The TIC module is a module which is placed in the moving trains which consists of a scratch reader. This GSM has the link between the train and the control station and vice versa. This module in the train when moving, the scratch reader will scratch the scratch pad in the track. This will retains at every checkpoints. In each checkpoint the details of the trains are communicated to the control station therefore the collision between the trains can be prevented. The messaging between the Train and TTCS is controlled by ARM.

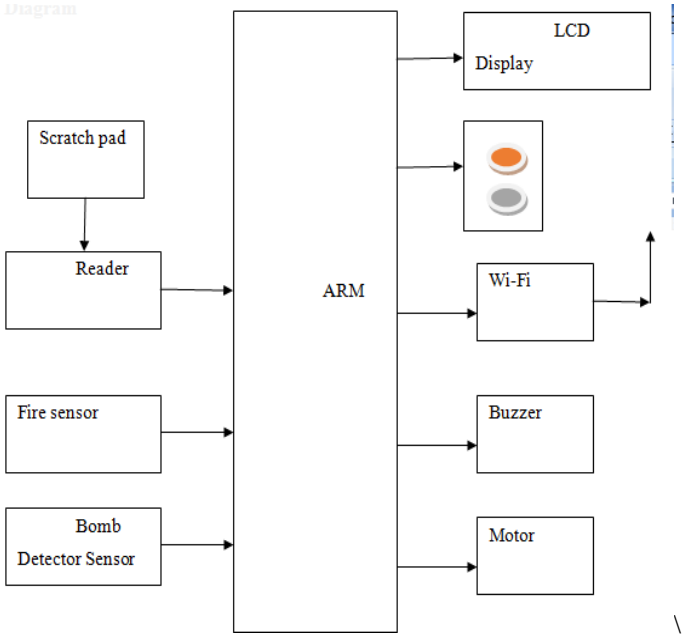

Fig1. *Train Module*

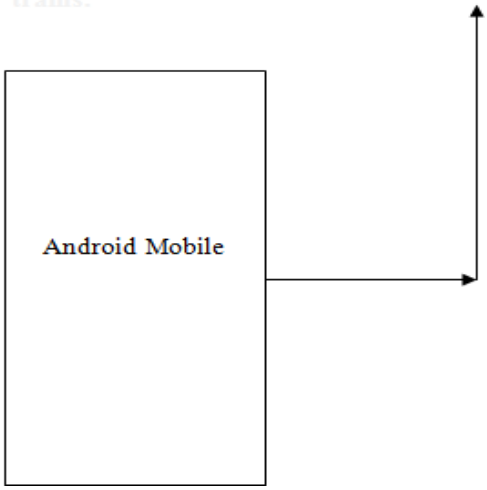

Fig2. *Control Station/Other Trains*

RESULTS

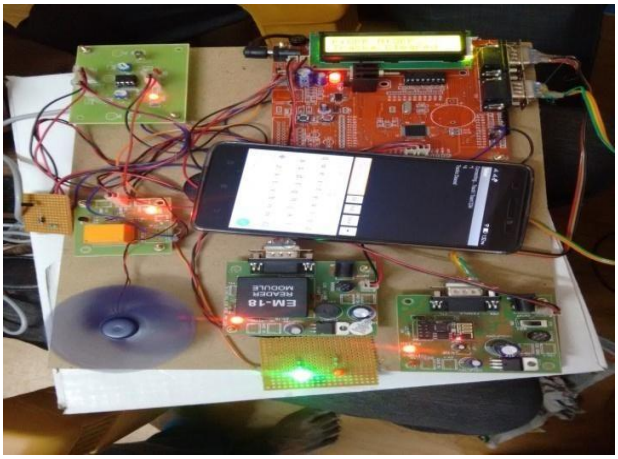

Fig3. *Identification of Train in Track*

The above figure depicts the identification of train on the track by using the RFID reader and the status is displayed on LCD screen, at the same time status is sent to the mobile by using the wifi technology.

Fig4. *Track Cleared Message Displayed on LCD When Train Went Out on Track*

Whenever the train is went out from the track, the clearance message is sent to the mobile by using the RFID reader. The clearance message is displayed on the LCD screen.

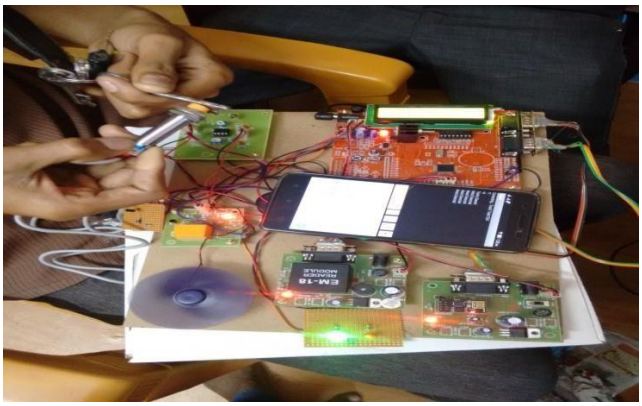

Fig5. *Identification of Metal Object by Using Bomb Sensor*

Whenever the bomb or any disposal materials are identified by the bomb detector sensor and immediately the status is sent to the control station and also displayed on the LCD screen in the train.

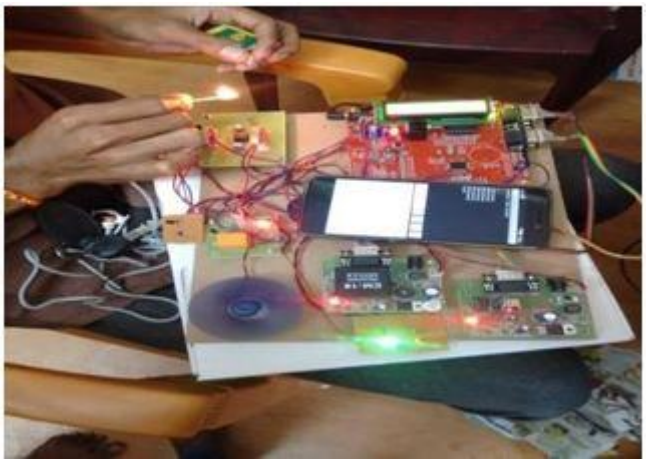

Fig6. *Identification of Fire using Fire Sensors*

Whenever the fire incident is happen in the train due to the short circuit or any other sources, it is identified by the fire sensors in the train and the status is sent to the control station and also displayed on the LCD screen in the train.

CONCLUSION

We have implemented a Train Collision Avoidance System Using Sensors and Wi-Fi Technology and also Detected the Fire Accidents and Bomb Blasted using Fire sensor and Bomb Detector Sensor. It is a low cost, low in power conception, compact in size and

standalone system. In this project, train collision avoidance system has been designed, and tested. The communication between the microcontrollers ARM 7and Wi-Fi is tested. It has been estimated that if the system is implemented in the railways networks, train accidents can be prevented. This collision between trains is calculated and colliding trains were alerted. By this project train collision is stoped. Many human lives and many properties can be saved if this system is implemented. The scenario of accident in Trains due to collision will be controlled with the help of this project.

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Citation: *Kondragunta Sri Latha et al, "Recognition of Train Collision Evasion Based on Sensor", International Journal of Research Studies in Science, Engineering and Technology. 2019; 6(2): 54-60. DOI: https://doi.org/ 10.22259/2349-476X.0602008*