

OBJECT COLLISION AVOIDANCE WITH TRAIN USING ANDROID BASED KIT (OAK)

S.Balaji¹, I. Sahanaz Begum², R.Lavanya³, K.Chitharthani⁴

¹PG Scholar, Computer Science and Engineering, University College of Engineering, (BIT Campus), Anna University, Tiruchirappalli, TamilNadu, India.

²Assistant Professor, Computer Science and Engineering, University College of Engineering, (BIT Campus), Anna University, Tiruchirappalli, TamilNadu, India.

³PG Scholar, Computer Science and Engineering, Parisutham Institute of Technology and Science, Thanjavur, Affiliated to Anna University, Chennai, Tamilnadu, India.

⁴Assistant Professor, Information and Technology, Parisutham Institute of Technology and Science, Thanjavur, Affiliated to Anna University, Chennai, Tamilnadu, India.

Abstract

Railways are providing Eco-Friendly transport system for the mankind. Train accidents can happen very often due to safety violations which results from human errors or limitations in the operation of the existing system and also due to equipment failures'. Our project is fully concentrating on avoiding train collisions and ensures passengers safety through android system integrated with ultrasonic and MEMS sensor based control system inbuilt in the train. Emergency alerts can be sent through traditional tele-communication systems such as Walkie-Talkies or other communication devices. However, Collision avoidance systems using IR sensor and anti collision device are being used by the Railway sector is still facing some problems due to the consideration of some factors such as cost-effectiveness, despite it is increasing the amount spent on implementation of the devices. Currently, to some extent the Konkan Railways has put efforts to provide train safety through Zigbee and Infrared based sensor concepts. Even though it has the disadvantages such as limited range of signal covered and difficulty in their implementation in the real world it is still being used. Hence these drawbacks can be overcome in our project by using android based electronic component for the fast communication with latest technology (ARM-7 LPC 2148) to avoid collision and it gets operated through the GPS /GSM concepts. Here RTOS is ported with ARM7 which deal with much more complicated tasks. Our work will be accepted worldwide because of its effectiveness and its robust communication features.

Keywords: Global Positioning Satellite, Global System for Mobile, Micro Electro Mechanical System, Advanced RISC Machine.etc...

1. INTRODUCTION

With the accrued demand for railway services, the overall railway infrastructure has been apace developing within the past 20 years, together with its communication systems Walkie-Talkies or different communication devices. Collision dodging systems on same track exploitation Infrared Sensors (IR) and opposed Collision Device (ACD) by Konkan Railway. The ACD system was statically mounted. Therefore it's found to be ineffective and later it had been intuitive. After geographical sensors have also been used, this makes use of satellites for communication. But the system is more costly and complicated too. The major goal of this project is to avoid the communication delays and provide an efficient way to avoid the collision among the trains. The key feature of this system based on Android, Linux based operating system is to overcome the short range communication. Android was developed by Google and members of Open phone Alliance.

Due to Android's open supply nature, straightforward and powerful fast application development tool for developing native mechanical man applications while not long. Its Performance is comparable to applications written with Java, Object bound programming language. The humanoid Open supply Project is an initiative created to guide development of the humanoid mobile platform. The humanoid platform consists of the OS (OS), middleware and integral mobile applications among GPS communication for establish the location of the train so as to avoid the collision and alert the motive force through mobile communication.

2. LITERATURE SURVEY

In this paper [1], Zigbee based automation also provides only a shorter range of communication. It performs the communication based on gate level signals. If the signals are not get transmitted correctly, then it unable to sense the trains

in the same track. In paper [2], automatic train protection that helps to forestall collisions with speed restriction and applying brakes. Safety analysis and analysis of automatic train protection with simulation is required to boost the system usability within the business space and offers a style of automatic train protection machine for radio-based train system. In paper [3], Inferno package that could be a radically simplified and revolutionary approach can create a trial to create the essential PDA applications in Inferno setting ported on ARM processor. In paper [4], Banica et.al introduced the ARM success attributable to its outstanding performance, power (MIPS/Watt) rating and this can seemingly still be its most important benchmark for future applications and architecture's high performance and low power operation. In paper [5], IR sensors have limitations due to the geographic nature of the tracks and also used along with Light Emitting Diode-Laser Dependent Resistor. The Anti Collision Device system (ACD) by Konkan Railway also lacks in communication capability between the trains and the control centers or stations, hence it has been later decommissioned. These methods of identification of problems have taken more time to identify the problems.

3. EXISTING APPROACH

In the existing system Konkan railways have planned associate and enforced an opposed Collision System. The system failed to take any active inputs from existing Railway signal system, and additionally lacked in 2 ways of communication capability between the trains and also the management centers or stations, thence was later decommissioned.

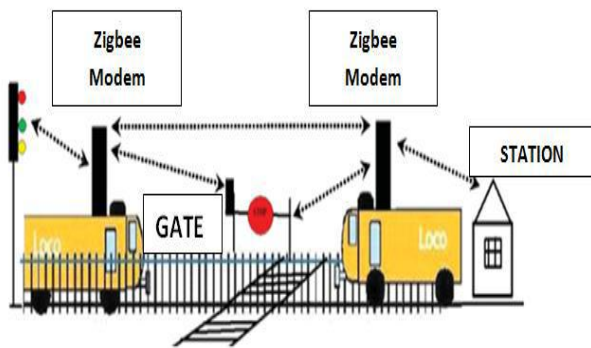


Fig -1: Existing System

The ACD system is also found to be ineffective because it does not considering any active inputs from existing Railway sign system, and additionally lacks 2 ways in which communication capability between the trains and also the management centers or stations, thence has been later decommissioned.



Fig -2: Existing Technology (Static Device)

Later geographical sensors have additionally been used that makes use of satellites for communication. However the system is very complex to implement. In current system, human error or carelessness might result in severe disasters as noticed within the past. Short vary of communication, severe harm to the trains and plenty of individuals were harmed and died. Manual work additionally concerned to avoid collision isn't effective.

4. PROPOSED WORK

The ARM7 LPC2148 is getting connected with GSM which is operate under the power supply of 3volt because it have the boosting variable capacitors for regulate the current as it needs. When the objects in the track are monitored by the ultrasonic sensor which uses the sound waves travel to sense the object. The waves send by the emitter to bounce off an object and come back to the receiver.

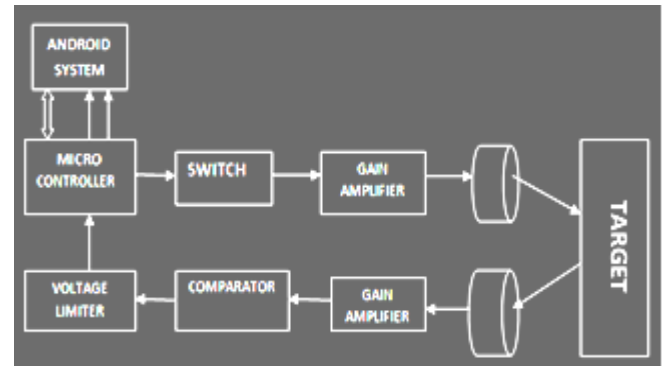


Fig -3: Proposed System Architecture

Then the RF Module is used to transmit and receive signals from one section to another. If any objects on the track is detects by an ultrasonic sensor, RF receive signal from train section interface with µ.GSM is used to send SMS to authorized persons as guard, controller station and driver. In this prototype based system, the ARM7 LPC2148 microcontroller along with the sensor which is used to sense the object in the track before 2feet.When the sensor detects

that object, it having the sensational threshold of manageable and unmanageable objects.

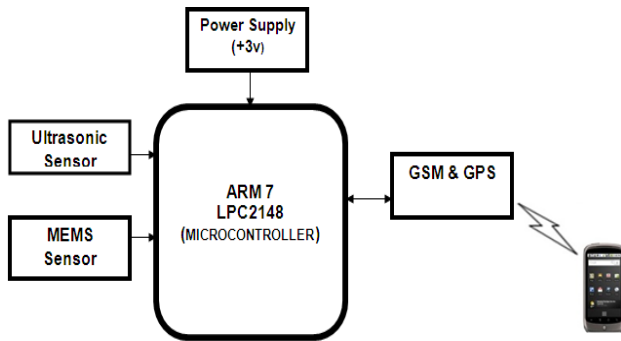


Fig -4: Proposed Block Diagram

If the object is a manageable object then it will not pass the information to anywhere else. Otherwise if it is an unmanageable object, while it gets detected it will send the information through alert system and also forward the message to the mobile in order to indicate the driver, guard, controller station and also to the driver to know the particular status of the track.

5. PROJECT DESCRIPTION

This Object Collision Avoidance for Train System consists of ultrasonic sensor, algorithm for sensing the collision, GSM module.

5.1 Ultrasonic Sensor Module

The module mechanically sends the wave and mechanically sight whether or not receives the returning pulse signal. If the signals returning, through outputting high level and therefore the time of high level continued is that the time of that from the unbearable transmission to receiving.

5.2 The Algorithm for Sensing the Collision

When the collision is detect by using ultrasonic sensor which having the capacity to emit the waves immediately for transmitting and receiving in order to detect the obstacles in the track. The arm controller gets connect with the sensing module to sense the objects in the track.

5.3 GSM Module

When the collision is detected through the collision algorithm, the GSM module sends the message to the driver in order to prevent the collisions in the track.

5.4 GPS Module

The sensing information can be transmitted via GPS interfaced with the ARM microcontroller to identify the particular location of the obstacle where it is located can be previously

identified and the warning can be given to the driver by means of alarm in order to stop the train.

5.5 MEMS Sensor

Mems is a technology, which is used to detect the tilt of the movable train and it makes a alarm to the driver. They can able to take precautionary measures to save the passenger's lives. The acceleration of a moving object can be determined by using the following formula:

$A = dv / dt = d^2r / dt^2$ wherever, dv is that the amendment of the velocity/speed over time dt that is capable the distinction between the initial speed and therefore the final speed of the thing, the dv can be defined as shown below: $dV = v1 - v0$ where $v0$ is the initial velocity/speed while $v1$ is the final velocity/speed of the moving object.

6. REALIZING

When a train reaches a lane, the obstacle present in the track is observed by the sensor. The function of the microcontroller in this application is to act as an interpreter between the hand gesture and the end application. According to the mobility of the Obstacle it can be classified into manageable and unmanageable category. If it's a manageable object (leaf, paper...) then it can be detected alone, but if it's a unmanageable object then the alert data is sent to the Driver, guard and control room .Here we use LPC 2148 which consume very low power for its operation purpose. The regulator will take 3V power supply for its operation, through GSM Module the detected information is sent to the Android Hand held devices. In case of emergency purpose through GPS module the control room persons can easily point out the geographical location of the train and rescue operation can be carried out in robust and effective manner. Abnormal train running can be identified by use of the MEMS technology with this micro kit and if this situation occurs then Buzzer get activated so that the abnormal driving can be overcome. The train can be activated in the traditional system itself While the passenger safety can be attained through the train obstacle collision warning system is implemented in a Micro kit oriented Android System and basically to check whether the vehicle is being driven to the destination in real time through the route deviation examination. The warning sign for abnormal running will be a buzzer sound.

7. EXPERIMENTAL RESULT

The scenarios of accident in Train are due to object collision. Our device detects the manageable and unmanageable objects in train track and sent the message to mobiles. The following figure:4 shows the implementation of our proposed work.

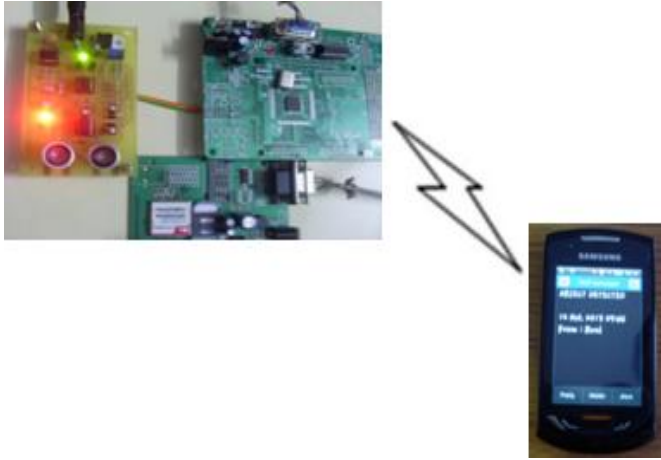


Fig-5: Implementation of our Proposed Work

8. CONCLUSIONS

In this OAK based Collision avoidance for Train System, which is paved the way to detect both the static and dynamic objects and also ensures passengers safety. This system is having the dynamic nature to detect the objects in the track. It offers a robust, secure and efficient mode of communication to prevent the collision. If it is a manual maintenance and monitoring of the track is very difficult and also it's not feasible one nowadays. This paper ensures the recent technology with cost effective.

ACKNOWLEDGEMENTS

First of all, we thank god for his blessings and grace on every success in our life. Because, everything goes on the way of creator. The success of any work lies in the involvement and commitment of its makers, this being no exception. At this juncture, we would like to thank our beloved staff members, parents, colleagues for their valuable guidance, technical support and thought-provoking questioning, who made this paper to be a reality.

REFERENCES

- [1] Arun P, Careena P, Madhukumar S, Sabarinath G Implementation of Zigbee Based Train Anti-Collision And Level Crossing Protection System for Indian Railways in International Journal of Latest Trends in Engineering and Technology(IJLTET)Vol.2,Issue1 January 2013 ISSN: 2278-621X.
- [2] Saurabh S.Chakole, Vivek R. Kapur, Suryawanshi Y. A. "ARM Hardware Platform for Vehicular Monitoring and Tracking", Communication Systems and Network Technologies, International Conference IEEE 2013.
- [3] Sehchan Oh, Yongki Yoon, Yongkyu Kim, Automatic Train Protection Simulation for Radio based Train Control System, Radio-Based Train Control Research Team, Korea Railroad Research Institute IEEE 2012.

- [4] Shubhangi Deshmukh & V.V. Shete," Developing ARM Based PDA Using Inferno OS" in International Conference on Computer Communication and Informatics IEEE 2012.
- [5] Sameer Darekar, Atul Chikane, Rutujit Diwate, Amol Deshmukh, Prof. Archana Shinde,"Track -ing system using GPS and GSM: practical approach", International Journal of Scientific & Engineering Research Volume 3, Issue 5, May-2012.
- [6] Teodor Neagoe, Ernest Karjala ,Logica Banica "Why ARM Processors are the Best Choice for Embedded Low-Power Applications "in 16th International Symposium for Design and Technology in Electronic Packaging (SIITME), IEEE 2010.
- [7] Bhatt, Ajaykumar A, "An Anti-Collision Device (ACD) Network A Train Collision Prevention System (TCPS)" in International Railway Safety Conference (IRSC) - Goa (India), October 2007.

BIOGRAPHIES



S.BALAJI is currently pursuing M.E in Computer Science and Engineering Discipline, University College of Engineering, Anna University-(BIT-Campus), Trichy TamilNadu. His current research interest is Embedded System, Wireless Communication, Software Engineering etc., His programming interests concerned in JAVA.



R.LAVANYA is currently pursuing M.E in Computer Science and Engineering Discipline, Parisutham Institute of Technology and Science, Thanjavur which is affiliated to Anna University-Chennai, TamilNadu. Her area of interests in Real Time System, Mobile Computing etc.,