Sensor Based Train Collision Identification and Avoidance System

Malyala Prabhakar
M.Tech (VLSI & Embedded Systems),
Siddhartha Institute of Engineering and Technology.

A. Ashok Babu
Assistant Professor,
Siddhartha Institute of Engineering and Technology.

Introduction

The accidents between trains are increasing due to negligence of intelligent techniques implemented in the trains and improper control signaling from the Train Traffic Control Station (TTCS). The Train Tracking Chip (TTC) modules and Train Identification Chip (TIC) modules are using to sense the presence of trains on the same track. The signals from the moving train are transmitted through the GSM network to the stationary trains on the same track and to the TTCS. By using this method one can determine whether the trains were heading for Rear-end collision or Head on collision. The TTCS transmits control signal to stop or move the trains.
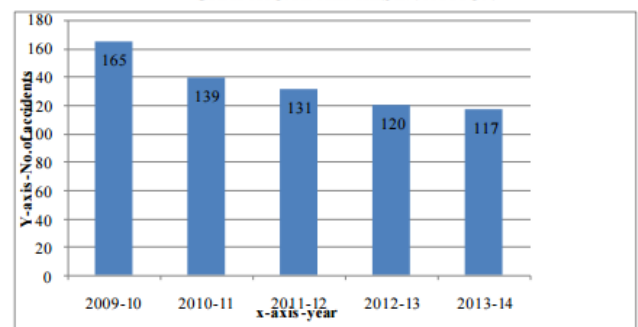
Existing system

The existing system uses traditional telecommunication systems like Walkie-Talkies or other communication devices. Due to human carelessness it fails some times. The Anti-Collision Device (ACD) is also another method introduced by Kankan railways. The ACD uses radio modems for communication and receive inputs.
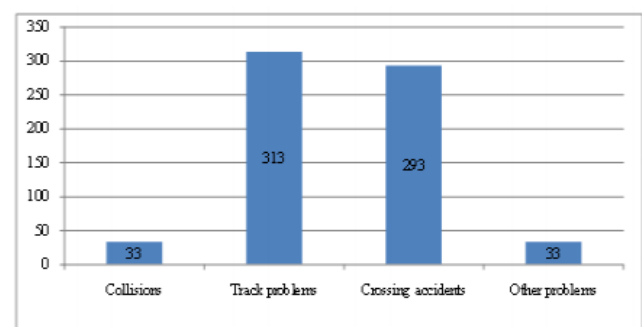

GRAPHICAL REPRESENTATION

Graph on accidents by year wise

Graph on number and Type of accidents

No. Of Train Accidents

Year	Collisions	Track Problems	Crossing Accidents	Other Problems	Total Accidents
2009-10	9	80	70	6	165
2010-11	5	78	53	3	139
2011-12	9	55	61	6	131
2012-13	6	48	58	8	120
2013-14	4	52	51	10	117
	33	313	293	33	

Drawbacks of ACD:

Ineffective: - it is ineffective because it does not receive inputs from railway system.

Communication problem:-The ACD does not provide proper communication between the trains and stations because it sees radio modems. To overcome this problem we have introduced a sensors based concept.

Proposed system

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'. As by the project is fully concentrating on avoiding train collisions and ensures passenger's safety through android system integrated with ultrasonic and MEMS sensor based control system inbuilt in the train. Ultrasonic sensor is used to detect the distance of other vehicle and mems sensor is used to identify the accident. RFID is used to identify the vehicle and GSM modem is interfaced to send the SMS.

Emergency alerts can be sent through traditional telecommunication 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.

Block Diagram:
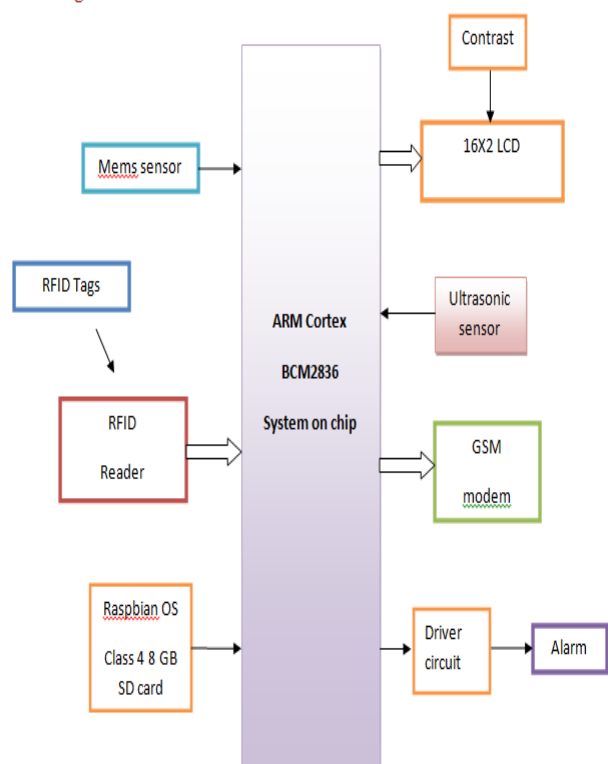
## HARDWARE MODULES
RASPBERRY-PI

The **Raspberry Pi** has a Broadcom system on a chip (SoC).

Features

- System Memory – 1GB LPDDR2
- Storage – micro SD card slot (push release type)
- Video & Audio Output – HDMI and AV via 3.5mm jack.
- Connectivity – 10/100M Ethernet
- USB – 4x USB 2.0 ports, 1x micro USB for power
- Expansion
- 2×20 pin header for GPIOs
- Camera header
- Display header
- Power – 5V via micro USB port.
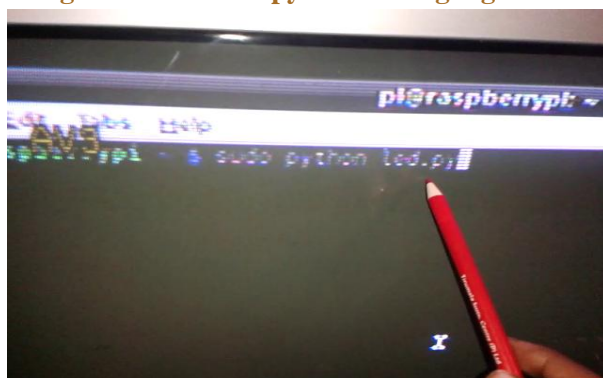- Dimensions – 85 x 56 mm

Basic Hardware of Raspberry-PI
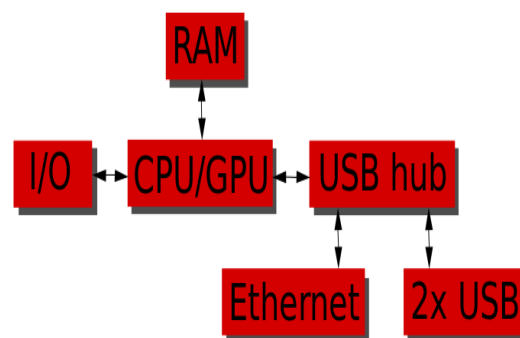
OS used in Raspberry pi is Linux
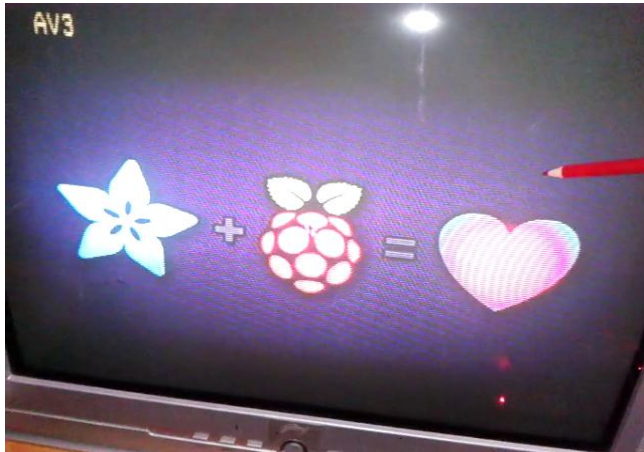
## Coding will be done in python/C language

RFID

Radio-frequency identification (RFID) is the use of a wireless non-contact system that uses radio-frequency electromagnetic fields to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. Some tags require no battery and are powered by the electromagnetic fields used to read them. Others use a local power source and emit radio waves (electromagnetic radiation at radio frequencies).
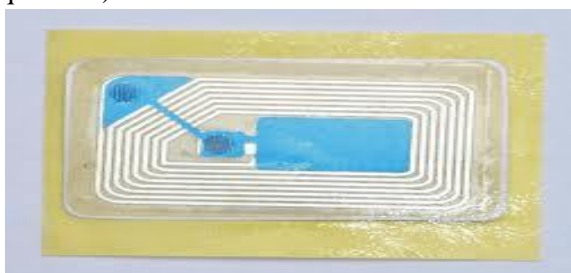
GSM
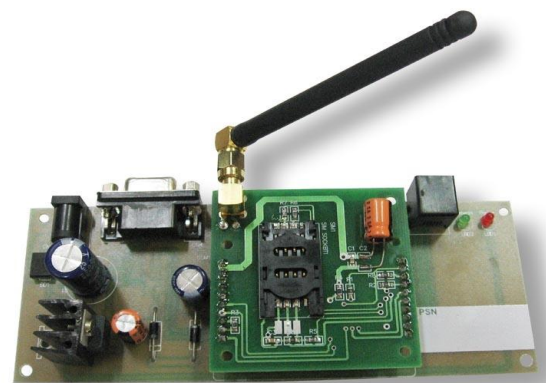
MODEM SPECIFICATIONS:

The SIM300 is a complete Tri-band GSM solution in a compact plug-in module.

Featuring an industry-standard interface, the SIM300 delivers GSM/GPRS900/1800/ 1900Mhz performance for voice, SMS, data and Fax in a small form factor and with low power consumption.

The leading features of SIM300 make it deal fir virtually unlimited application, such as WLL applications (Fixed Cellular Terminal), M2M application, handheld devices and much more.

1. Tri-band GSM/GPRS module with a size of 40x33x2.85
2. Customized MMI and keypad/LCD support
3. An embedded powerful TCP/IP protocol stack
4. Based upon mature and field proven platform, backed up by our support service, from definition to design and production.

Advantages

- Can avoid train collisions and save human lives
- Alerting of Trains and stoppage before collisions

Applications

- Implemented in Railways
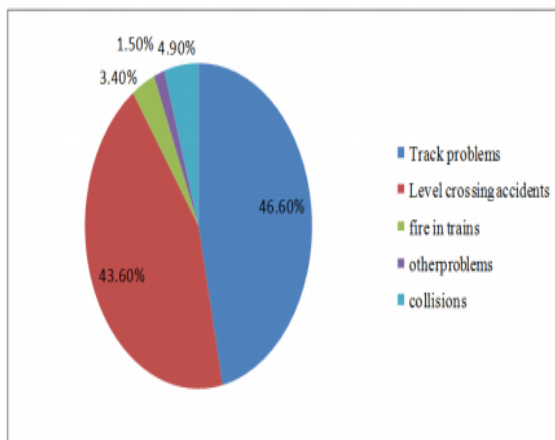
Type of accidents by percentage

Conclusion

Sensor based identification system for train collision avoidance has been implemented. Experimental work has been carried out carefully. The result shows that higher efficiency is indeed achieved using the embedded system. The proposed method is verified to be highly beneficial during transportation.

Results:
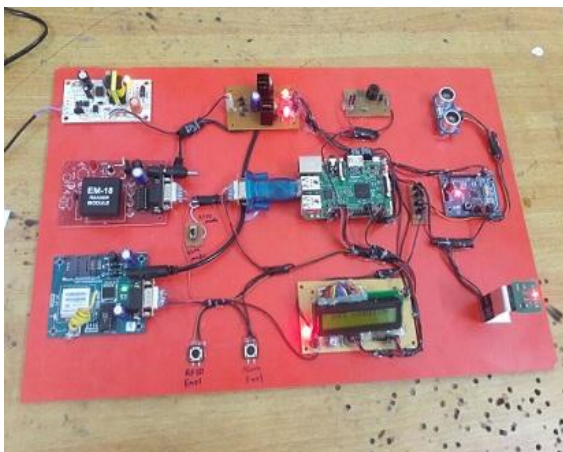
Hardware kit
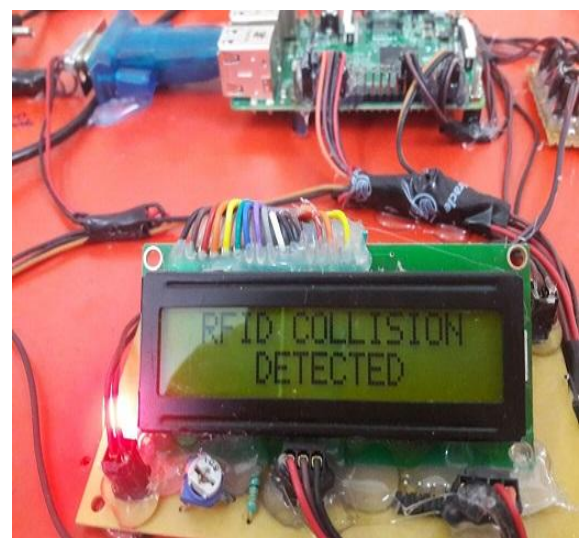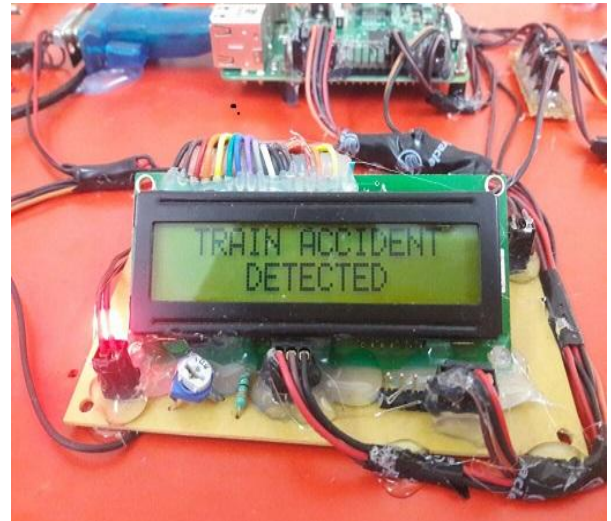
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Author Details

M. Prabhakar is a M.Tech (VLSI & Embedded Systems) student in Department of Electronics and Communication Engineering from Siddhartha Institute of Engineering and Techno-logy, Ibrahimpatnam, Hyderabad. His interest of field in Embedded Systems and Networking.
Email id: mprabakar57@gmail.com

Ashok Babu Amudapakula completed his B. Tech in ECE from Rao&Naidu Engineering College of Technology, ongole, affiliated to JNTU, Kakinada, A.P, India and M. Tech in DECS at QIS College of Engineering & Technology ongole, affiliated to JNTU, Kakinada, A.P, India. He is currently as an Assistant Professor in Electronics and Communication Engineering Department at Siddhartha Institute of Engineering and Technology, Ibrahimpatnam, Hyderabad. His area of interest are Digital VLSI Design & VLSI Image Processing.
Email id: ashokbabu45@gmail.com

Dr. D Subba Rao, is a proficient Ph.D person in the research area of Image Processing from Vel-Tech University, Chennai along with initial degrees of Bachelor of Technology in Electronics and Communication Engineering (ECE) from Dr. S G I E T, Markapur and Master of Technology in Embedded Systems from SRM University, Chennai. He has 13 years of teaching experience and has published 12 Papers in International Journals, 2 Papers in National Journals and has been noted under 4 International Conferences. He has a fellowship of The Institution of Electronics and Telecommunication Engineers (IETE) along with a Life time membership of Indian Society for Technical Education (ISTE). He is currently bounded as an Associate Professor and is being chaired as Head of the Department for Electronics and Communication Engineering discipline at Siddhartha

Institute of Engineering and Technology, Ibrahimpatnam, Hyderabad.
Email –Id: subbu.dasari@gmail.com
Contact: 09966779182, 07893744445