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A Study on Accident Prevention at Unmanned Level Crossings: A Fail Proof System

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ABSTRACT: The accidents at unmanned level crossings and collisions of trains running on the same track are the major accidents in railways which cause heavy human causality and damage to train. Hence it is proposed to develop a fail proof system to avoid such accidents. Presently railway-crossing gates are operated manually. At present scenario, in level crossings, a gate keeper operates the railway gate normally after receiving the information about the train's arrival. When a train starts to leave a station, station master of the particular station delivers the information to the nearby gate. The above said procedures are followed generally for operating the railway gates. Sometimes the road traffic is so busy that it becomes impossible for the gate keeper to shut down the gates in correct time. In many remote areas, railway crossing gates are open and no person is located for the operation of gates and hence leading to accidents. Sometimes gates are shut down too early leading to wastage of time of people stuck at crossings. Hence one new proposal for controlling accidents at railway crossings is proposed. Which will be called primary and secondary barriers. Train will be detected using simple relay sensors which will be placed at predefined distance so that the barriers will be opened accordingly. Further sections will discuss the detailed analysis, hardware as well as the methodology used for thisproject.

KEYWORDS: Microcontroller 89c52 to control the whole system, L293D motor IC to control the motor rotation at the gate, Siren and LCD display, Stepper motor to open and close the crossings, IR sensors, Solar cells and batteries for power supply.

I. INTRODUCTION

The history of the level crossing in India is far distinct from the one which are outside the India. The level crossing completely depends on the location, sometimes consist of flagman in a booth who will indicate the train‟s arrival, a red alert, a bell and 2 barriers to stop vehicle from crossing. There are a standard set of rule for level crossing which are decided internationally, but unfortunately they are not followed by every remote areas of India. Railway crossing can dangerous as it can cause severe injuries. People trespass the closed poles, which can be dangerous. There are many cases where people lost their lives because of such misconduct. In India, there are many heart wrecking disasters taken place back then because the level crossing handled here are by human, few of them are December 9, 1994- Deoria level crossing disaster, A bus hit by a passenger train in Uttar Pradesh, at least twenty-nine people were killed and seventy-two people were injured. One of them was April 26, 2018.Dudhinagar level crossing accident - A fast passenger train crashed into a school bus - thirteen children died and eight were seriously injured. The crash happened near Dudhinagar. Things which are done manually are confined with human error which can cost lives. Accident Preventions at Unmanned Level Crossing is a fail proof system which will automatically indicate the arrival as well as departure of train on a level crossing with proper safety precautions and indications. We used a unique approach of place two barriers with a minimum required distance between them.

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II. A STUDY ON THE RAILWAYDISASTERS

The coming bar graph delineates the different and number of accidents because of derailments &accidents at level crossings. 9 out of 10 railway accidents during 2009-10 and 2014-15 have been due to derailments and accidents at Railway crossings. The other accidents are relatively very less as compared to thesetwo.

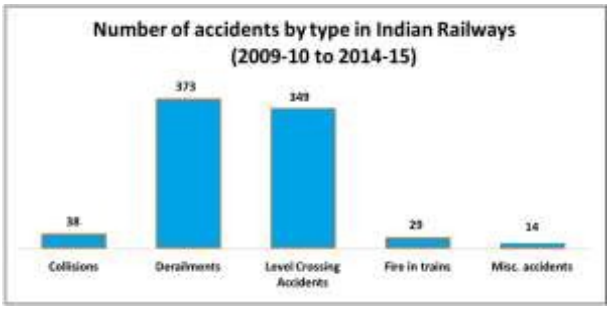

FIG: 2.1

There have been various reasons for train disasters from Human Failure to Equipment Failure to Sabotage etc. In the 6-year interval between 2009-10 and 2014-15, human failure has caused more than 86% of the total accidents. Out of this, 41% accidents were caused due to the failure of railway staff and the rest due to the collapse of others. Equipment failure accounts only 2.2% of the accidents.

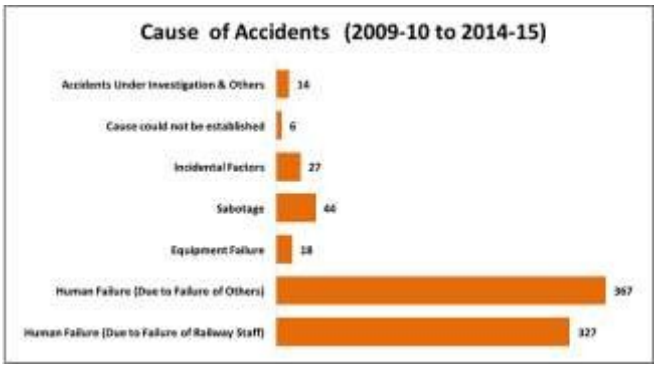

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FIG: 2.2

III. PROPOSED ALGORITHM

The proposed system will be automatically controlled, utilizing the already established railway signaling system, based on solar powered battery to control the rail gates for the trains coming from either side of the crossings. There will be red and yellow light board at crossings with siren and display indicating the „STOP" message. Train will be sensed/detected by utilizing the already established railway signaling system from approximately 2 KM distance from the gate and this information will be transmitted to the receiver (i.e. microcontroller) which is kept at the gate and the yellow light in the board at gate starts blinking with siren and the „STOP" message in the display, so that the road crossing users will know that train is coming. After some time (approx. 10 sec), as per the program stored in the microcontroller unit, both the barrier gates (Primary and Secondary) will close gradually up to the half level itself.

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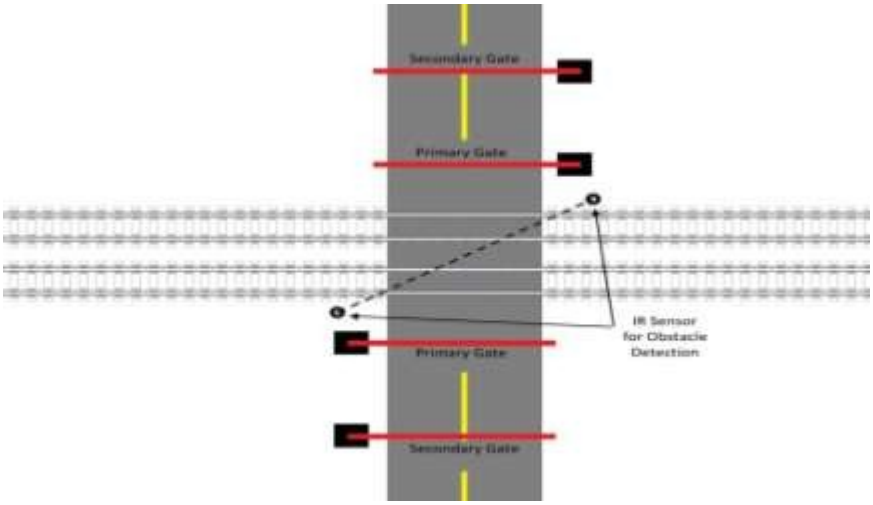

FIG: 3.1

After that when the train will be at a distance of 1 KM far, the next signal will be generated utilizing the same railway signaling system and this signal will be sent to the microcontroller again and the red light (on the board) will start blinking with siren which indicates to stop the motorists. At the same time, secondary gates will be closed permanently and the IR sensor system will be activated and it will check if there is any obstacle present on the railway track on that time. If any obstacle will be present, then the primary gates will get open for few seconds (approx. 10 sec) to give time for the motorists (in our predicted case) to move around the space provided between the primary and secondary gates and then the primary gates will be closed permanently. The distance between the primary and secondary gates will be approx. equal to the average length of a car. When the last compartment of the train passes through, the signal will be generated again by utilizing the same railway signaling system and this signal will be sent to the microcontroller and the gates open at once, and system resets and gets ready for next train. The figure 1 shows proposed gates and sensor locations for the railway track. A track circuit typically has power applied to each rail and a relay coil wired across them. When no train is present, the relay is energized by the current flowing from the power source. through the rails. When a train is present, its axles short (shunt) the rails together; the current to the track relay coil drops, and it is de-energized

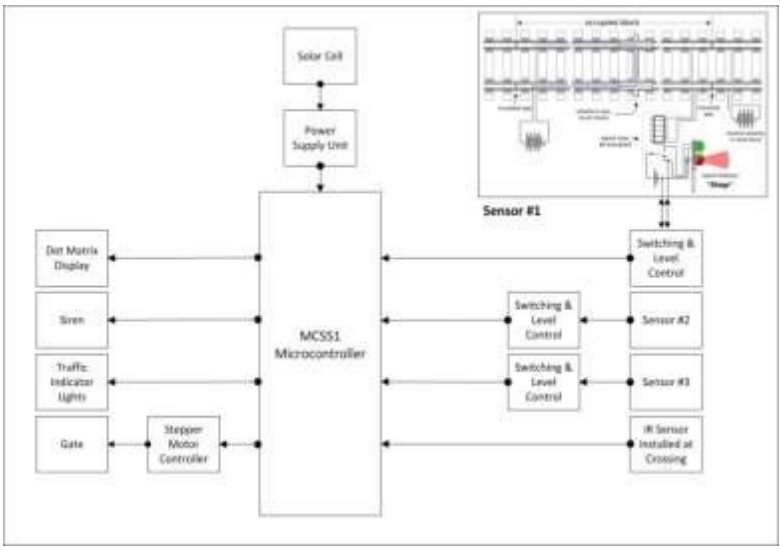

FIG: 3.2

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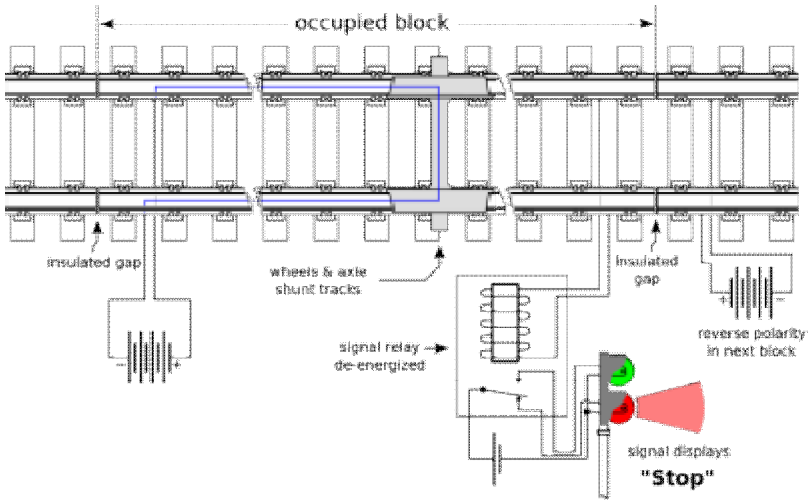

FIG: 3.3

Each circuit detects a defined section of track, such as a block. These sections are separated by insulated joints, usually in both rails. To prevent one circuit from falsely powering another in the event of insulation failure, the electrical polarity is usually reversed from section to section. Circuits are powered at low voltages (1.5 to 12 V DC) to protect against line power failures. The relays and the power supply are attached to opposite ends of the section to prevent broken rails from electrically isolating part of the track from the circuit. A series resistor limits the current when the track circuit isshort-circuited.

FIG: 3.4

IV. CONCLUSION AND FUTURE WORK

The prototype design of the above project is discussed in detail. This proposed design can be further modified according to the location and needs like solar panel could be used with a battery backup to make it more economic. This project can be easily implemented in any rural area of India without disturbing the existing. It is less power consumption and highly reliable since relays sensors, LEDs, microcontroller are used which is quite simple. It is again really cost effective and cheap. The sensor response is quick as compared to other proximity sensors. This is a fail proof system which will increase the safety and decrease theaccidents.

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REFERENCES

1. Dargie, W. and Poellabauer, C., "Fundamentals of wireless sensor networks: theory and practice", John Wiley and Sons, 2010 ISBN 978-0-470- 99765-9, pp. 168-183,191-192.
2. "ReportofHighLevelSafetyReviewCommittee(KakodkarCommittee)",Feb. 2012,MinistryofRailways,Govt. ofIndia.
3. "Indian Railways Vision 2020 (Dec. 2009)", Ministry of Railways, Govt. ofIndia
4. Sohraby, K., Minoli, D., Znati, T. "Wireless sensor networks: technology, protocols, and applications, John Wiley and Sons", 2007 ISBN 978 -0- 471-74300-2 pp.203-209
5. Indian Railways Permanent WayManual".
6. Corporate Safety Plan (2003-2013)", Ministry of Railways, Govt. ofIndia
7. The8051MicrocontrollerandEmbeddedSystemsusingAssemblyandCbyMuhammadAliMazidi,JaniceGillispie,RolinD.Mckinlay
8. J.Banuchandar,V.Kaliraj,P.Balasubramanian,S.Deepa,N.Thamilarasi"automatedunmannedrailwaylevelcrossingsystem"International Journal of Modern Engineering Research (IJMER) Vol.2, Issue.1, Jan-Feb 2012 pp-458-463 ISSN:2249-6645.
9. P.Kumar,V.Singh.,andD.Reddy,Advancedtraveler informationsystemforHyderabadcity,Proc.IEEETransactionsonIntelligent Transportation Systems, Hyderabad, India,2005.
10. Ahmed Salih Mahdi. Al-Zuhairi, "Automatic Railway Gate and Crossing Control based Sensors &Microcontroller", International Journal of Computer Trends and Technology (IJCTT) –Volume 4, Issue7, July2013.
11. InternationalJournalofEmergingTechnologyinComputerScience&Electronics(IJETCSE)ISSN:0976-1353Volume8Issue1 –APRIL 2014.
12. Jacob Millman Christos C. Halkias.: "Electroni Devices And Circuits", Tata McGraw-Hill Publishing Company Ltd.Sep, 2003.