LITERATURE SURVEY

TEAM ID	PNT2022TMID48646
PROJECT	SMART SOLUTION FOR RAILWAYS

TOPIC: Smart Solutions for Railways

Reference:

Dr. A. Benjamin Joseph1, Mohan kumar aradhya M S2, N phaneendra3, Ranjith kumar G M4 1,2,3,4Electronics and Communication Department, Kammavari Sangham Institute of Technology, Bengaluru.

Abstract:

Even with greatest of ideas to avoid railway accidents, many trains accidents still happen worldwide. This paper shares an idea on how to avoid train collision by using an automated control incorporated in the trains. In this proposed paper we have implemented ideas such as pre-crashing using RFID sensor, ultrasonic sensor in-order to choose an array of commands which would run as per the conditional algorithm created in the microcontroller. We would also have a EPM to control the speed of the motor to lessen speed. This system will be more efficient since it was fully automated and also it was cost effective.

http://troindia.in/journal/ijcesr/vol5iss4part3/42-57.pdf

TOPIC: A survey on Smart Railway Track Fault Detection Using IOT

Reference:

1Vatsala Sharma, 2Kamal Nayanam, 3Himani 1Assistant Professor, Electronics & Communication Department, Military College Telecommunication Engineering, MHOW, Indore, India. 2Assistant

Professor, IETE, New Delhi, MEM: 186009, Bhagwaan Mahavir Institute of Engineering and Technology, Sonipat, India. 3Assistant

Professor, Electronics & Communication Department, MSIT, IPU, New Delhi Received 10 August 2021; Accepted 05 August 2021

Abstract:

Indian Railways is the largest railway network in Asia and additionally world's second largest network operated underneath a single management. Due to its large size it is difficult to monitor the cracks in tracks manually. This paper deals with this problem and detects cracks in tracks with the help of ultrasonic sensor attached to moving assembly with help of stepper motor. Ultrasonic sensor allows the device to moves back and forth across the track and if there is any fault, it gives information to the cloud server through which railway department is informed on time about cracks and many lives can be saved. This is the application of IoT, due to this it is cost effective system. This effective methodology of continuous observation and assessment of rail tracks might facilitate to stop accidents. This methodology endlessly monitors the rail stress, evaluate the results and provide the rail break alerts such as potential buckling conditions, bending of rails and wheel impact load detection to the concerned authorities.

http://www.iosrjen.org/Papers/vol11_issue8/Series-2/G1108023842.pdf

TOPIC: A Review Paper on "Smart Railway Crossing using Microcontroller"

Reference:

Prof. Sushant M. Gajbhiye Assistant Professor, Dept. of Civil Engineering, Guru Nanak Institute of Technology, Nagpur (MS), India. Prof. Raju A. Bondre Assistant Professor, Dept. of Civil Engineering, Guru Nanak Institute of Technology, Nagpur (MS), India. Prof. Zen P. Raut Assistant Professor, Dept. of Civil Engineering, Guru Nanak Institute of Technology, Nagpur (MS), India

Abstract:

The main purpose of this research paper is to reduce the railway accidents occurring at the level crossings (Intersection Points). Railway is the vast mode of the transportations in India and it is the cheapest way for travelling. So there are more numbers of rail users and it is not easy to stop railway anywhere to obstruct accident, due to that there are major drawbacks of that. At present anunmanned system is available at level crossings and hence, lots of accidents occur at such crossings, since there is no one to take responsibility of the functioning of the railway gate when a train reaching the crossing. The objective of this research paper is to handle and control the system of railway gate by applying the microcontroller. This model includes infrared (IR) sensors, radio frequency indication device (RFID), Liquid Crystal Display (LCD),Light-emitting diode (LED), Lights, buzzer, motor driver and microcontroller. In the self-regulating railway gate control system, at the level crossing the meeting of the train is identify by the IR sensor and RFID placed close to the gate. In case of RFID it identifies only meeting of train. Hence, the time for which it is closed is less compared to the manually operated gates and reduces the human labor. As the whole system is automated fault occurring due to manual operation are restricted because the corrected of automated operation is more than the manned operation. Side sensor activated and the signal about the removal is sent to the microcontroller and motor turns in further direction and gate opens and motor shut down automatically.

https://www.ijert.org/research/a-review-paper-on-smart-railway-crossing-using-microcontroller-IJERTV9IS020070.pdf

TOPIC: Literature Review Toward Decentralized Railway Traffic Management

Reference:

Elisa Marcelli and Paola Pellegrini

Abstract:

This paper analyses the literature to identify ideas which may be applied to decentralized real-time railway traffic management. This system represents a new way for dealing with railway traffic perturbations in absence of a central decision maker. Specifically, we are interested in identifying techniques that may constitute suitable automatic mechanisms for the emergence of an effective system behaviour. In this literature review, we discuss the possibility of exploiting the existing research works on other transport modes. The analysis of these works makes it clear that real-time railway traffic management is very peculiar. Hence, we consider different approaches: hierarchical self organization, task allocation, reinforcement learning, consensus, auction and coopetition techniques. Some promising possibilities emerge, which we analyse proposing ideas for modelling decentralized real-time railway traffic management. Index Terms—Real-time railway traffic management, Multiagent system, Hierarchical self-organization, Task allocation, Reinforcement learning, Consensus, Auction, Coopetition

https://hal.archives-ouvertes.fr/hal-02617135/document

TOPIC: Research and Analysis on the Top Design for Smart Railways

Reference:

Shaofu lin1,2*,Yafang Jia2,Sibin xia2

1Beijing Advanced Innovation Center for Future Internet Tecnology, Beijing, 100124, China. 2College of Software, Beijing University of Technology, Beijing, 100124, China

Abstract:

Deepening the informatization and intelligent construction of railways has become an inevitable choise to promote the innovation and development of railways and enhance their core competitiveness. At present, China has in-depth research in smart cities, smart transportation and other fields, but the search on smart railways is still in its infancy, and it is urgent to make plans for the development of smart railways to provide guiding suggestions for the development of railways informationization. Based on the research of smart cities and smart transportation in related fields at home and abroad, combined with the applications trends of internet technology and big data technology in railway informationzation, this paper attempts to give a clear definition of smart railways from the perspective of smart city development. It also proposes the overall structure of the top-level design of the smart railway, and the application of the smart railway in combination with the development needs of the construction of the Jing-Zhang high-speed railway.

https://www.researchgate.net/publication/332944253_Research_and_Analysis_on_the_Top_Design_of_Smart_Railway

TOPIC: Towards Mobile and Intelligent Railway transport: A review of recent ertms related research.

Reference:

Hoang, T.S., Butler, M. & Reichl, K., The Hybrid ERTMS/ETCS Level 3 case study.
Abstract State Machines, Alloy, B, TLA, VDM, and Z. ABZ 2018, eds. M. Butler, A.
Raschke, T. Hoang & K. Reichl, Springer: Cham, 2018.

Abstract:

The development of the European Railway Traffic Management System (ERTMS) throughout Europe over the last two decades to remove obstacles to providing an interoperable railway network has been facing several challenges. This study briefly highlights several of these challenges by analysing the current architecture of ERTMS and main concerns such as its implementation, the interoperability of communication, formal methods, hybrid ERMS (Level 3), safety, and human factors. This study has taken a systematic approach to data collection and analysis through a review of the current literature.
The studies examined illustrate that it is necessary to reduce the number of components in order to pivot the system toward mobile equipment, autonomous trains, and decentralised communication. In the area of formalisation, every supplier and responsible party conducting modelling and testing of the system uses a different tool. Here, we conclude it would be appropriate to develop a robust and reliable tool for modelling, formalisation, testing and the validation of critical safety systems in the railway industry according to its particular specifications and functionalities, e.g. for ERTMS L3, including moving block, virtual coupling, and Automatic Train Operation (ATO).

https://www.witpress.com/Secure/elibrary/papers/CR20/CR20006FU1.pdf

TOPIC: 5G Key Technologies for Smart Railway

Reference:

Bo Ai, Senior Member, IEEE, Andreas F. Molisch, Fellow, IEEE, Markus Rupp, Fellow, IEEE, Zhang-dui Zhong, Senior Member, IEEE

Abstract:

Railway communications has attracted significant attention from both academia and industries due to the booming development of railways, especially high-speed railways (HSRs). To be in line with the vision of future smart rail communications, the rail transport industry needs to develop innovative communication network architectures and key technologies that ensure high-quality transmissions for both passengers and railway operations and control systems. Under high mobility and with safety, eco-friendliness, comfort, transparency, predictability, and reliability. Fifth-generation (5G) technologies could be a promising solution to dealing with the design challenges on high reliability and high throughput for HSR communications. Based on our in-depth analysis of smart rail traffic services and communication scenarios, we propose a network slicing architecture for a 5G-based HSR system. With a ray tracing-based analysis of radio wave propagation characteristics and channel models for milli meter wave (mm Wave) bands in railway scenarios, we draw important conclusions with regard to appropriate operating frequency bands for HSRs. Specifically, we have identified significant 5G-based key technologies for HSRs, such as spatial modulation, fast channel estimation, cell-free massive multiple input multiple-output (MIMO), mm Wave, efficient beam forming, wireless backhaul, ultra-reliable low latency communications, and enhanced handover strategies. Based on these technologies, we have developed a complete framework of 5G technologies for smart railways and pointed out exciting future research directions.

https://wides.usc.edu/Updated_pdf/ai20205g.pdf