

## LITRATURE SURVEY

|              |                              |
|--------------|------------------------------|
| Date         | 19- September-2022           |
| Team ID      | PNT2022TMID41891             |
| Project Name | Smart Solutions For Railways |

### Published by IEEE

A Review Paper on “**Smart Railway Crossing using Microcontroller**”, Prof. **Sushant M. Gajbhiye** Assistant Professor, Dept. of Civil Engineering, Guru Nanak Institute of Technology, Nagpur (MS), India. 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 an unmanned 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.

### Literature Survey of Railway Track Crack Detection and Anti-Collision System

Devesh R. Atkari, Harshal M. Kohale, Akash A. Choudhary, Arpan P. Akotkar The largest railway networks in the world is in India , over a distance of 1,15,000 km in distance, all over India. However it is not reliable and passenger safety Indian Railways is not up to global standards. A recent study revealed that over 25% of the track length is in need of replacement due to the development of cracks on it. Manual detection of tracks is difficult and not fully effective owing to much time consumption and requirement of skilled technicians. This project is analysis for the crucial situation which occurs in the automatic train system. In the railway surveying in many accidents cause multiple damage for life and also our property. Thus this project is to implement and analize crack detection,obstracles, gate control and water lodging on track. Whether the track stipulation is good or not for use the Proximity Sensor to check it. Secondary for them to avoid the obstacle crossing in train track, when the train is come. The main objective of this project the multi sensor railway track geometry surveying system.

**Intelligent Railway Track Crack and Obstacle Detection;** Mr. Yogesh N1 , Chinmaye Chinnappa H E2 , Karthik H K3 , Madhusudhan L E4 , Deepak N5 Assistant Professor, Department of Electronics and Communication1 Students, Department of Electronics and Communication2,3,4,5 Vidya Vikas Institute of Engineering and Technology, Mysuru, Karnataka, India. In India railway is one of the most common means of transport, which is the fourth largest railway community in the world. Even though Indian railways has an outstanding boom, it remains plagued because of some of the major issues like problem in gate crossing, fire accidents and problem in the track which remains unmonitored causing derailment. The tracks contract and expand due to changes in season. Due to this cracks may develop on the track. This proposed system identifies the cracks and the obstacles on the track using sensors and inform the control room through an SMS using GPS module. This intelligent railway track crack and obstacles detection using arduino helps in prevent accidents to a large extent. It helps in maintenance of the track After detecting the crack and obstacles it sends a SMS to a stationmaster. This will greatly help in maintaining and monitoring the condition of railway track.

**IoT based Indian Railway Ticket Booking and Authentication System-A Smart Approach** ; Anita Panwar, 2Deepak Kumar, 3Shashwat Kunwar 1Assistant Professor, UCET, Bikaner, India, anitapanwar01@gmail.com, In this rapidly changing digital world, the use of android application is also increasing and which makes day-to-day tasks more efficient and secure. Considering the problems occurring during the railway journey right from booking ticket to passenger verification and during journey also we are trying to improve the digitization of ticket booking and verification process of railway using smart devices available around us. We prepared a system which will overcome all the problem through an app in which QR (Quick Response) code will be generated where ticket information will be stored in encrypted form, user has to scan the QR code from smart phone which will act as QR scanner at the railway station. All the details of the passenger will be directly sent to Railway Central Database. QR code scanner will be installed at entrance of train coach after the scanning of QR-code passenger's ticket information will be verified. This app can also track the location of passenger in real-time and the app will only be able to track a passenger as long as that passenger is traveling in the train maintaining the privacy . Before real time implementation we also surveyed or reviewed many papers related to smart ticket booking and authentication systems using QR code, biometrics and IoT device like (GPS and GSM module). This IoT-based smart approach is to create an environment which is hassle-free and user-friendly for visitors as well as for passengers and also booking and verification problem will be easier and reduced to a large extent. when a user (passenger) gets down in the middle of the journey then the GPS[12] in train can track user's location and if it confirms the user has got down and left the train, then the user's remaining amount should be refunded to his/her account.

**5G Key Technologies for Smart Railways :** 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 millimetre 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 beamforming, wireless backhaul, ultrareliable 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.

**Towards railway-smart grid: Energy management optimization for hybrid railway power substations:** In order to analyse the feasibility of implementing Smart Grid technologies at railway network scale, this paper presents an optimization study of hybrid railway power substations energy management. Fuzzy logic supervision strategy is developed to achieve renewable energy sources and storage units' coordination in the railway power substation. Objectives such as limitation of the exceeding subscribed power by favouring local renewable energy consumption are considered through empirically defined supervision parameters. Declared as optimization variables, these are the inputs and outputs of the fuzzy logic membership functions. Then, adapted economic indicators chosen to quantify supervision's performance are defined as the objective functions in the optimization model. To solve the problem, experimental design and genetic algorithm are iteratively implemented in an optimization interface. Eventually, to illustrate the influence of the optimization procedure on the system supervision, the simulation results of the optimal solution are analysed.

**Smart Railway Maintenance – Challenges and Research Directions** João T. Fernandes<sup>a</sup>, Marília Curado<sup>a</sup>, Howard Parkinson<sup>b</sup>, Fernando Boavida<sup>a</sup>  
<sup>a</sup>Center for Informatics and Systems, Department of Informatics Engineering, University of Coimbra, Coimbra, Portugal  
<sup>b</sup>Digital Rail Limited, Lancaster, United Kingdom, Railway maintenance is crucial for the operation of current railway systems, as these are subject to strict requirements in terms of efficiency, cost-effectiveness, quality of service and scalability. Existing solutions for railway maintenance are, traditionally, either reactive or periodical, which is far from optimal. Moreover, they tend to use expensive, specialized approaches, and do not take advantage of emerging technologic tools and techniques, such as 5G systems, cloud-based operation, and intelligent data processing and information extraction/inference for achieving predictive maintenance. In fact, predictive maintenance is the core paradigm of what is now called Smart Railway Maintenance. This paper provides an insight on Smart Railway Maintenance, by overviewing existing approaches to railway maintenance systems, identifying their limitations with respect to current requirements, presenting technologies with potential for supporting

future Smart Railway Maintenance systems, and offering new research directions. Moreover, in line with the suggested research directions, the paper also proposes a novel architecture to address the encountered issues/limitations. Keywords: Smart Railway Maintenance, Internet of Things Context-Aware, Software-Defined Railway Monitorization, Railway-Oriented Architecture.

**Smart Railway System;** Ishan Mishra ,Independent ,Date Written: April 21, 2020, When it comes to travelling, in our country the cheapest and the most comfortable mode of transport is railway. A lot of people in India travel to other places using railways and some people use Indian Railways to travel even on daily basis. So, a lot of people trust railways with their life on daily basis and if the railways are not secure and prone to accident then life of many people are at risk. A lot of railway accidents occur at level crossing that is the point of intersection of road and railway track and the reason in most of the cases is human error. So, to avoid the accidents caused due to human failure this model is to make level crossing unmanned and smart than can reduce the chances of accidents manifold. This model automatically closes the gates of railway crossing when the train is arriving near the crossing before a safe interval of time so that there is no chance of human error. After the train has passed the gates are again opened automatically to allow people to use the roadways again. Also, our model keeps a track of the train passed from the particular crossing along with exact time of passing so that the data is maintained that too without human effort. With the help of IR sensor and using GSM, information can be sent to the authorities (loco pilot) of the train if the track has any hindrance so that accident can be avoided as far as possible.