

Smart Solution for Railways Literature Survey

Submitted by,

911019104017 - S. RAMAKRISHNAN

911019104020 - T. SABARINATHAN

911019104026 - G. SURIYAKRISHNA

911019104033 - M. VISHNU

LITERATURE SURVEY

1)

Title : Long Term Evolution for Secured Smart Railway Communications Using Internet of Things

Author : Shweta Babu Prasad and P. Madhumathy

Year of Publication : 2021

Abstract:

The railroads have consistently met hurdles due to maintenance and upkeep issues. The length and scale of the network impedes maintenance. Likewise executing and utilizing new age innovation is not feasible still changes should be made on current frameworks. Internet of things is new age innovation that can be executed inexpensively. This can be actualized by simulating the IoT network in small-scale by utilizing Android application and also 4G LTE systems for real time execution. The proposed system uses various sensors to detect distinctive parameters which are regularly checked via the IoT network. And in case any parameter is triggered the system will automatically stop. Although derailment is imminent due to enormous mass of trains, the effect of the crash can be definitely improved by immediate mediation of IoT network. These systems will likewise lessen the overload on government on maintenance and safety related issues of existing framework with lower expenses. These systems also vulnerable to hacking by external factors and one time password system is also used for security. Real time tracking of parameters from base station allows systems to find train journey details such as average speed and performance parameter.

Methodology:

Internet of Things – Embedded System: uses ATmega328P Arduino **Sensors:** Ultrasonic Sensor, Touch Sensor, IR Sensor, Flame Sensor Module. – **Security and Privacy:** robust authentication system instead of outdated static passwords paving way for a temporary one-time password (OTP).

Existing System:

The existing system comprises of an IR, temperature and touch sensor along with Zigbee and buzzer. IR sensor is utilized to identify the cracks in the tracks by obstacle detection principle. If the IR detects the changes, the buzzer expends the alert signal to notify the neighbouring areas and the motor automatically shuts down. Infrared (IR) transmitter is a form of LED from which infrared rays are given out. In the same way, IR receiver is utilized to detect the IR rays transmitted by the IR transmitter and these two are placed in a straight line. If they are positioned correctly, both the sensors constantly deliver the sensed output. A temperature sensor is interfaced with the controller to detect the temperature. Again if the temperature exceeds the normal, the buzzer expends the alert signal to notify the neighbouring areas and the motor automatically shuts down.

Proposed Solution:

The issues with the existing model is that the signal from the base station has to penetrate into the vehicle, and undergoes a loss of up to 24 dB which has to be taken care by increasing the transmission power along with the sensitivity of the receiver. The structure can be combined into present structures without considerable infrastructural modifications. Aforementioned structures are implemented in several countries and are extremely effective in ensuring safety of passengers. Government agencies need to implement such systems to undertake special measures of safety, support and reliability. The main objective is to identify cracks on railway track, obstacle in front of the train, fire emergencies and added functionality is that the touch sensor senses the presence of the user and turns the light and fan ON or OFF. Manual stoppage of the train can also be implemented to avoid any accidents and ensure safety of the passengers. But this can be performed only by issuing an OTP which is sent to an authorized and authentic user. This way adversary cannot issue manual stoppage and security and privacy of the system is preserved. Additionally the entire information needs to be updated to a specific IoT website.

2)

Title : Digirail - The Digital Railway System and Dynamic Seat Allocation

Author : Mr. Sunil Mhamane & Mr. Pranav Shriram

Year of Publication : 2018

Abstract:

One of the major challenges in present ticketing provision is QUEUE in buying and railway ticket checking. In this fast world people want all work is to be done within minutes with help of digitalization and usage of smartphone it is all possible. Users ticket information is stored in a database for security, which is absent in present system. Ticket checker is having admin login in application to look for user ticket with the ticket number in the database which scans in the form of QR code. Dynamic seat allocation also gives 100% utilization of seats as well proper allocation for waiting list passenger during Journey.

Methodology:

Android app - QR Code: Every QR code has unique value and information stored in it, which is used for proper validation of the user. QR code is very useful in proper and secure validation of tickets - **Dynamic seat allocation:** In this Dynamic Seat Allocation if the passenger are not travelling then the seat are vacant and that seats are utilized by the Railway. That seats are allocate to the next waiting list passenger, by using this Dynamic Seat allocation the railway Board can generate more revenue, **Ticket checker:** The ticker examiner will be handed a tablet that has specifically designed application for checking the authentication of the

passengers and ticket. To use the app, the examiner will have to login through his ID that is generated by the administrator.

Conclusion:

Passenger and Ticket checker are most important factors in the proposed system. Application will increase efficiency, speed and reduce efforts of passenger as well as administrator. QR code is able to provide all the information about passenger it will help to reduce work with paper which is eco-friendly. Hence, with help of this we are taking one step towards green computing. Also, the problem of the waitlisted passengers will be solved. Along with these benefits for the passengers this system will also enhance the efficiency of the ticket checker by making it easier for him to check upon the passenger in a better manner.

3)

Title : Enhancement of Railway Reservation System Using Internet of Things.

Author : Mallikarjuna, B and Reddy, D Arun Kumar and Sailaja, G

Year of Publication : 2018

Abstract:

The developed countries has been implemented smart train using internet of things (IoT), IoT provide exploit the opportunities created by Industrial Internet of Things (IIOT). In this paper the survey focuses on different communication technologies under the paradigm of IoT. The broad band communication technologies like Global System Mobile Communications- Railway (GSM-R), Long Term Evaluation (LTE), fifth generation (5G), IEEE 802.11 and Wireless Sensor Networks (WSN). We described the passenger ticket generation, ticket validation, with Unique Identification Authority of India (UIDAI) under the smart train transportation the vision of India 2022 and the experimental result proved that IoT system is effective than well known system.

Methodology:

Ticket Generation Algorithm: The smart railway reservation database maintained by two data bases one is railway data base and another one maintained by UIDAI, the efficient to use these two databases and perform the query-service between the two data bases. The queries from the railway database will be served by the UIDAI database and vice versa, a query is sent from the railway database system to the UIDAI database asking whether the UIDAI number and the fingerprint of the passenger satisfy each other. If both of them correspond to the same person, the information related to passenger that UIDAI number is fetched from the UIDAI database to the railways database. This information may include Name, Age, Sex, Address etc.

(all the information is needed railway reservation system to issue the ticket). All this information gets fed into the smart passenger reservation system database.

Conclusion:

In this paper the survey of railway industry broadband technologies like GSM-R, LTE, 5G, IEEE 802.11 are examined. GSM-Railway is a international wireless mobile communications standard for various railway applications has been described. In Indian railway reservation system to replace the present 4G network to GSM-R, 5G, LTE and IEEE 802.11 brought a new standardized telecommunication network. In present PRS system there are many dilemmas passenger to book the ticket and railway reservation system to issues the ticket. Passenger must wait on IRCTC website more 5 minutes to book ticket. Hence present PRS is updated to smart railway reservation under the vision of India 2022. The passenger vending machine read the passenger details that can be interacted with railway reservation system to UIDAI database. The result proved that passengers obtained the ticket with fraction of mile seconds, the reservation chart contains the passengers name with photo, effective passenger reservations will be maintained.

4)

Title : An Introduction to Parallel Control and Management for High-Speed Railway Systems

Author : Bin Ning, Tao Tang, Hairong Dong, Ding Wen, Derong Liu, Shigen Gao, and Jing Wang

Year of Publication : 2019

Abstract:

This paper introduces a framework of parallel control and management for high-speed railway systems (HRSs). First, based on multiagent modelling, an artificial HRS that is consistent with realistic operations of the actual HRS is constructed. Then, different kinds of computational experiments are performed on the artificial HRS, followed by analysis and synthesis with a case. Finally, through an interactive and parallel operation between the actual and artificial HRSs, a set of practical control and management strategies can be achieved for the actual HRS. With the primary objective of ensuring reliability and safety of HRSs, this study could enhance the quality of services and the integrated transportability with other existing modes of transportation systems to provide appropriate recommendations and strategies for forming an overall effective comprehensive transportation system.

Methodology:

Artificial system - Computational Experiment: The artificial HRS, once built, will be used as a platform for computational experiments. Through various experiments on the platform, many tests that cannot be performed on the actual system can be carried out, which provides a

low-cost high efficiency way for feasibility verification and evaluation for design and planning; thereafter, the actual high-speed railway can be safely controlled and effectively managed - **parallel execution (ACP) method**: Repeating a large number of computational experiments on the artificial railway system platform and using sufficiently many plans with possible solutions from the databases, one can integrate the artificial platform and the actual railway system to execute real control and management in parallel - **high-speed railway system (HRS), parallel control, parallel management**.

Conclusion:

As the rapid development of information technology and increase of society demands, the HRS has evolved to become increasingly complicated and complex, with higher connectivity and interactions with its various subsystems, exhibiting many interrelated features of dynamic, fast-speed, and real-time properties. Taking into account social, natural, engineering, and cultural aspects, and considering the dynamical evolution of the complex HRS, it is evident that establishing a global model for the integrated system is extremely difficult and that the current control system theory is hard to apply. Therefore, in this paper, we have proposed a new concept of HRS parallel control and management. The key issue is to establish an artificial HRS that is highly consistent with the existing actual HRS to resolve the limitation of the conventional centralized control and management system. It integrates all subsystems (personnel, control, scheduling, etc.) to model the actual system, taking into account the cooperation and coordination between the actual and artificial systems, as well as data processing and fusion. It carries out computational experiments and compares the results with the actual situations to predict the special and temporal future changes of the HRS, thereby suggesting plans and solutions to safe operations and efficient management of the actual HRS, which will lay a foundation for future development of an integrated comprehensive modern high-speed railway transportation system.