

# SMART SOLUTIONS OF RAILWAY SYSTEMS USING IOT - A LITERATURE SURVEY

## INTRODUCTION:

Safe and highly available railway operation requires components that feature high quality, a long service life, and reliability. For almost 100 years, we have supported our customers in the railway industry as a reliable partner. We introduced our very first commercial product – a catenary armature for streetcars – in 1923. We wanted to be apart of our surrounding with some change and advancement so that it can bring the better life of the middle class and lower class people to travel in high secutity and advanced locomotions .the train is one and only most widely used transportation, and not only for this they are used for goods transportation also. Indian railways are not able to facilate the customer properly due to crowded amount of people. Statistics show that the leading cause of death by injury in railways traffic accidents (two train collision each other). There are number of causes for which an accident can occur, some of them are; lack of training for driving or less experinessed, use of

drivers, driving while intoxicated, bad railway track condition, overloading in train and negligence traffic management. In this survey paper, we briefly review selected railway accidents detection techniques and propose a solution. And we will also be there for you in the future: With smart solutions for railway engineering that ensure safe operation and railway infrastructure digitalization. Our digitalization portfolio ranges from information receipt to the cloud.

## Abstract:

Establishment of traffic control system with basic digitalization basic interoperability and smart solutions for border crossings use of funding tools aimed primarily at financing construction and network upgrade use of transportation modelling to understand the necessity for further developments e-interoperability legislative work to assure internal harmonization of solutions use of smart form of railway -customs interfaces use of freight flows modelling to adjust the capacities of border infrastructure all spectrum of smart railway solutions can be used as a part of modal shift policy intensive

e-interopability  
technologies for predictive maintenance  
smart technologies for international  
carriage (for all issues from maintenance  
to operations) use of new types of  
financing tools (like bonds, venture  
investment funds, etc.). artificial  
intelligence and machine learning  
data integration and data-as-an-asset  
approach data sharing and use of new  
distributed data technologies like block.

## **Railway Survey :**

[1] **Authors:** william Mitchell Acworth, Robert Adley, Ernest L.Ahrons, Cecil J.Allen, J Freeman Allen, Christopher Awdry, wilbert Awdry. Title: Smat Solutions for Railways.

Transport control system (signalling, automatic break and speed control) with uniform "network - train" communication system based on mobile data transfer  
Speed acceleration (a must have for high speeds), safety improvement BENEFITS  
National and international.

**Merits:** The greatest advantage of the railway transport is that it is the most dependable mode of transport as it is the least affected by weather conditions such as rains, fog etc. compared to other

**Demerits:** The railway requires is large investment of capital. The cost of construction, maintenance and overhead expenses are very high as compared to other modes of transport. Moreover, the investments are specific and immobile.

[2]**Authors:** Lucius Beebe, Arthur Morton Bell, William Henry Boulton (author), James I. C. Boyd. Condition-based maintenance is a maintenance based on the monitoring of the condition of the railway components, by comparing real-time condition values of the observed parameter against critical parameter threshold.

**Merits:** The rail transport is better organised than any other form of transport. It has fixed routes and schedules. Its service is more certain, uniform and regular as compared to other modes of transports.

**Demerits:** Another disadvantage of railway transport is its inflexibility. Its routes and timings cannot be adjusted to individual requirements.

[3] **Authors:** Harold H. Carstens, H. C. Casserley, Charles Clegg, Michael Cobb (railway historian), Anthony Coulls, Lewis Cozens. Predictive maintenance incorporates condition-based monitoring and is based on a forecast of future condition of a railway component using

conditions data, historical data and future usage estimation (using artificial intelligence and machine learning).

**Merits:** Its speed over long distances is more than any other mode of transport, except airways. Thus, it is the best choice for long distance traffic.

**Demerits:** Rail transport cannot provide door to door service as it is tied to a particular track. Intermediate loading or unloading involves greater cost, more wear and tear and wastage of time.

[4] **Authors:** C. F. Dendy Marshall, George Dow, Tim Dunn (historian) Automated train operation (ATO) is a solution that provides support for automation of driving function (e.g., starting, accelerating, braking, and stopping) that is used in conjunction with the safety automatic train protection (ATP) function of train control systems.

**Merits:** Railway transport is economical, quicker and best suited for carrying heavy and bulky goods over long distances.

**Demerits:** As railways require huge capital outlay, they may give rise to monopolies and work against public interest at large. Even if controlled and managed by the government, lack of competition may breed inefficiency and high costs.

## Conclusion:

By using this Autonomous vehicle for purpose of railway track inspection and crack detection, it will have a great impact in the maintenance of the tracks which will help in preventing train accidents to a very large extent. The regions where manual inspection is not possible, like in deep coal mines, mountain regions and dense thick forest regions can be easily done using this vehicle. By using this vehicle for the purpose of Railway track inspection and crack detection and automated SMS will be sent to pre-defined phone number whenever the vehicle sensors detect any crack or deformation. This will help in maintenance and monitoring the condition of railway tracks without any errors and thereby maintaining the tracks in good condition, preventing train accidents to very large extent Railway track crack detection autonomous vehicle is designed in such a way that it detects the cracks or deformities on the track which when rectified in time will reduce train accidents.

## Reference:

[1] S. Sawadisavi J. Edwards, E. Resend, J. Hart, C. Barkan, and N.

machine vision system for inspection of railroad track,” in Proc. Amer. Railway Eng. Maintenance Way Assoc. Annu. 2012

[2]. M. Singh, S. Singh, J. Jaiswal, and J. Hempshall, “Autonomous railtrack inspection using vision based system,” in Proc. IEEE Int. Conf. Comput. Intell. Homeland Secur. Pers. Safety, 2009

[3]. J. Lin, S. Luo, Q. Li, H. Zhang, and S. Ren, “Real-time rail head surfacedefect detection: A geometrical approach,” in Proc. IEEE Int. Symp. Indust. Electron., 2009.

[4]. R. Clark, S. Singh, and C. Haist, “Ultrasonic characterisation of defects in rails,” Insight, vol. 44, no. 6, pp. 341–347, 2002

[5]. R. Edwards, S. Dixon, and X. Jian, “Characterisation of defects in the railhead using ultrasonic surface waves,” NDT & E Int., vol. 39, no. 6, pp. 468–475, 2006.

[6]. Ramavath Swetha ,P.V. Prasad Reddy,”Railway Track Crack Detection Autonomous Vehicle” ISSN, vol. 4, Issue 2015.

[7]. P. Navaraja,”Crack Detection System For Railway Track By Using Ultrasonic And Pir Sensor” IJAIC-2014

[8] A. .H. Cribbens, “Solid-state interlocking (SSI): an integrated electronic signaling system for mainline railwave”