HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

INTELLIGENT CONTROL SYSTEMS IN RAILWAY TRANSPORT

Deatriz Selva

Technical researcher

Annotation

Intelligent control systems are revolutionizing railway operations by improving safety, punctuality, and energy efficiency. This paper discusses smart signaling technologies, predictive maintenance algorithms, and automation in modern railway networks.

Keywords

Railway automation, smart signaling, predictive maintenance, control systems, AI

Main Text

The adoption of intelligent control systems in railway transport enhances the reliability and safety of train operations. Modern signaling systems such as the European Train Control System (ETCS) and Positive Train Control (PTC) enable real-time speed regulation and collision prevention.

Predictive maintenance uses AI and big data analytics to detect early signs of component wear or malfunction. Sensors installed on locomotives and tracks continuously monitor vibration, temperature, and load parameters. This allows operators to perform maintenance before failures occur, reducing downtime and costs.

Furthermore, autonomous train operation (ATO) is gaining momentum in metro and high-speed networks. These systems rely on advanced control algorithms and high-speed data communication to ensure precise braking, acceleration, and route management.

References

1. UIC (2023). *Intelligent Rail Transport Systems Report*.
2. Chen, L. & Park, S. (2022). “AI Applications in Predictive Railway Maintenance,” *Transportation Research Part C*, 144, 103897.
3. Siemens Mobility (2024). *Digital Rail Infrastructure White Paper*.