Patent Search

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Inventor

Name	Address	Country	N
K. Ramesh Chandra	VISHNU INSTITUTE OF TECHNOLOGY,KOVVADA, BHIMAVARAM, ANDHRA PRADESH-534202.	India	In
K. Venkata Satya Manikanta	VISHNU INSTITUTE OF TECHNOLOGY,KOVVADA, BHIMAVARAM, ANDHRA PRADESH-534202.	India	In
K. Jonathan David Paul	VISHNU INSTITUTE OF TECHNOLOGY,KOVVADA, BHIMAVARAM, ANDHRA PRADESH-534202.	India	In
N.Gowtham Krishna	VISHNU INSTITUTE OF TECHNOLOGY,KOVVADA, BHIMAVARAM, ANDHRA PRADESH-534202.	India	In
M. Devi Sri Prasad	VISHNU INSTITUTE OF TECHNOLOGY,KOVVADA, BHIMAVARAM, ANDHRA PRADESH-534202.	India	In
N.Hari Krishna	VISHNU INSTITUTE OF TECHNOLOGY,KOVVADA, BHIMAVARAM, ANDHRA PRADESH-534202.	India	In

Applicant

Name	Address	Country
VISHNU INSTITUTE OF TECHNOLOGY, BHIMAVARAM	Department of Electrical & Electronics Engineering,KOVVADA, BHIMAVARAM, ANDHRA PRADESH-534202.	India

Abstract:

ABSTRACT The present invention relates to a centralized emerge·ncy braking system for trains designed to significantly reduce response time and improve safety in ra operations. Conventional braking systems rely on a sequential process wherein braking commands are first communicated to the locomotive pilot before manual exe leading to delays, miscommunication, and increased risk of accidents. The proposed system eliminates this dependency by establishing a direct communication inter between the control room and the train's onboard braking mechanism. In this invention, braking commands generated at the control room are transmitted via a GSM communication module to an onboard microcontroller unit. The microcontroller validates and processes the received commands, subsequently activating a relay driv energize a solenoid valve coil, which releases compressed air into the braking pneumatic system. The activation of the solenoid valve applies the brakes instantaneou rapid response during emergency scenarios. Safety and reliability are reinforced through the integration of opto-isolators for electrical isolation, a tlyback diode for su protection, an emergency stop switch for manual intervention, and a feedback loop that transmits braking execution status back to the control unit. The system is po 12V battery regulated through a buck converter, ensunng compatibility with electronic modules. Its fail-safe architecture guarantees continuous operation under dive environmental and operational conditions. Furthermore, the design is scalable and adaptable, making it suitable for passenger trains, freight trains, and metro syster electrified railways, the system is also configured to interface with the pantograph, enabling coordinated braking with electrical power management and compatibility regenerative braking systems ..

Complete Specification

FIELD OF INVENTION

The present invention relates to the field of railway safety ami control systems, and more particularly to a centralized emergency braking mechanism for trains. The invention is directed toward systems and methods that enable direct communication between a control room and a train's braking system, bypassing conventional manual relay through the locomotive pilot. By incorporating wireless communication, automated control units, and solenoid valve-based pneumatic actuation, the invention enhances emergency response efficiency, reduces human error, and provides a reliable framework tor real-time braking in passenger, freight, and metro railway networks.

BACKGROUND OF THE INVENTION:

Railway transportation is one of the most widely used modes of mass transit, requiring stringent safety mechanisms to protect passengers, cargo, and infrastructure. Arnoug the most critical safety functions in trains is the emergency braking system, which is expected to respond rapidly

View Application Status