

# Designing Self-Healing IoT Networks: A Framework for Autonomous Fault Detection and Recovery in Smart Infrastructure

Raj Sagar<sup>1</sup>, Vukanti Ganga Krishna Manikanta<sup>2</sup>, Neppalli Mukesh Babu<sup>3</sup>

<sup>1</sup>Assistant Professor, Dept. of Computer Science and Engineering

<sup>2,3</sup>Student, Dept. of Computer Science and Engineering

<sup>1</sup>[rajsagar1993@gamil.com](mailto:rajsagar1993@gamil.com), <sup>1</sup>[krishnamanikantavukanti@gamil.com](mailto:krishnamanikantavukanti@gamil.com), <sup>1</sup>[nmbabu309@gamil.com](mailto:nmbabu309@gamil.com)

NRI Institute of Technology- An Autonomous Engineering College, Vijayawada, India

**Abstract:** *The increasing integration of IoT (Internet of Things) devices in smart infrastructure has led to greater connectivity, but also heightened vulnerability to network faults, failures, and cyber-attacks. To address these challenges, this paper proposes a novel framework for designing self-healing IoT networks, focusing on autonomous fault detection and recovery mechanisms. Leveraging machine learning algorithms and distributed edge computing, the framework enables real-time monitoring and analysis of network anomalies, allowing for proactive identification of potential issues. The system can autonomously reconfigure itself, reroute traffic, and restore optimal functionality without human intervention. By integrating adaptive security protocols, the framework also ensures resilience against malicious attacks while maintaining scalability for large-scale IoT deployments. This self-healing IoT architecture offers significant potential for enhancing the reliability, efficiency, and security of smart infrastructure in various sectors, including transportation, healthcare, and urban management.*

**Keywords:** Internet of Things (IoT), cyber-attacks, self-healing, machine learning, urban management

