

# IoT-XPLAIN: Intelligent Fault Detection and Natural Language Explanation for IoT Systems using ML and LLMs

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*Modern IoT deployments face challenges in maintaining fault resilience due to limited observability, dynamic conditions, and constrained edge resources. Traditional detection methods often lack flexibility and explainability. This paper introduces IoT-XPLAIN, a hybrid framework integrating Random Forest classification with large language models (LLMs) for automated anomaly detection and human-readable fault explanations. Trained on TON IoT telemetry with DNS layer metadata, the model detects transport-and application-level anomalies, including synthetic DNS faults. Upon detection, GPT-4o generates summaries of fault patterns, causes, and recovery steps. IoT-XPLAIN enables interpretable, efficient fault analysis for smart manufacturing, remote monitoring, and fault-aware edge infrastructures.*

**Internet of Things (IoT), Fault Detection, Anomaly Detection, Random Forest, GPT-4o, Explainable AI, DNS Fault Injection**



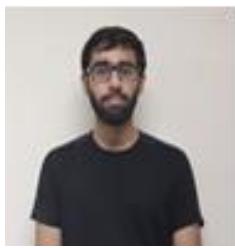
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