

ABSTRACT

Forest fires pose a significant threat to ecosystems, wildlife, and human life, making early detection and accurate prediction crucial for effective mitigation. This study presents an Internet of Things (IoT)-based system for forest fire detection and prediction, integrating real-time sensor networks, data analytics, and machine learning algorithms. The proposed system utilizes IoT-enabled sensors to monitor environmental parameters such as temperature, humidity, smoke, and air quality across forested areas. These sensors transmit data to a centralized platform for processing and analysis. Machine learning models are employed to predict the likelihood of forest fires based on historical and real-time data patterns. Additionally, the system incorporates a warning mechanism that triggers alerts to authorities for prompt action in case of high fire risk. Experimental results indicate the system's ability to detect potential fire outbreaks with high accuracy, while predictive models provide reliable forecasts to prevent escalation. The integration of IoT and machine learning not only enhances situational awareness but also minimizes response times. This study underscores the role of emerging technologies in safeguarding natural resources and supports global efforts to combat forest fire disasters.

Keywords: Forest fire detection, IoT, Machine learning, Environmental monitoring, Fire prediction, Smart systems.