WILDLIFE AND ENVIRONMENTAL MONITORING IN PADDY FIELDS USING IOT & MACHINE LEARNING

Roxshan A. A.* **and Akmal Jahan M. A. C.**
[1]*Department of Computer Science, Faculty of Applied Sciences, South Eastern University of Sri Lanka, Sammanthurai, Sri Lanka.*
**rockroxshan375@gmail.com*

Accurate environmental monitoring is essential for optimizing crop management in precision agriculture, particularly in sensitive areas such as paddy fields. This thesis introduces an IoT-based Wild Animal Monitoring System, specifically designed for paddy fields. The system integrates multiple sensors, including a microphone, DHT11 temperature/humidity sensor, motion sensor, and a buzzer for real-time alerts. These components provide insights into environmental conditions and potential wildlife threats to crops. By analyzing sensor data, the system detects wildlife movement, allowing for timely interventions that protect crops and boost agricultural productivity. The system's combination of motion sensors, microphones, and temperature/humidity sensors offers a comprehensive approach to wildlife detection and management in paddy fields. This study evaluates the effectiveness of the system in detecting wildlife presence and enhancing crop protection efforts. The machine learning models employed for processing the audio signals include Support Vector Machines (SVM), which achieved 80% accuracy, and K-Nearest Neighbors (KNN), which attained 79% accuracy. While SVM demonstrated a slight advantage in accuracy, KNN remains an effective alternative due to its simplicity and efficiency in specific scenarios. Real-world testing validates the system's practicality, providing continuous monitoring and real-time alerts to help farmers respond quickly to wildlife threats in paddy fields. Despite its effectiveness, the system faces challenges, including false positives, environmental noise interference, and dependence on stable power and communication infrastructure. Future research will focus on expanding the system's capabilities to detect a wider range of wildlife, improving machine learning models, and incorporating advanced noise-filtering techniques and additional sensors. Integrating renewable energy sources and developing resilient communication methods will enhance reliability in diverse agricultural environments. This system represents significant progress toward sustainable crop management and wildlife conservation in precision agriculture.

Keywords*: Audio Signal Processing, Crop Protection, IoT, Precision Agriculture, Sensor Integration.*