

## Innovative Approaches to Protect Farms from Monkey Threats Using Smart Technologies: A Review

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### Abstract

Human-monkey conflict in Sri Lanka poses a significant challenge to wildlife conservation and human livelihoods. In recent years, the threat posed by monkeys has escalated. Among the culprits, the Sri Lankan Toque macaque (*Macaca sinica*) emerged as the most destructive, contributing to an annual loss of US\$19.3 million in coconut production alone. In response, the government proposed exporting 100,000 macaques to China, but the plan was abandoned due to objections from conservation groups. Instead, smart technology has been identified as a promising alternative to address this issue. Innovations such as real-time monitoring and automated prevention systems offer the potential to detect and deter monkey incursions while safeguarding crops and preserving wildlife. This research explores the use of low-cost, eco-friendly solutions leveraging the Internet of Things (IoT), deep convolutional neural networks, transfer learning, and ultrasonic sound waves. These technologies enable the creation of virtual fences and provide early, non-invasive warnings of monkey activity, significantly enhancing crop protection. Through surveys and literature reviews, the study highlights the limitations of traditional methods such as manual field protection and chemical repellents, which are neither effective nor sustainable. The findings indicate that integrating IoT with image processing and sound-based deterrents offers a scalable and sustainable approach to mitigating human-monkey conflicts. Such innovations not only protect agricultural productivity but also contribute to broader wildlife conservation efforts.

**Keywords:** *Smart monkey repellent, IoT-based animal detection, Convolutional neural network (CNN), Ultrasonic deterrence, Crop protection.*