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Animal Intrusion Detection System with AI Automation

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Abstract: *Human-wildlife conflict around the forests is leading to hazardous confrontations between villagers and predators such as tigers and leopards. This potentially deadly risk was a catalyst for AniDet: an animal intrusion detection system with AI automation, designed as a smart, solar-powered early warning and detection solution. The system utilizes several RCWL-0516 microwave sensors in order to observe a 360° area of possible motions. When motion is detected, the ESP32-WROOM microcontroller will activate a pan-tilt camera in the direction of the detected movement. The MLX90614 infrared temperature sensor verifies that the detection in question is not a simple object but rather something with a warm body. It then sends the live video feed over Wi-Fi to a laptop or mobile device with a YOLO-based AI model running on it, which identifies if the object is a tiger or leopard. If a predator is confirmed, it immediately triggers a buzzer and LED spotlight to scare the animal away, capturing the image with a timestamp for record purposes. Powered by a solar panel, TP4056 charging module, and MP1584 buck converter, the setup ensures continuous operation in remote forest areas. It integrates IoT, AI, and renewable energy into one comprehensive ecosystem-a reliable, automated, and environment-friendly solution for tiger and leopard intrusions to help in the protection of both human and wildlife.*

Keywords: ESP32-CAM, YOLO, IoT, Edge AI, Wildlife Monitoring, Solar-Powered System, Animal Detection, Conservation

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