

Wildlife Monitoring and Forest Survey Spider Robot

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Abstract: This paper presents the design and implementation of a quadruped spider robot aimed at assisting in wildlife monitoring and forest survey operations. The robot is developed to navigate uneven terrains, detect the presence of animals or humans, and transmit live data for remote observation. The system combines mechanical legged locomotion, artificial intelligence-based object detection, and wireless communication for real-time environmental monitoring. The proposed spider robot uses an ESP32 microcontroller as the central processing unit integrated with a PCA9685 servo motor driver, MPU6050 sensor, and ESP32CAM module for thermal and visual data acquisition. The motion of four servo-actuated legs enables stability and adaptability in rough forest surfaces. AI algorithms such as YOLOv3 and thermal sensing allow identification of poachers and wildlife even in low-light conditions. The system provides a low-cost, portable, and autonomous monitoring solution with potential applications in anti-poaching efforts, ecological research, and forest surveillance.

Keywords: Quadruped Robot, Wildlife Monitoring, ESP32, PCA9685, YOLOv3, Thermal Imaging, Forest Survey, IoT Robotics

