

ABSTRACT

The advancement of Internet of Things (IoT) and Artificial Intelligence (AI) technologies has opened up significant opportunities in developing intelligent and responsive automation systems. This research implements an automatic cat feeding system based on IoT and AI to address the problem faced by cat owners who struggle to feed their pets regularly due to busy schedules. The system utilizes the YOLOv11 AI model to detect and recognize cat identities in real time via a webcam, ensuring that only registered cats receive food. The model is trained using the Roboflow platform and converted to TensorFlow format for compatibility with edge devices. A Raspberry Pi 4 is used as the local controller to operate sensors and actuators, while the system is connected to a local server integrated with Cloudflare Tunnel, allowing secure web access from the internet without opening public ports. A loadcell sensor is used to measure the weight of food in the final container; an ultrasonic sensor detects the remaining food in the main storage, and stepper motors control the food distribution in both automatic and manual modes. The system can be monitored and controlled remotely in real time via a web interface and Telegram notifications. Testing results show that the loadcell sensor achieved an accuracy of 97.48%, the ultrasonic sensor 98.57%, automatic feeding 91.92%, manual feeding 89.13%, and cat detection accuracy reached 95%. The website's average connect time was 109.2 milliseconds, Telegram notification delay was 3.4 milliseconds, access time was under 1 second, and latency from the website to the local server averaged 373.6 milliseconds. By combining IoT and AI technologies, this system provides a selective, efficient, and adaptive solution for automated cat feeding.

Keywords: AI, Cloudflare Tunnel, IoT, Raspberry Pi 4, YOLOv11