Portable IoT Pill Dispenser with Insulin Cooling and Blood Sugar Monitoring

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Abstract:

This study presents a compact, IoT-based medication dispenser that integrates insulin cooling and real-time blood sugar monitoring. The system achieved 100% accuracy, recall, precision, and F1-score in detecting and sorting Metformin, Gliclazide, and Dapagliflozin using the YOLOv8 model. Detection occurred within 6–7 seconds, with Gliclazide sorted fastest. Dispensing trials (10 per drug) confirmed a 100% PASS rate with no misdispenses. Although the dispensing time was near-instantaneous, scheduled dispensing showed delays of 13–30 seconds, yielding a 42.86% on-time rate, still acceptable for clinical use. The cooling system reliably reduced internal temperatures from 25 °C to 2 °C within 30 minutes, reactivating automatically above 8 °C. The device, enclosed in a 40 cm × 11 cm × 28 cm acrylic case, supports user access and monitoring via a smartwatch and web portal. These results validate the system's accuracy, responsiveness, and suitability for automated medication management in both home and healthcare environments.

Keywords:

Insulin Cooling System, IoT-based Medication Dispenser, Object Detection, Real-Time Monitoring.