

ABSTRAK

Peningkatan jumlah lansia di Indonesia mendorong kebutuhan terhadap sistem pengingat konsumsi obat yang andal. Penelitian ini mengembangkan Smart Reminder Medicine Box berbasis embedded system yang mengintegrasikan smartwatch ESP32 LilyGO T-Display dengan Pillbox Arduino UNO melalui Bluetooth HC-05. Kendala utama yang ditemukan adalah keterbatasan baterai LiPo 450 mAh yang tidak mampu mendukung operasional 24 jam. Untuk mengatasinya, dilakukan studi pemilihan baterai optimal melalui metode eksperimental komparatif, meliputi power profiling sistem pada empat skenario operasional (WiFi AP, idle, sinkronisasi NTP, dan mode aktif penuh), serta analisis komparatif spesifikasi baterai dari berbagai vendor berdasarkan parameter kapasitas, densitas energi, dimensi fisik, dan stabilitas tegangan. Hasil pengukuran menunjukkan konsumsi arus mode aktif mencapai 180–250 mA dengan rata-rata harian 90–120 mA. Dari empat kandidat yang dievaluasi, baterai LiPo High-Density 900 mAh (40×25×8 mm) terpilih sebagai solusi optimal karena memberikan peningkatan durasi operasional hingga 100% dibandingkan baseline, memenuhi batasan dimensi 10 mm, dan memiliki penambahan berat yang masih dalam toleransi kenyamanan pengguna lansia.

Kata Kunci: Baterai LiPo, ESP32, Wearable Embedded System, Power Profiling, Smart Reminder Medicine Box, Pengingat Obat

ABSTRACT

The growing number of elderly people in Indonesia has increased the need for reliable medication reminder systems. This study develops a Smart Reminder Medicine Box based on an embedded system integrating an ESP32 LilyGO T-Display smartwatch with an Arduino UNO Pillbox via Bluetooth HC-05 communication. The primary limitation identified was the 450 mAh LiPo battery's inability to support 24-hour operation. To address this, a comparative experimental study was conducted involving power profiling across four operational scenarios (WiFi AP, idle, NTP synchronization, and full active mode) and a comparative analysis of battery candidates based on capacity, energy density, physical dimensions, and voltage stability. Measurements revealed an active mode current draw of 180–250 mA with an estimated daily average of 90–120 mA. Among four evaluated candidates, a 900 mAh High-Density LiPo battery (40×25×8 mm) was selected as the optimal solution, delivering over 100% improvement in operational duration compared to the 450 mAh baseline while remaining within acceptable size and weight limits for elderly users.

Keywords: *LiPo Battery, ESP32, Wearable Embedded System, Power Profiling, Smart Reminder Medicine Box, Medication Reminder*