Design of a Personalized Smart Remainder System Utilizing IoT-Enabled Device and Machine Learning for Efficient Routine Management

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ABSTRACT

The increasing demand for personalized health management solutions has led to innovative approaches that integrate intelligent systems into everyday routines. This project introduces a smart reminder system designed to enhance adherence to scheduled activities—particularly medication intake—by leveraging Internet of Things (IoT) devices and machine learning algorithms. The system comprises pressure sensors, microcontrollers, buzzers, and wireless communication modules that detect medication use through physical interaction. Non-compliance triggers real-time alerts, with optional mobile notifications, ensuring timely intervention.A lightweight prediction model refines reminder timing based on behavioral data, improving efficiency and minimizing alert fatigue. By analyzing usage patterns, the system adapts over time, promoting sustainable routine management. The hardware and software components are designed for cost-effectiveness and modular expansion, targeting low-resource environments without sacrificing functionality. Comparative analysis with existing solutions from recent literature (2023–2024) demonstrates the system's unique contributions, such as minimal smartphone dependency, physical feedback integration, and behavioral personalization.The project aligns with key Sustainable Development Goals, including SDG 9 (Industry, Innovation and Infrastructure), SDG 11 (Sustainable Cities and Communities), and SDG 12 (Responsible Consumption and Production). Its emphasis on routine automation, responsible health behavior, and inclusive design underscores the system's potential impact in advancing community well-being and technological accessibility. Future extensions may involve cloud-based data syncing, integration with health records, and the system incorporates hardware-level fail-safes to maintain consistent performance across various environmental and usage conditions, ensuring reliability in both domestic and clinical settings. All sensor interactions are encrypted and locally stored, supporting data privacy while enabling offline operation where connectivity is limited. Its modular architecture supports seamless integration with future biosensing technologies and environmental sensors, allowing scalable enhancements without overhauling the base system design.Comprehensive evaluation methods assess compliance rate, response time, energy consumption, and feedback precision, reinforcing the system's robustness. Moreover, stakeholder impact analysis demonstrates its practical value for elderly populations, caregivers, and medical practitioners, showcasing its potential to bridge generational and technical gaps in healthcare accessibility.The system's adaptive timing reduces unnecessary alerts, improving user responsiveness. Its minimalist interface supports accessibility across age and literacy groups. Environmental testing confirms consistent performance under humidity and vibration. Offline functionality safeguards continuity in low-connectivity areas. Use cases span from rural clinics to assisted living, demonstrating versatile deployment.

Keywords— Machine Learning, Object Detection, You Only Look Once (YOLO) Algorithm, Fast SMS, Smart Surveillance, Real-Time Analytics, Privacy Preservation.

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