

Abstract: Bridging the Post-Acute Care Gap through Intelligent Remote Monitoring System

The Healthcare Challenge:

The transition from hospital-grade surveillance to home-based recovery represents a period of significant clinical vulnerability. Patients recovering from major surgeries or critical illnesses often enter a "monitoring void" where the lack of continuous oversight leads to undetected "silent emergencies"—physiological declines that manifest without obvious symptoms until they reach a crisis point. Currently, home recovery relies heavily on manual caregiver intervention, which is both inconsistent and cost-prohibitive. This gap in care results in high readmission rates and suboptimal recovery tracking for patients with reduced mobility.

The Proposed Solution:

To address this, we are developing a low-infrastructure, high-fidelity Remote Patient Monitoring (RPM) system designed for the home environment. The solution aims to democratize hospital-grade safety by providing automated, continuous detection of critical health events while tracking long-term recovery milestones. By minimizing the technical burden on patients and reducing reliance on non-professional caregivers, the system ensures high adherence and timely clinical intervention.

Current Development Status: (TRL Level 4)

Our project has successfully progressed from concept to a functional hardware prototype. We are currently in the software integration phase, building the infrastructure to sync real-time sensor data with a centralized monitoring platform. A core component of our innovation lies in the application of Machine Learning (ML) models; we are actively in the training and testing phase, utilizing curated datasets to refine predictive algorithms capable of identifying early markers of medical distress.

Strategic Roadmap & Requirements:

The path to market over the next 12–24 months focuses on transforming this prototype into a certified medical device. Our immediate objectives include:

Clinical Design & Engineering: Refining the current hardware into a market-ready, clinical-grade design that meets ergonomic and durability standards for home use.

Algorithm Optimization: Tuning our ML models to achieve the high sensitivity and specificity required to detect emergencies without triggering excessive false alarms.

Regulatory Compliance: Navigating the complex landscape of clinical device licensing to ensure the product meets global safety standards.

Clinical Validation: Initiating rigorous clinical trials to validate the system's efficacy in real-world scenarios, ensuring data accuracy and user safety.

Impact and Goal

The ultimate objective is to deploy this technology across diverse home care services, providing a scalable, cost-effective safety net for recovering patients. By integrating intelligent detection with ease of use, we aim to significantly lower hospital readmission rates and improve the quality of life for patients during their most critical recovery phase.