ICRTME25-159

Mind Guard: AI-driven Digital Wellbeing Platform

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ABSTRACT

This project seeks to create an AI-driven system to predict and prevent digital addiction in children (ages 8–15) by combining passive behavioral monitoring, context-aware risk assessment, and just-in-time adaptive interventions (JITAI). Leveraging smartphone usage patterns; such as app frequency, session lengths, and interruption sensitivity—the system employs machine learning (e.g., Random Forest, XGBoost, neural nets) to identify early signs of addictive behavior. Upon detection, it delivers tailored prompts (e.g., encouraging breaks, mindfulness activities), personalized via an LLM-based motivational engine.A key innovation lies in the inclusion of mechatronic wearable components—such as smart bands or interactive devices embedded with flexible and stretchable sensors—to capture physiological signals like stress, motion, and respiration. These mechanical engineering enhancements enrich digital behavioral data with real-time biometric context, enabling more accurate risk models and timely interventions. Complementing this is a parent/educator dashboard that visualizes risk trends and suggests balanced alternatives. Pilot deployments aim to validate efficacy by tracking reductions in addictive usage patterns and improvements in mental wellbeing metrics. Combining AI, behavioral science, wearable-mechatronic sensing, and parental engagement, this tool promises to support healthier digital habits while safeguarding child autonomy and privacy.

Keywords: Mechatronic wearables, Flexible/stretchable sensors, Physiological signal monitoring, Stress detection, Motion tracking, Respiration sensing, Biometric context integration.

978-81-992034-1-9