

HealthReact: Advanced mHealth Platform for Comprehensive Stroke Management

Targeted call: HORIZON-JU-IHI-2023-05-03

Overview: HealthReact is a state-of-the-art cloud-based system designed for real-time data collection, evaluation, and reporting. By integrating vital data from a variety of sources, HealthReact offers a holistic approach to health monitoring and intervention tailored to the needs of comprehensive stroke management.

Key Features

- **Data Integration:** Seamless gathering of data from wearables, unobtrusive sensor pads, accelerometers for movement patterns, cognitive assessment tools, and heart rate variability (HRV) monitoring via API, ensuring a comprehensive view of patient health.
- **Real-time Evaluation:** HealthReact processes data in real time, enabling timely interventions and care adjustments based on patient-specific rules related to vital signs.
- **Dynamic Interaction:** Event-triggered prompts and feedback mechanisms for patients tailored to individual health metrics and trends, enhancing patient engagement.
- **Comprehensive Reporting:** Regular insights on patient health metrics, trends, and potential areas of concern, ensuring continuous monitoring and feedback for healthcare professionals.

HealthReact Applications for Stroke Management

- **Early Detection and Diagnosis:** Utilizing integrated data from medical health records and other sources, we can employ previously developed algorithms (e.g., Tazin 2021, Zhang 2019) to identify individuals at risk of stroke. These algorithms, combined with our capacity to develop new AI-driven predictive models, ensure rapid diagnosis and timely intervention, optimizing the chances of a successful recovery.
- **Personalized Care Pathways:** Integrating data from various sources (e.g. medical health records, hospital devices such as MRI machines and CT scanners, patient-reported outcomes using the Ecological Momentary Assessment (EMA), data from wearable devices like heart rate and blood glucose monitors) to provide a comprehensive view of the patient, enabling tailored treatment strategies based on individual health metrics and trends.
- **Post-stroke Rehabilitation:** Using wearable and ubiquitous sensors, along with the HealthReact smartphone app, we can track movement patterns, assess cognitive and speech functions, and monitor vital signs to guide rehabilitation efforts, prevent secondary strokes, and optimize recovery.
- **Data-Driven Interventions:** Leveraging event-triggered prompts and feedback mechanisms directed towards patients, caretakers, and healthcare professionals to enhance patient engagement and adherence to care plans.

Our Team: Boasting over a decade of experience in vital data evaluation, our multidisciplinary team combines expertise from both technological and biomedical backgrounds, including regulatory aspects of Medical Device Software. Specializing in advanced statistical methods and AI-driven anomaly detection, we have successfully executed national and international projects, showcasing our comprehensive expertise in the domain.

Recent Collaborations

- ERA HDHL-INTIMIC (2022–2025): Wearable sensors for assessing physical and eating behaviors (**integrated data collection system simultaneously capturing physical and eating behaviors**; 600 participants).
- AZV (2021–2024): mHealth intervention in practices of general practitioners for patients with prediabetes and type 2 diabetes (**data-driven intervention to guide rehabilitation efforts**; 340 patients).
- TAČR ÉTA (2020–2023): SMART Solutions Across Continuum of Care for the Elderly (system for **integrating data from wearable devices and environmental sensors**; 400 older adults).
- ERDF (2019–2022): Healthy Aging in Industrial Environment (system for **integrating health records, data from wearable and environmental sensors and patient-reported outcomes** using the EMA; 1340 individuals).

Technology: HealthReact is built on a scalable cloud infrastructure, utilizing Kubernetes for efficient deployment. The accompanying smartphone application, developed with Flutter, offers cross-platform compatibility for iOS and Android devices. Our system employs robust security protocols to ensure secure transmission of data, prioritizing user privacy and data integrity.

Contact:

Ing. Richard Cimler, Ph.D.

Head of Center of Advanced Technology

Faculty of Science, University of Hradec Kralove

Phone: +420 723 068 569; E-mail: richard.cimler@uhk.cz

References: Tazin et al. (2021). Stroke Disease Detection and Prediction Using Robust Learning Approaches. DOI: 10.1155/2021/7633381.
Zhang et al. (2019). A Stroke Risk Detection: Improving Hybrid Feature Selection Method. DOI: 10.2196/12437.