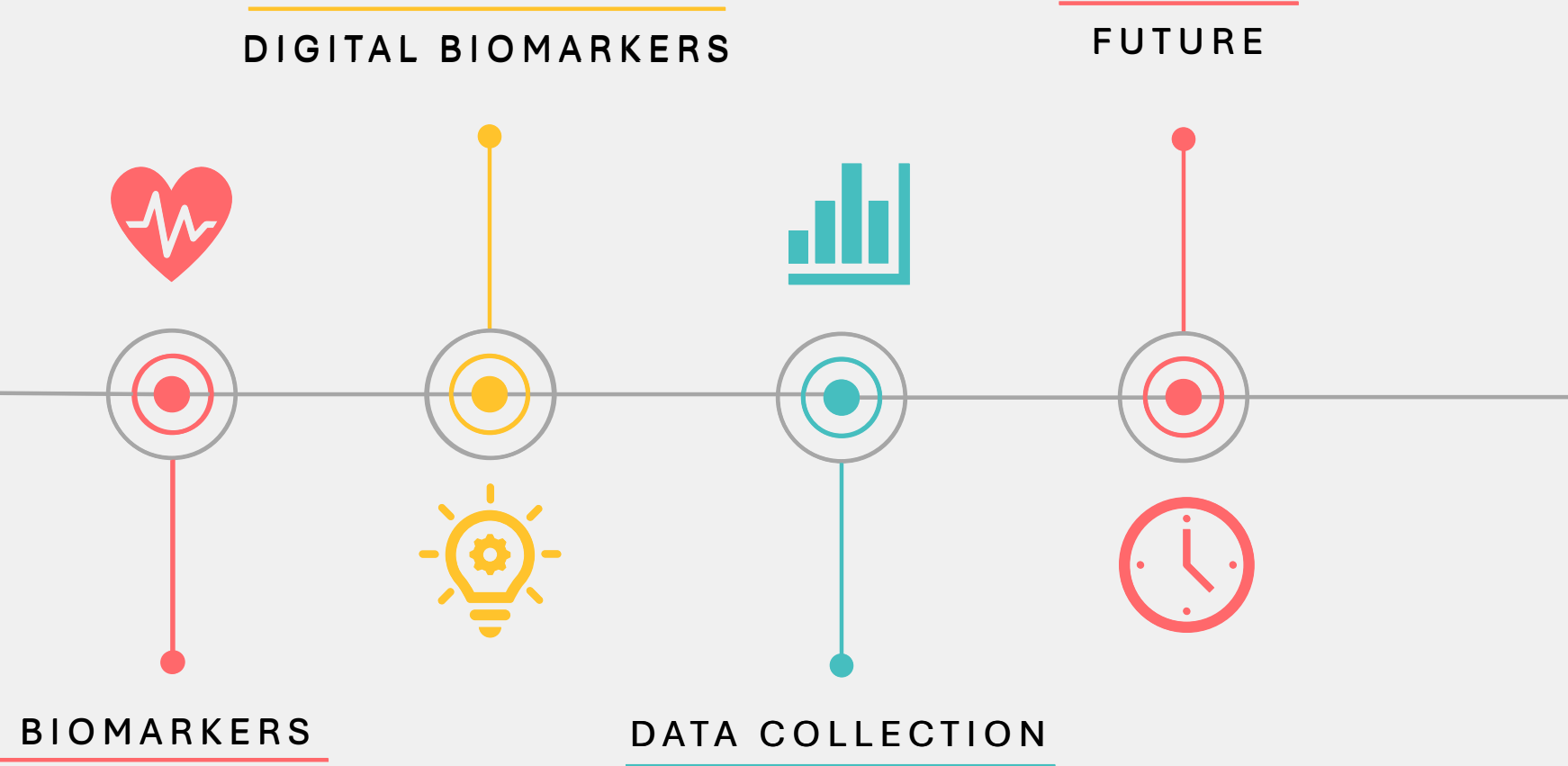


DIGITAL BIOMARKERS

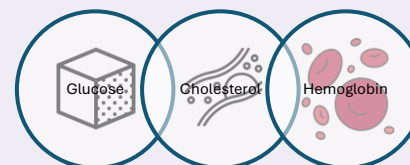


Biomarker

(short for "biological markers") are measurable indicators of a biological state, condition, or process in the body. They are often used in medical science and research to detect diseases, monitor disease progression, assess the effects of treatment, or predict outcomes.



Blood



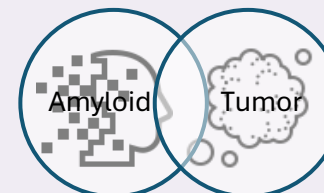
Protein



Genetic



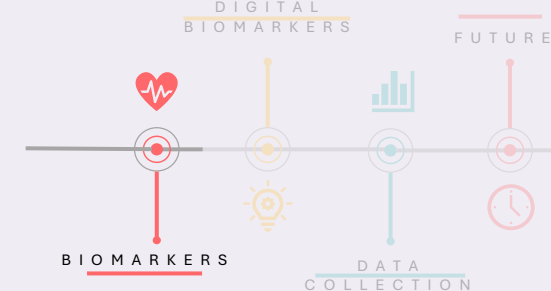
Image



Metabolic



Environmental Exposure





DIGITAL BIOMARKER

“a characteristic that is objectively quantified and assessed as an indicator of normal biological functions, pathological states, or pharmacological responses to therapeutic interventions”

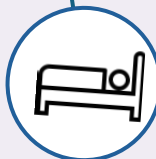
Atkinson, A. J. et al. Biomarkers and surrogate endpoints: Preferred definitions and conceptual framework. Clin. Pharmacol. Ther. 69, 89–95 (2001).



Physical Activity and fitness



Cardiovascular Health



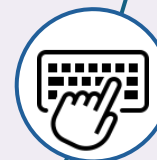
Sleep Patterns



Behavioral Health

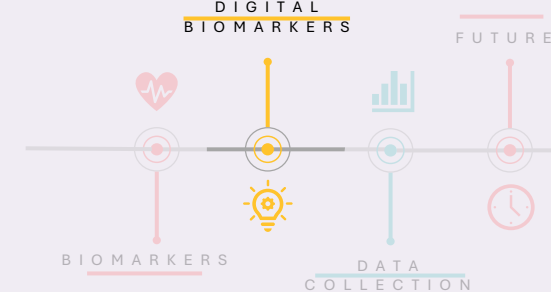


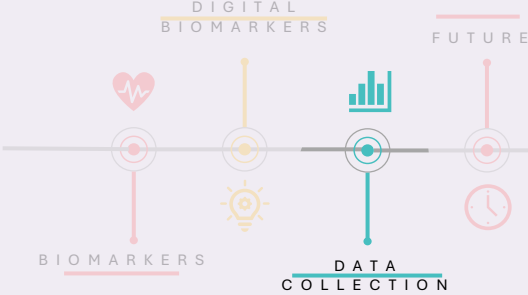
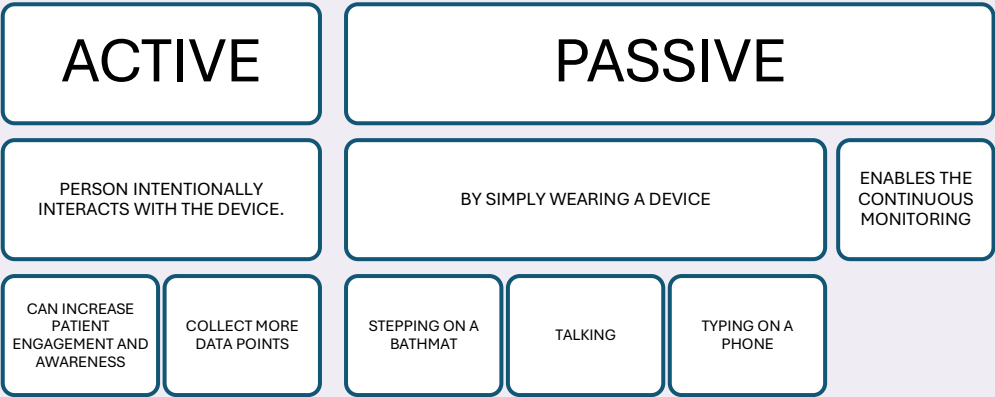
Respiratory Health

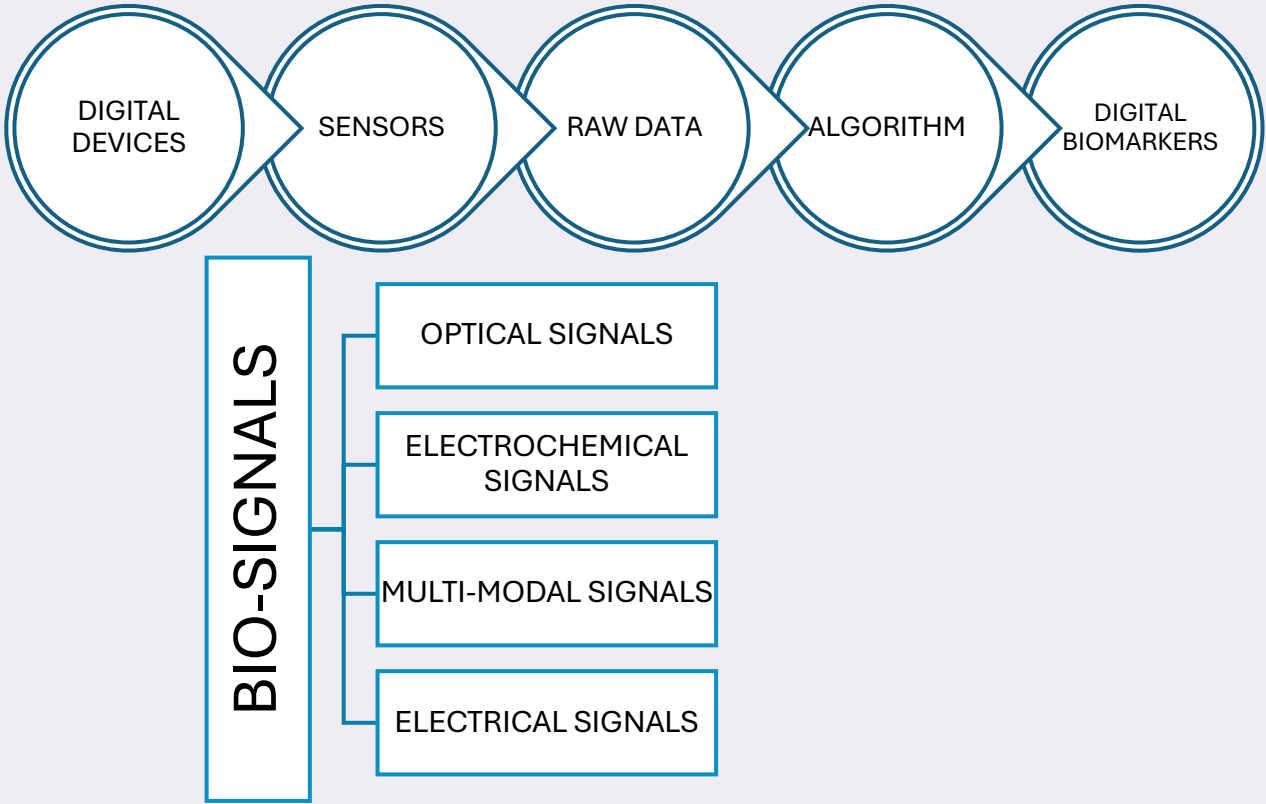
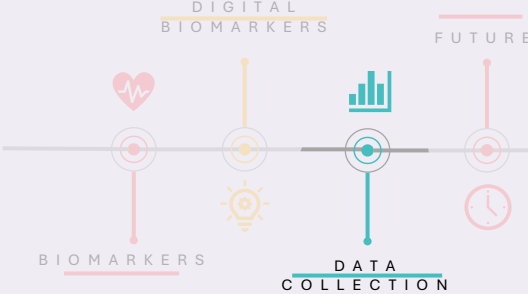
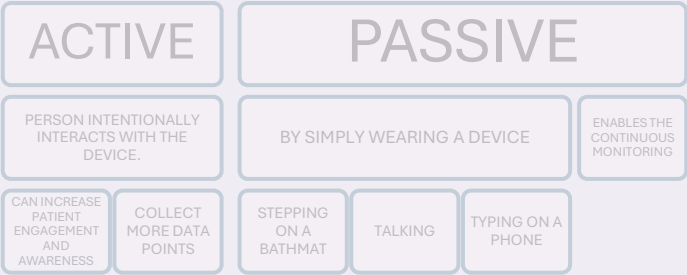


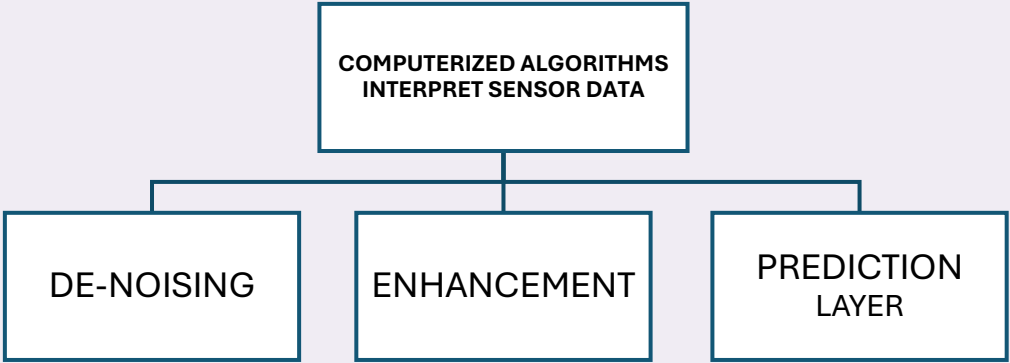
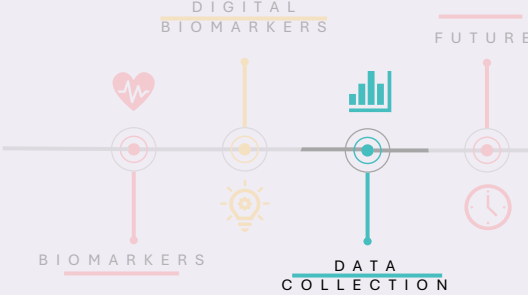
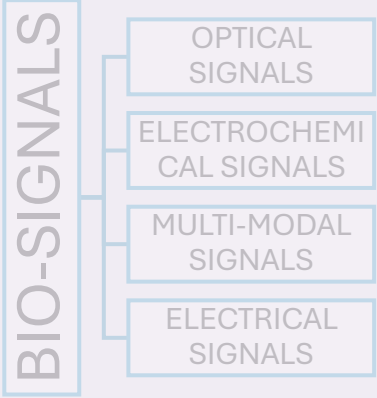
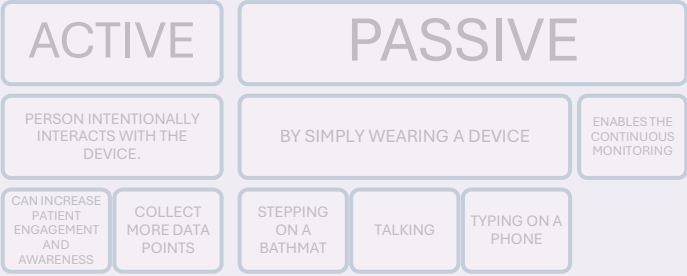
Neurological and Cognitive Health

Digital biomarkers











DIGITAL BIOMARKER

Digital biomarkers will deeply transform healthcare by driving innovations in disease **prevention**, **diagnostics**, **treatment**, and **monitoring**.

Game-changing for **patients**, healthcare **professionals**, and **pharmaceutical** companies.



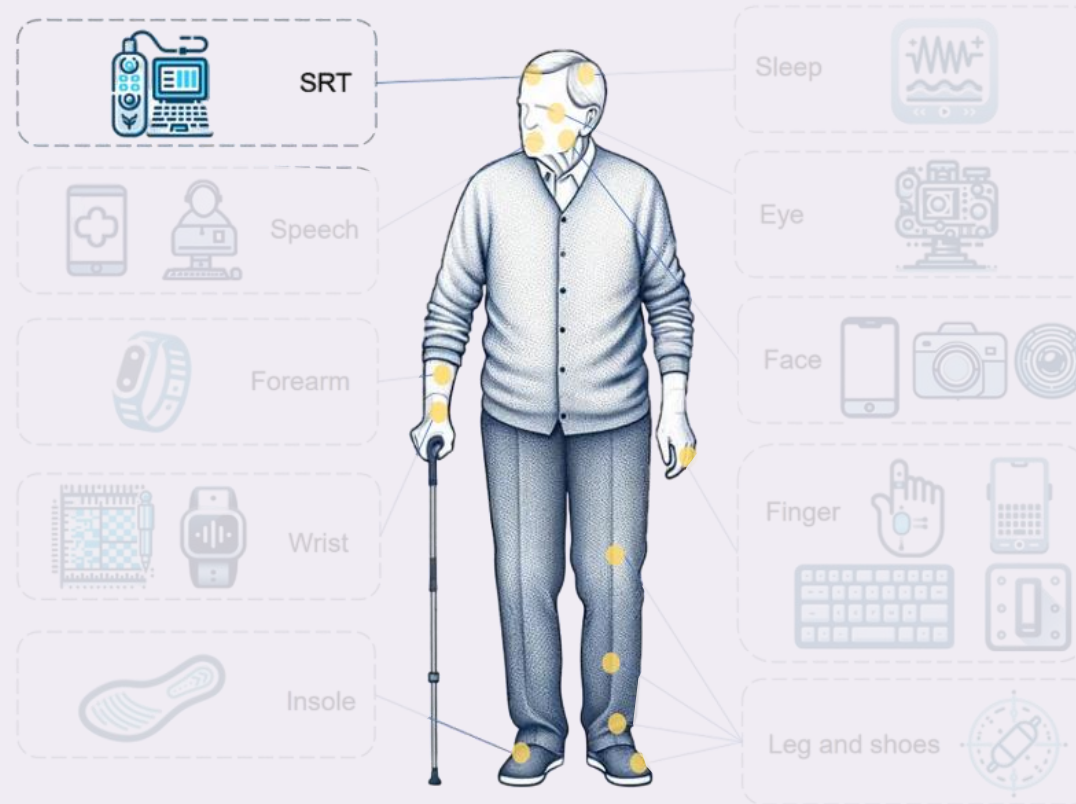
Serial Reaction Time (SRT)

Digital biomarkers:

- Response time after an event occurs.
- Reaction time

Detection Devices:

- Serial Response Box
- A personal computer with a 33-cm color monitor connected to a four-button box



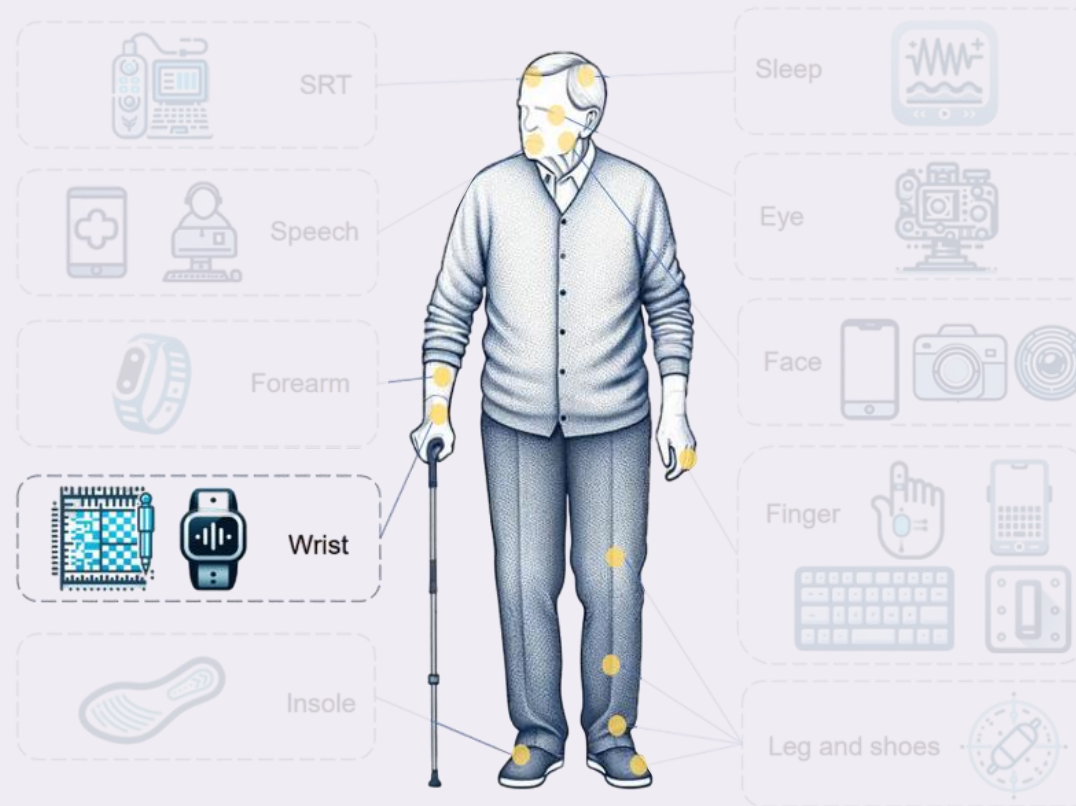
Wrist

Digital biomarkers

- Volume, velocity, acceleration, and frequency of hand positions
- Acceleration and angular velocity
- Continuous inertial sensor data

Detection Devices

- A Leap Motion Controller (LMC)
- Apple Watch and its application MM4PD



PARKINSON

INTRODUCTION

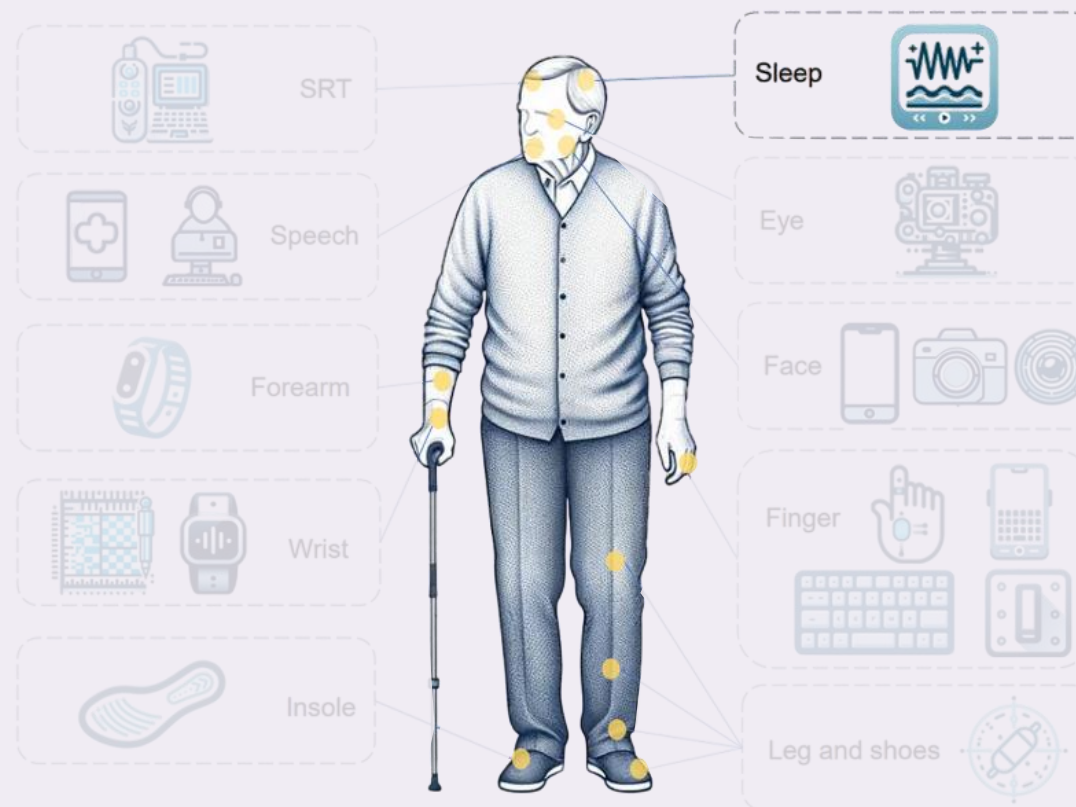
SLEEP

Classification

- EEG headband
- Nighttime respiratory signals
- Wearable device
- Smart bed

Digital Biomarkers

- Total sleep time, sleep efficiency, wakefulness, light sleep duration, etc.



PARKINSON

INTRODUCTION

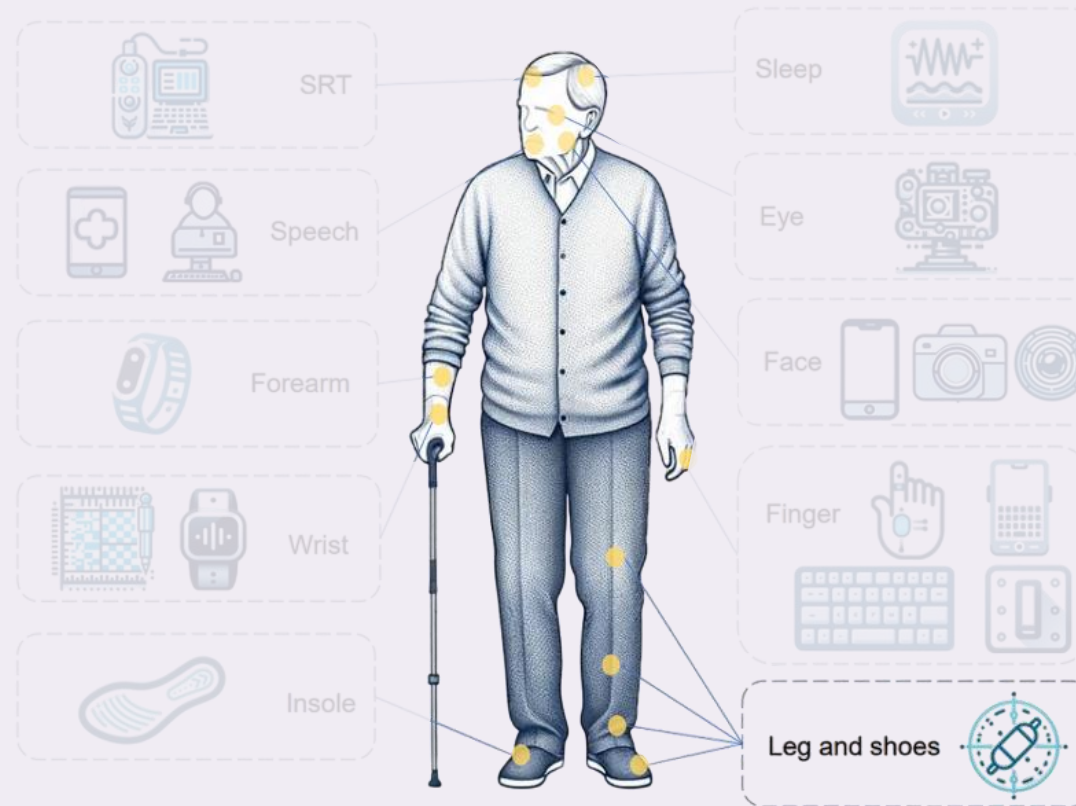
Gait and balance

Classification

- Ankle
- Footwear
- Insole
- FoG

Digital Biomarkers

- Stride length, stride duration, gait speed
- Pressure values of the sensors, acceleration and angular velocity



PARKINSON

INTRODUCTION

CURRENT CHALLENGES

This table summarizes key challenges faced in the realm of digital biomarkers.

CHALLENGE	DESCRIPTION	IMPACT
Data Privacy	Concerns regarding user data	Trust issues with users
Integration	Difficulty combining data sources	Hindered analysis capability
Validation	Lack of standardized methods	Inconsistent results
Interoperability	Systems not communicating effectively	Data silos

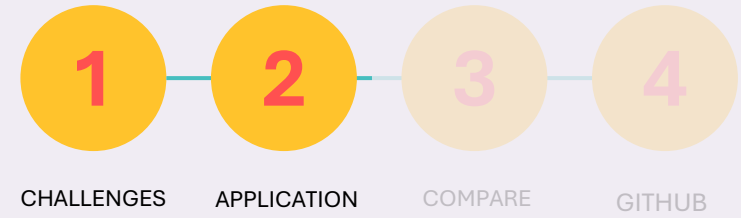
APPLICATIONS

Diagnosis

Prognosis

Therapeutic Monitoring

Risk Assessment

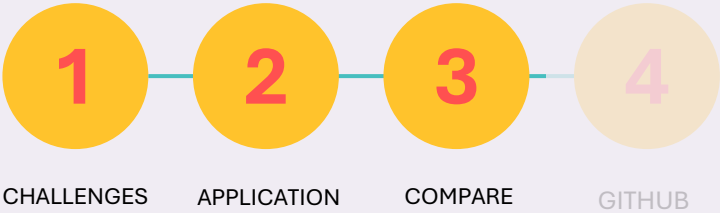


SUMMARY

PARKINSON

INTRODUCTION

BIOMARKERS VS DIGITAL BIOMARKERS

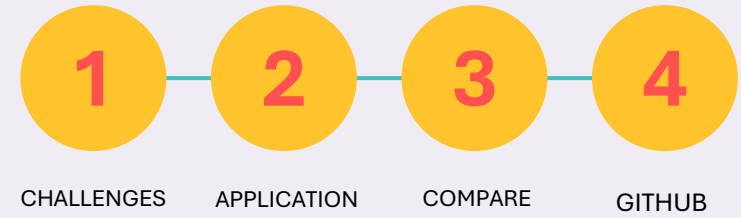


Aspect	Biomarkers	Digital biomarkers
Definition	Measurable biological indicators of a biological state.	Measurable physiological or behavioral data collected using digital devices
Accessibility	Requires specialized equipment and healthcare professionals.	Accessible through consumer grade device (e.g. smartphone, fitness trackers)
Personalization	Limited, based on standardized clinical parameters.	Highly personalized, tracks individual behaviors and physiological trends.
Cost	Expensive	Generally lower cost after initial device purchase.



GITHUB

<https://github.com/pxsa/Digital-Biomarkers>



pxsa

Edit profile

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pmvind Public

Predicting missing values in non-numeric datasets

Jupyter Notebook ☆ 2

piziStar Public

robot path planning algorithm

C++ ☆ 2 🐞 1

snake Public

simple cli snake game in go

Go ☆ 1

news-categorization Public

categorizing news according to their contents

Jupyter Notebook ☆ 2 🐞 1

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258 contributions in the last year

Contribution settings



Learn how we count contributions

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SUMMARY

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