

MULTIMODALITY IN HEALTHCARE: THE ROLE OF AI AND DIGITAL BIOMARKERS (MULTI-BIO)

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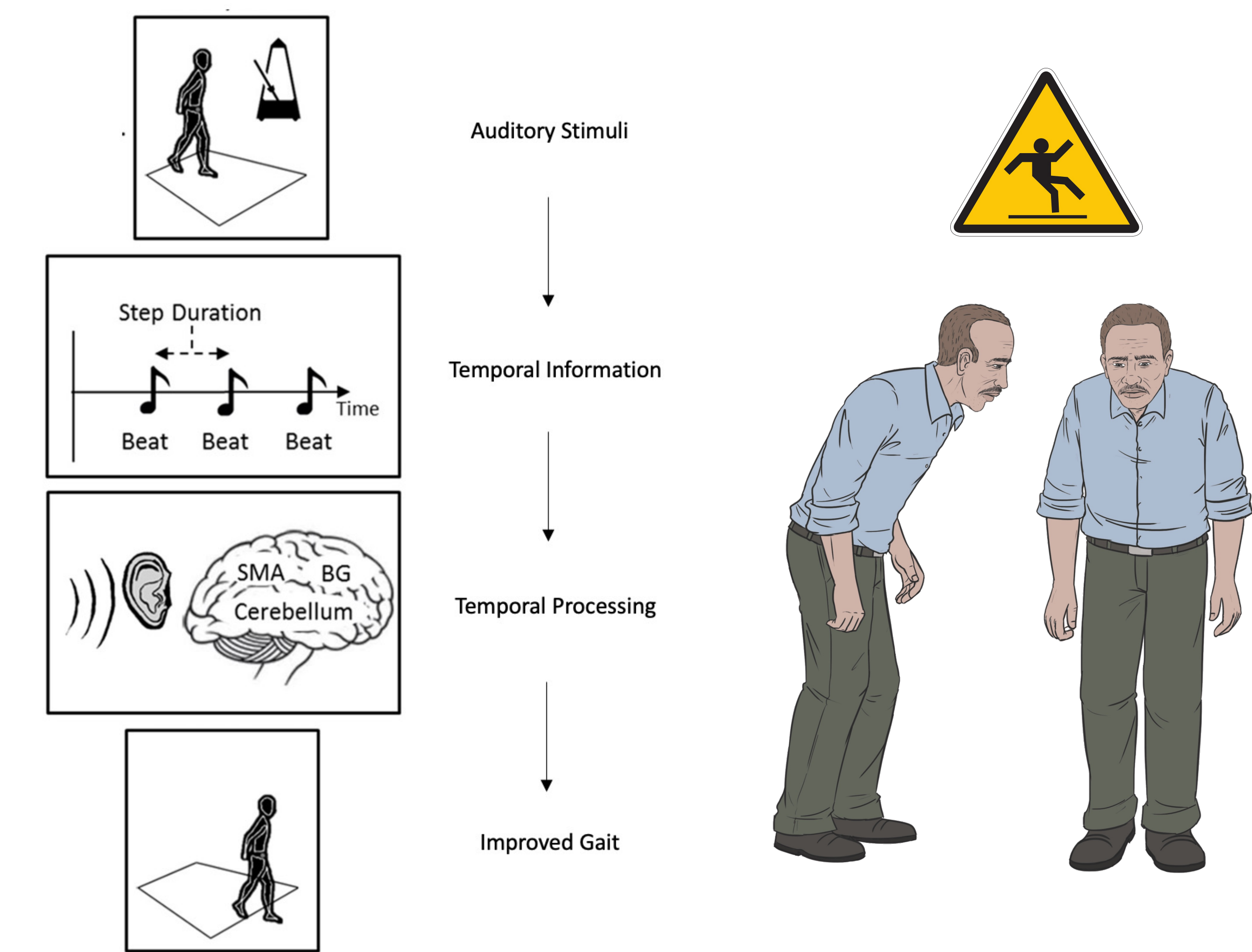
INTRODUCTION

Parkinson's is a neurological disorder that causes gait impairments such as decreased speed, shorter stride lengths, shuffling steps, and freezing episodes [1-2].

These impairments increase the risk of falling, with an annual fall rate between 45% and 68%, and recurring falls in 39% of individuals with Parkinson's [3-4].

Pragmatic interventions like visual, audio, and tactile cueing can improve gait [5-8].

Music cueing has also shown promise for alleviating abnormal gait in Parkinson's [9-10].



RATIONALE & AIM

Current state-of-the-art approach is the use of a metronome.

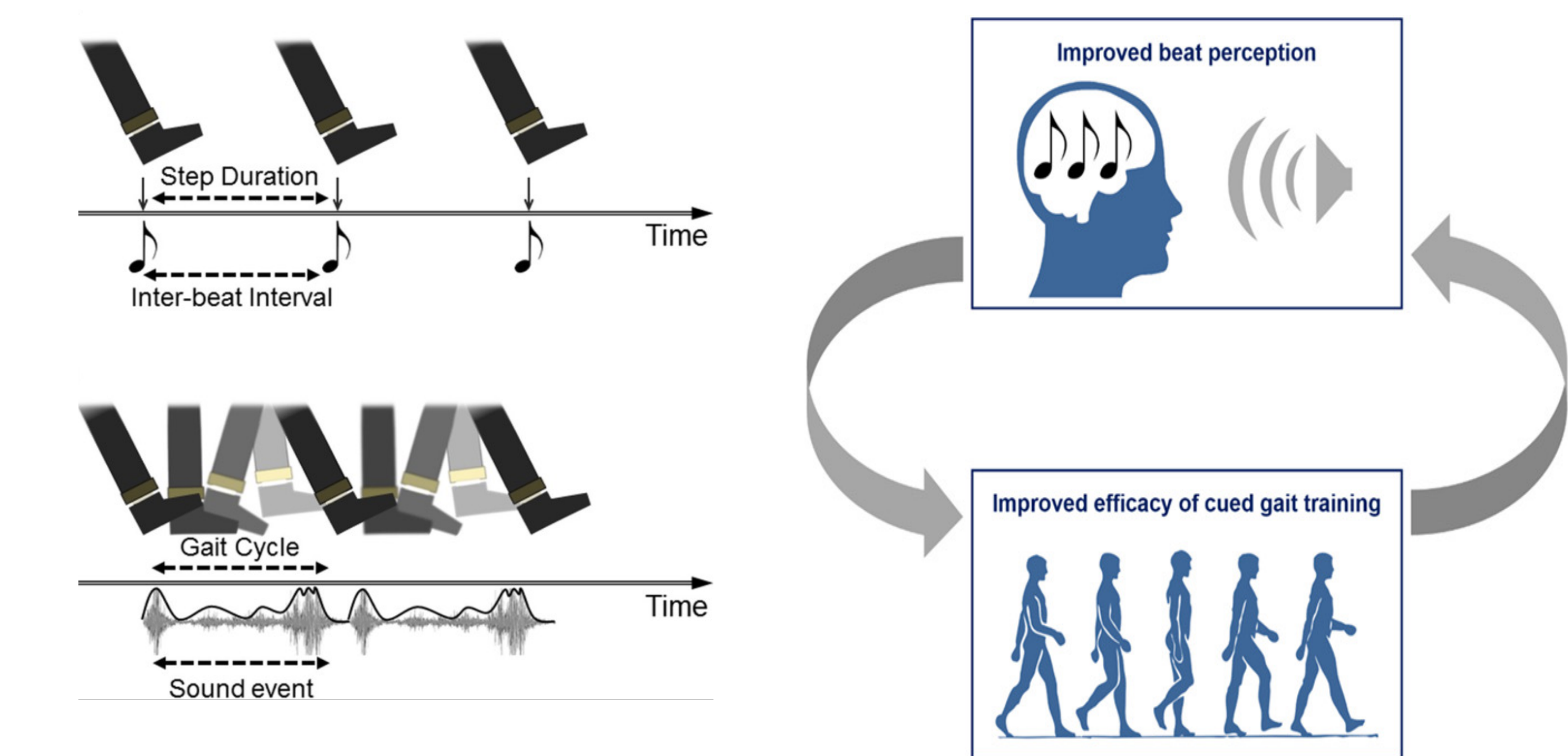
While there are successful attempts at music cueing, the exploration of a more personalized approach is lacking within literature.

Lack of a personalized approach results in almost 50% of Parkinson's patients either showing no improvement or in some cases, worse gait [11].

The overall aim of this project is to utilise mobile computing to investigate a novel multi-modal smartphone application that dynamically use near real-time physiological assessment and biofeedback to monitor and improve motor-based tasks.

OBJECTIVES

1. Performing extensive research to determine optimal methods for approach.
2. Obtaining ethical approvals.
3. Developing a smartphone app to capture real-time physiological signals and then produce personalised real-time music cueing.
4. Conducting a multidisciplinary study with individuals with PD in a lab setting to assess validity of approach.



PROPOSED METHODOLOGY

| Using | Developing | Producing |
|---|---|--|
| Using embedded sensors effectively as an Inertial Measurement Unit (IMU), to gather triaxial sensor data. | Developing a smartphone application that near real-time tracks gait characteristics using triaxial sensors. | Producing music that matches gait characteristics to deliver a more personalized approach to music cueing. |

CONTRIBUTION TO KNOWLEDGE

Development of a contemporary approach that provides a personalised approach to music cueing through accurate sensing.

Personalised approach would use recorded gait characteristics to dynamically adapt music cueing to fit patient's physiological condition and characteristics.

Approach would be low-cost, adaptive, and widely accessible.



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