G(AI)T MOBILITY: THE MICRO:BIT ASSISTED GATEWAY FOR LOWER BODY REHABILITATION THROUGH AN INTERACTIVE GAMEPLAY SYSTEM

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Abstract

Lower-body mobility impairment compromises autonomy and quality of life, affecting individuals of all ages due to neurological conditions, aging, or orthopedic injuries. However, gait-inspired exercises can help strengthen legs and balance to regain or improve these skills. This project created G(AI)T Mobility, an engaging way to effectively restore mobility through gait movement exercises, placing emphasis on physical and cognitive skills. G(AI)T Mobility was made by training a Micro:bit to detect six movements: Low-Still, High-Still, Up, Forwards, Backwards, and Sidestep, which allow the machine to detect a user's movement in both the sagittal and frontal planes to change their coordinates in the system. The foundational function is based on the recognition of three gait-related exercises: forward/backward steps with hip flexion, and lateral side steps. To make this work, we implemented a coordinate system where a player moves to a desired box to score points, alongside radio communication to avoid misfires between each Micro:bit while the other leg is moving. Our results show that G(AI)T Mobility improves mobility and balance by training muscles in a fun and consistent way. Currently, our prototype uses four blocks yet is a limitless and expandable foundation. The next step is to expand into a commercial product that turns health improvement from a chore into an enjoyable game. We plan to refine our product for manufacturing and build a brand that reaches those in need, with the goal of opening the GAITway of mobility back to our customers.

Keyword: Micro:bit, Machine Learning, Gait Exercises, Mobility Impairment, Rehabilitation Technology.