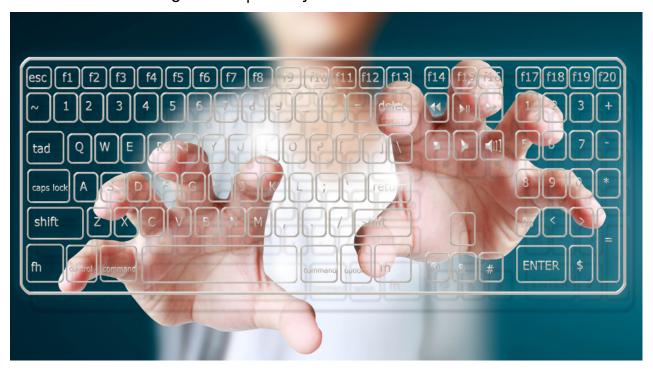# TYPE IT DOWN

Development and evaluation of cueing techniques to support people with Parkinson's Disease when interacting with computer keyboards.

Introduction

Currently, there are about 53.000 people in The Netherlands which have been diagnosed with **Parkinson's Disease (PD)** and this number is increasing fast. PD is **a progressive disorder that affects the nervous system and the parts of the body controlled by the nerves**, causing problems with **movement, mental health, sleep, pain, and other health issues**. PD gets worse over time and there is no cure yet. However, therapy, tools and medicines exist that can reduce symptoms and thus improve the quality of life for people with PD.

One of the hallmark symptoms of PD is **bradykinesia**, characterized by slowed movements that impair fine motor skills, complicating routine tasks like fastening buttons, handling kitchen utensils, or operating a computer keyboard. In today's increasingly digital age, **computer keyboard interaction** has gained paramount importance for facilitating social engagement and performing essential administrative duties, such as banking. However, past research indicates that individuals with PD encounter difficulties in executing sequential movements and exhibit delayed reaction times when using keyboards, resulting in **frustration**, **avoidance behaviors**, and **decreased engagement** in both professional and personal spheres.

GRADUATION PROJECT

PROBLEM STATEMENT

Assistive Innovations, a longstanding entity specializing in the development and manufacturing of assistive devices for over 25 years, has recently joined forces with Roessingh Research and Development, Radboud University Medical Center, and Delft University of Technology to address this issue. Together, they have secured funding from ParkinsonNL to explore the integration of **'cueing techniques'** aimed at aiding individuals with PD in computer keyboard interaction. These techniques entail the use of external cues, such as visual or auditory prompts, to facilitate the initiation and execution of movements that might otherwise prove challenging for people with PD.

While cueing techniques have been applied in assistive devices, their utilization in supporting upper extremity functions, particularly arms, hands, and fingers, has been relatively limited. Preliminary studies suggest the potential efficacy of **auditory cues** in enhancing movement variability among individuals with PD exhibiting reduced finger tapping variability. Additionally, exploring **haptic feedback** via vibrations holds promise, inspired by research demonstrating its benefits in mitigating freezing, improving postural alignment, and enhancing vocal projection. The primary challenge lies in seamlessly integrating these cueing techniques into a design that not only enhances **typing efficiency** but also prioritizes **comfort** and **user preference**.

ASSIGNMENT

The goal of this graduation assignment is to explore the feasibility of applying cueing techniques to support people with PD in interacting with a computer keyboard. It will apply an **iterative process of research and design** through building and evaluating multiple **prototypes**. Starting with user research and simple **mock-ups of low fidelity**, these would gradually evolve into more **high-fidelity concepts**. Throughout the project you will be in contact with people from the target group, involving them in several stages of the project.

YOUR PROFILE

We are looking for an enthusiastic **IPD** or **DFI student** with a keen and genuine interest in contributing to this relevant and sensitive topic. You are dedicated, have a curious mindset and are open to explore novel solutions. You should be comfortable with building prototypes of different fidelity and technology as well as user testing them in different conditions.

MORE INFORMATION

Please contact dr.ir. Gert Pasman (g.j.pasman@tudelft.nl) if you want to know more about this meaningful and challenging project!