A Self-Stabilizing Haptic Accessibility Mouse for Parkinson's Sufferers

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Haptic technology, which delivers a sense of touch, has gained significant popularity in the entertainment industries for providing immersive virtual experiences. However, its potential as an accessibility accommodation for medical disabilities remains largely untapped. This project proposes an unprecedented application of haptic technology on Parkinson's Disease accommodations by developing a low-cost accessibility mouse that provides guiding forces for users to navigate electronic devices. The gadget addresses the limitations of current products by providing direct friction as applied forces, overcoming tremors, stiffness, and coordination issues that make it challenging to control electronic devices. Through experimentation and comparison of more than 20 electronic components, the final design incorporates optical flow movement testing, MLX Hall effect sensors, the Esp32 microcontroller, and P.I.D. algorithms in an electronic circuit to achieve accuracy and efficiency. A framework was developed to compare the stability of the gadget under spasms, leading to the development of the final product. The final gadget significantly improved cursor navigation accuracy and efficiency by up to 81%, compared to current accommodations. This research demonstrates the potential of haptic technology as an innovative accommodation for individuals with Parkinson's Disease, offering a new avenue for individuals with movement disorders to access electronic devices and improve their quality of life. Overall, this project highlights the promise of haptic technology as a practical, cost-effective, and accessible solution for medical disability accommodations. Further research is warranted to explore the full range of applications of haptic technology in healthcare and other fields.

Awards Won:
Association for Computing Machinery: Fourth Award of $500
Serving Society Through Science: Second Award of $500