Forearm Exoskeleton for Tremor Alleviation (FETA)

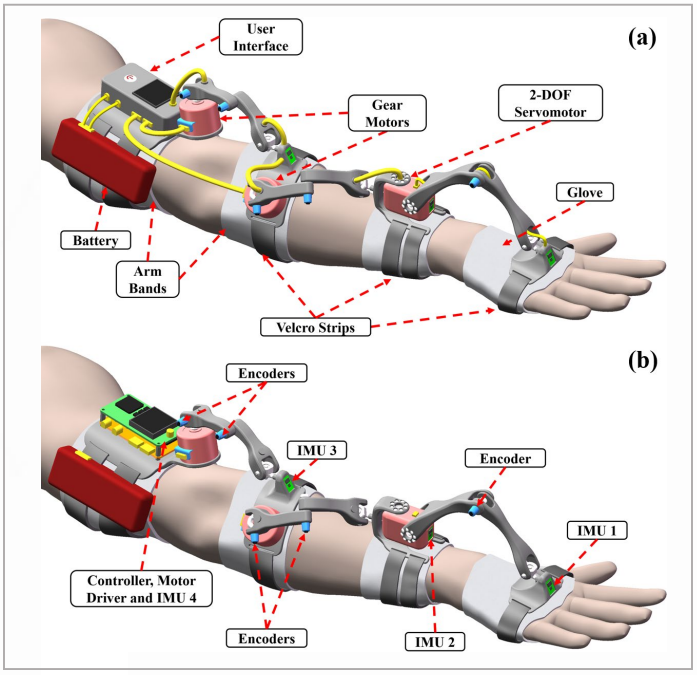
VTIP 22-034: "High-Degree-of-Freedom Forearm Exoskeleton for Tremor Alleviation"

THE CHALLENGE

Parkinson's Disease and Essential Tremor are the two most common causes of neurological tremors and together effect approximately eight million people in the US alone. These pathological tremors make many everyday activities—from writing to the most basic of tasks like eating and drinking—difficult or impossible for the patients afflicted with them. The incidence of these tremors increases with age, so any remedies need to account for decreased muscle mass and reduced physical stamina commonly associated with elderly populations.

OUR SOLUTION

Oumar Barry and his team at Virginia Tech have developed a novel forearm exoskeleton that can provide a non-invasive answer to the everyday difficulties associated with Essential Tremor and Parkinsonian tremors. Servo motors along the arm provide tremor alleviation and movement assistance with the help of algorithms designed to suppress tremors and aid voluntary movements. All of the joints within the exoskeleton take into account normal ranges of motion; linkages have six degrees of freedom and will not hinder any natural movements. The main electronic components that make up the majority of the device's mass are attached to the upper arm to allow wearers to more efficiently bear the weight. To improve the ergonomics of the design and ensure increased compliance and stability, attachment of the exoskeleton glove to the arm is done via soft, non-binding interfaces including gloves, arm bands, and adjustable straps. This exoskeleton promises to be a life-changing innovation for patients suffering from tremors and could prove to be the deciding factor between independence and institutionalization.



Schematic drawing of the structure of the novel forearm exoskeleton. The top portion of the illustration shows the mechanical and electrical parts, the bottom the electronic components. (DOF: degrees of freedom; IMU: inertial measurement unit)

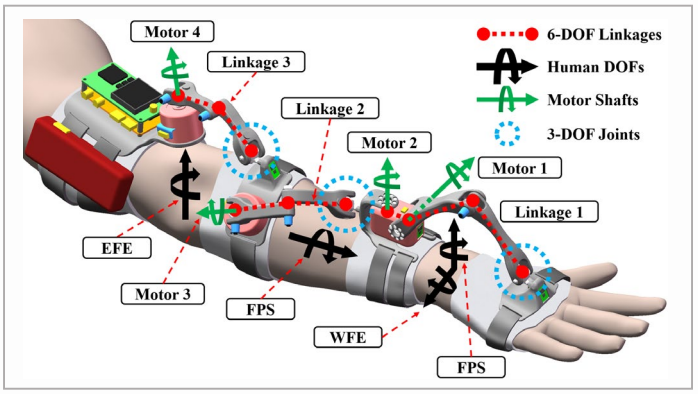


Diagram outlining the mechanisms and movement capacity of the novel forearm exoskeleton as compared to natural movements of the forearm.

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