Wrist-driven Wearable Grasping Device for Enhancing the Independence of Spinal Cord Injury Patients

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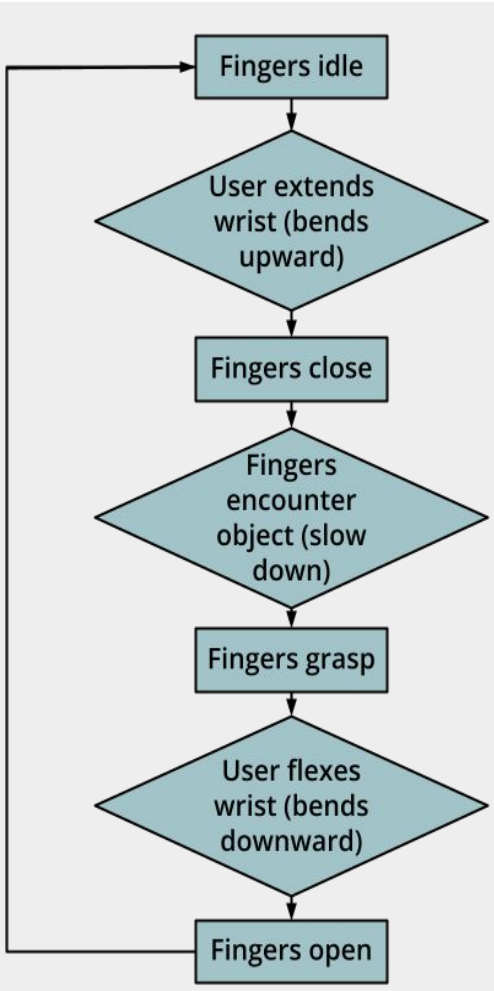
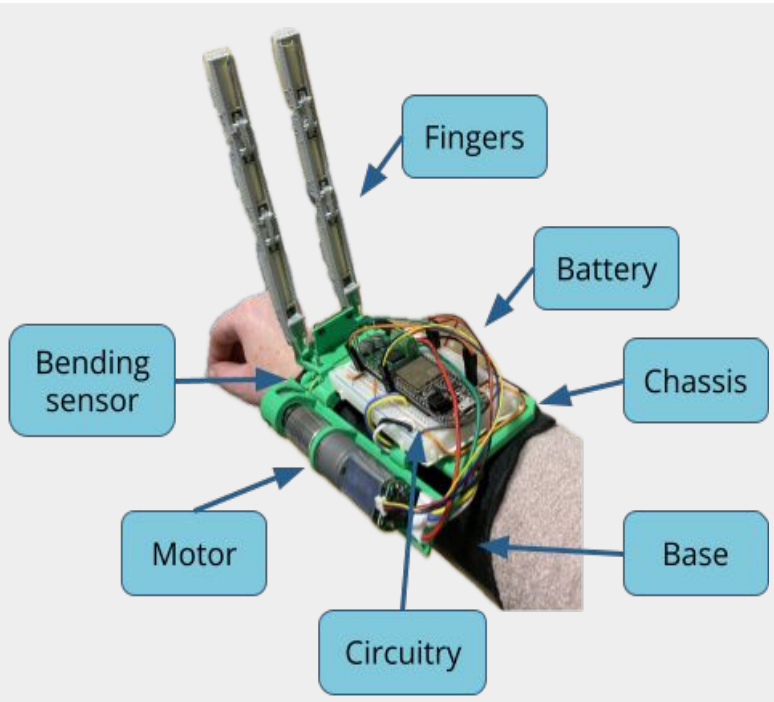
Patients with C5-C7 spinal cord injuries have limited grip strength, leading to difficulty performing routine tasks. Current solutions involve costly technologies and complex mechanisms to enable patients to engage in activities of daily living.



Grasping Algorithm:

The fingers close around an object when triggered by a change in wrist angle detected by the bending sensor.

Moving the wrist in the opposite direction causes the fingers to open.



Device Structure:

Wrist extension triggers the closing of the fingers, which is powered by a battery and is considered an all-in-one device.

We are enhancing patients' independence through a low-cost assistive grasping device driven by electric power that does not impede natural grasping function. Our grasping device consists of two supernumerary fingers located on the back of the wrist and utilizes flexor sensing to detect wrist bending, which closes the fingers for grasping objects.

Objects are trapped against the back of the hand when the wrist bends backwards.

Patient Testing:

- ❑ Patients perform tasks related to a morning routine
- ❑ Use the device to complete tasks
- ❑ Passively wear the device while performing tasks
- ❑ Planning human trials with 2-4 case studies

Aiming to discover
- How much will they use it?
- Does it restrict natural function?

Future Work:

- ❑ Continuous improvements are required to streamline the manufacturing process
- ❑ Design changes will make the device customizable & manufacturable at scale
- ❑ Further patient testing reveals suitability for other medical conditions and provides feedback for future iterations

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