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Knee Exoskeleton – MetaMobility Lab — ONGOING

V1.1 built from onyx

What?

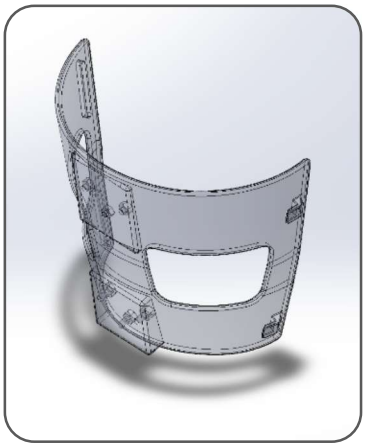
- The knee-exoskeleton is a wearable assistive device designed to enhance human mobility
- It uses a knee-mounted actuator to deliver torque directly to the joint during the gait cycle

Challenge

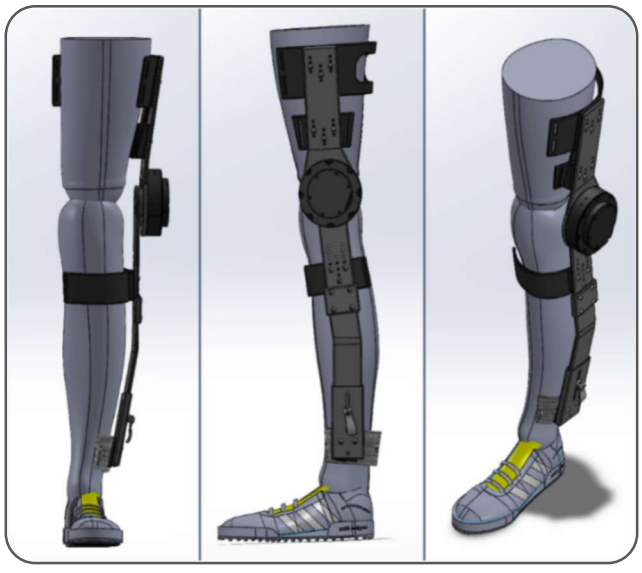
- Design a lightweight knee exoskeleton to assist stroke patients with muscle recovery
- Anchor the exoskeleton at the ankle
- Develop a modular design that can function independently or integrate with other exoskeleton systems
- Ensure the design is optimized for mass manufacturing

Results

- V1.1 Exoskeleton capable of delivering up to 20 Nm of torque to knee joint
- Secure anchorage at ankle
- Adjustable thigh cuff, calf cuff, and sliding shank shaft for multi-user compatibility
- Flat bar design for ease of manufacturability



18th iteration thigh cuff



13th iteration assembly

DESIGN

- Designed in SolidWorks
- Printed and tested 18+ iterations to optimize comfortability and versatile fit
- Integrated IMU sensors to collect 6-axis motion data
- Designed orthotic cuffs and BOA ratcheting straps to reduce hardware shift during gait and improve torque transfer to knee joint by 10%