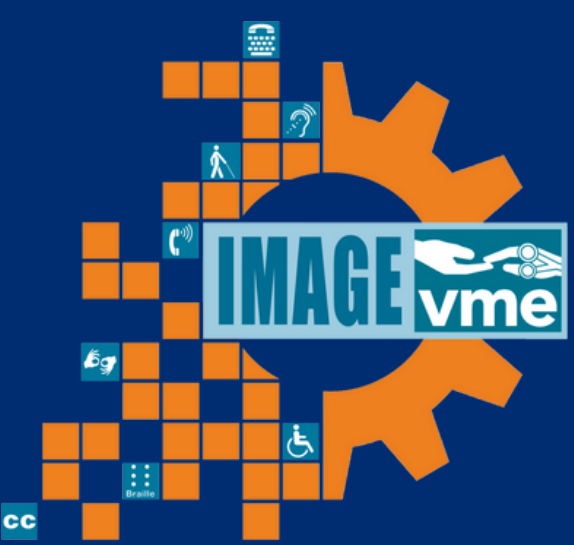




Engineering Assistive Technologies for Disabilities: E-Trike, Nasal Spray Assist, Seizure Detection System, Hug-A-Bear

Alexander Tinana¹, Tunde Ayodeji², Victoria Allen², Ryan Nguyen³, Leqi Shen⁴, Brianna Wu¹, Rich Bauernschub, MS², Niel Leon, BSME²

¹Department of Materials Science and Engineering, ²Department of Mechanical Engineering, ³Department of Biomedical Engineering, Johns Hopkins University Whiting School of Engineering, Baltimore, MD, USA

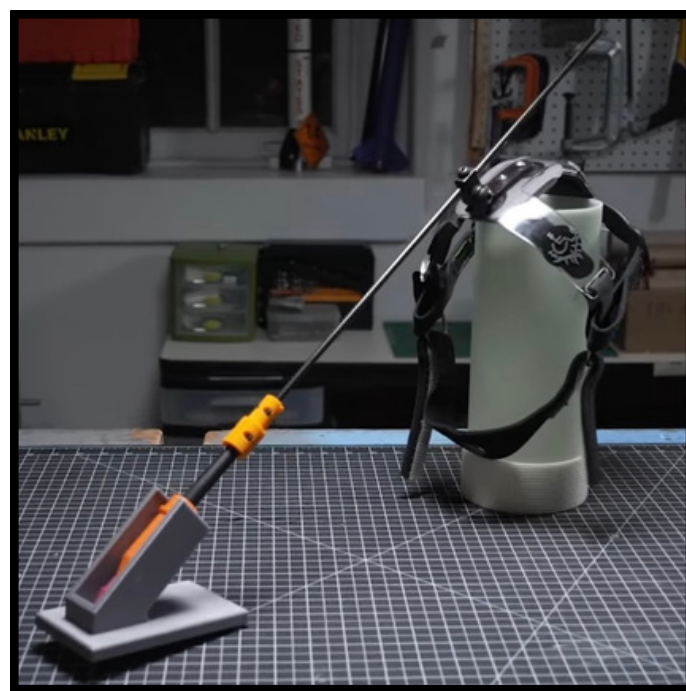
⁴Department of Biology, Johns Hopkins Zanvyl Krieger School of Arts and Sciences, Baltimore, MD, USA



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Introduction

The **Volunteers for Medical Engineering Club at JHU** is a student organization affiliated with **The IMAGE Center of Maryland**, a non-profit organization dedicated to designing and testing assistive aids/devices for community members with disabilities within the greater Baltimore area.



Low-Cost Nasal Spray Assist

Goal: Develop a mechanical assist device allowing individuals with hindered grip strength or hand dexterity to dispense a nasal spray bottle.

Description: Taking inspiration from the candy Push Pops, we created a shell to go around the nasal spray bottle. This reconfigured the hand configuration of dispensing from a vertical "pinching" motion to a horizontal "pushing" motion. This model is designed to be 3D-printed, which allows for the device to be low-cost and accessible. Future steps involve a series of mechanical tests to ensure the product is strong, safe, and reduces required force as intended.

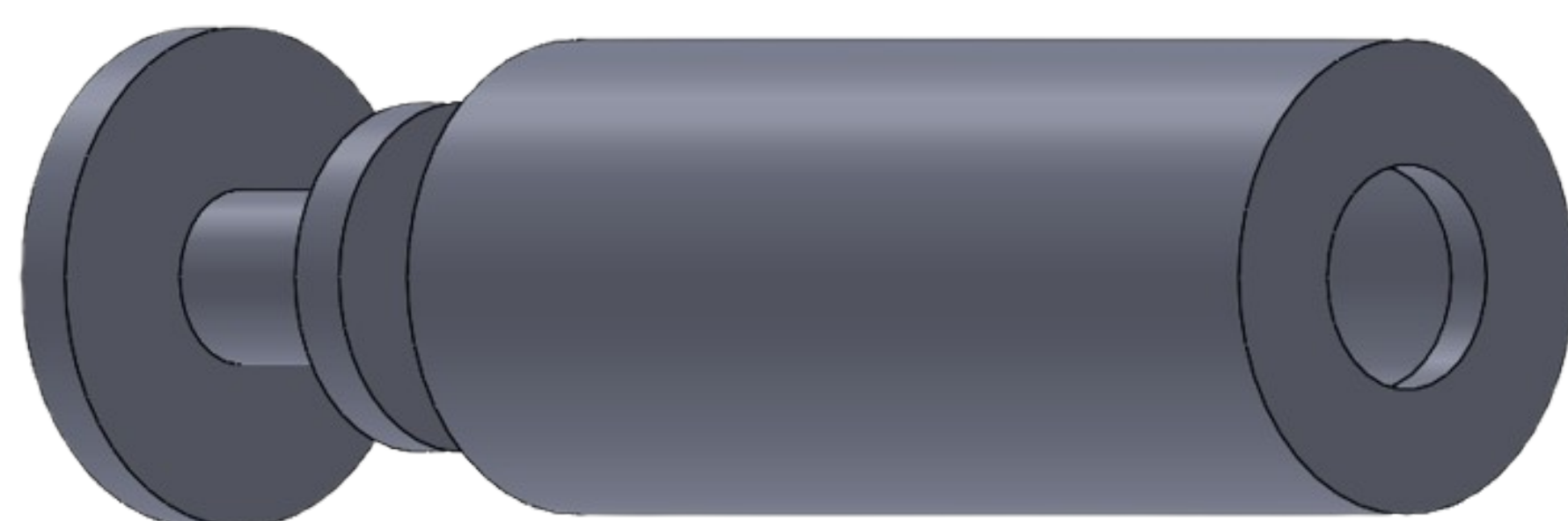


Fig. 1. Device Ideation of the Nasal Spray Assist

Hug-A-Bear System

Goal: Produce a robotic teddy bear programmed to give a hug to a child to assist with anxiety management.

Description: Hug-A-Bear was conceptualized as a comfort aid for children with separation anxiety and/or panic disorders. The system is designed to provide physical comfort, appropriately responding to a child's hug in a familiar form factor and pleasant, relieving manner. To realize this goal, a large teddy bear will be fit with an endoskeleton containing 3-DOF (degree of freedom) servo motor robot arms and a compartmentalized electrical system, designed to ensure safety and comfort.

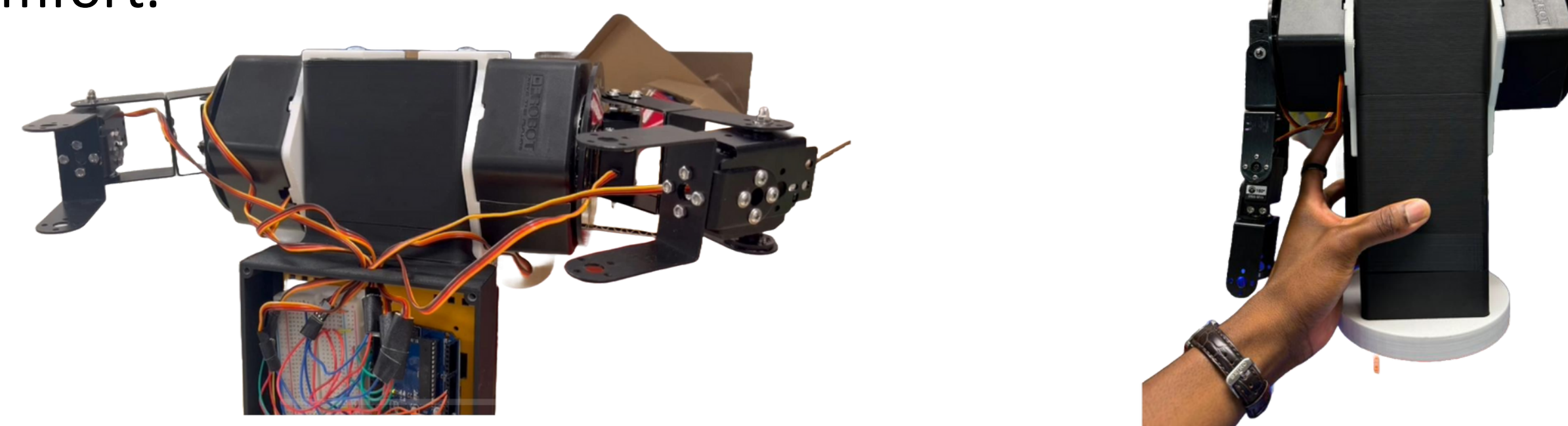


Fig. 2. Hug-A-Bear Frame

Seizure Detection System

Goal: Design a wearable seizure detection system to alert guardians of oncoming seizures.

Description: Collaborating with the OpenSeizureDetector project, an open-source application for affordable seizure care, we strived to reduce the high false positive rate of existing models and worked towards re-designing the current Android app interface to improve user accessibility.

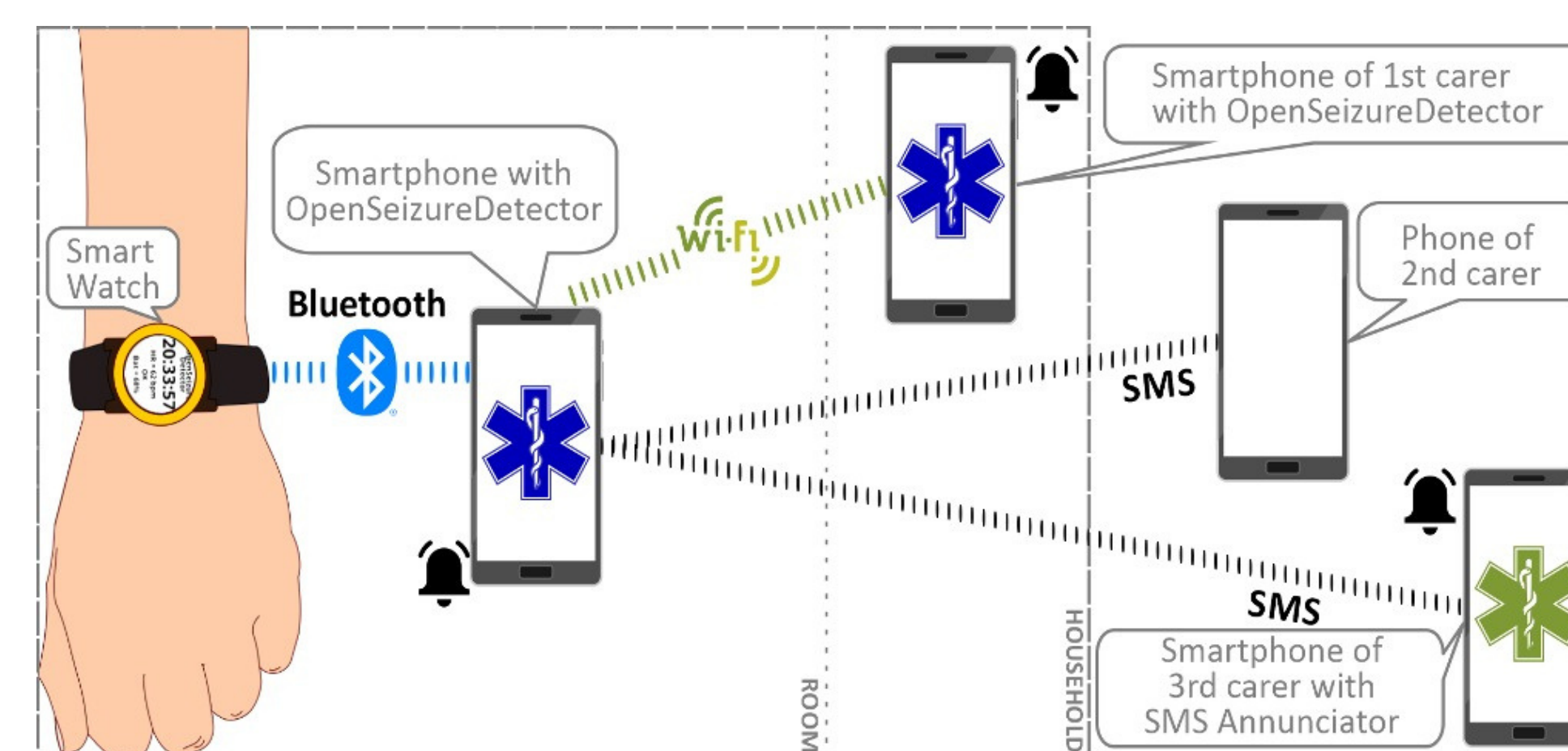


Fig. 3. OpenSeizureDetector Workflow and App UI



E-Trike for Degenerative Joint Disease

Goal: Assemble an adapted and inexpensive electric trike with trunk support according to protocol used by UMD's VME branch.

Description: For adults with disabilities, stability and required pedal torque may be significant detractors to riding a bike. However, market e-bikes are prohibitively expensive and still lack sufficient stability. To make a suitable bike for our client, we adapted a standard adult e-bike frame. A torque adjuster controlled by the pedals and a set of handlebar controls sends power to the front powered wheel. The bike is fit with an LCD display, and all electronics are enclosed in a waterproof rear case. Additionally, a more-stable bike seat will be added. The E-trike makes bike riding newly accessible to a patient who may not otherwise be able to, at a reduced cost.



Torque Adjuster

Fig. 4. Partly-Assembled Adaptive E-Trike

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Scan the QR Code to learn more about the VME Club at JHU!

