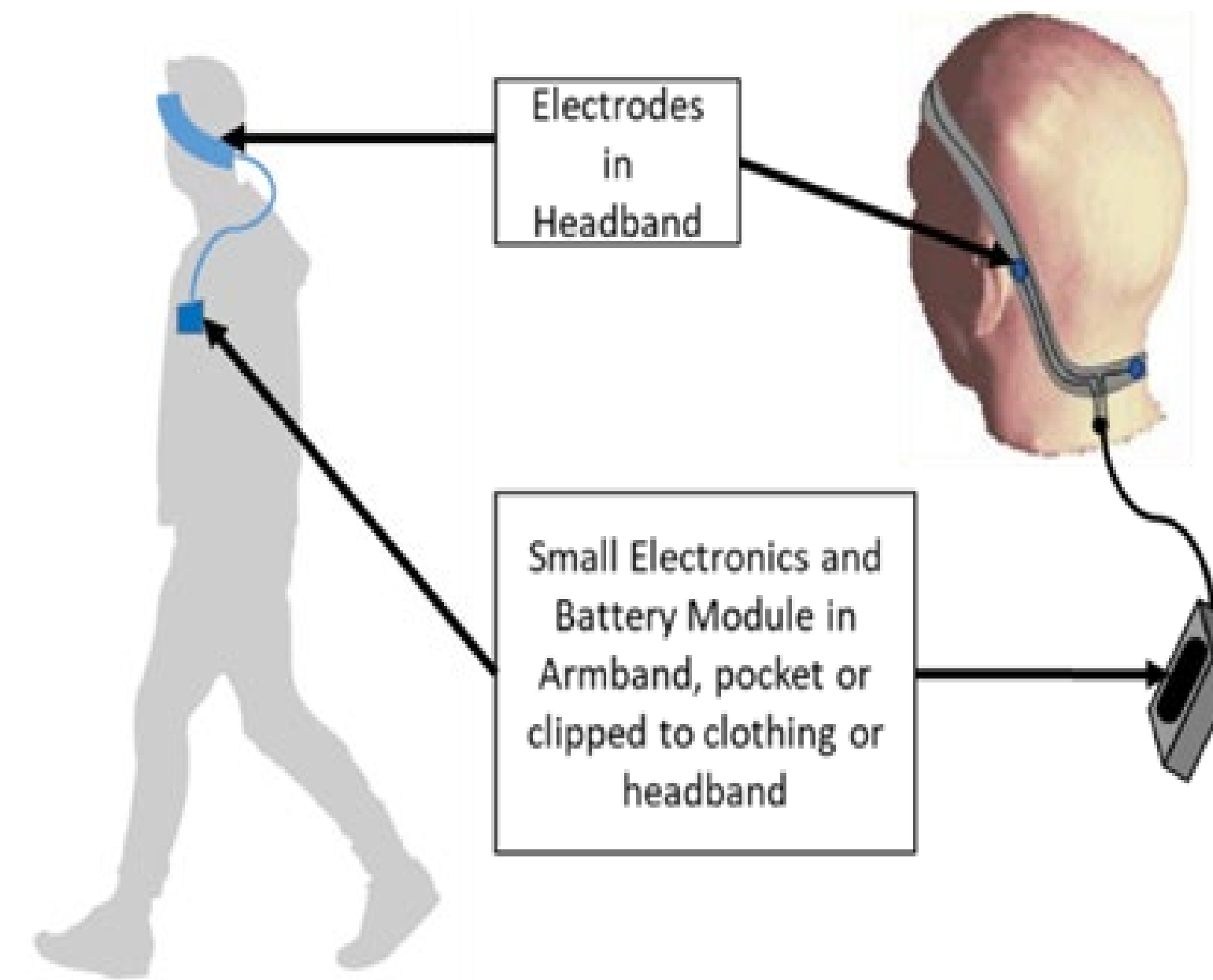


Background

- The vestibular system is an essential element of human balance
- 35% of adults 40 years or older in the United States have experienced some form of vestibular dysfunction
- Invasive and risky vestibular implants are the only treatment directly targeting the vestibular system but are not suited for most cases with acute symptoms
- There is a need for a wearable, non-invasive device with the same treatment abilities as an implant

Approach

- Vestibular Intervention via Portable Electrical Stimulator (VIPES): a small, lightweight device able to deliver stochastic vestibular stimulation (SVS) using a comfortable electrode set on the back of the head
- Designed to report effectiveness and rehabilitation progress to itself, clinicians, and caregivers



Conclusions and future directions

We successfully demonstrated the feasibility of producing a stimulating mechanism via a benchtop system:

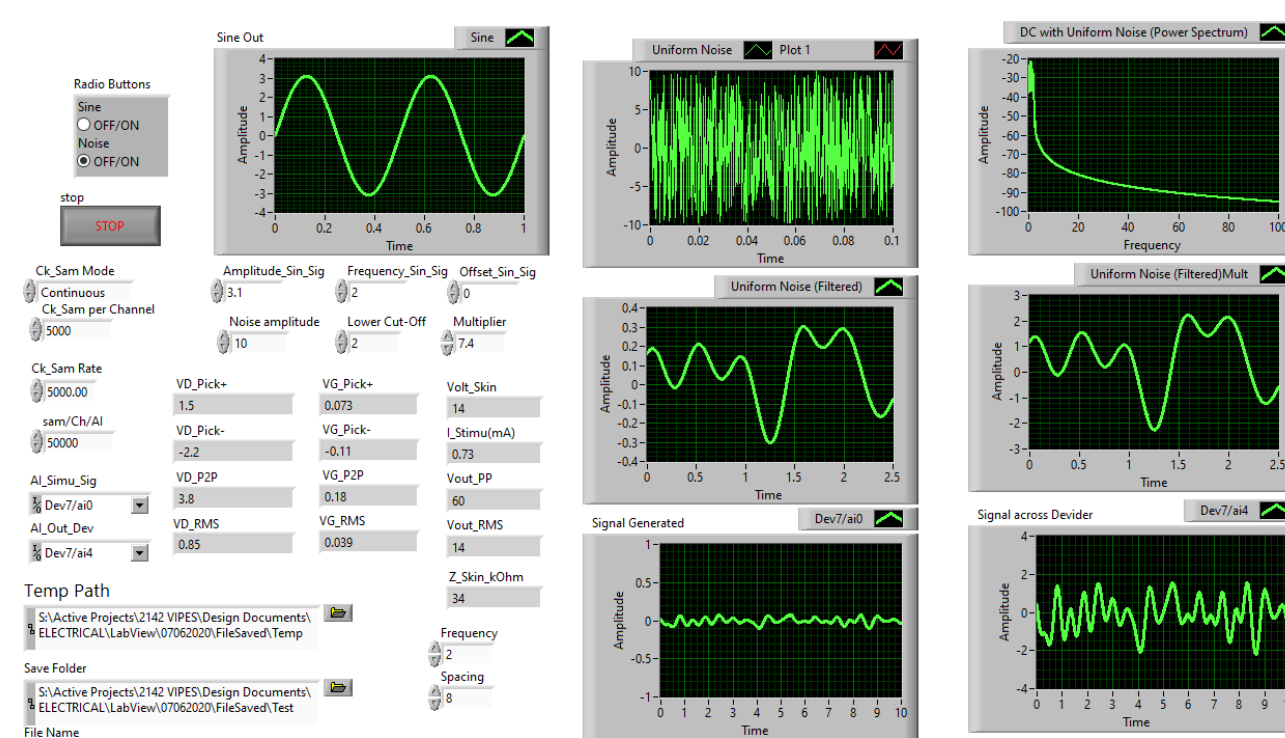
- Development of a stimulation circuit capable of generating signals of different kinds with controllable parameters
- Circuit for the high voltage power supply
- LabVIEW code for signal generation, analysis and display of signals, measurement of phantom impedance

Next phase: Clinical study to evaluate use on human beings

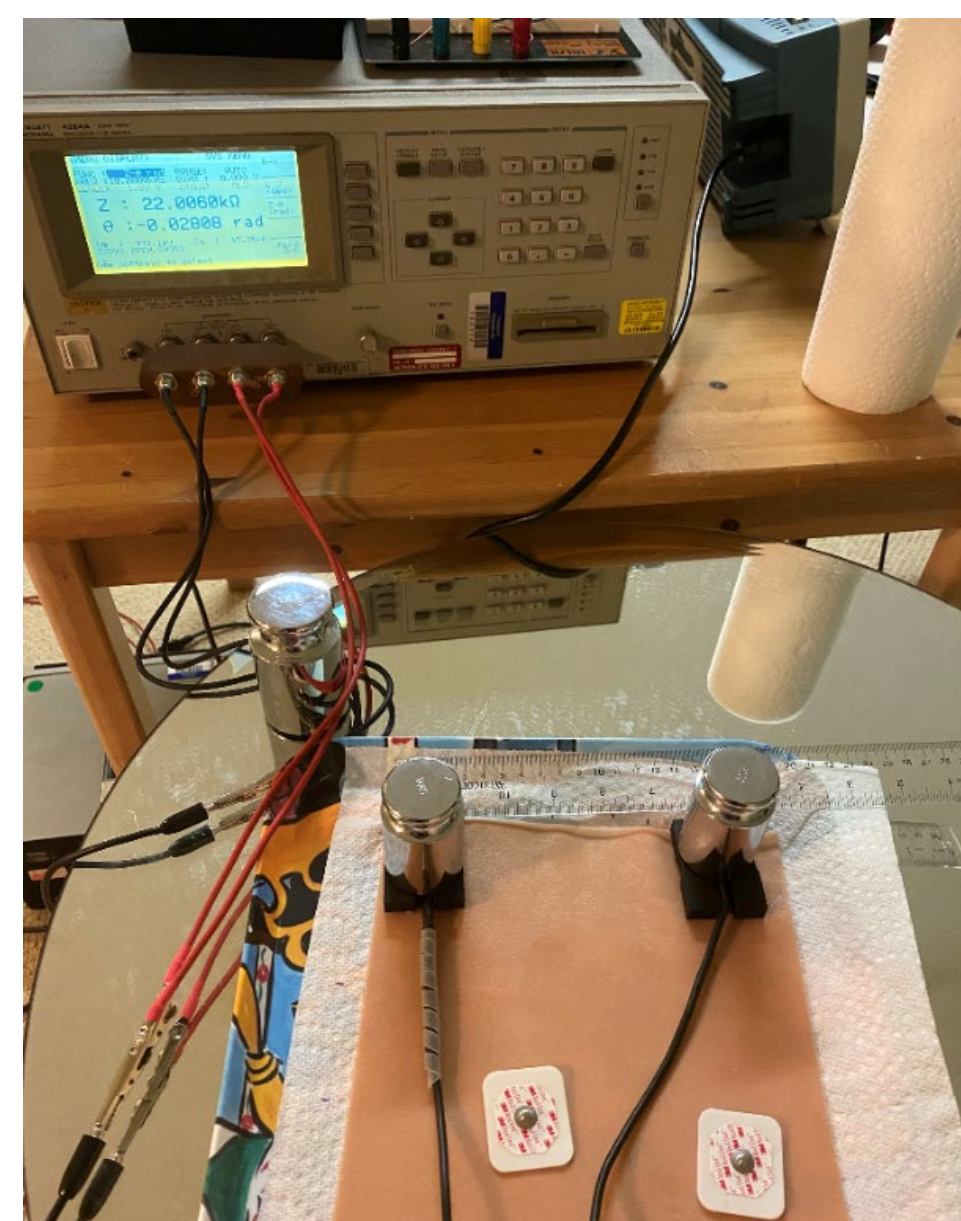
- Wearable form factor
- Human testing (in collaboration with Mayo Clinic)

Methods and results

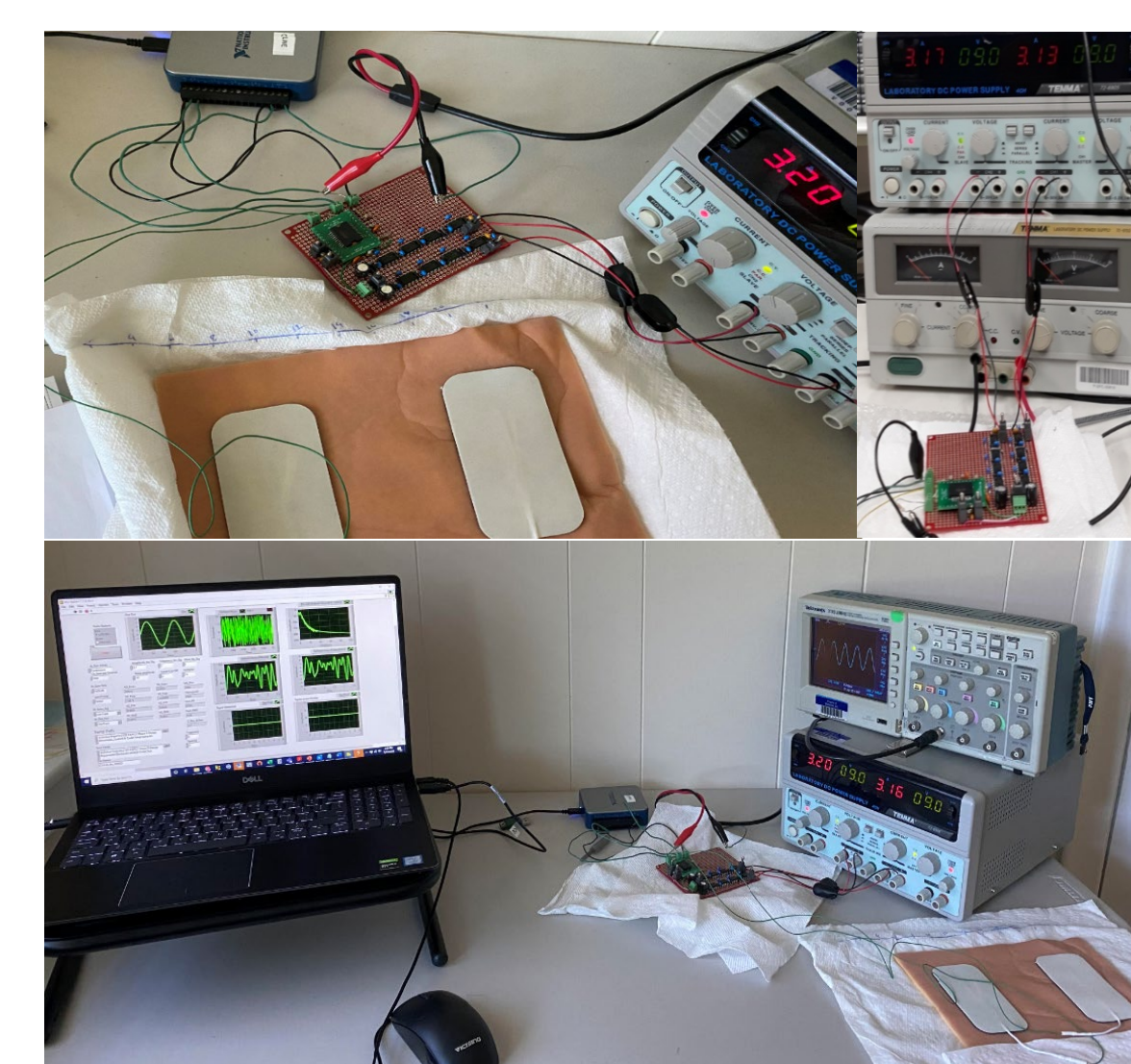
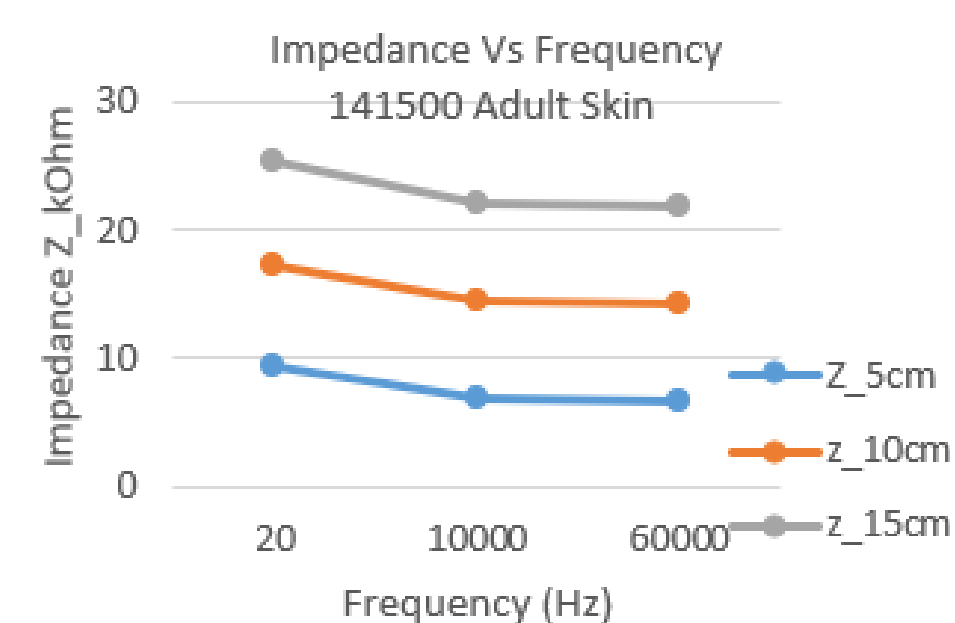
Below: Generation of a stimulating signal (sine wave and uniform white noise), as displayed in LabView.



Right: Experimental setup for measuring impedance by electrode distance and signal frequency in skin and tissue phantoms.



Below: Sample output of impedance experiment.



Above: Benchtop prototype of VIPES system.

Acknowledgements

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