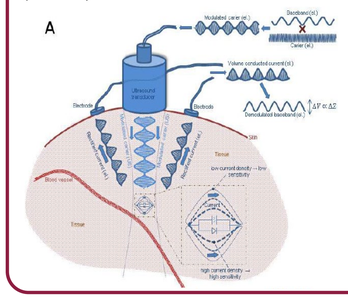
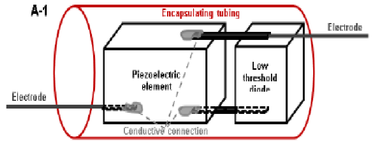
Method to Measure Intracranial Pressure Wirelessly Using Remote Powering by Ultrasound

Oscar Voeller, Biomedical Engineering
Mentor: Jit Muthuswamy, Associate Professor
School of Biological and Health Systems Engineering

Introduction

Research Question: Is the cerebral bioimpedance measured remotely using a novel remote impedance measurement system (RIMS) correlated with changes in intracranial pressure (ICP) in the ventricular space?

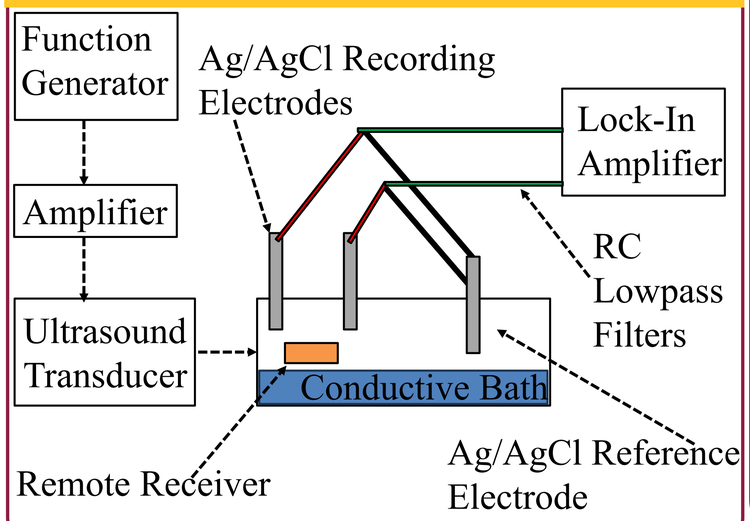




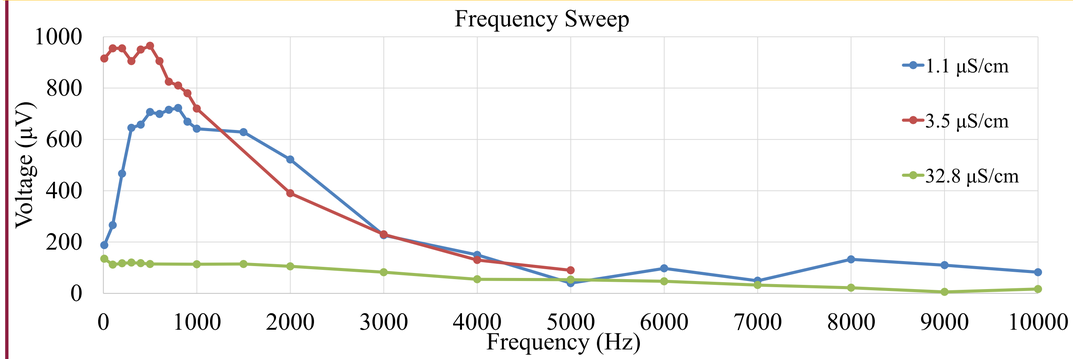
Left: Impedance measurement technique using RIMS. [1]

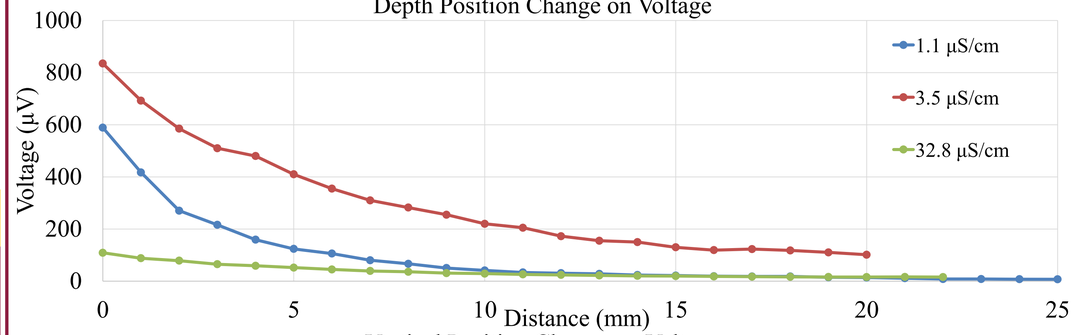
Right: Schematic of RIMS remote receiver. [1]

Methods



Results





Top: Frequency sweep data comparing the optimal baseband frequency for each test.

Middle: Position change data comparing the effects of electrode depth placement on voltage readout.

Bottom: Position change data comparing the effects of vertical electrode placement on voltage readout.

Discussion

- The results of this project support the ability of RIMS to wirelessly measure cerebral bioimpedance using remote powering by ultrasound.
- The results highlight the significance of electrode placement relative to the remote receiver.
- Future work involves testing in a brain phantom model to establish a relationship between ICP and cerebral bioimpedance.

References

[1] Celinskis, Dmitrijs. “Investigation of Ultrasonically Powered Implantable Microdevices for Wireless Tissue Impedance Measurements.” *Arizona State University*, 2014.

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