Improving the Sensitivity and Automating the Basilar Membrane Probe

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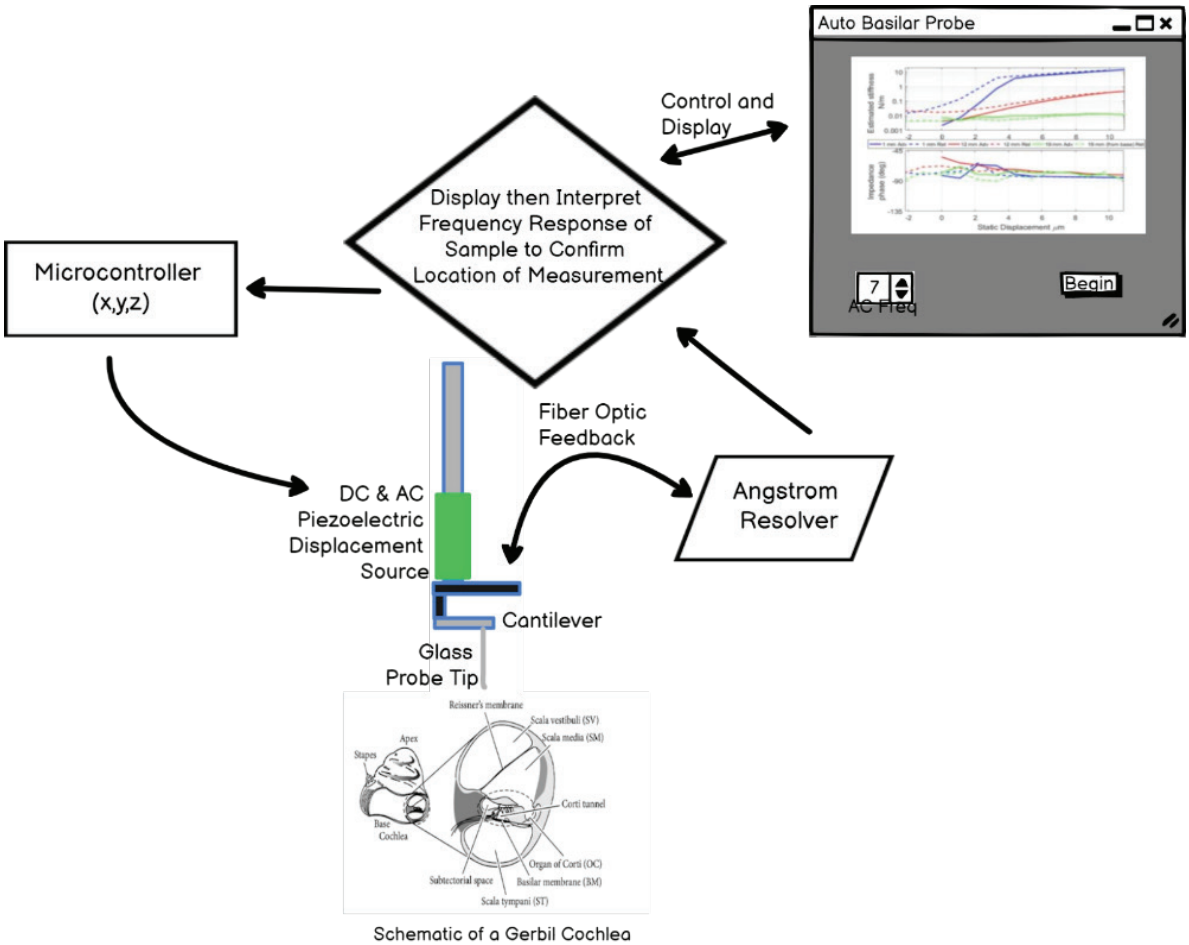
Marine mammals rely on their hearing for spatial awareness, catching prey, and communicating. Interference from naval sonar disrupts their abilities to survive such as causing their eardrums to rupture which can result in them being stranded. The cochlea is a part of the inner ear which aids with hearing. Within it is the basilar membrane, a spiral shaped membrane which contains sensory receptors responsible for hearing. The stiffness of the membrane is what determines what frequencies it is sensitive to. To better understand this we have built a probe to measure the stiffness of the basilar membrane based on the design of a similar probe by Brian S. Miller et al. The main changes we have made to this design is to make the loading mechanism less stiff as well as automate it to increase the sensitivity of the probe and to optimize gathering of measurements. To determine the probe's performance, measurements were taken using the old probe and our improved probe on AFM beams of known stiffness to determine the accuracy of the probe. Measurements were also taken on gerbil membranes with both probes to determine the amount of time to take measurements. We believe a successful automated basilar probe will allow for a better understanding of what frequencies animals are sensitive to.



Schematic of a Gerbil Cochlea