

Bio-Potential Electrode Mechanical System

Team Members: Andrew Werdowatz | Carlos Martinez | Joseph Kiefert | Tuan Le

Background:

- The Bio-Potential Electrode Mechanical System (BPEMS) combines the attributes of both wet and dry electrodes. Which is done by eliminating the undesired messy effects that come with handling wet electrodes and correcting the high electrical impedance of dry electrodes. We aim at advancing the field of neurological research by developing a device that improves brain activity readings and data collection. The BPEMS would allow for improved treatments on patients experiencing various brain disorders such as Parkinson's disease.

Finalized Design/Key Components:

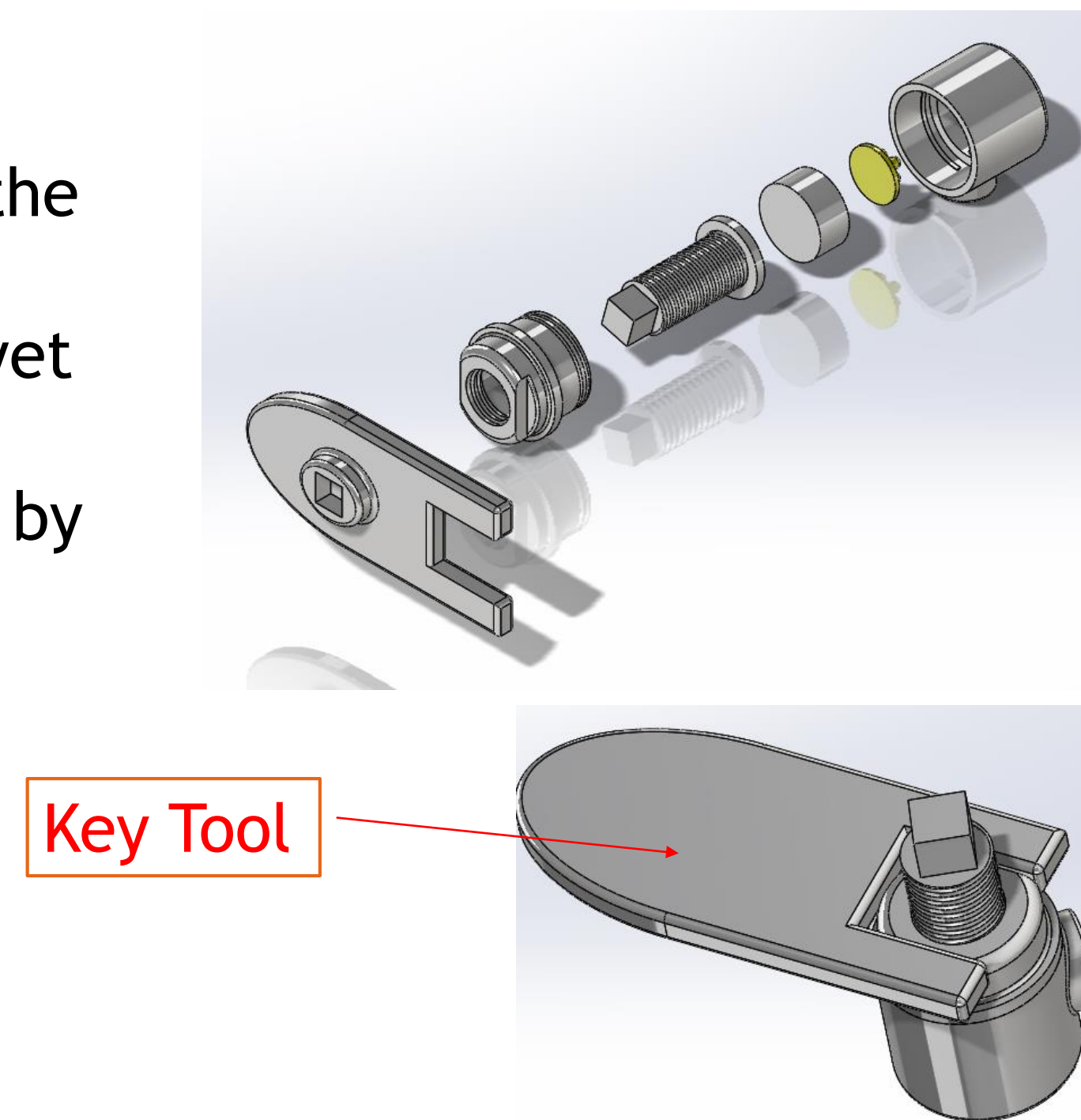
- Screwing Mechanism:** Acts like a piston and is turned by a key tool, this mechanism applies sufficient pressure to the gel in order for the gel to be impregnated into the electrode. This is necessary in order to eliminate the high impedance of dry electrodes.
- Pre-soaked Damping Sponge:** The sponge is held inside the gel reservoir and is necessary to minimize vibrational effects when collecting data, all while maintain proper contact with the skin surface.
- Gel Reservoir and Housing:** This portion of the device holds excess gel that can be used throughout multiple testing and also, along with the sponge, keeps the electrode in place with its four hole insertions in its base.

Conclusion:

- Through extensive testing it was shown that the Bi-potential Electrode Mechanical System ensures that the electrode will stay in constant contact with the patient's skin and has the ability to impregnate the electrode with a desired amount of gel. These attributes are important because they create a reliable and accurate signal response from the patient that enables a clinician/physician to correctly diagnose a patient's condition and/or treatment

Acknowledgements:

Dr. Khaled Morsi | Dr. Kee Moon | NSF - Engineering Research Center



Key Tool

CAD Model:

Gel Reservoir

Damping Sponge

Housing

Testing:

- The electrode gel was successfully detained inside the reservoir and the pre-soaked sponge during pre-injection (as shown in left image below).
- The precision of the screw allowed for proper pressure application and gel impregnation throughout the electrode (as shown in image to the right).



Pre-Gel Injection



Post-Gel Injection

