

Pocket-Size EEG+



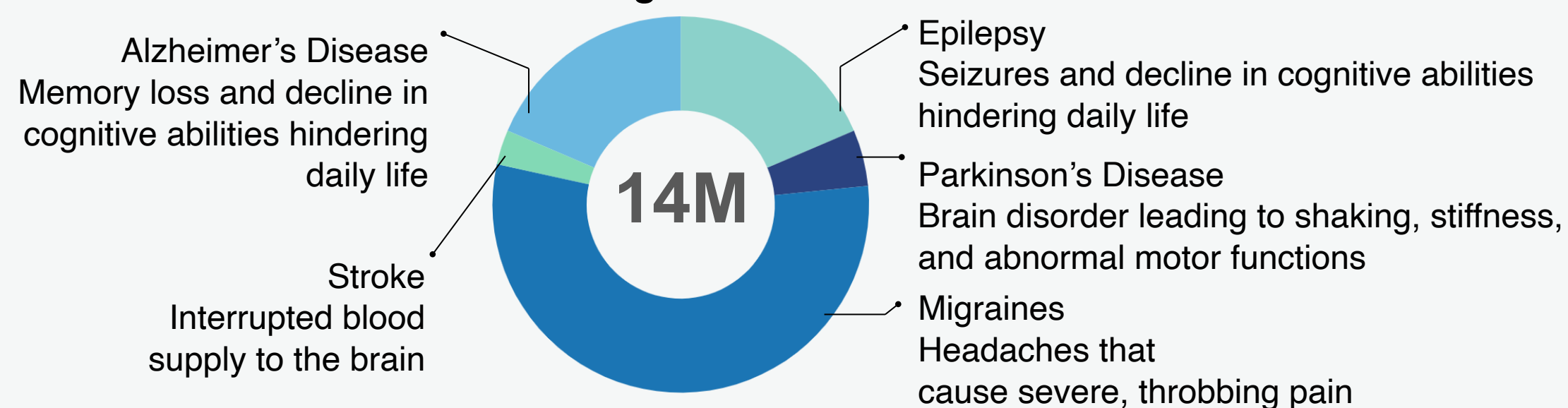
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Background

Prevalence and Cost

- About 50 million people had active epilepsy globally [1]
- Neurological conditions like epilepsy are becoming more common and more costly.
- Direct and indirect costs of brain disease amount to approximately 8.8 percent of GDP in the United States, or \$1.5 trillion annually [1-5]. Significant portions of these costs are used to diagnose and manage disruptive neurological conditions due to inadequate diagnosis early on..
- Globally, there are around 14 million cases of neurodegenerative diseases, and EEGs are one of the premier tools for diagnosing them. [6]
- EEG costs and accessibility vary throughout the world, and there remains room for improvement and innovation.

Global Neurodegenerative Diseases



Current Diagnosis & Treatment	Pros	Cons
Physical Exams	Accessible, personal care	Intermittent, Unable to continuously monitor patient
Brain Imaging (CT, MRI, etc)	Highly accurate	Costly, Bulky, Temporal resolution is low
Contemporary EEGs	Good temporal resolution	Costly, Technician not always accessible

What is an EEG?

- EEGs detect electrical activity in the brain and diagnose brain disorders [7]
- Tests can take up to 60 mins and results can take up to 48 hours [8,9]
- Current hospital EEGs are large and bulky
- Delay in care during situations such as seizures or strokes can lead to lasting brain damage
- Purpose: Create a portable electronic device that can provide near real-time EEG readings and diagnoses

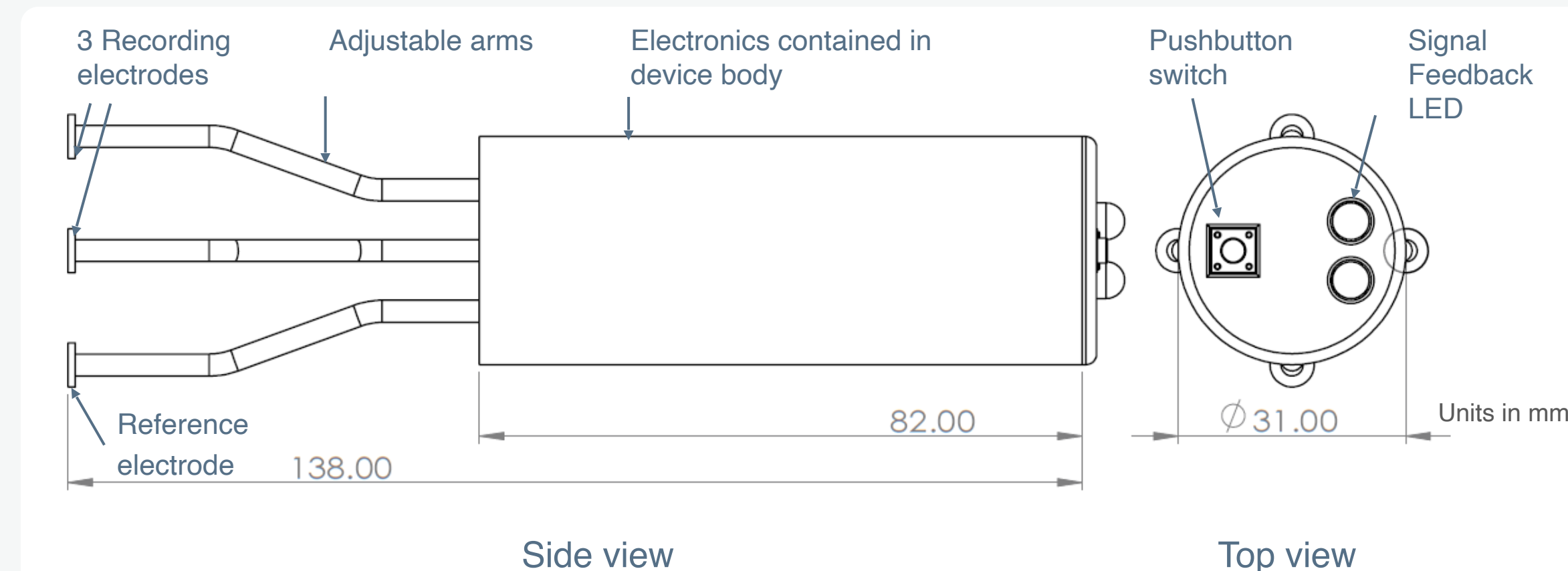


Figure 2: EEG Monitoring System [7]

Project Goal: Creating the Stethoscope of EEGs

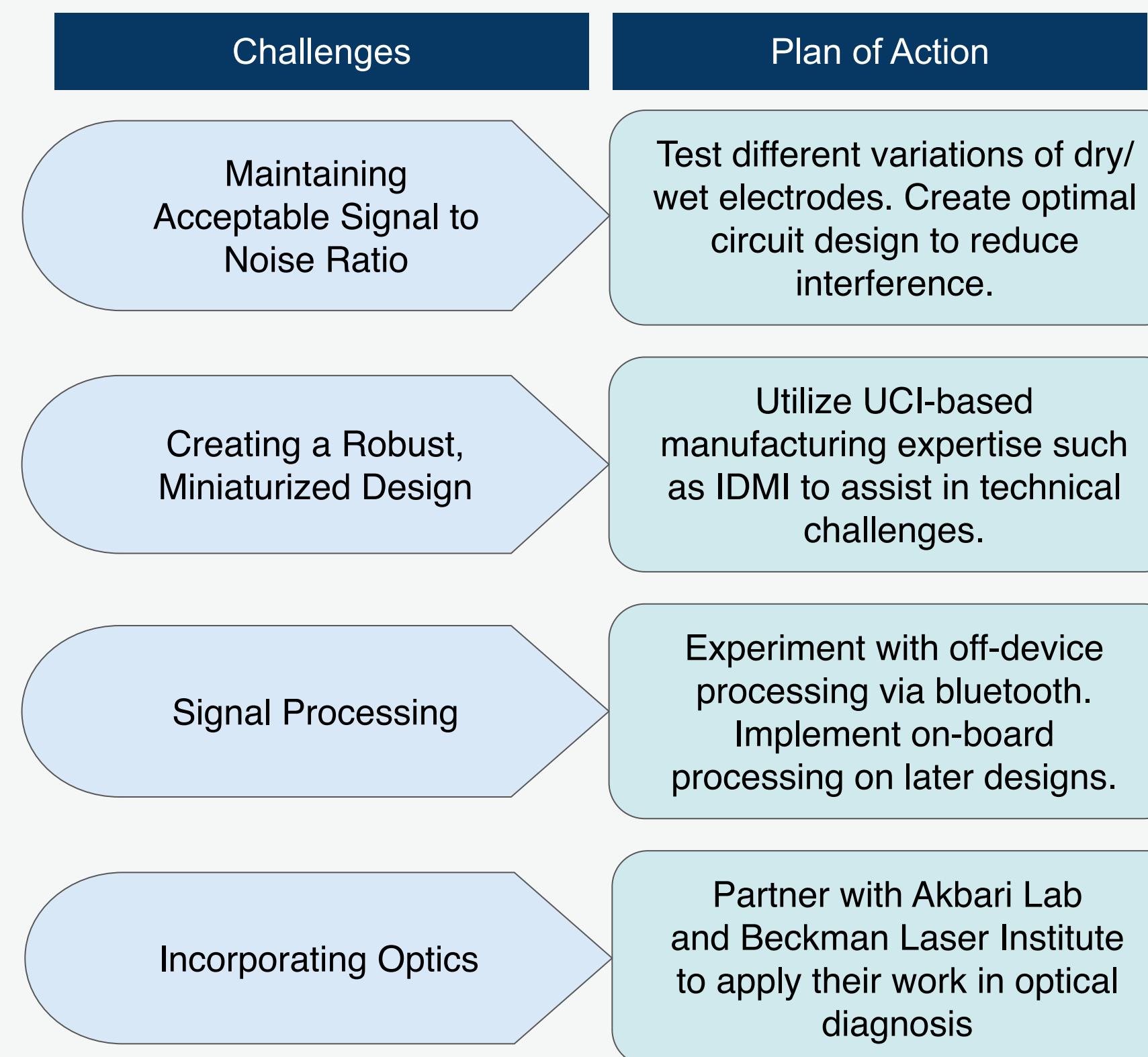
- Create an EEG that is as quick and easy to use as a stethoscope
- Bridge the gap between the initial need for an EEG and a comprehensive EEG analysis
- Build a compact hand-held device for easy access
- Provide a rapid examination to inform the subsequent direction of care, whether that be a drug treatment or a full EEG scan
- Maintain an acceptable degree of signal fidelity through the miniaturization process
- Use EEG base function as a platform for additional tools, such as optical diagnostics

Project Design

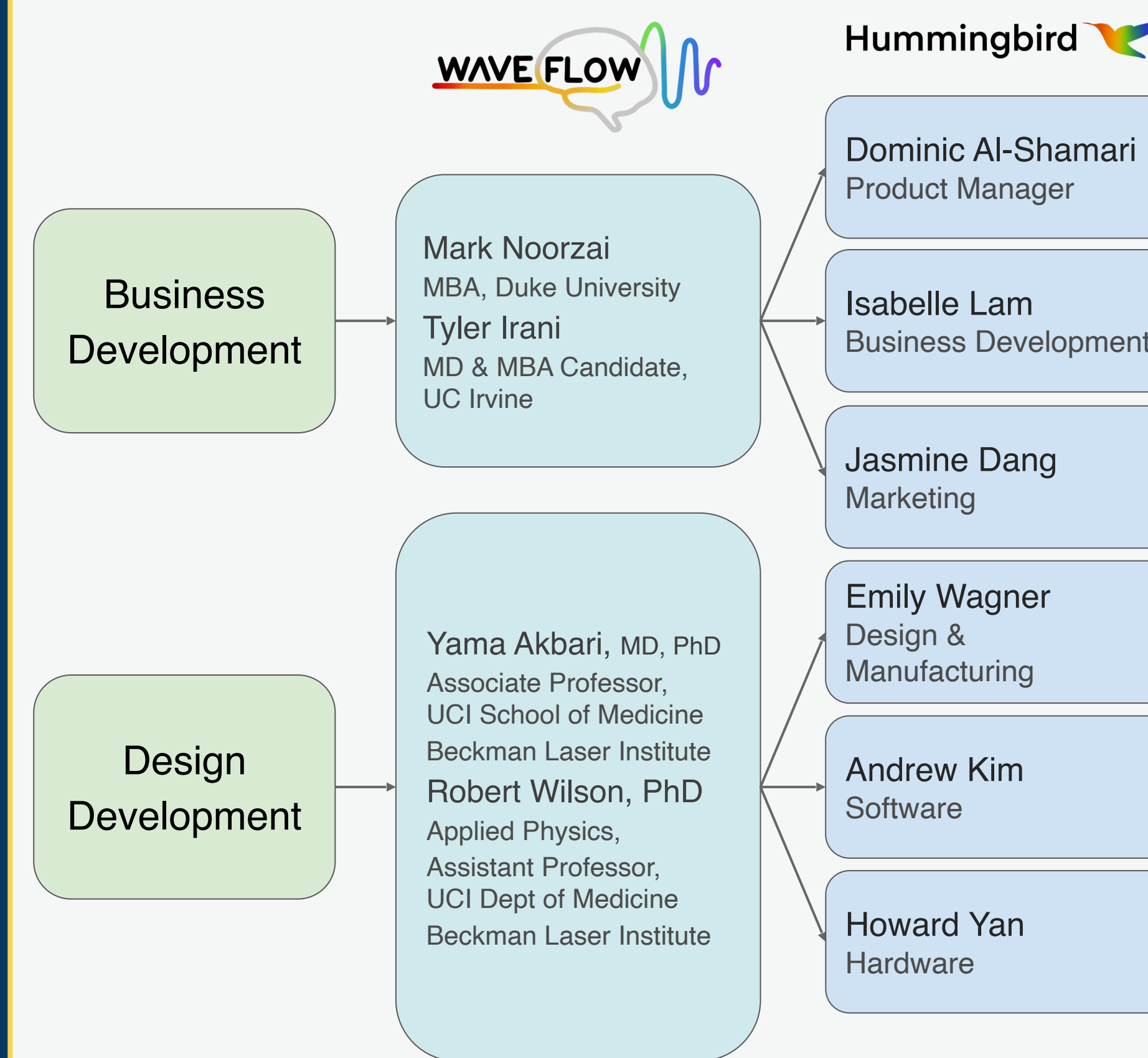


- Criteria:
- Results in ~1 minute from initial need
 - Device can fit in your pocket
 - Signal processing on external smart device

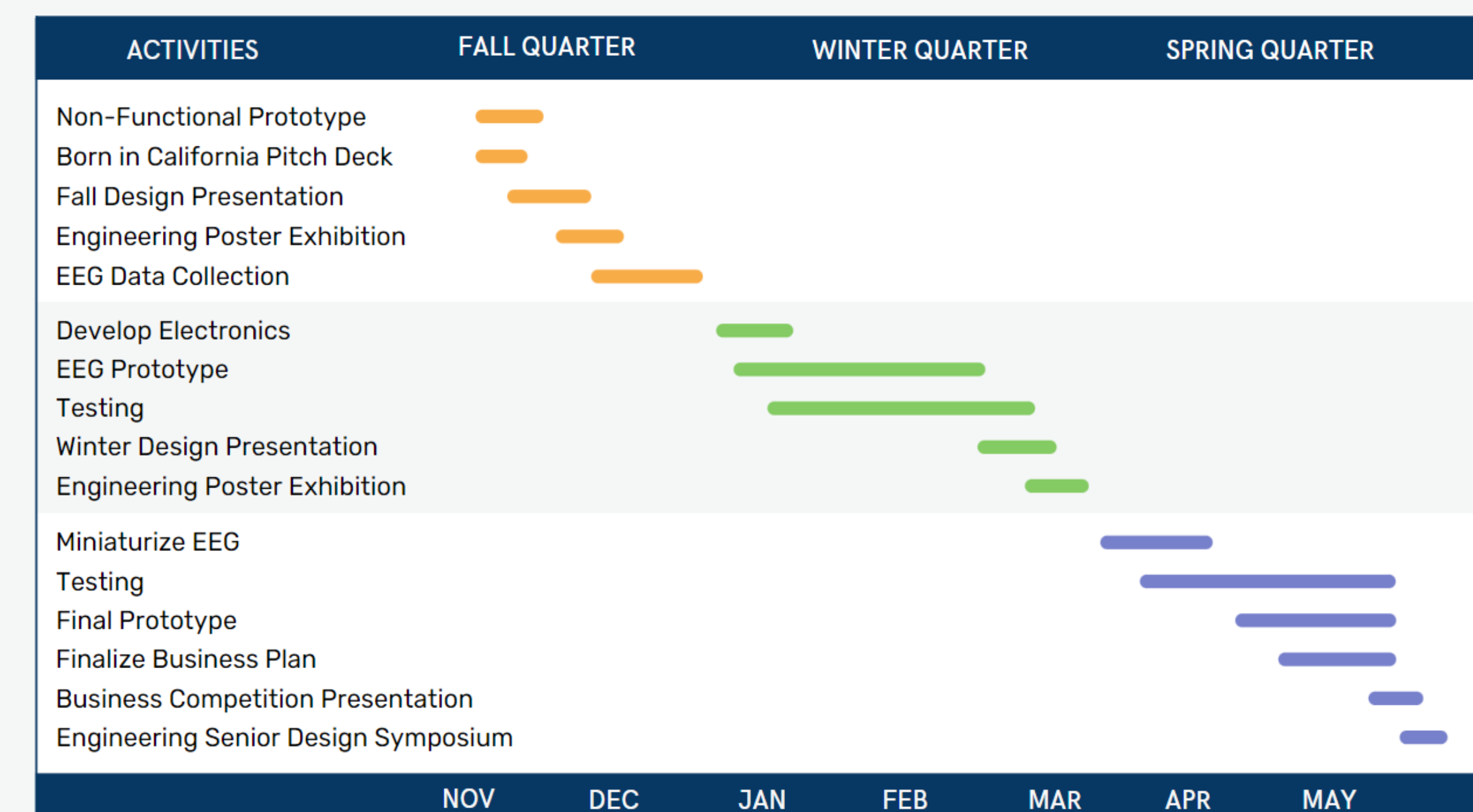
Design Challenges



Team Organization



Project Timeline



Acknowledgements



References

