02

AURA 1.0 | NOVEL MEG HEADSET & SYSTEM

The design of Aura 1.0 headset was executed to address critical issues of current headsets with existing research-based MEG Systems as reported by researchers and participants. Primary issues identified by participants were wearing comfort, excessive heat generated by sensors, and headset stabilization. While issues reported by researchers relating to data collection included scan noise (caused by motion artifacts), loose sensors, sensor logging, sensor jamming, headset adjustability, and cable management.
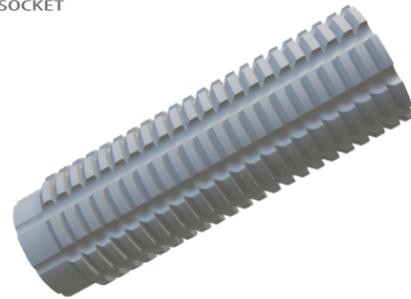
HELMET

SOCKET

SLEEVE

PRODUCT LIMITATIONS

Aura 1.0 was executed to address issues with an *existing research-based MEG Helmet Design;* specifically, to solve the following shortcomings as reported by facilitators and participants.

Discomfort: Nearly all subjects experienced discomfort at the back of their head

Motion Artifacts: Head was free to move within the helmet, which caused the sensors to move easily across the skin.

Poor Fit: The helmet was very large and locations of the sensors were not consistent for everyone.

Loose sensors: Slight movement would push out sensors and wound result in signal loss

Sensor Jamming: Sensors would jam in to each other when pushed into the sockets

Random sensor Locations: Ideally the helmet should follow the 10/20 international Standard for EEG

Warm Sensors: sensors had a tendency to feel warm, which caused few subjects to feel dizzy
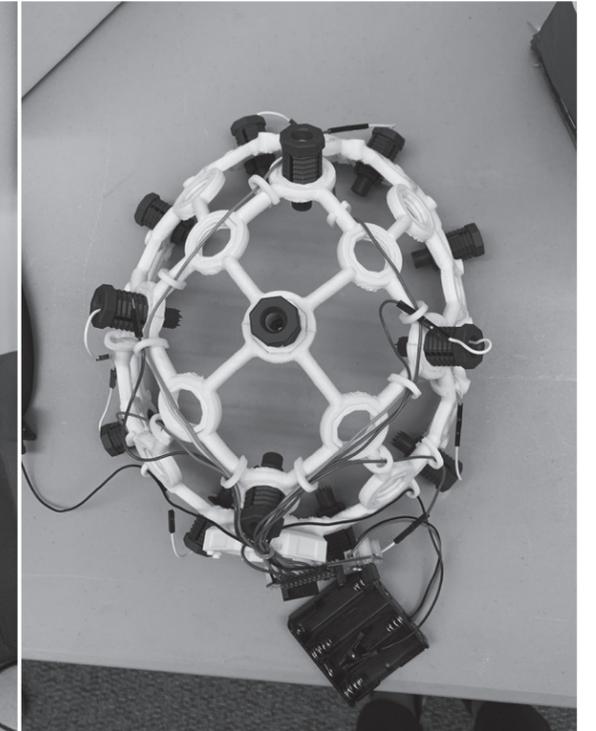
COMPARATIVE ANALYSIS

CGX QUICK-30

MUSE

ULTRACORTEX "MARK IV"

DESIGN OPPORTUNITY

Helmet
Design a one size fits All helmet based on statistical shape models of the scalp, which should result in a more comfortable, accurate fit and a reduction in motion artifact.

Sensors & Sleeves
Designing a better approach to securing the sensors onto the helmet, and integrating a more visible reference for data logging

System approach
Integrating a holistic design approach in improving on all the components of the MEG system, creating a better experience for both participants and facilitators (Bed Setup, Helmet, Sensor sleeves, cable management)

Early Concept
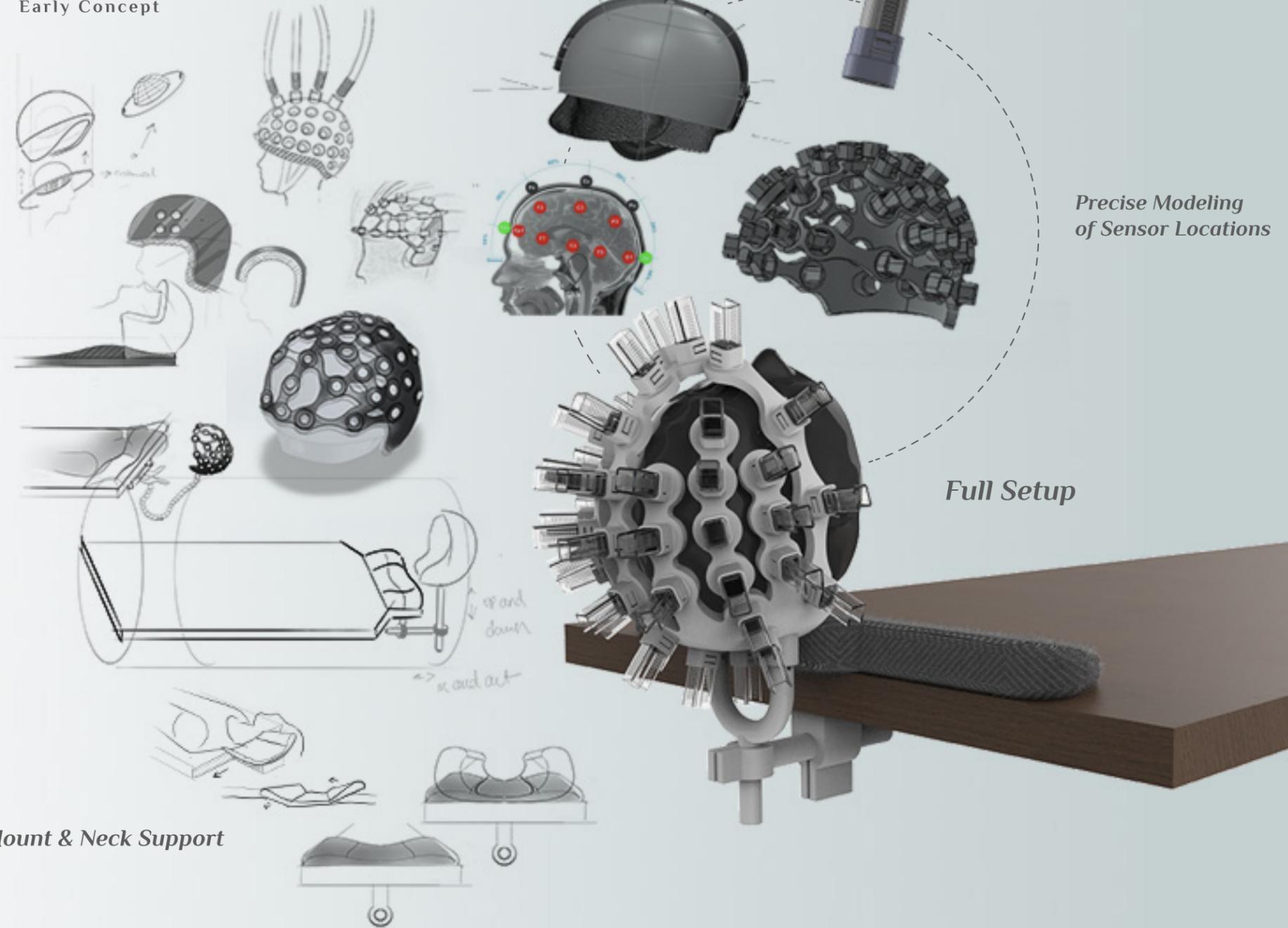
Precise Modeling of Sensor Locations

Full Setup

Mount & Neck Support

With the use of empirical user models, a precise cad model was made of the helmet that would accommodate head sizes up to the 95th percentile. *The sensor locations were accurately placed following the 10/20 International standard.*
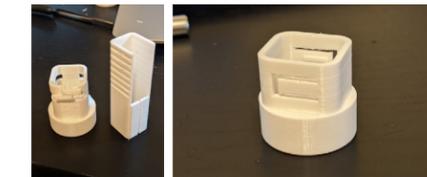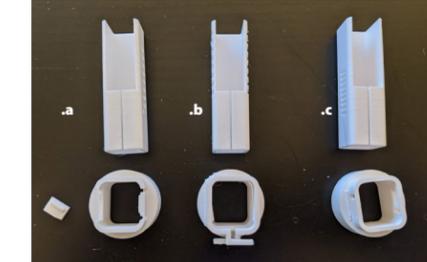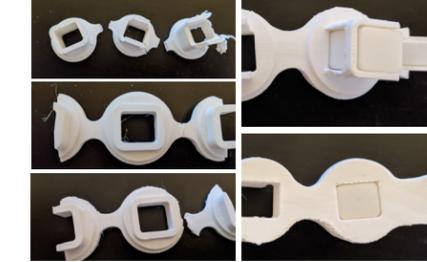
TESTING

Helmet Prototypes
3 full helmet prototypes were created to test various aspects such as functionality, comfort, and precision.

Sensor Sleeve & Socket
Over 20 3D prints were made for the sensor sleeves and sockets while constantly testing and refining in between.

Mount
Multiple mounting solutions were explored. For maximum adjustability we proposed a 3 part mount that allows for both x and y adjustments.
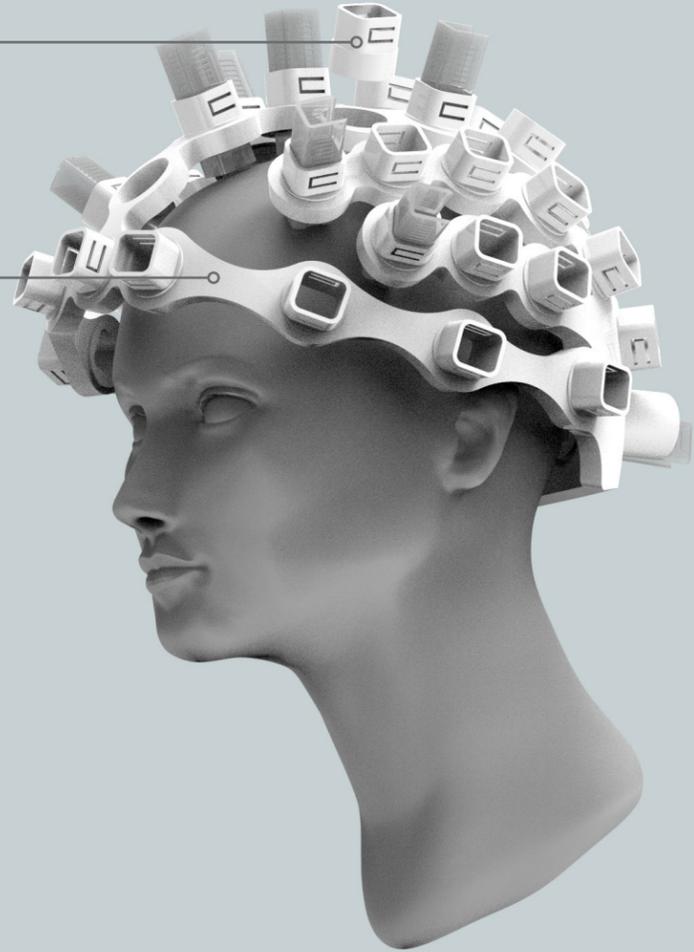
ZERO FIELD SENSORS

SENSOR SLEEVE

SOCKET

A 3-part headset **(sleeve, socket, frame)** design to provide a better mechanism for securing the sensor onto the headset and providing depth adjustability

HELMET FRAME

The novel **skeletal structure** creates a natural form of ventilation that helps dissipate heat fro, the senors; and minimizes the amount of materials used creating a the light headset that could be worn in more wearable context.