# **MEETING SUMMARY – NXP COLLABORATION**

### **Participants and Roles**

This collaboration involves four key partners, each contributing a specialized component to the integrated wearable EEG solution:

* **HABS**: Responsible for the development and deployment of the AI algorithm, particularly for signal interpretation and cognitive/emotional inference.
* **Sencure**: Provides the **low-power analog front-end (AFE) IC**, optimized for EEG signal acquisition.
* **NAOX**: Delivers the **earbuds form factor** incorporating **dry EEG electrodes** for comfortable, real-world neural data capture.
* **NXP**: Supplies key hardware components including:
  + Embedded **processor**
  + **Sensors** (e.g., IMU)
  + **NFC interface**
  + **Secure element** for data protection

### **Technical & Integration Considerations**

#### **Battery and Power Management**

* **Battery life must support full-day operation**, even with continuous sensing and wireless communication.
* Exploring **NFC charging systems** to enable compact form factors and ease of use.

#### **Data Processing and Communication**

* **Raw and/or minimally pre-processed data** will be transmitted via **Bluetooth Low Energy (BLE)** to a smartphone.
* **All heavy AI processing will be performed on the smartphone**, not embedded in the device itself.
* The firmware on the NXP processor **does not currently support this specific data acquisition and streaming pipeline**; custom firmware or middleware development may be required.

### **Key Design Implications**

* The processing offload strategy allows the wearable to remain lightweight and power efficient.
* BLE must be optimized for bandwidth, latency, and power.
* Collaboration across partners will be essential to:
  + Align hardware interfaces (e.g., SPI/I2C between AFE and NXP chip)
  + Standardize data formats and transmission protocols
  + Ensure seamless OTA updates, security compliance, and app integration.

### **Relevant Links and References**

* **NAOX – EEG Earbuds**: <https://www.naox.tech/>
* **Sencure – Analog Front Ends**: <https://www.sencure.com/>
* **NXP NHS52S04EVK Development Kit**: <https://www.nxp.com/design/design-center/development-boards-and-designs/NHS52S04EVK>
* **Related Publication – Low-power EEG Wearable**:  
  Sensors 2024, 24(12), 3973:  
  <https://www.mdpi.com/1424-8220/24/12/3973>

A diagram of a computer hardware system

AI-generated content may be incorrect.

**A close-up of a computer chip

AI-generated content may be incorrect.A diagram of a device

AI-generated content may be incorrect.**