Researching the complexity of comfort reciprocity within the built environment

01–12 / **Project introduction**

Architechural explores the integration of a low-energy sensor network and evaluative user research within the built environment to achieve interior and exterior comfort reciprocity.

Roles

Definition of project strategy and vision

Synthesis of secondary research

Consideration of design conditions

Prototype creation and evaluation

Presentation preparation

Course

Advanced Construction

Instructor

Lars Gräbner

Tools

Adobe Illustrator

Arduino

Creality Ender 3 Pro

Rhinoceros 3D

Seeed Studio Grove Sensors

Date

Spring 2021

02-12 / Design objectives

Comfort reciprocity accounts for the relationship between bodily responses to environment conditions and the conditions experienced within interior and exterior spaces.

Building typology-agnostic

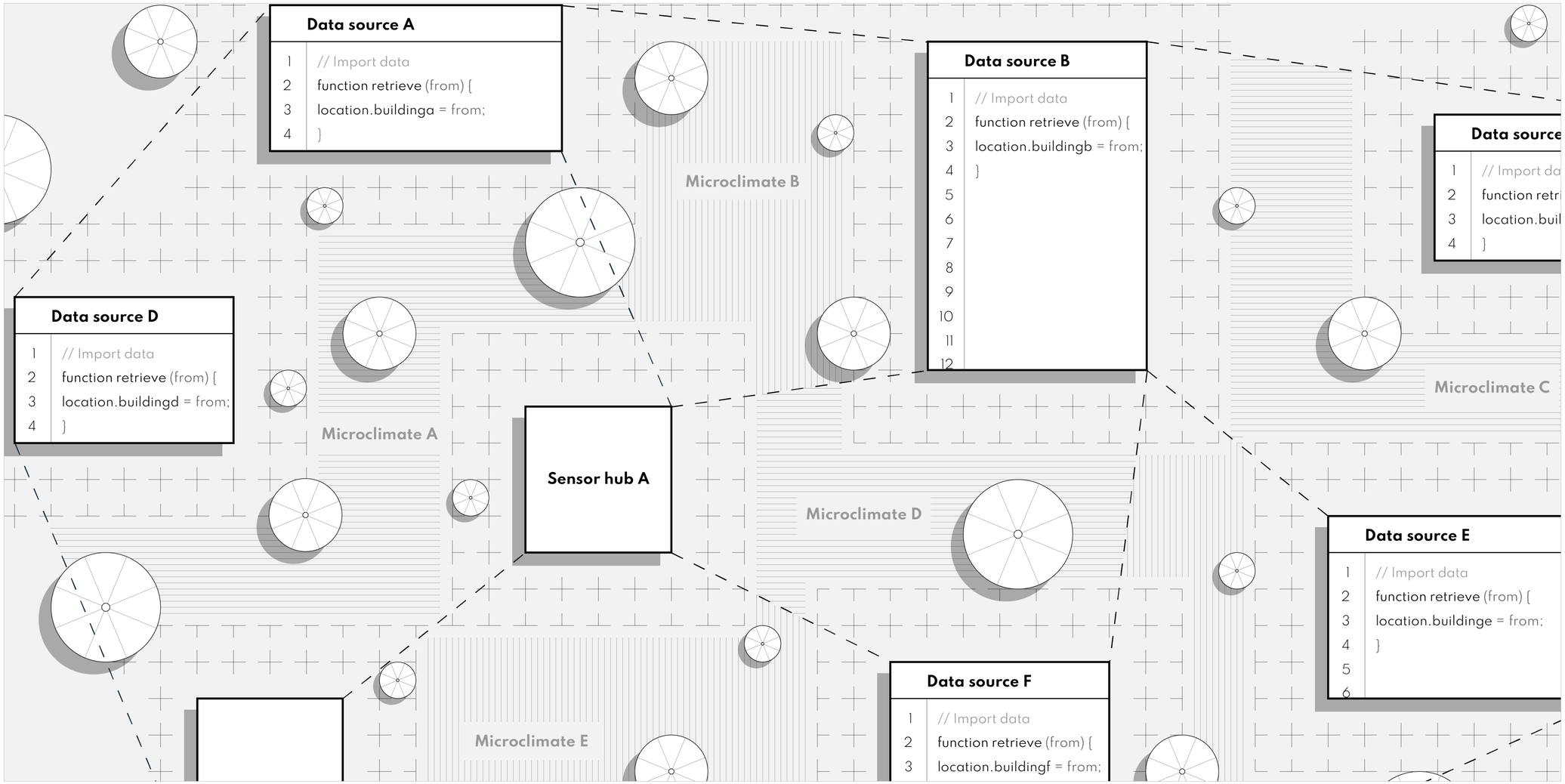
The integration and application of the sensor network is compatible with all programmatic elements in both new and existing construction as a way to achieve environment scale.

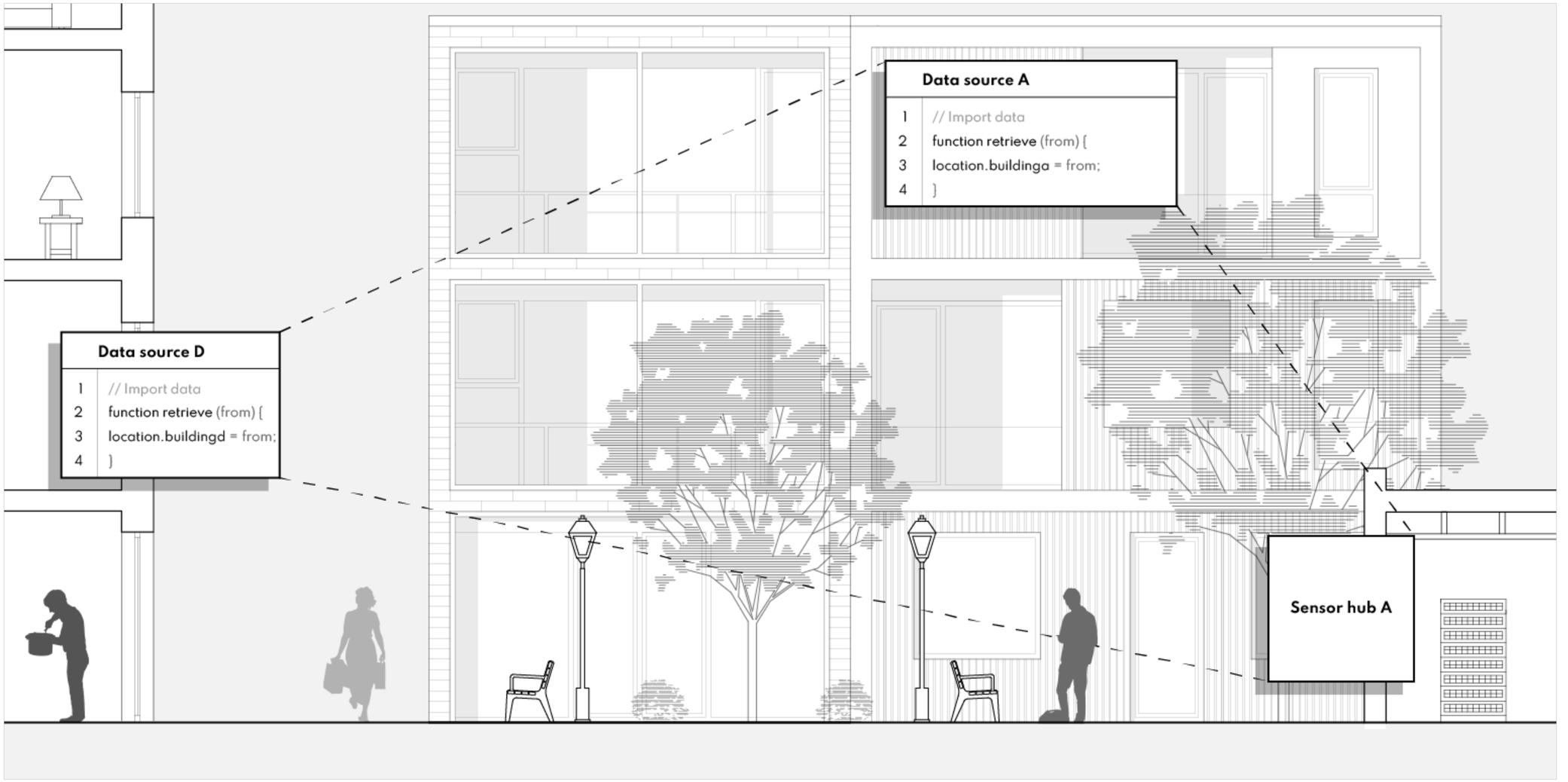
Research methodology diversification

Attitudinal and behavioral studies are necessary to collect qualitative and quantitative data, through both traditional and emerging methodologies, on how people define and experience comfort.

Multidimensional data construct

Data generated by simultaneous real-time environment monitoring sources illustrates the need for the application of network science principles as a way to foster model development and simplify data analysis.

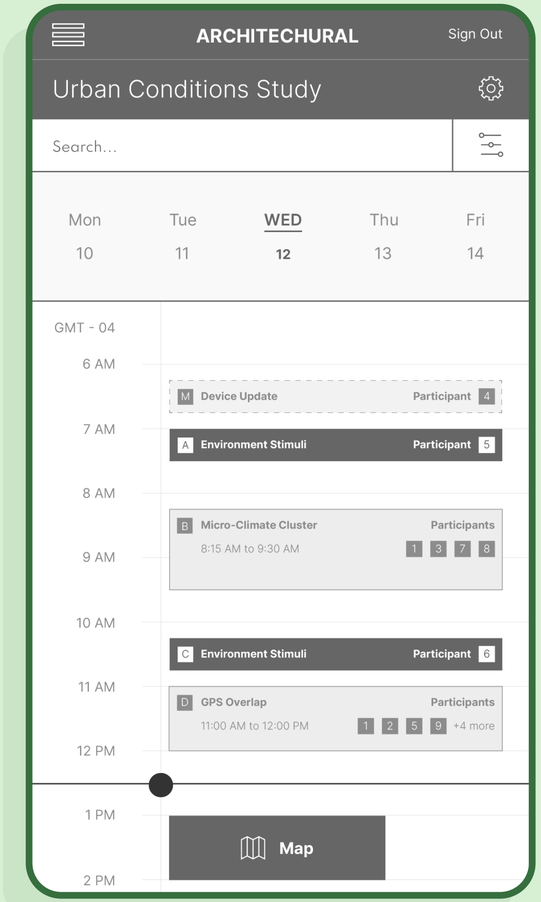

Data source A
1 // Import data
2 function retrieve (from) {
3 location.buildinga = from;
4 }
Data source B
1 // Import data
2 function retrieve (from) {
3 location.buildingb = from;
4 }
Data source
1 // Import da
2 function retri
3 location.buil
4 }
Data source D
1 // Import data
2 function retrieve (from) {
3 location.buildingd = from;
4 }
Microclimate A
Microclimate B
Microclimate C
Microclimate D
Microclimate E
Sensor hub A
Data source E
1 // Import data
2 function retrieve (from) {
3 location.buildinge = from;
4 }
5
6
Data source F
1 // Import data
2 function retrieve (from) {
3 location.buildingf = from;

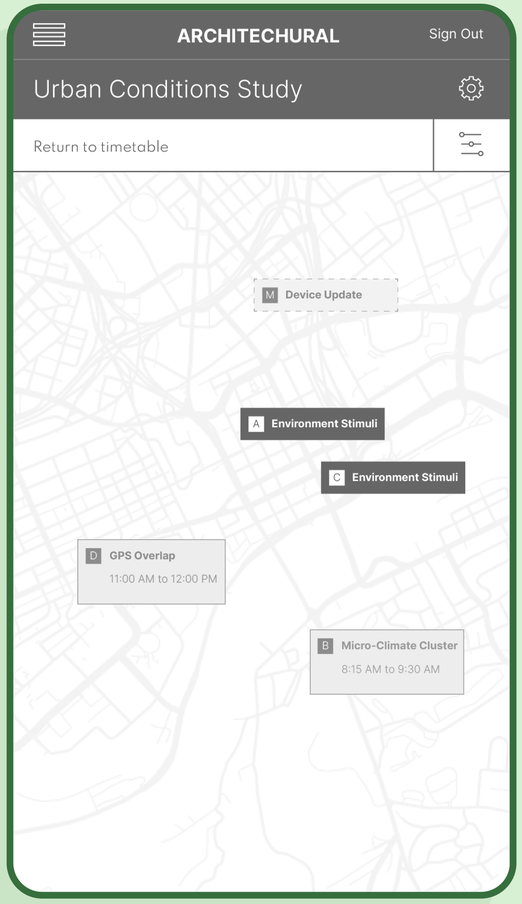


04-12 / **Integrated sensor network section**

05-12 / **Study platform wireframes**

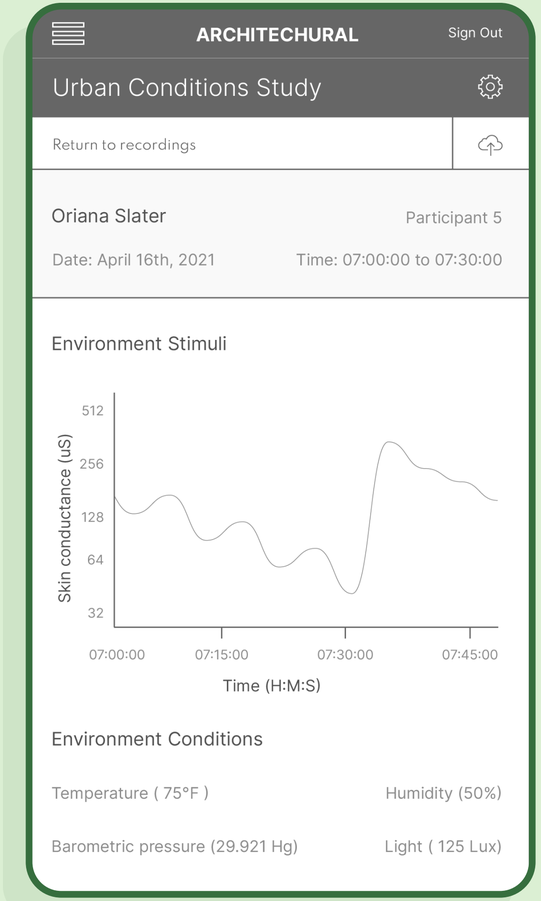
To augment the quantitative data collected through the sensor network, a qualitative research platform provides the opportunity to collect in-context user responses.

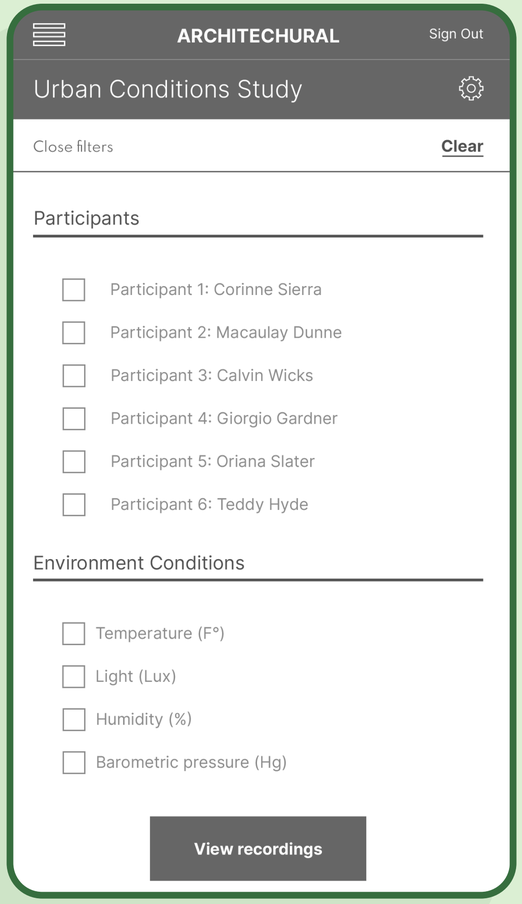


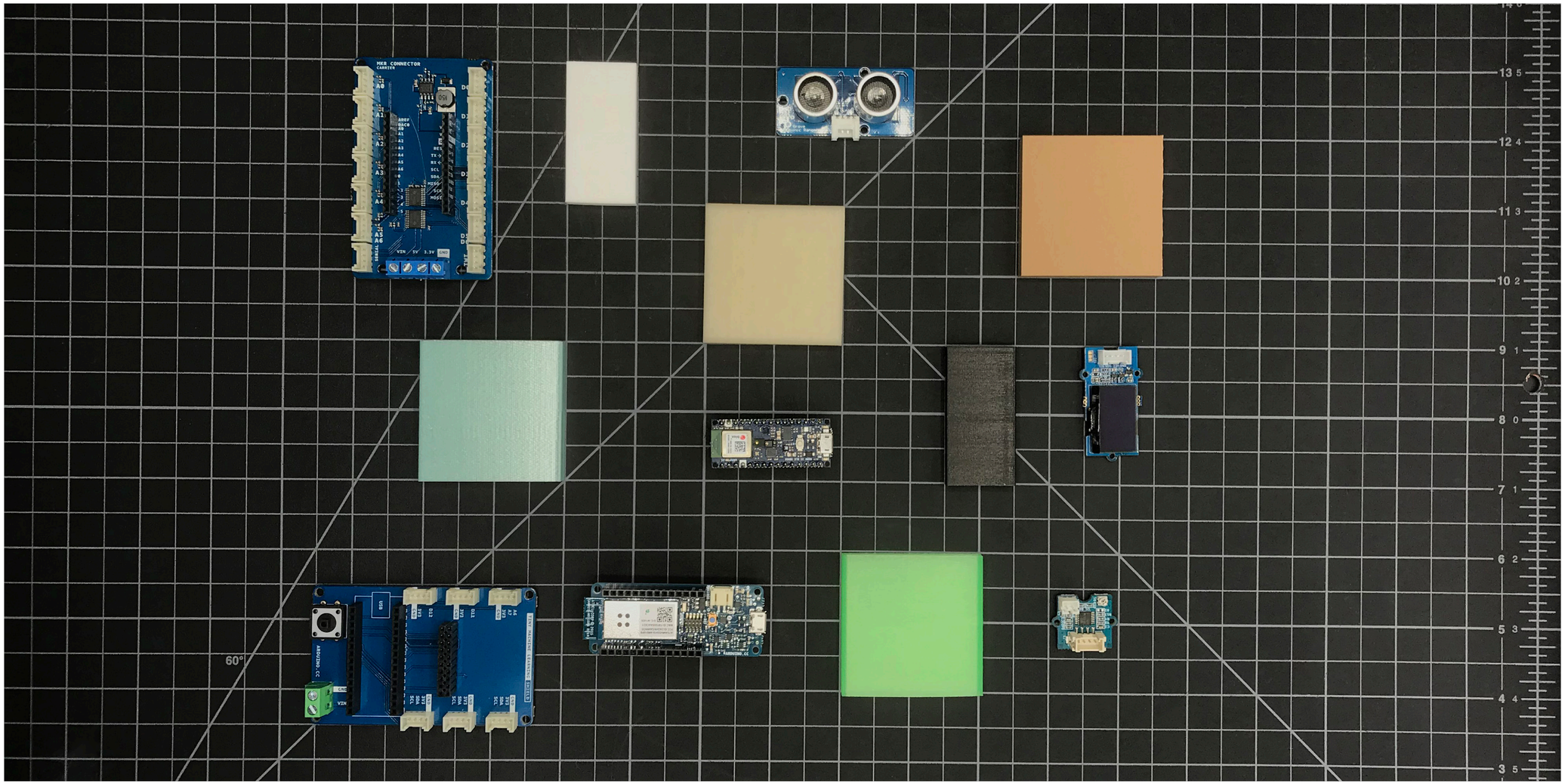


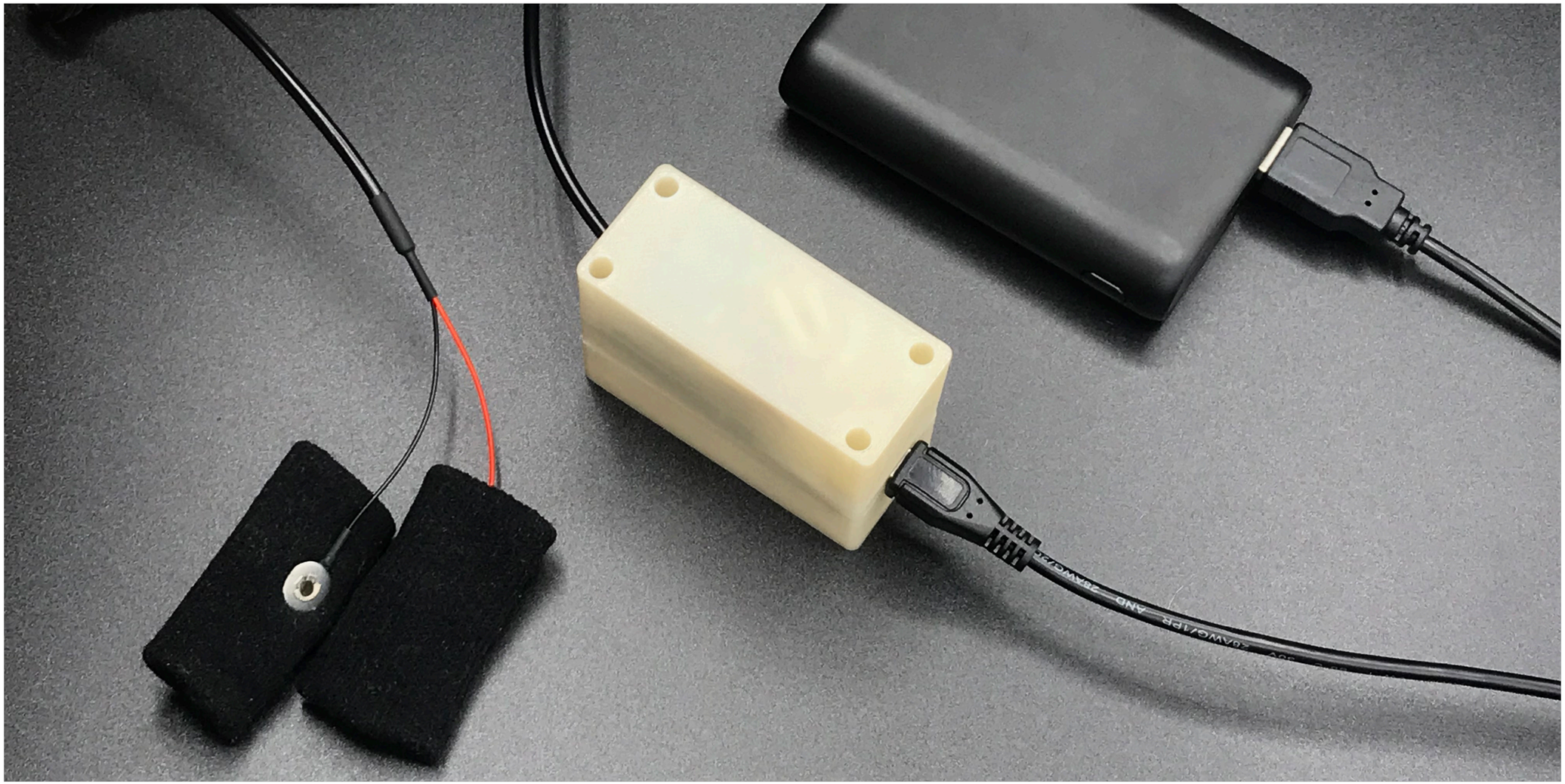
06-12 / **Reporting wireframes**

In-context user responses to environmental stimuli are actionable through the ability to synthesize, filter, and tag within the platform.

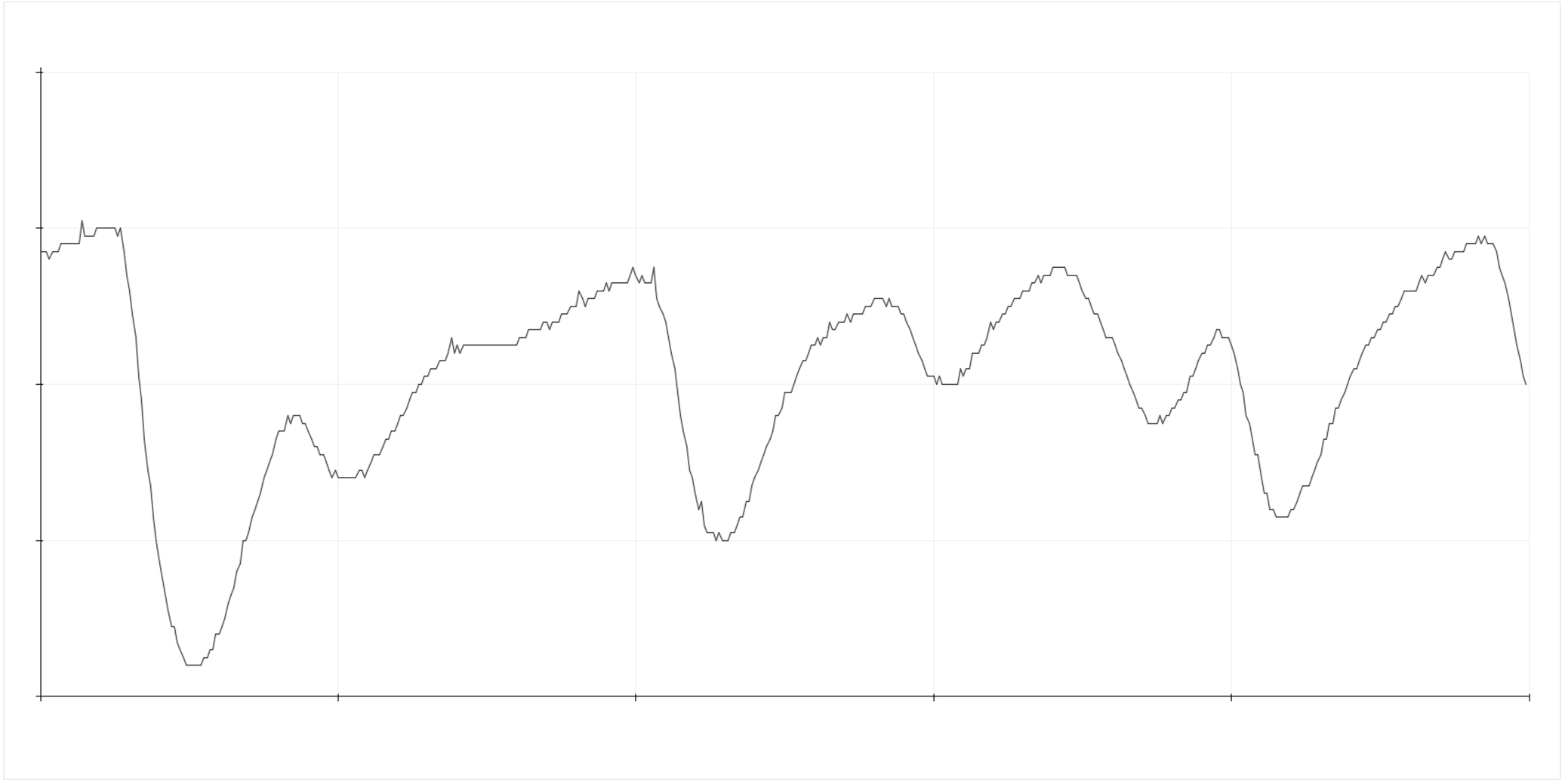




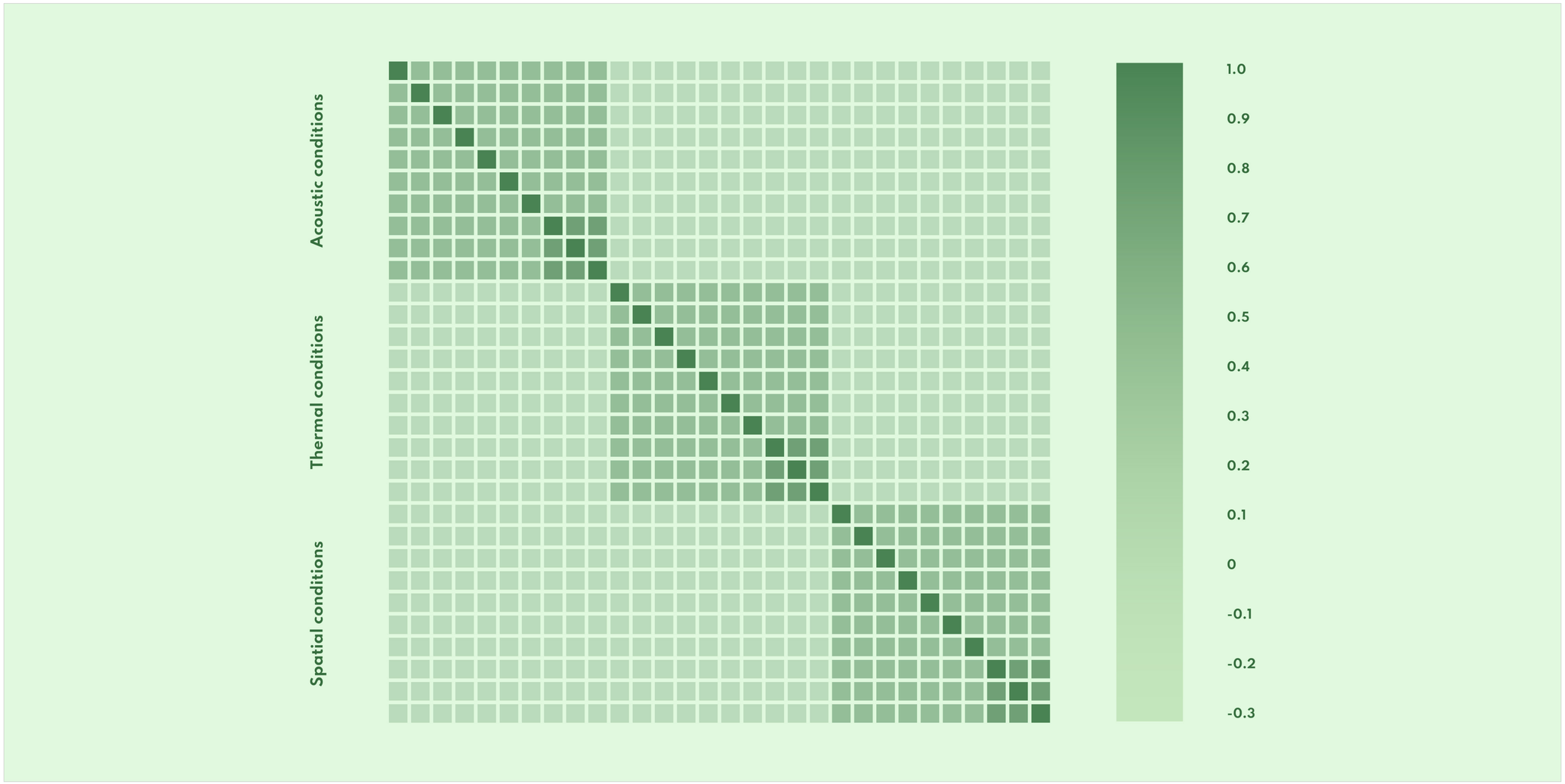

MKR CONNECTOR
CARRIER
60°



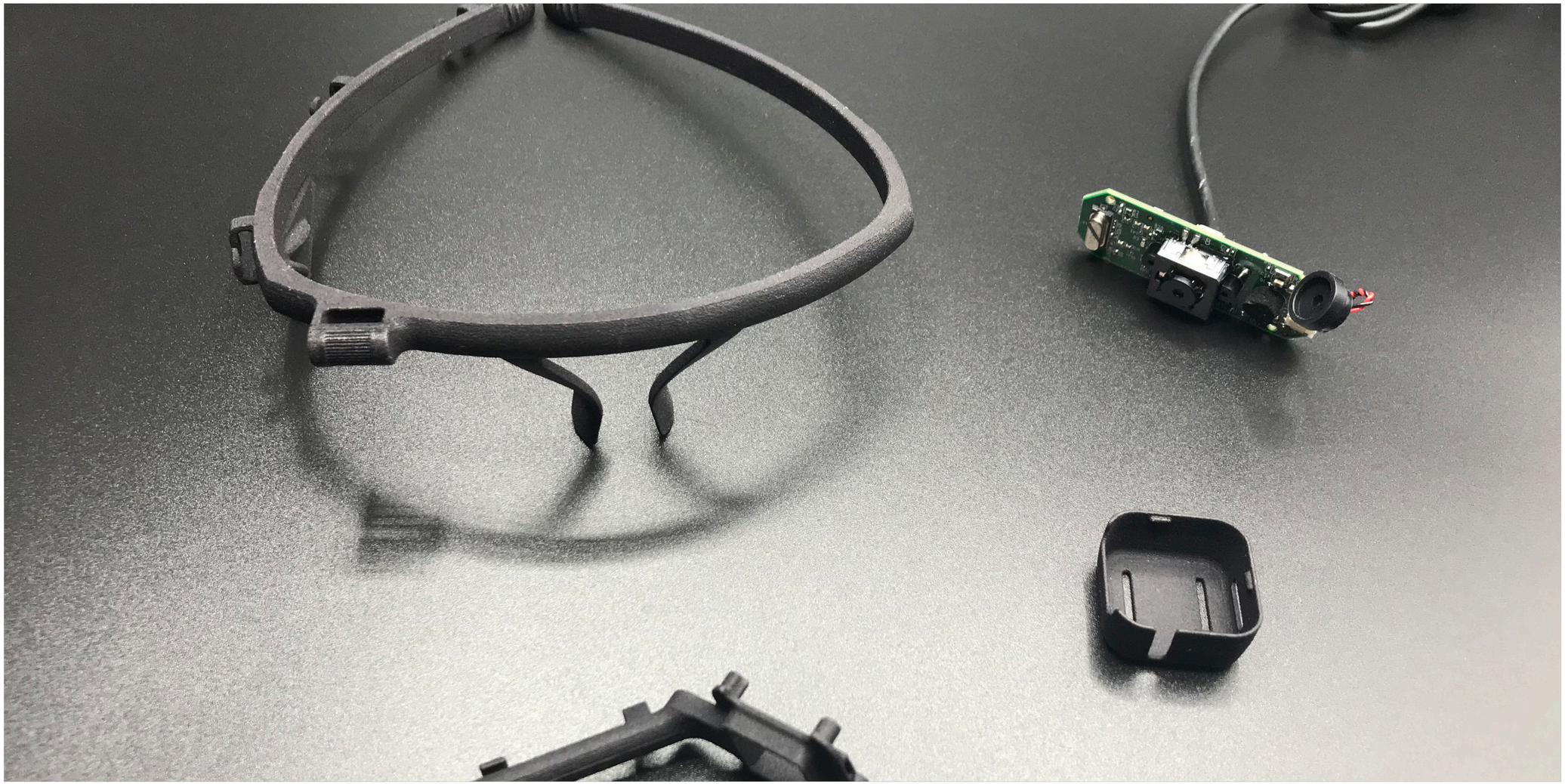
08-12 / **Electrodermal response prototype with UV-activated filament**



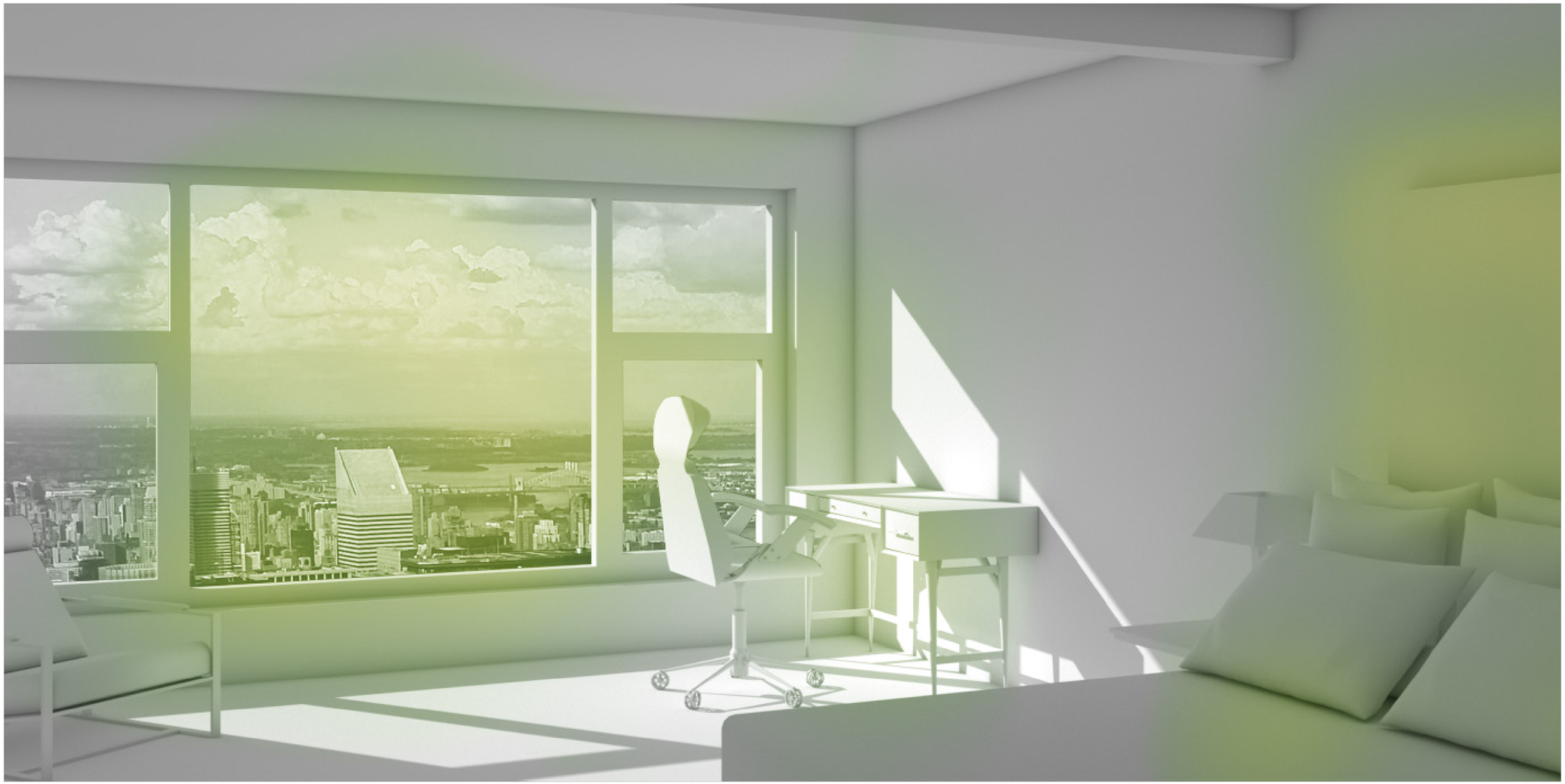
09-12 / **Electrodermal response prototype data output**



10-12 / **Conceptual environment similarity matrix based on electrodermal response data**



11-12 / **Components of Pupil Labs' DIY eye tracking glasses**



12-12 / **Conceptual gaze point heat map based on simultaneous localization and mapping (SLAM)**