

# Sleep Environment Monitor

ACES - Wireless Sensor Networks and IoT (Project)  
TD'Adamo 2023-2024



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# Project description



# Measured Environmental Parameters & Rating Method

<b>CO2</b>	<400 ppm	400 – 700 ppm	700 – 1000 ppm	1000 – 2000 ppm	2000 – 5000 ppm	> 5000 ppm
Percentage awarded for the global score	20%	15%	10%	5%	0%	-10%

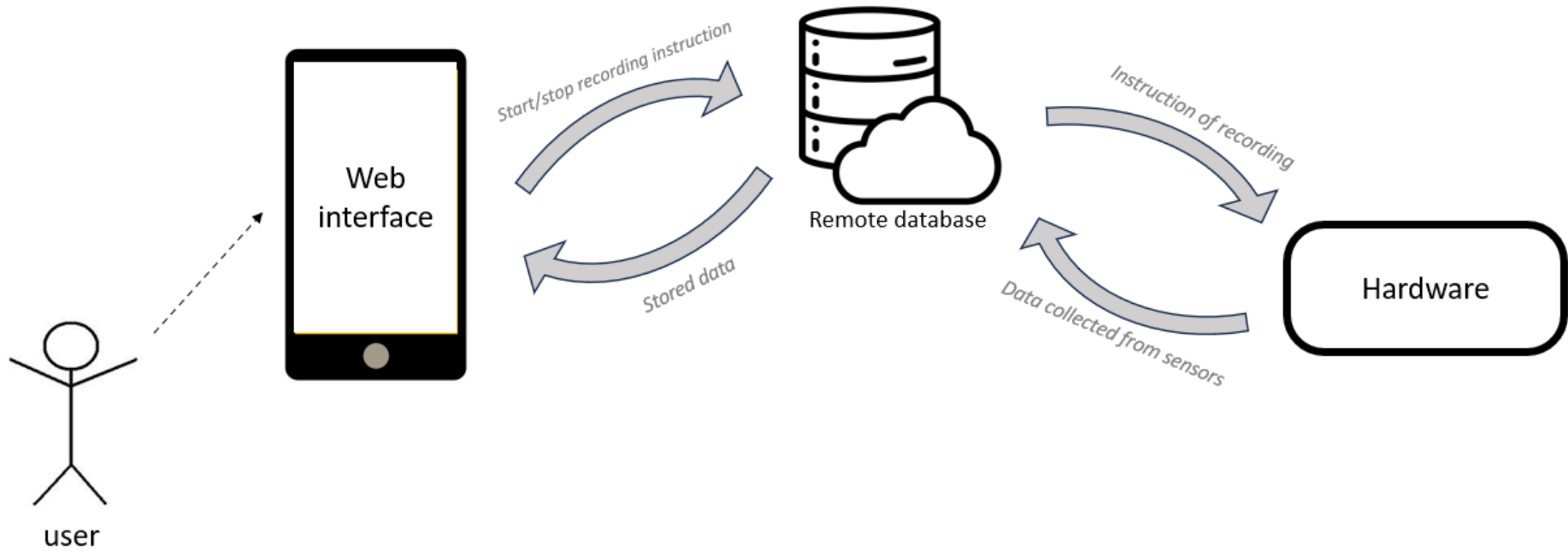
<b>Light</b>	<5 lux	5 – 15 lux	15 – 40 lux	40 – 100 lux	100 – 200 lux	> 200 lux
Percentage awarded for the global score	20%	15%	10%	5%	0%	-10%

<b>Sound</b>	<25 dB	25 – 30 dB	30 – 40 dB	40 – 55 dB	55 – 75 dB	> 75 dB
Percentage awarded for the global score	20%	15%	10%	5%	0%	-10%

<b>Temperature</b>	17 – 18 °C	16 – 20 °C	14 – 25 °C	12 – 28 °C	10 – 30 °C	<10°C and >30 °C
Percentage awarded for the global score	20%	15%	10%	5%	0%	-10%

<b>Humidity</b>	40 – 60 %	35 – 65 %	30 – 70 %	20 – 80 %	10 – 90 %	<10% and >90%
Percentage awarded for the global score	20%	15%	10%	5%	0%	-10%

# System overview

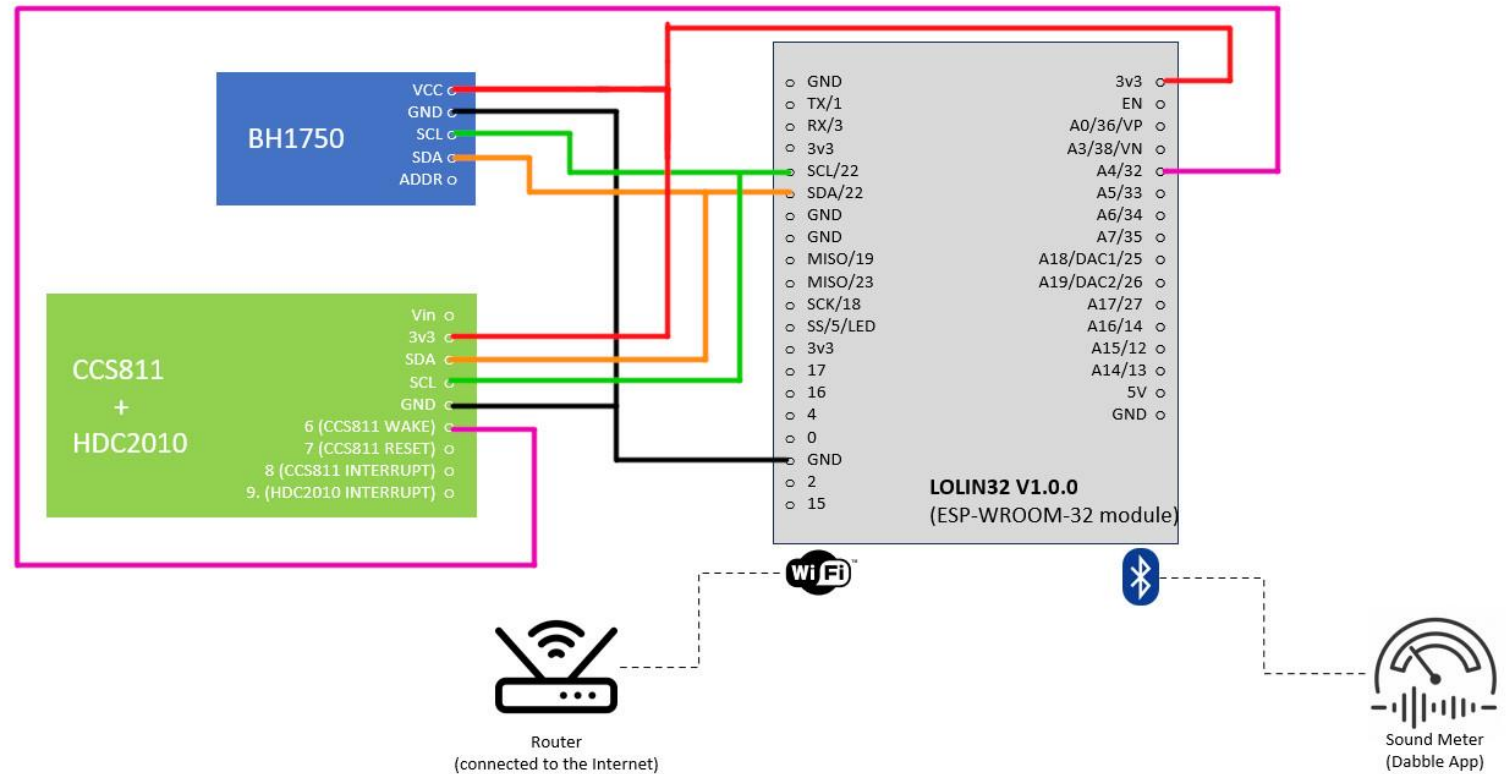


# Hardware

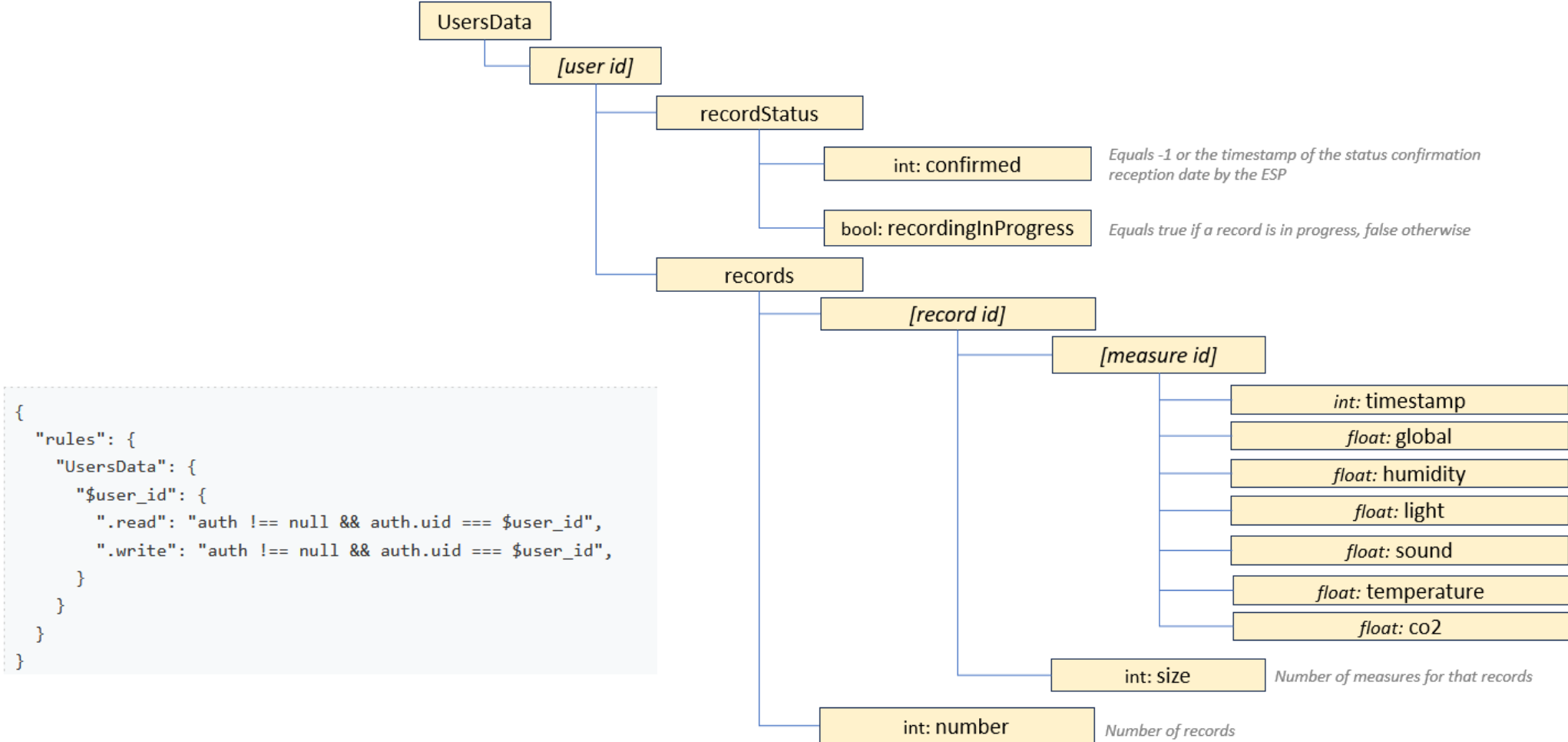
## Components:

- BOARD:
  - **LOLIN32 v1.0.0**
- SENSORS:
  - **BH1750**
  - **CCS811**
  - **HDC2010**
  - **Dabble soundmeter**

## Circuit Diagram:



# Database Structure



```
{
  "rules": {
    "UsersData": {
      "$user_id": {
        ".read": "auth !== null && auth.uid === $user_id",
        ".write": "auth !== null && auth.uid === $user_id",
      }
    }
  }
}
```

# Implementation in broad strokes

## Hardware Pseudo-Code

```
init sensors, database, wifi

while(true):
    listenToDatabaseChanges()
    if(stateChanged):
        confirmChange()

    if(recordingState AND time in INTERVAL):
        collectDataFromSensors()
        sendDataToFirebase()
```

## Web app Code structure

```
public
  scripts
    JS auth.js
    JS charts-definition.js
    JS index.js
    404.html
    index.html
    # style.css
  {} database.rules.json
  firebase.json
```



# User Interface & Results

## Sleep Environment Monitor

**Email**

**Password**

Login

# Sleep Environment Monitor

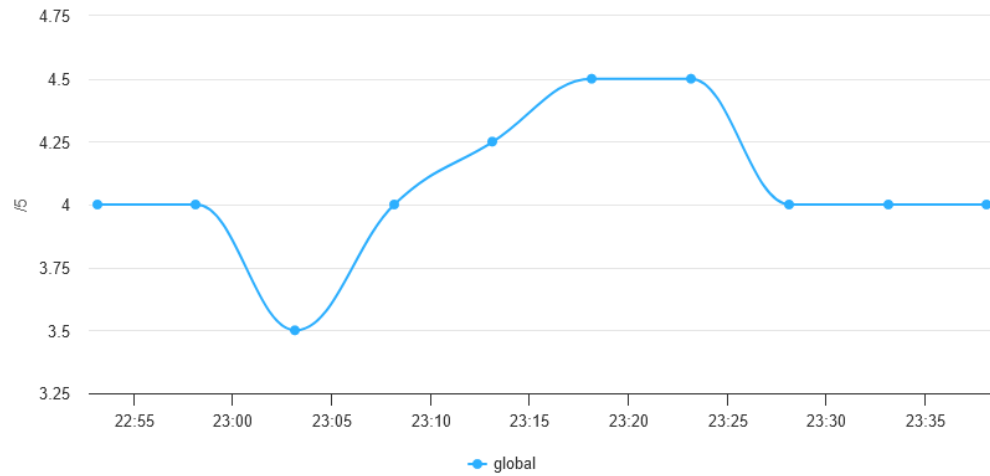
user@mail.com  
[\(logout\)](#)

Choose a record to display: 2: [2024/01/10 22:53:08 - 2024/01/10 23:43:08] ▾

START RECORDING

Global : ★★★★★ (4.08/5)

### Global Grade



☀ LIGHT

5.42 lux

🔊 SOUND LEVEL

8.20 dB

🌡 TEMPERATURE

19.96 °C

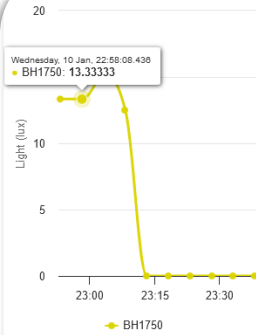
💧 HUMIDITY

44.23 %

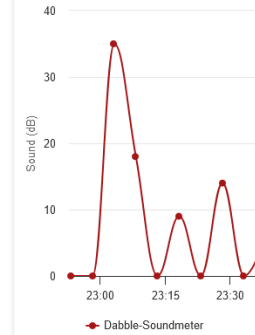
🌫 CO<sub>2</sub>

911.20 ppm

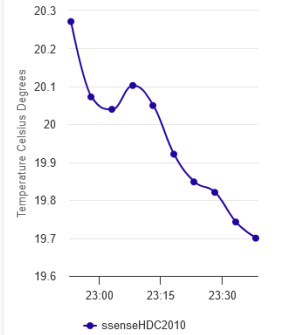
### ☀ LIGHT CHART



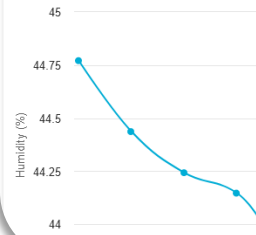
### 🔊 SOUND CHART



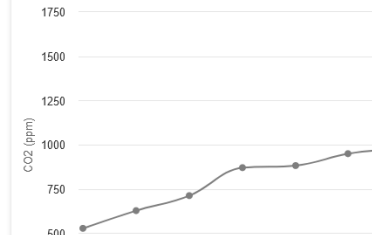
### 🌡 TEMPERATURE CHART



### 💧 HUMIDITY CHART



### 🌫 CO<sub>2</sub> EQ CHART



Demo time! (video)

# Conclusion

## Areas for Improvement

**Scientific Rigor**

**Comprehensiveness**

**User Interface limited**

## IoT class

**Technical Skills Organizational Skills**

**Human-Machine Interface in IoT projects**

*Any questions?*