

USER MANUAL

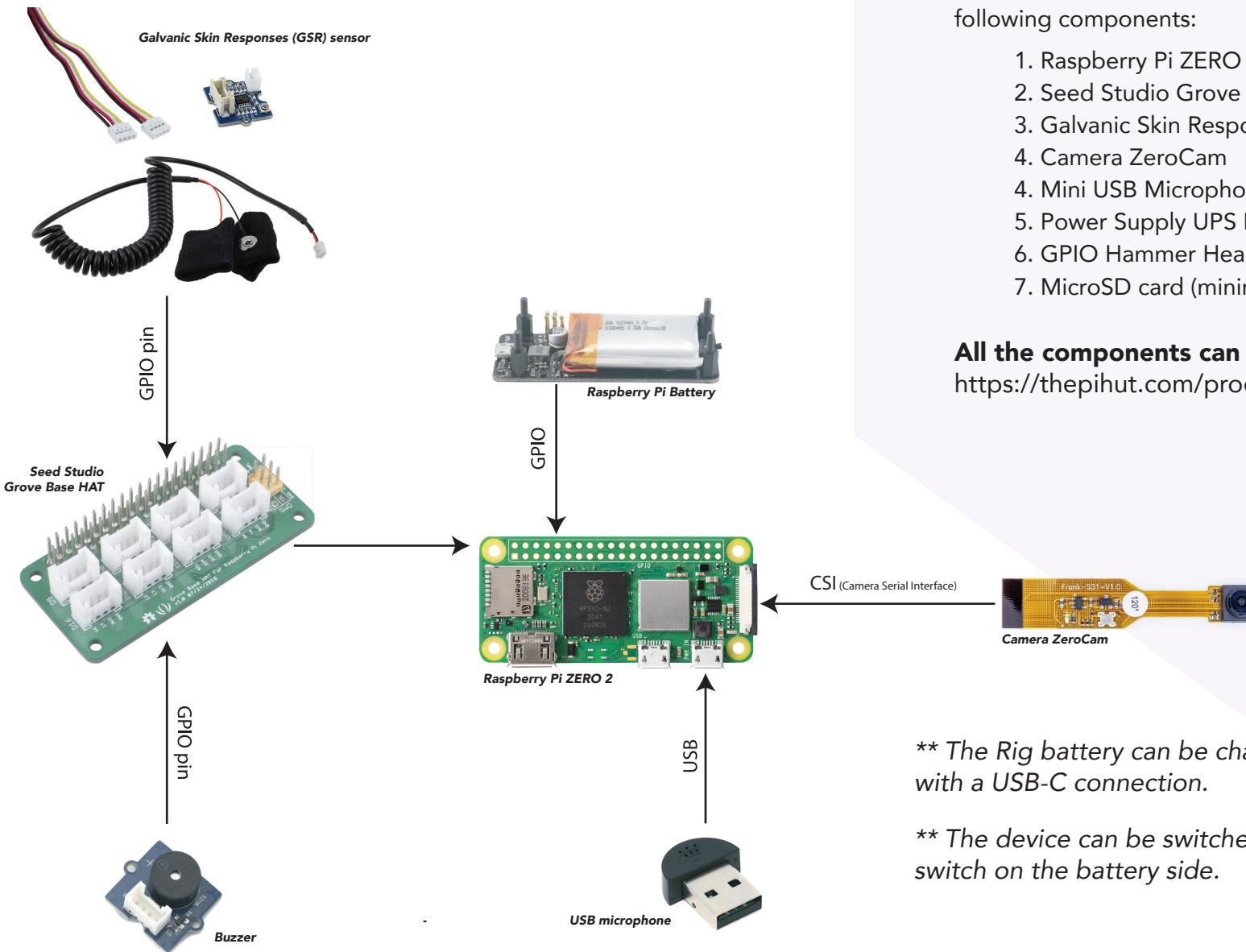


ROADMAP

ROADMAP

1. Build the Data Recording RIG Hardware.
2. Install the Raspberry Pi OS on the microSD card.
3. Download the folder **RIG-Software** onto the RIG microSD card and copy its contents into the folder **/home/rig/Documents/App/main**.
4. Connect the RIG to the same Wi-Fi network as the server.
5. Download the Data Recording RIG project onto your server machine.
6. Download and install Python, Node.js, Emotiv Launcher, Emotiv BCI, and Bonjour Print Services application.
7. Download and install the AWS CLI.
8. Set the AWS credentials.
9. Edit the **environment.env** file from the RIG-Server folder and add your **Emotiv credentials**.
10. Rename the file from **environment.env** to **.env**.
11. Install the Node serverless on your machine and deploy the Blockchain API.
12. Run the file **set_server.ink** from the RIG-Server folder.
13. Open the **Emotiv Launcher** app and log in to your Emotiv account.
14. Start the EEG headset.
15. Connect the EEG headset in the Emotiv Launcher application.
16. Open the **Emotiv BCI** and follow the instructions to calibrate the headset.
17. Start the server by running the **start_server.ink** file from the RIG-Server folder.
18. On the first application run, it will ask to confirm the new application in the Emotiv Launcher app.
19. Open the Web User Interface by accessing **http://localhost:8080** in your browser.
20. In the **Setting** section, edit the Host fields by replacing the current IP with your server's IP. Press the **Save** button.
21. Press the **Set User** button and create a new user name. Press the **Set User Name** button.
22. Press the **Start** button.
23. Stop the server by pressing **Ctrl + C**.

RASPBERRY PI COMPONENTS



To build the multimodal recording rig, you will need the following components:

1. Raspberry Pi ZERO 2
2. Seed Studio Grove Base HAT
3. Galvanic Skin Responses (GSR) sensor
4. Camera ZeroCam
4. Mini USB Microphone
5. Power Supply UPS HAT For Raspberry Pi Zero
6. GPIO Hammer Header (Solderless)
7. MicroSD card (minimum 32GB)

All the components can be found on:
<https://thePiHut.com/products/>

**** The Rig battery can be charged using a standard charger with a USB-C connection.**

**** The device can be switched ON or OFF using the small switch on the battery side.**

RASPBERRY PI OS

R A S P B E R R Y P I O S

Operating System (OS):

1. Download the Raspberry Pi Imager software onto your computer from the following link: <https://www.raspberrypi.com/software/>

2. In the Raspberry Pi Imager, configure the following settings:

- Set up your Wi-Fi connection and provide your Wi-Fi network's name (SSID) and password.
- Choose the device name for your Raspberry Pi (for example, "raspberry") and set up a username (for example, "rig")

3. Use the Raspberry Pi Imager to install the Raspberry Pi OS x64 Lite onto the microSD card.

4. Insert the microSD card into the microSD card slot on the Raspberry Pi Zero 2.

5. Open a Terminal or Command Prompt on your computer and establish an SSH connection to the Raspberry Pi by entering the following command (replace "rig" with your chosen username and "raspberry" with your chosen device name):

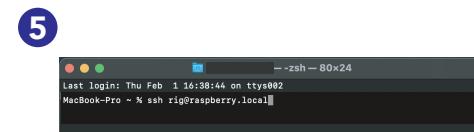
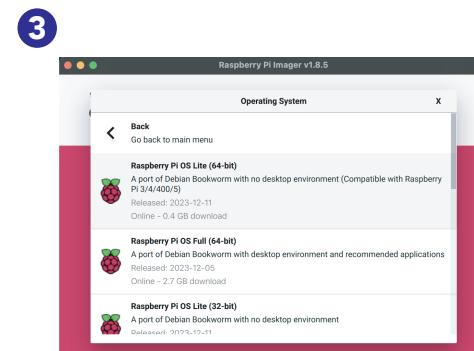
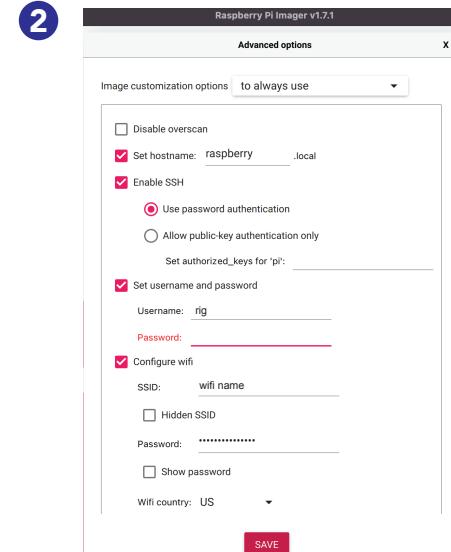
ssh rig@raspberry.local

You will be prompted to enter your device's password. By default "raspberry"

6. Enter your device's password to complete the connection.

IMPORTANT:

The SSH command 'ssh rig@raspberry.local' is tested on a macOS system. For a Windows system, it will require replacing 'raspberry.local' with the RIG's IP address or installing the Apple Bonjour application on your Windows machine.



RASPBERRY PI APP

Once you are successfully connected to the raspberry pi via SSH connection (ssh rig@raspberry.local or ssh rig@<rig-ip-address>), execute:

1. Create folders "/App/main/" in the directory "/home/rig/Documents/", as to ensure that the following path exists: "/home/rig/Documents/App/main". You can use the commands:

```
cd /home/rig/Documents/  
mkdir -p App/main
```

2. Open the directory /home/rig/Documents/App/main using the command:

```
cd /home/rig/Documents/App/main
```

3. Download the project from the following link: <https://github.com/ancara22/Data-Recording-Rig>

4. Copy the contents of the Rig-Software folder into /home/rig/Documents/App/main.

** You can remove all the other project folders from the Raspberry Pi system.

IMPORTANT:

It is necessary to connect the Recording Rig to your WiFi network. You can do this in two ways:

1. Using SSH:

- Connect to the Recording Rig via SSH.
- Run the command **sudo nmtui** to open the WiFi user interface where you can set up a new WiFi connection.

2. Using an HDMI Monitor:

- Connect a monitor to the Recording Rig via mini HDMI port, and a keyboard using a USB 3.0 to USB-C adapter.
- Configure the WiFi network using the intuitive GUI user interface.

LOCAL SERVER

1. To install the Recording Rig Server, download the project from the link:

<https://github.com/ancara22/Data-Recording-Rig>

2. Download and install the latest version of Node.js and Python on your device:

Node.js: <https://nodejs.org/en/download/prebuilt-installer>

Python: <https://www.python.org/downloads/>

3. In the project folder open the Rig-Server (the actual Rig server) and run:

set_server.exe - That will install all the node (npm install) and python dependences.

4. Run the Rig Server by running the **start_server.exe** file.

5. To stop the server press **Ctrl + C** in the terminal (black window), if necessary press **Y** and **ENTER**.

For other operating systems, or as an alternative method of execution, the server setup and running can be performed from the terminal (shell) using the following commands:

cd Data-Recording-Rig/Rig-Server

npm install - To install node_modules

npm run dep-install - To install python dependencies

npm start - To start the server

IMPORTANT:

The output session files are saved in the directory:

\Data-Recording-Rig-v1.0\Rig-Server\data\session_files

AWS ACCOUNT

Set the AWS Account:

1. Install the AWS CLI:

On Windows, download and run the installer from the AWS CLI download page:

<https://docs.aws.amazon.com/cli/latest/userguide/getting-started-install.html>

On macOS or Linux, you can use the package manager or pip to install the AWS CLI:

`npm install awscli`

2. Configure the AWS CLI:

Open a terminal or command prompt and run:

`aws configure`

You will be prompted to enter your AWS Access Key ID and Secret Access Key, which you can get from your AWS Management Console in the IAM section. You will also be asked to enter your default region (e.g., us-east-1) and default output format (e.g., json).

3. Set your AWS credentials file: (Optional)

To set your AWS credentials, go to the AWS Management Console, access 'My Security Credentials', generate or manage your access keys, and add them to the AWS credentials file located at `~/.aws/credentials`.

Amazon Web Services:

<https://aws.amazon.com>

BLOCKCHAIN FUNCTION

Deploy the Blockchain functionality:

To deploy a Lambda function named on your AWS account using the Serverless framework, follow these steps:

1. Navigate to the Function Directory:

Open a terminal or command prompt and navigate to the blockchain-api folder in the downloaded repository.

2. Prerequisites:

Before deploying the Lambda function, users need to have Node.js and npm installed on their local machines. They also need to install Serverless globally by running the following command:

```
npm install -g serverless
```

3. Deploy the Lambda Function:

After the dependencies are installed, deploy the Lambda function to AWS by running:

```
serverless deploy
```

Serverless:

<https://www.serverless.com>

Set the EEG headset:

Here's a step-by-step guide to connecting to the Emotiv headset:

1. Install Emotiv Apps Launcher and Emotiv BCI: First, download and install the Emotiv Apps Launcher and Emotiv BCI

Emotive Launcher: <https://www.emotiv.com/products/emotiv-launcher>

Emotiv BCI: <https://www.emotiv.com/products/emotiv-bci> applications.

2. Login to Emotiv Profile in Launcher: Open the Emotiv Apps Launcher and login with your Emotiv profile credentials.

If you don't have an Emotiv account, contact the Evolve team.

3. Set the Environment: In the Rig-Server folder open the environment.env file with a simple text editor, and insert your

HEADSET_LICENSE, HEADSET_CLIENT_ID and HEADSET_CLIENT_SECRET in the double quotation marks "example".

Rename the **environment.env** file to **.env**

4. Start the Headset: Turn on the Emotiv headset by pressing the power button on the side. Make sure it's charged if it's a wireless model.

5. Connect to the Launcher App: Open the Emotiv BCI application. Here, you should see an option to connect to the Emotiv headset. Click on this and wait for the connection to be established.

6. Configure Headset Position: Once connected, you may need to configure the headset position.

7. Configure Recording Quality: In order to ensure accurate readings, it is necessary to adjust the sensors' positions and ensure their proper salinity.

8. Create a Face Model: To use the facial expression detection features of the Emotiv headset, you'll need to create a face model. This involves following the on-screen instructions to make various facial expressions and train the model.

9. Train Facial Expressions: After creating the face model, you'll need to train it by making various facial expressions. The headset will record your expressions and use them to recognize your emotions in the future.

10. Repeat Training: To ensure accuracy, it's recommended to repeat the training process several times.

IMPORTANT:

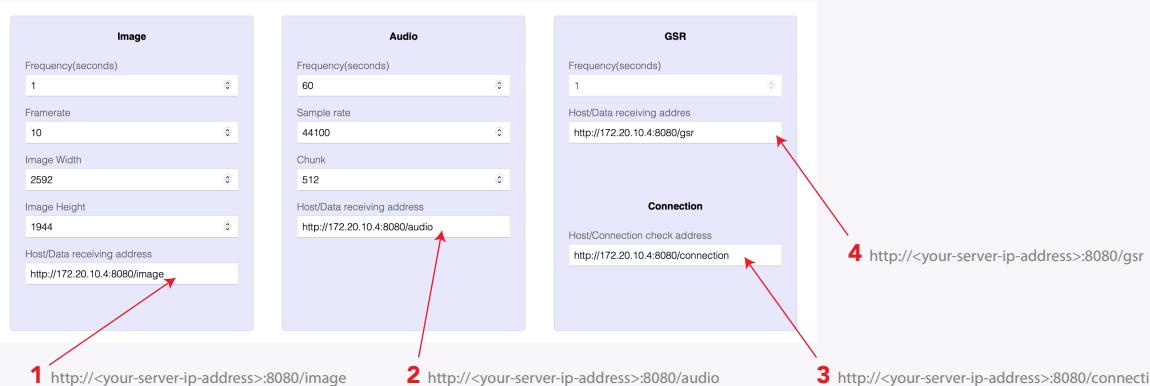
You must accept the access request from the server app on CortexUI. Launch the EMOTIV launcher to approve the app on a new install while the application is running.

USER INTERFACE

USER INTERFACE

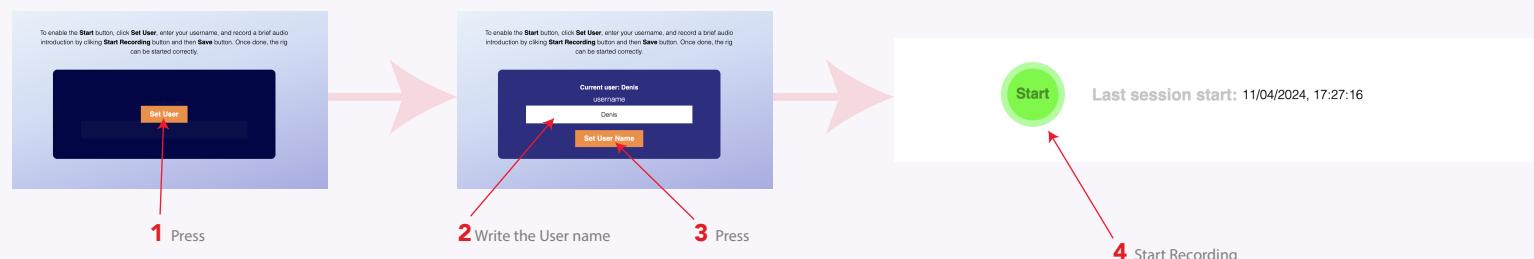
Open the link **http://localhost:8080** in your browser to access the user interface.

1. On the Setting page, in the Rig Settings section, edit the Host fields in the following four boxes by replacing the current IP with your server's IP address.



** The input format must remain the same (http://<your-server-ip-address>:8080/audio; for example: http://172.20.10.4:8080/audio).

2. Press the **Save** button.
3. Set the new user by pressing the **Set User** button, enter your username, and press the **Set User Name** button.



** The User setting is required only for the first time. After that, to start the recording, simply press the Set User button (1) and then the Start button (4).

IMPORTANT

***** The application is developed and tested on a macOS system. Compatibility and functionality on a Windows machine may require additional settings and steps.**

COMMON FACED ERRORS:

The server is not receiving data from the RIG:

It's essential to find the correct IP address of the server and update it in all the Host fields within the Web UI settings. Failure to do so may result in the RIG crashing due to connection errors. Additionally, try deactivating the firewall and avoid using a public network.

SSH connection timeout:

The command 'ssh rig@raspberry.local' works perfectly on macOS systems. However, on a Windows OS, you may need additional software like Bonjour Print Services from Apple (not tested), or replace 'raspberry.local' with the actual RIG IP address. For example: 'ssh rig@192.168.0.23'.

EEG connection error:

It's necessary to confirm the new application in the CortexUI/Emotiv Launcher upon the first application run.