# PATIENT MANUAL

A comprehensive guided explanation of all patient functionalities and system processes necessary to make proper use of this unit and successfully send all symptoms and signals so a doctor can make a routinely evaluation of SMA patients.


**CREDITS**

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## 1. Introduction

The Patient application allows patients to interact with MotivSMA, our medical platform, connecting them with doctors at a distance. Through this application, patients can register symptoms, upload measurement sessions, request a doctor, view their assigned doctor and their locality on a map, and access their reports history.

### Role

The role of the Patient application is to SMA patients to:

- View and update their basic profile information
- Start and manage measurement sessions
- Record symptoms and physiological signals (ECG, EMG)
- See the currently assigned doctor and the status of that assignment
- Browse available doctors and submit a doctor request

All this information will allow the patient to send relevant clinical information to a doctor who will track their evolution at a distance through this telemedicine application.

## 2. Objectives

### 2.1. Primary

The main goal of this unit is to provide patients with an interface so they can log measurement sessions so that their respective doctors can keep track of these sessions therefore maintaining a periodic control over their evolution during treatment stages.

Patients send measurement sessions which include symptoms and signals: an electrocardiogram (ECG) and electromyogram (EMG).

### 2.2. Secondary

It was considered important to provide an intuitive and easy-to-use interface which allows them to travel throughout the unit.

Additional actions (see *Section 4*) were added to ensure organization in doctor-patient assignation and to facilitate signal recording for the patients.

## 3. Getting started

### 3.1. How to initialize the application

You can start the platform in two different ways. The first option is to use Docker, which provides a straightforward setup with all services pre-configured and ready to run. This approach is recommended if you want quick and consistent deployment across different environments without the need to have pre-requisites installed.

Alternatively, you can download the individual repositories and run each component separately. This method offers more flexibility for development and debugging, as it allows you to modify or replace specific modules without affecting the entire platform.

#### 3.1.1. Through Docket Deployment

Docker Deployment provides a fully containerized environment for running the SMA (Spinal Muscular Atrophy) telemedicine system.

In this section how to use and install it is explained below. Nevertheless, for more information refer to the README section in the GitHub repository.

1. Make sure Docker has been installed in your computer through the official website: https://www.docker.com
2. Download the GitHub repository on your computer terminal: https://github.com/pilarbourg/telemedicine-deploy

```
git clone https://github.com/pilarbourg/telemedicine-deploy
```

*From this point on, please make sure you have all necessary requirements specified in the README and the certificate in place (Refer to the Certificate Manual)*

3. Decompress the zip file and open a terminal or console on your device and navigate to the project directory.
4. Start all services by running the following in your terminal:

```
docker-compose up -d
```

5. The web app should now be accessible locally at https://127.0.0.1

Finally, to shut down all containers run the following in the same terminal: `docker-compose down`

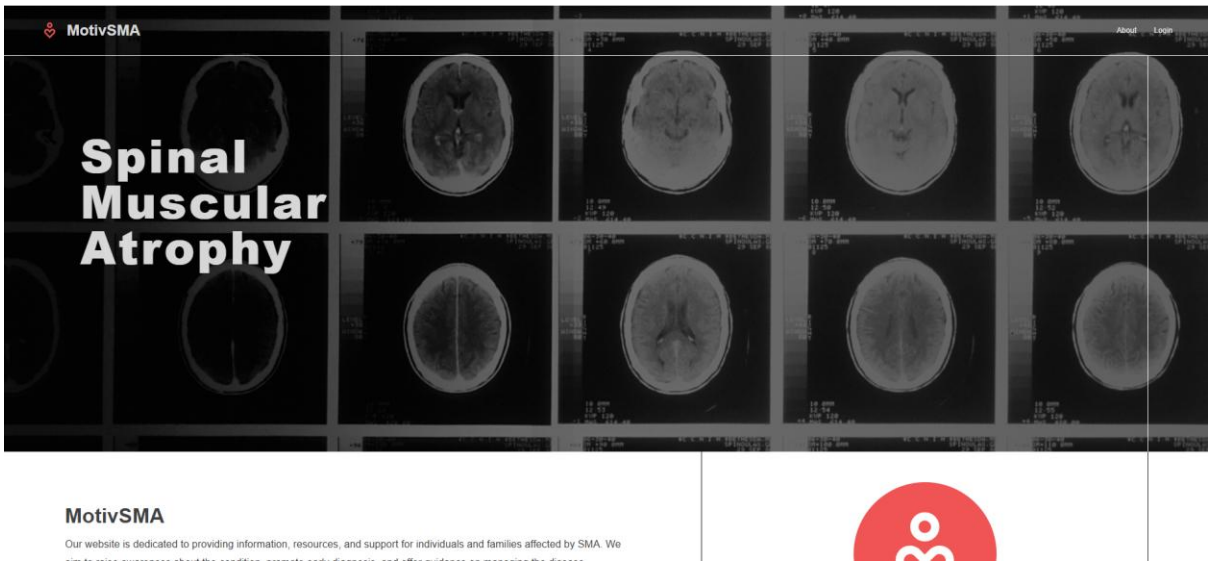
#### 3.1.2. Manual setup

In order to access the webpage:

1. Download the GitHub repository: https://github.com/alejandraoshea/sma-server
2. Download the GitHub repository: https://github.com/alejandraoshea/sma-client

3. Locate the index.html (*/sma-client/index.html*) and double click on it to open the browser

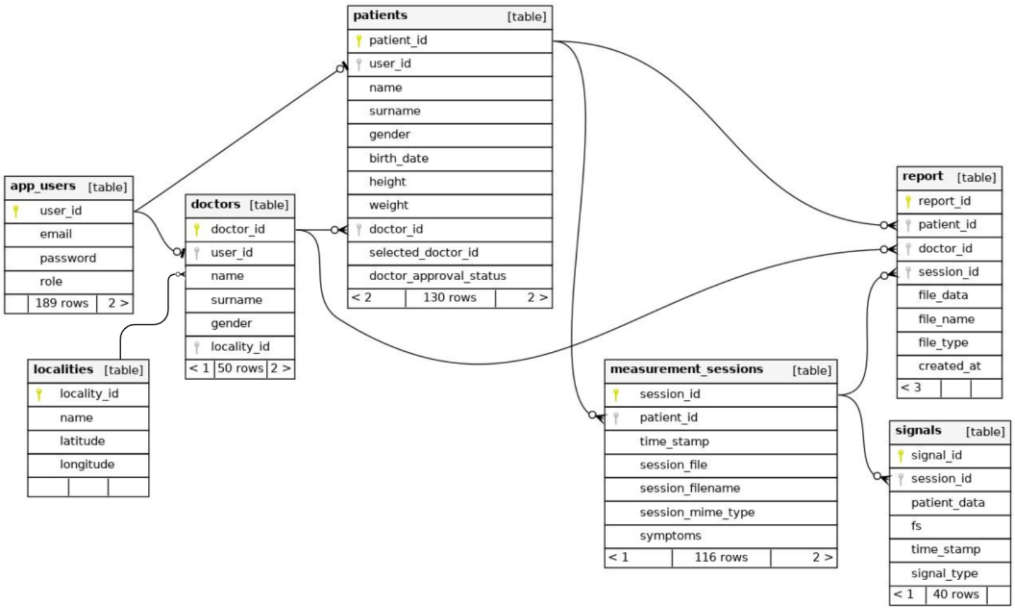
Now, you should see the initial register and log-in dashboard:




3.2.The database

The architecture of the database is designed around three main roles and their interactions: Patient, Doctor and Users and the measurement data generated by the patients:

- All authentication (Log-in/Sign-in) information is stored in the app_users table, which defines login credentials and role (ADMIN, DOCTOR, PATIENT) for each account.
- The patients and doctors extend the user records by storing their corresponding user information in and linking back to app_users through a shared user_id. A patient can be assigned to a doctor, and doctors may supervise multiple patients. A doctor can also generate a report containing the patient's data, all the information regarding a session, symptoms and both signals, and the doctor's notes. This report will be saved as a pdf that both the doctor and the patient will be able to see (for more information refer to the DOCTOR MANUAL and/or CLIENT MANUAL).
- To support the data recollection by the patients, a measurement_session table which represents individual measurement events performed by a patient at a specific timestamp, and signals, which store the processed physiological data recorded during those sessions (EMG or ECG). The data of both signals once processed will be stored in a .csv file along with patient's data.
- Each signal entry references both the patient and the session it belongs to, allowing full traceability of all collected data.




### 3.3. Connecting the database

To connect the database stored in your computer to the server you will need to have the DUMP file that was given with the documentation, it must follow exact template as shown in *Section 5.1*.

Now that the database is created and stored in your computer you will have to go into the sma-server repository to *src/main/resources/application-local.yml* and change the following parameters:

```
spring:
  config:
    activate:
      on-profile: local

datasource:
    url: jdbc:postgresql://localhost:5432/database_name
    username: YOUR_USERNAME
    password: YOUR_PASSWORD
    driver-class-name: org.postgresql.Driver
    hikari:
      schema: public

server:
  port: 8443
  ssl:
    enabled: true
    key-store: /path/to/your/keystore.p12
    key-store-password: YOUR_KEYSTORE_PASSWORD
    key-store-type: PKCS12
    key-alias: YOUR_KEY_ALIAS
```

```
admin:
  username: ADMIN_USERNAME
  password: ADMIN_PASSWORD

operator:
  username: OPERATOR_USERNAME
  password: OPERATOR_PASSWORD

jwt:
  secret: JWT_SECRET
  expiration: 3600000
```

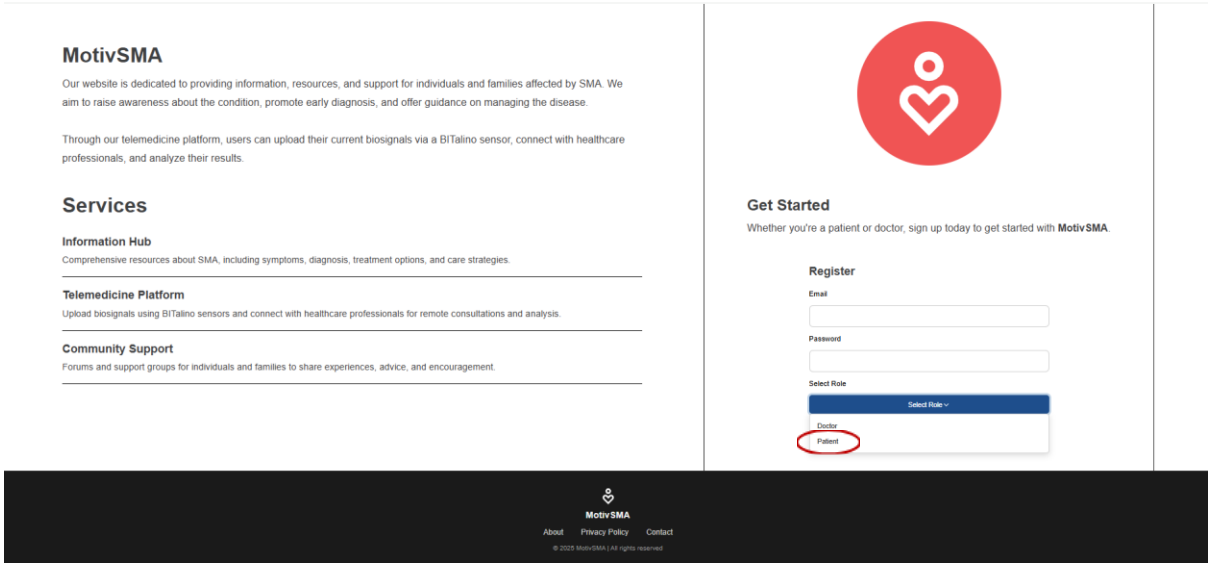
*Highlights must correspond to your admin parameters; these will be used to log into the system*

Note: To generate the key check “MotivSMA: Certificate Generation for HTTPS Browsing”

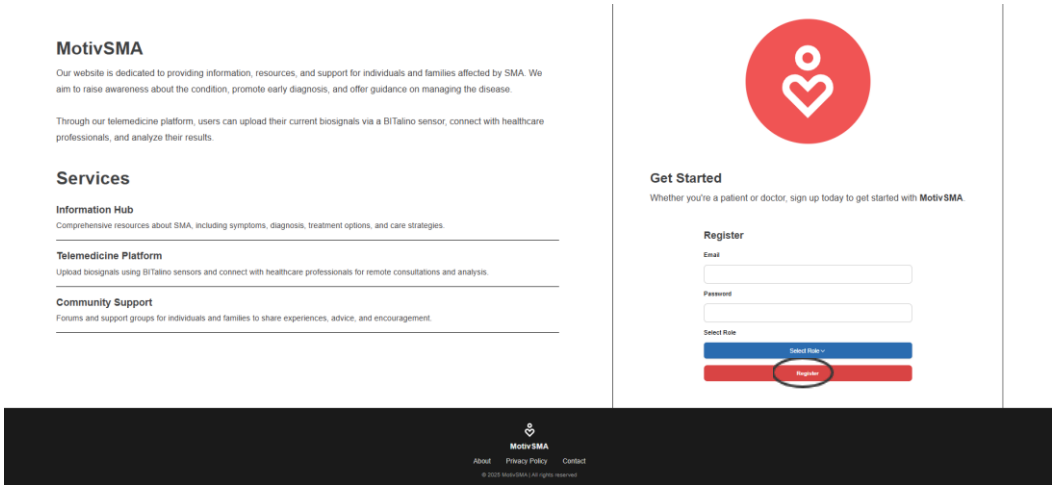
### 3.4.Register

If you don't have an account, please complete the registration form with the following required information:

1. Email: Enter your email address (this will be used as your identifier).
2. Password: Enter a password.
3. Role: Select *Patient* from the dropdown menu.



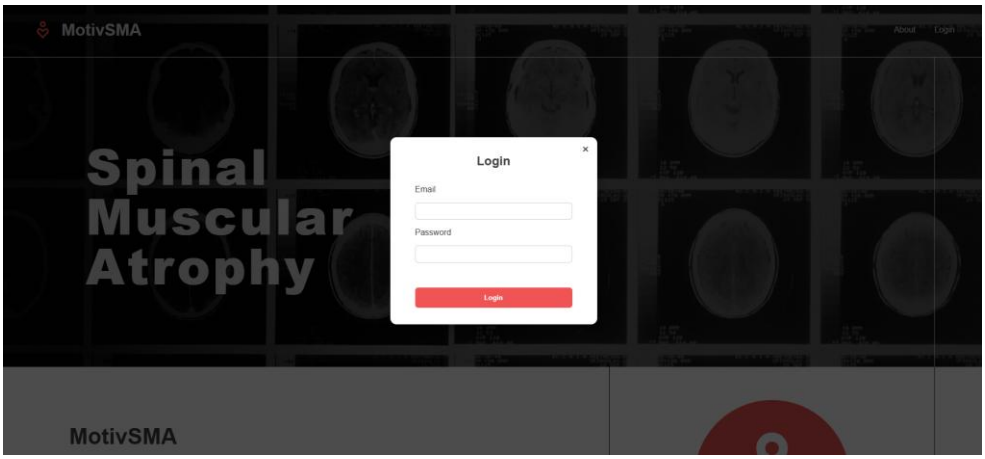

Finally, click the registration button.



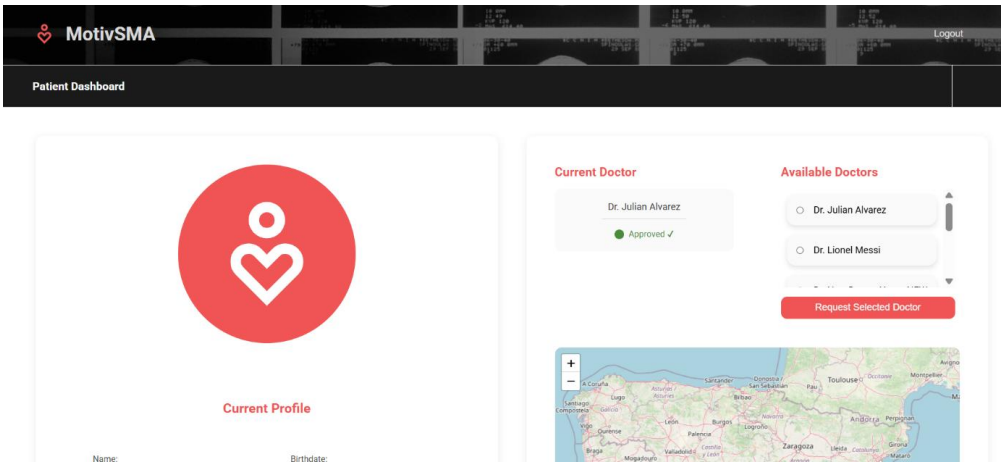

## 3.5.Log in

*Please insert your personal information after the first Log-in.*

You must log-in into the doctor unit using the *email* and the *password* specified during the "Sign-in".

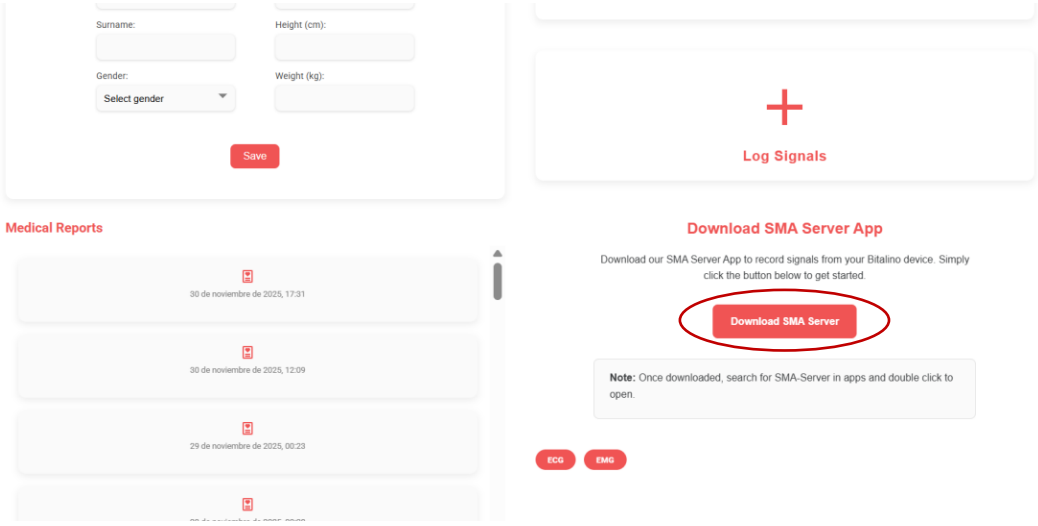



Whenever these parameters are correct, you will have access to the patient dashboard.

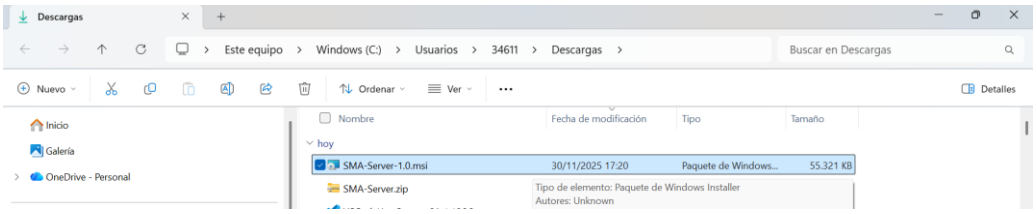


## 3.6. Download the SMA Bitalino Application

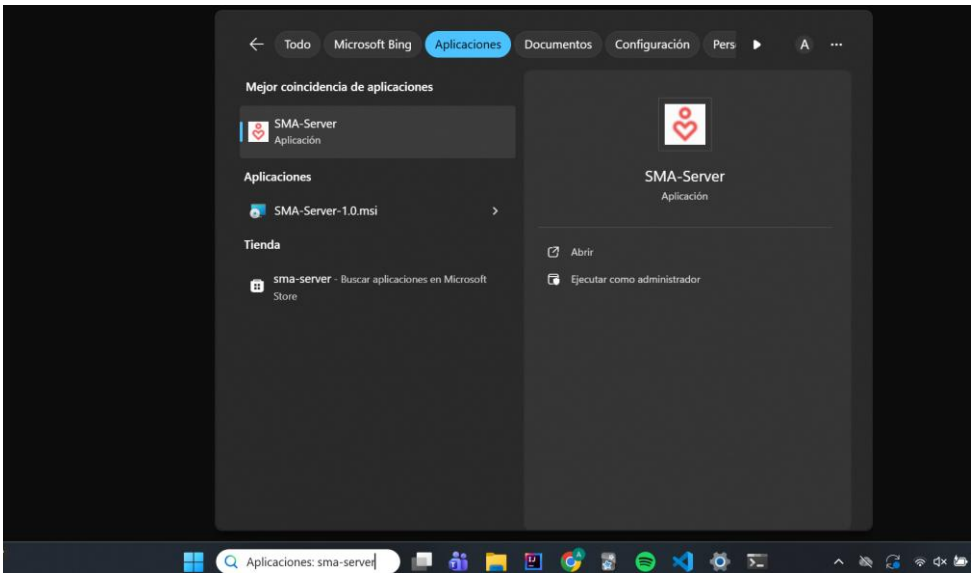
To obtain your recorded signals and download them in a format supported by our webpage, please obtain the SMA-Server application. For this you will have to download it by clicking on "*Download SMA Server*". (Instructions available in GitHub README):



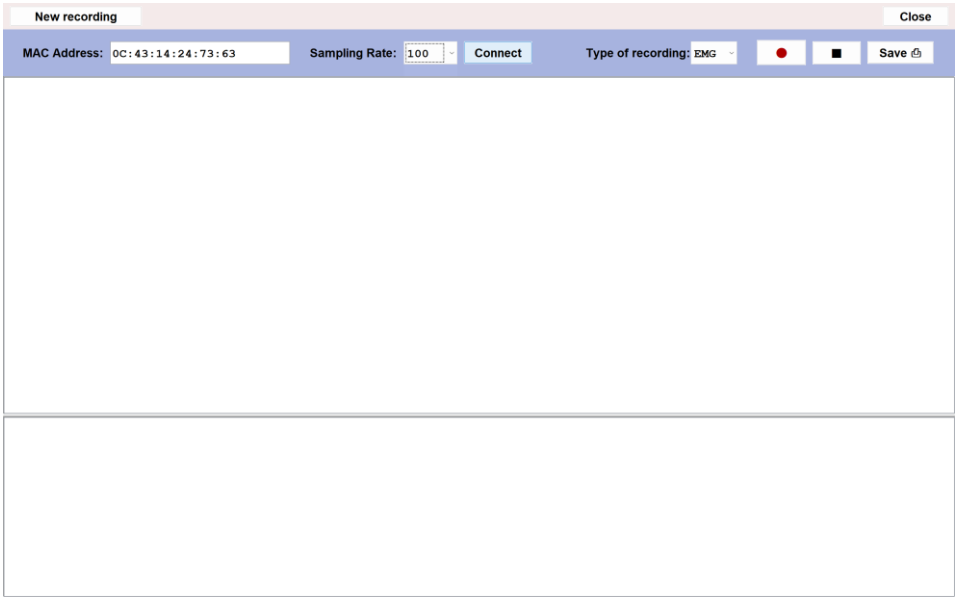

Once it has been downloaded, you will need to click on the .msi file and the installation of the Bitalino application will start:




If the installation was correct, you will only need to look for the application and launch it:



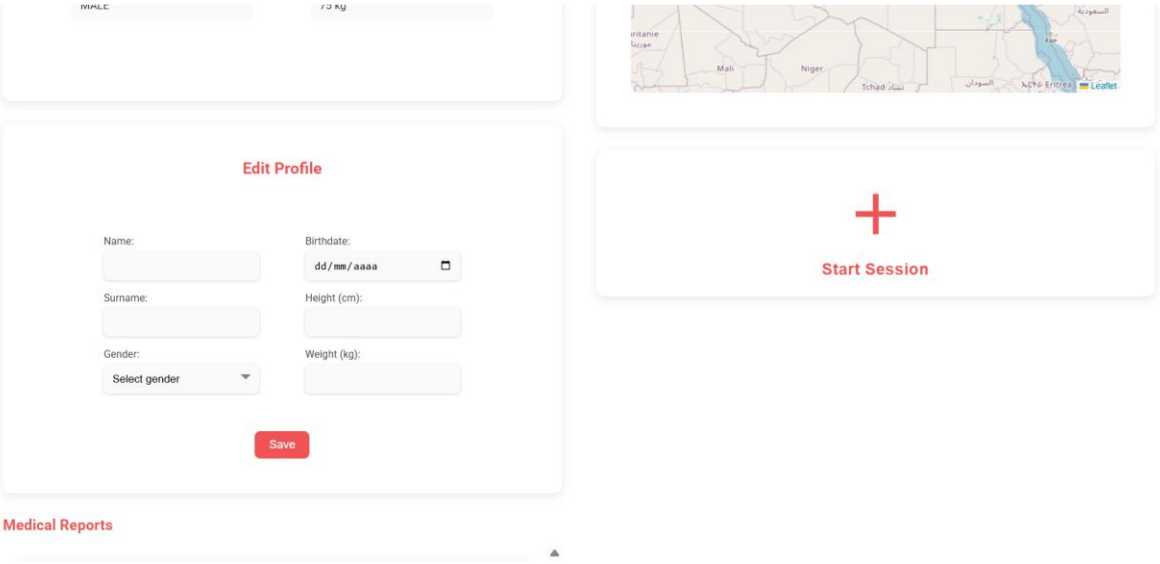
Once you open the application, the signal recording interface should pop up:



## 4. Patient Profile Configuration

Once logged in, you can edit your own patient information, please keep this information updated.

- Access the main screen (Patient Dashboard).
- Locate the "*Edit Profile*" section in the top left corner.
- The following personal details can be changed:
  a) **Name**
  b) **Surname**
  c) **Gender**
  d) **Birthdate**
  e) **Height**
  f) **Weight**




Finally, to confirm the changes, click on the "*Save*" button to update the profile in the system.

## 5. Requesting a doctor

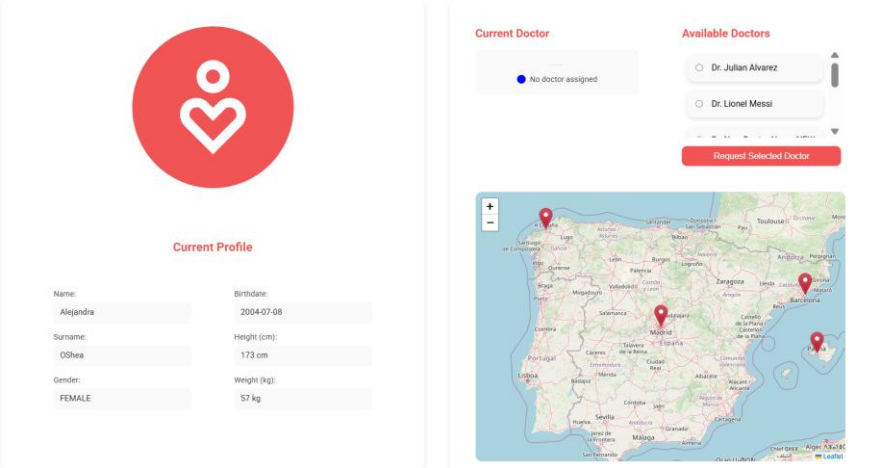
Once inside the **Patient Dashboard**, the user will be able to see a list of the doctors available with their names and surnames, and he will see the location (locality) of each doctor in the interactive map. The user will have the possibility to request one of doctors from the list. Once requested, he won't be able to select a different doctor unless the doctor denies the request.

For data to be supervised, the account must be linked with that of a medical professional available on the platform.

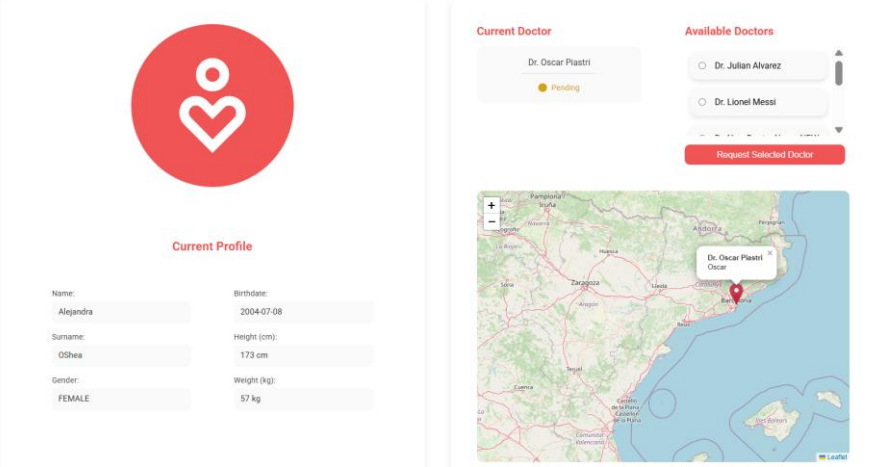
On the main dashboard, the top right section you can find:

- "Available Doctors": shows the doctors by name you can send a request to.
- "Current doctor": the assigned doctor to your patient profile with the state of the request. There are 3 possible case scenarios:

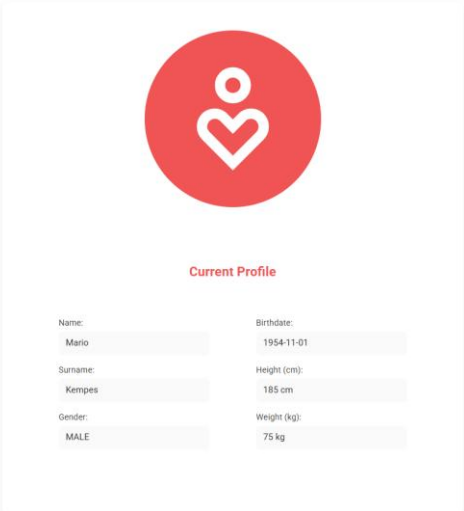
a. No doctor assigned: if no doctor was requested and an interactive map showing the localization (localities) of all available doctors

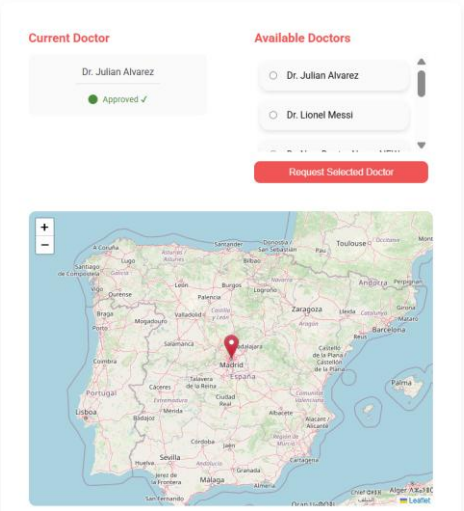



b. Pending: if the user requested a doctor but the latter still hasn't accepted it nor declined it and an interactive map showing the localization of the doctor to whom the request was sent to.



c. Approved: if the doctor accepted the request and an interactive map showing the localization of the doctor that has accepted the request.




5.1. Request a doctor

To request a doctor, the user must select the doctor he wants to send a request to and click on "*Request Selected Doctor*" button and then wait until the doctor accepts it or declines it.

- Once you have sent a request to a doctor, the "*Current Doctor*" section will change to the name of the doctor and will show the status of the request.
- The map will now only show the localization of the doctor whom the request has been sent to.
- Once the doctor has approved your request, the "*Selected Doctor*" section will be updated

Note: If you solicitation has been denied, you can send another request to another doctor, or the same doctor if you have been turned down by mistake.

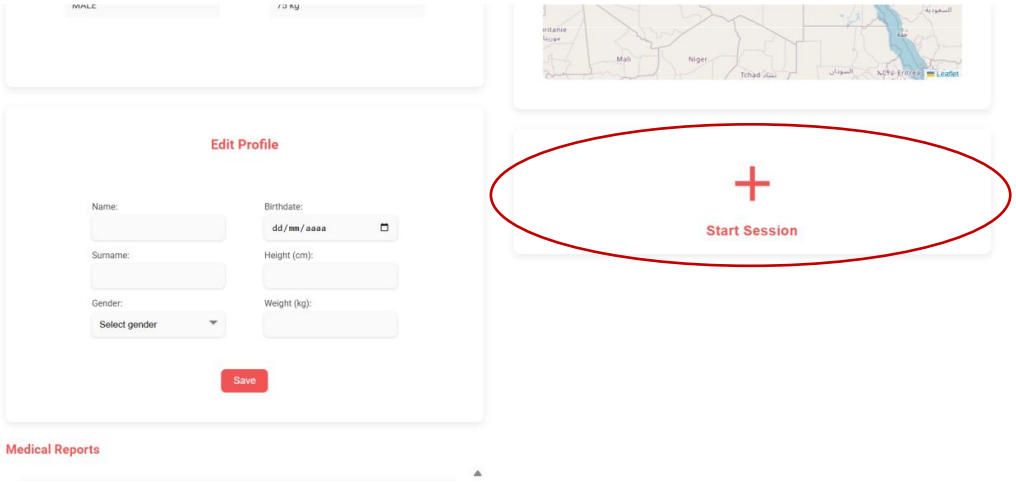
## 6. Sending a measurement session

You do not need to have a doctor assigned before you can start uploading measurement sessions, so just upload all the sessions and once you have been linked to a doctor, he/she will be able to see all your data.

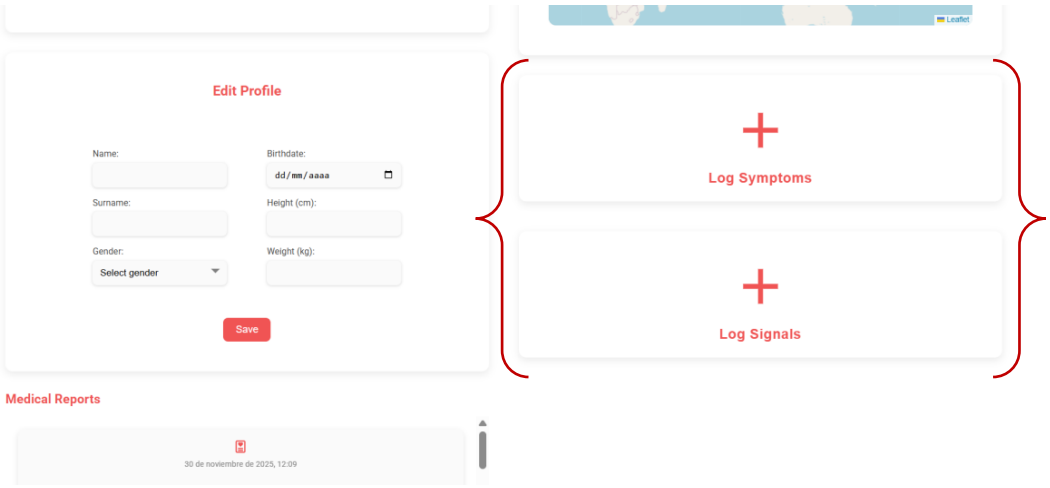
### 6.1. General information

The system organizes medical data into "Sessions", please upload sessions with no missing data: load symptoms and upload both EMG and ECG signals. You will need to log first the symptoms and then the signals. You won't be allowed to log signals if the symptoms were not recorded. However, the order of the signals is not relevant.

- Click on "Start Session"




- Now you should see two buttons*: "Log symptoms*" and "*Log Signals*"

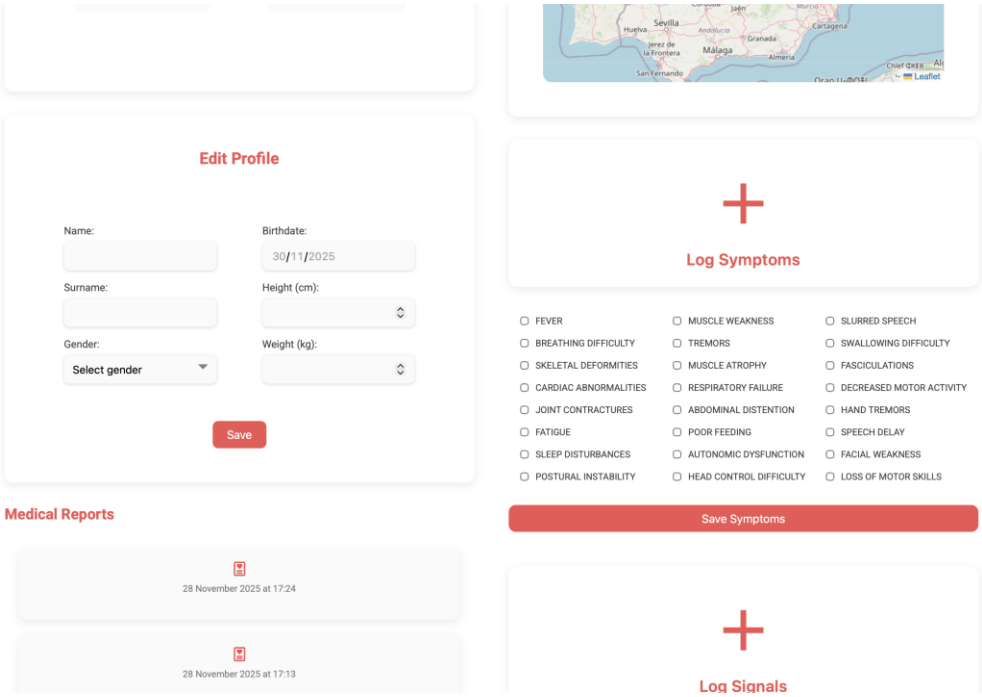



### 6.2. Symptoms

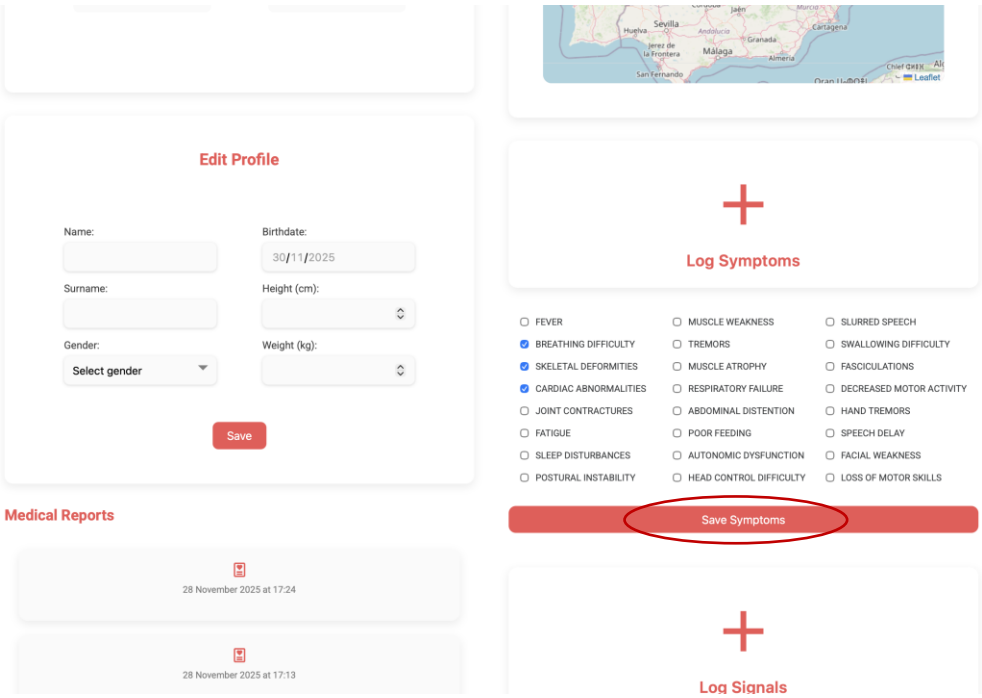
Allows the patient to subjectively report their current health status associated with the session. Press the "*Log Symptoms*" button.

A floating box will appear with a list of predefined symptoms.

- If you have any symptoms that do not appear on the dashboard, please contact your doctor and ask him/her to get in contact with us, we will add more symptoms to the system!




Check the boxes corresponding to what you are feeling (e.g., Headache, Nausea, Fatigue, etc.) and click the "*Save Symptoms*" button to send them to your history.



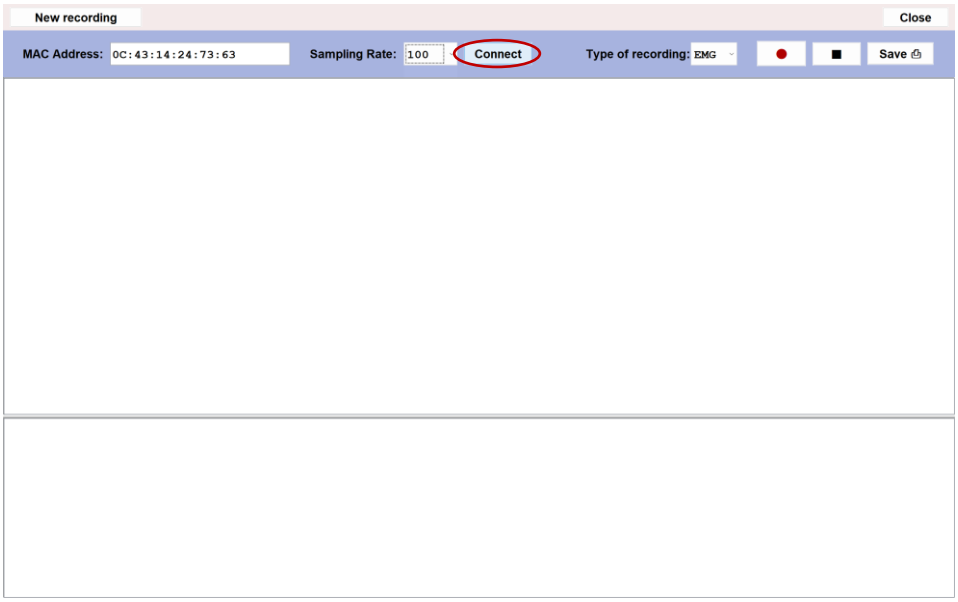

Now you can go on to upload your signals.

## 6.3.Record the signals

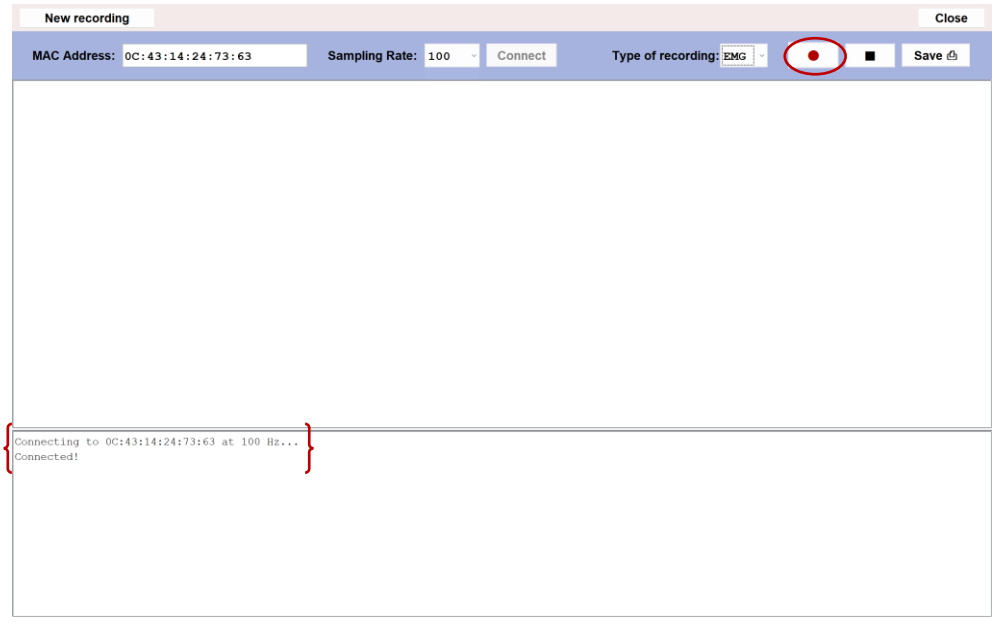
Please consider that you must log at least one symptom by clicking on "*Save Symptoms*" before being able to upload and send the signals.

Our web does not support Bluetooth connections therefore, to record your signals you will have to access the SMA Bitalino App (to download it refer to *section 3.4*), download the recorded signals and upload them to the web page:

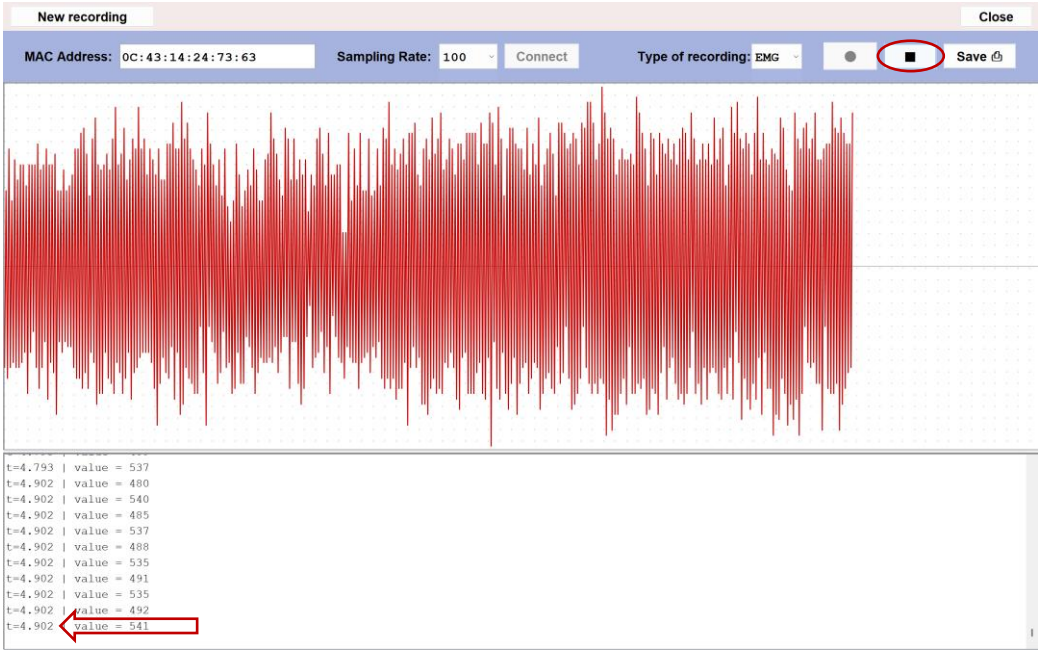
1- Enter the MAC address of your BITalino device and select the correct sampling rate (the sampling rate should have been previously discussed with your doctor). Make sure that the BITalino device is connected to your computer via Bluetooth. To continue, click on the "*Connect*" button. If the connection is successful a message will appear in the dashboard:



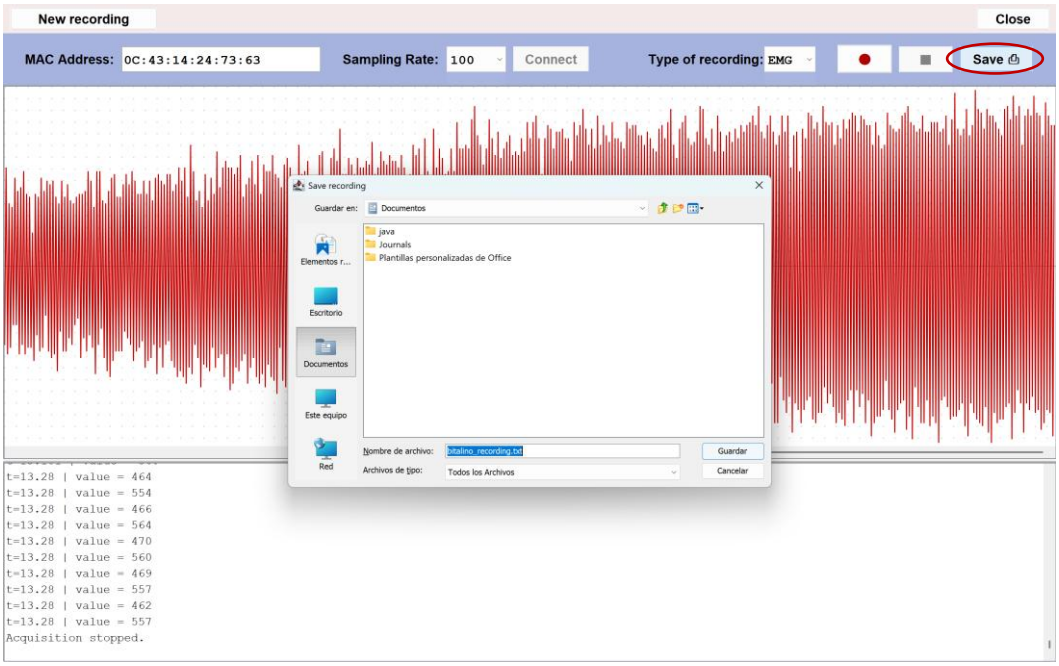

2- If the connection with the BITalino has been successful, now you can select the type of measurement (ECG or EMG) you want to record and click on the recording button (●).



3- To stop the recording click the stop button (■). Time passed since the recording can be visualized in the dashboard (In the example only 4.902 seconds have passed).




4- Once you are satisfied with the signal, select a place in your directory to download the recording into your computer by clicking on the "*Save*" button.

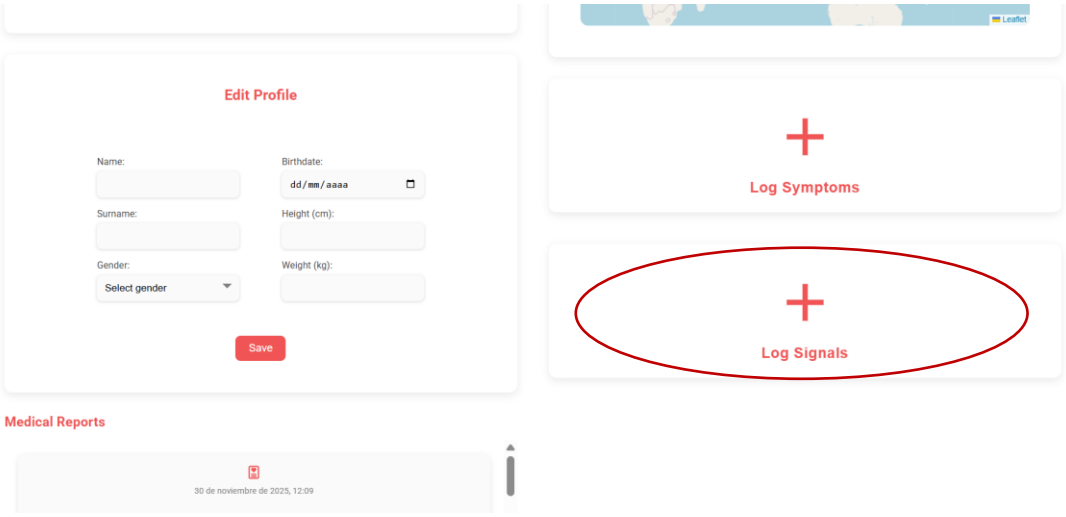



If you want to record another signal just click on "*New recording*", the MAC address will be saved you just have to select the sampling rate, connect the BITalino again and follow the instructions for the new recording.

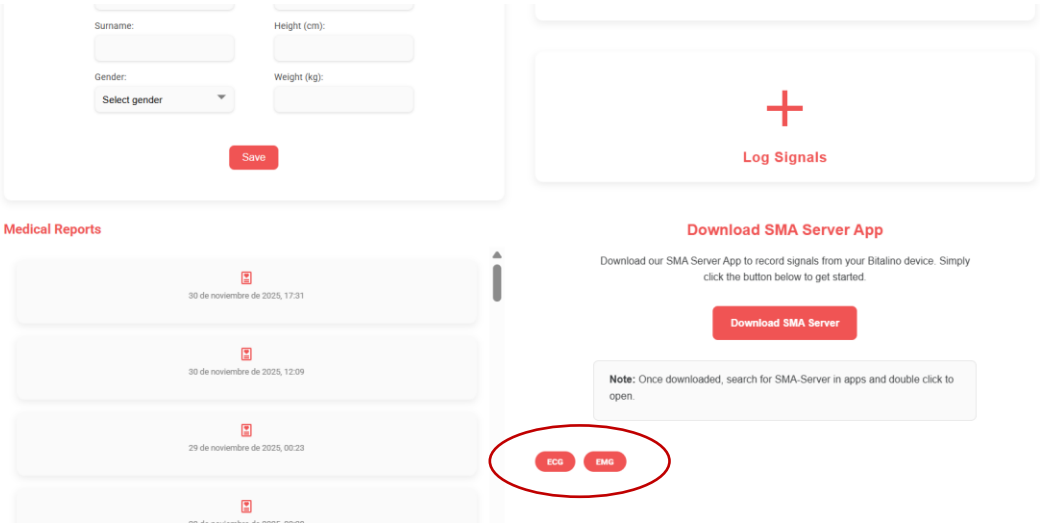
*Note: You will have a maximum of 2 minutes to record your signal, if you are not satisfied with the result don't worry, just record the signal again without saving the previous recording into your computer.*

6.4.Upload signals.

Once you click on the “Log Signals” button, the instructions for the SMA-Server application will appear as well as two buttons: ECG and EMG.




You should see a button to download the recording application (refer to *section 3.4*), but you should already have you recorded signals in files in your computer from the previous section.

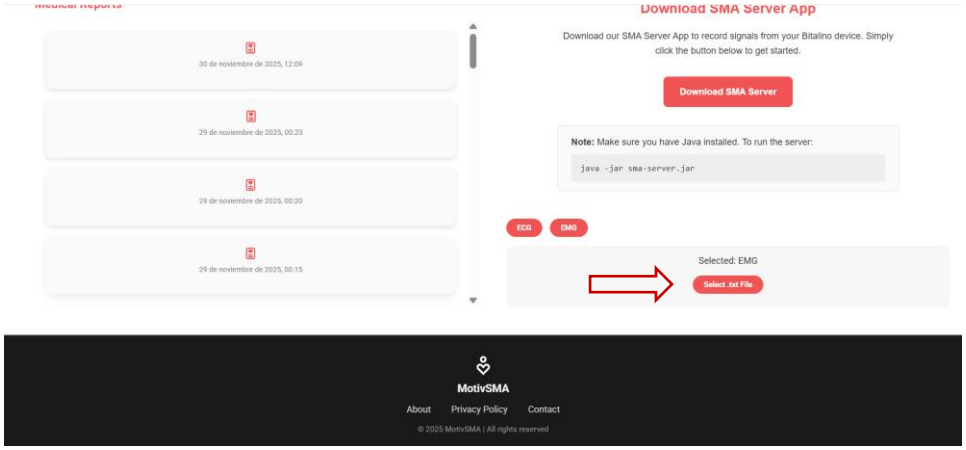



Now you can upload the pre-recorded ECG and EMG using the buttons corresponding to the signal.

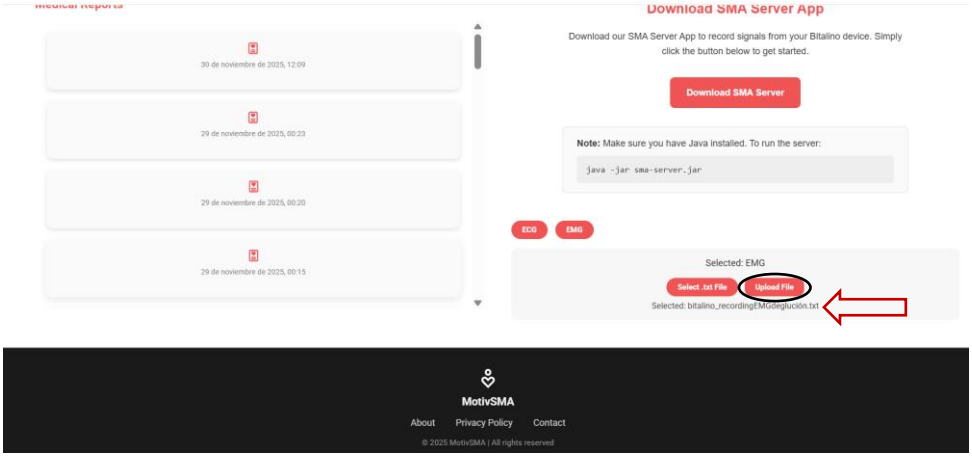
- **Upload a Signal file**

For the purpose of the explanation, EMG was used as an example, but the same workflow is to be used to upload both signal types.

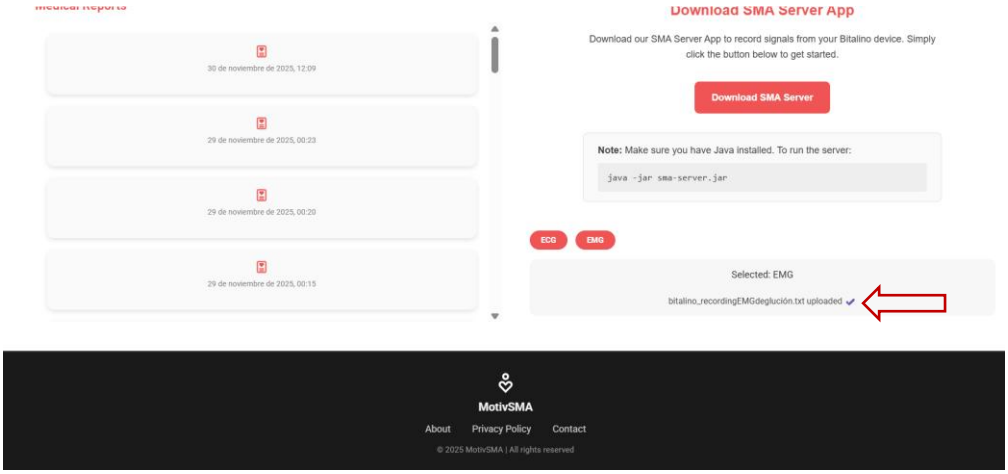
1. Click on the respective type of signal (in this case EMG) to upload the file and click on “*Select .txt File*”




2. A browser to your directory will be opened, now you select the file to upload. You will be able to visualize the name of the selected file and a new button “Upload file will appear”.
   - You cannot see the uploaded file, so make sure that you are uploading the correct file.




3. Once you have clicked on “Upload File”, the file will be sent to the server where the signal will be processed and stored in the database.
   - A confirmation message can be seen.



Now that one of the recordings has been uploaded, upload the other one.

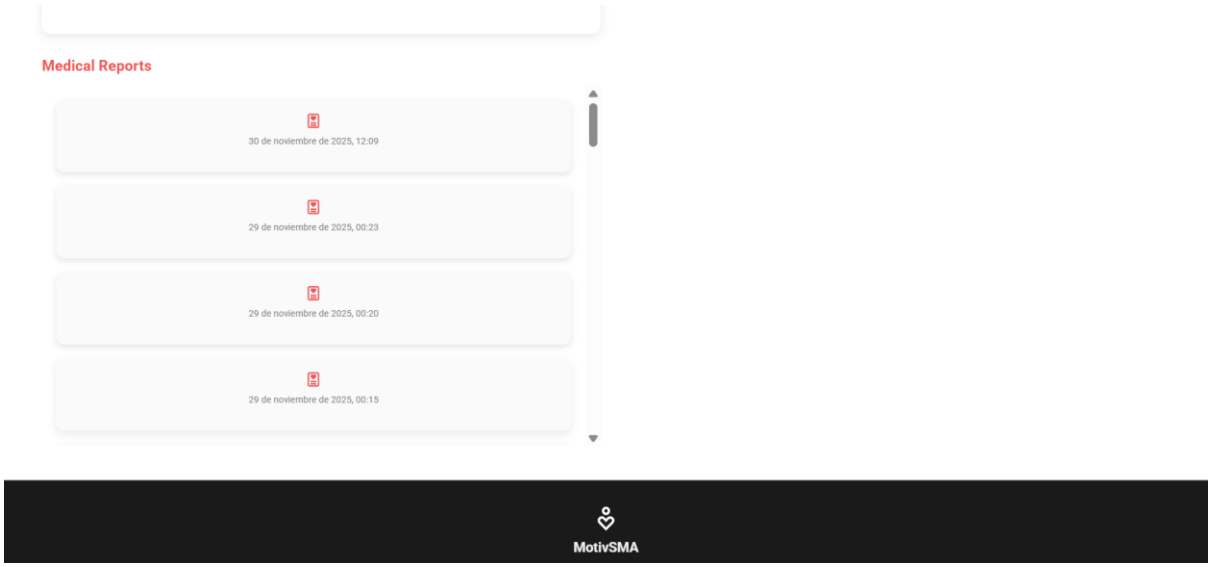
Make sure both recordings, EMG and ECG are uploaded.

## 7. Session Report Files (PDF)

The system allows patients to download a report containing the patient and sessions' information along with a doctor's comment in PDF format, which can be useful for personal records or external analysis.

If you want to do this:

1. Navigate to the "Medical Reports" history list.
2. Search a specific session by date to view its details.
3. Click on the session you want to download.
4. A PDF report will be downloaded and now you can visualize the symptoms and the signals of a specific measurement session along with notes from your doctor.




Note: Only measurement reports issued by the doctor can be visualized. As a patient you do not have the power to create measurement reports.

## 8. Log out

To protect your personal medical information, especially if using a shared computer, you must properly close your session.

1. Look at the top navigation bar of the dashboard.
2. Click the "Logout" button located in the top right corner.