FetalSenseM Dashboard – User Manual

Version: V2.1

Interface: Web Dashboard (Dash/Plotly)

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1. What This Dashboard Does

This dashboard helps you:

- Upload raw optical intensity data (FNIRS-type)
- View and inspect channel intensities
- Perform data cleaning
- Analyze signal quality
- Analyze movement/sensor data
- Download data as SNIRF
- Upload processed files to the cloud (AWS S3)

You do **not** need programming knowledge to use the dashboard.

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2. Main Sections of the Dashboard

At the top of the screen, you'll see:

➤ Top Bar

- Shows the title: **FetalSenseM V2.1 Dashboard**
- A button called **Upload to Cloud** (to send files to AWS)

Below the top bar, the dashboard has **Tabs** on the left:

Tabs Available:

1. **General**
2. **Movement Analysis**
3. **Data Clean**
4. **Data Analysis**
5. **Concentrations** (if available)
6. **Other associated plots** (depending on your version)

You will mostly use **General**, **Data Clean**, **Movement Analysis**, and **Data Quality**.

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3. Using the Dashboard Step-By-Step

Step 1 — Upload Your Raw Data

Go to **General → File Upload**

How to upload:

1. Click **Drag and Drop or Select Files**
2. Choose your raw intensity CSV file
3. The filename will appear under the upload box
4. The dashboard now loads this file for all other tabs

Step 2 — (Optional) Download SNIRF File

Still in **General → Download SNIRF**

- Click **Download Raw Data SNIRF**
- A SNIRF file will be generated for your uploaded data
- Your browser will download it automatically

Step 3 — View Intensities (Raw Signals)

Inside **General → View Intensities**, you can:

Select which channels to view

1. Click the dropdown "Select one or more"
2. Choose LED groups such as:
    - LED_A_782_DET1
    - LED_B_828_DET2
    - etc.

Optional Group Switches

You also have toggle switches:

- **GroupA Detector 1 / 2 / 3**
- **GroupB Detector 1 / 2 / 3**
- **Select All**
- **Plot Sensor Data**

Switch **ON** the channels you want to plot.

Plot

Click: **View Intensity Over Time**

A graph will appear on the right.

Step 4 — Raw Data Quality Check

Still in **General → Raw Data Quality Check**

You can select any one LED channel in the dropdown:

Select one: (Example: LED_A_808_DET2)

Then press: **Check Raw Data Quality**

This will show:

- Signal-Noise Ratio (SNR)
- Average SNR
- Noise Equivalent Power
- Scatter Plot
- Distance from Dark
- Saturation Percentage

Each result appears in a card (alert-style box).

You can close any result with the × button.

Step 5 — Movement Analysis

Go to the **Movement Analysis** tab.

To plot intensity + sensor data

Press:

Plot Intensity with Sensor Data

You will see:

- Raw intensity curve
- Accelerometer & gyroscope motion data

Movement Threshold

The dashboard computes a **Movement Threshold (Magnitude)** and displays it automatically.

Movement Metrics

When you click:

View Movement Metrics

You will get:

- Total Duration
- Movement Duration
- Movement %
- Peak Acceleration
- Peak Gyroscope
- Movement Episodes

Each is shown in a card. You can close each card with ×.

Artifact Removal

Press:

Apply Movement Artifact Removal

This cleans intensity signals from periods with excessive movement.

Step 6 — Data Cleaning Tools

Go to **Data Clean**

This page allows you to apply preprocessing filters.

Tools Available:

- **Subtract Dark**
- **High-Pass Filter**
- **Low-Pass Filter**
- **Band-Pass Filter**
- **Median Filter**

Each filter has configurable settings such as:

- Cutoff frequency
- Filter order
- Sampling rate

- Median filter size

Apply Filters

After selecting filters and entering values:

Press **Apply**

You'll see a message: "Apply the selected techniques and parameters"

View Data After Cleaning

Scroll to "View Changes"

Switch ON any channels for:

- Group A Detector 1–3
- Group B Detector 1–3

Then press:

View

You will see "Before vs After" cleaning plots.

Step 7 — Data Analysis Tools

Go to **Data Analysis**

You will get statistical information such as:

- **Histogram**
- **Standard Deviation**
- **Mean**
- **Maximum & Minimum**
- **Largest Variations**
- **Scatter Effect**

Each result pops up in a card and can be closed with **×**.

Step 8 — Calculate Concentrations (Final Processing Step)

Once your data is cleaned (and optionally resampled), you can generate concentration data.

Go to: **Concentrations** tab (or the section labeled for hemoglobin/UCLN/SRS processing)

Inside this section, you will find **three main buttons**:

1. Calculate Concentrations

- Press this button to run the UCLN/SRS processing pipeline.
- The system processes:
  - Corrected optical intensities
  - Movement metrics
  - LED/detector paths
- The result is:
  - ΔHbO
  - ΔHbR
  - ΔHbT
  - Tissue oxygen saturation (StO_2)
  - Dual-slope oxygenation (if supported)

A loading spinner appears during computation.

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2. Preview Concentration Plots

After the calculation completes:

- The dashboard creates multiple **tabs**, each containing:
  - ΔC concentration plots per group
  - StO_2 plots for LED A, LED B, and Dual Slope

- These plots allow you to visually inspect results for each channel or detector.

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3. Download Concentration Excel

Once processing is complete, you can download:

- The full concentration workbook
- With all sheet tabs (ΔC, StO_2, metadata, movement metrics, etc.)

Click: **Download Concentration Excel**

This generates the Excel file and downloads it to your system.

If you chose **1 Hz resampling**, you can also click: **Download Resampled Concentrations**

This downloads a version with the updated 1 Hz timestamps.

Tips for Beginners

- You can upload only **one file at a time**
- If nothing happens, check if you uploaded a valid file
- Close alert boxes using the **× button**
- Always upload data in **General** before going to other tabs
- Use **View Intensities** first to confirm your data looks correct

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Common Mistakes

- Not selecting channels before clicking “View Graph”
- Trying to apply filters with empty or invalid numerical inputs
- Uploading wrong file format (stick to CSV)
- Forgetting to press **Apply** after selecting filters

There is **no cloud upload step** in the workflow anymore unless you reactivate it

later.