Spectral HRM Toolkit Manual

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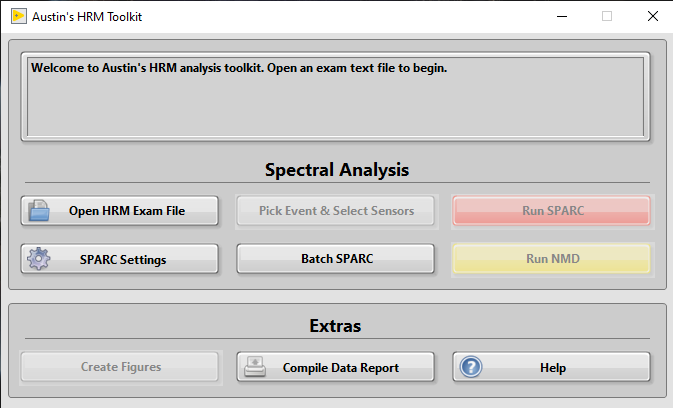
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# Front Panel

## Main Menu

The main menu, shown on the right, is the first window shown to the user.

The following sections describe what happens when each of these buttons is pressed.

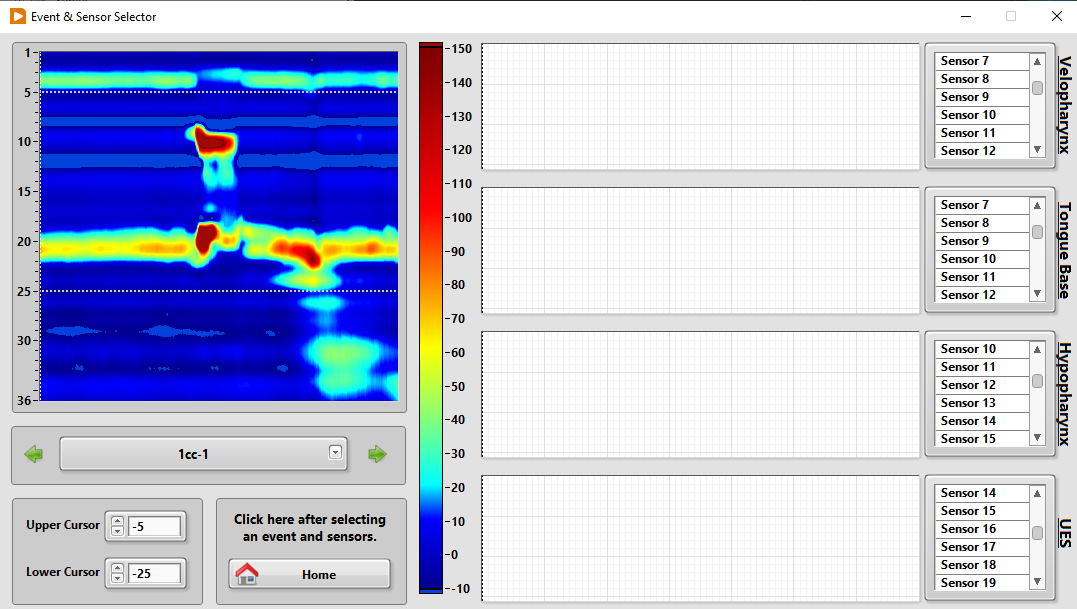
In the second half of this document, you can find detailed descriptions of the code (Block Diagram).

### Open HRM Exam File

Here, the user is prompted to select an examination file for analysis. Note that only text files will be accepted. Once selected, the program checks if the file has events annotated. The annotation status is added to the main menu message box. If the selected file has annotations, the **Pick Event & Select Sensors** button will be enabled.

If there are no annotations, the **Add Annotations** button will appear. Clicking this will prompt the user to open the XML file that corresponds to the selected exam file. The annotations will then be added from the XML file to the exam text file.

### Pick Event & Select Sensors/Add Annotations

In this menu, the user selects an event they want to analyze using the dropdown menu. They can move the data window one second forward or backward using the green arrows.

Users then assign sensors to each pharyngeal region by either ctrl-clicking or shift-clicking the sensor numbers in the boxes on the right.

Changing the upper and lower cursor values will move the dotted white lines and disable selection of sensors outside those bounds.

Once satisfied with their select, the user can press the home button to return to the main menu where the **Run Sparc** and **Run NMD** buttons should now be enabled.

### Run SPARC

Diagram

Description automatically generated with medium confidenceThe user is first prompted to select the swallow region using two vertical cursors.

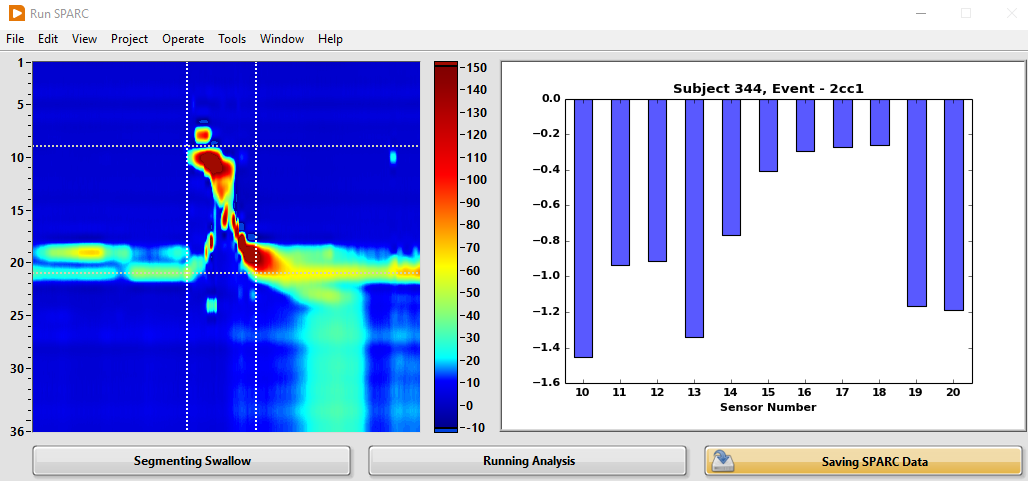
The left bound should be placed a little before where pressure starts to increase on the uppermost sensor trace.

The right bound should be placed at the peak in UES pressure that indicates the end of the swallow. Everything that follows should happen automatically.

Chart

Description automatically generatedThe user will only need to interact with this window (left) if the program cannot not find a definite peak in the last sensor. The user is then prompted to select it manually.

If the program can find the peak by itself, the user will only see this window for a brief moment before it moves on to the next one.

Here, the program displays where the select swallow region is and SPARC values for each sensor. The buttons on the bottom will light up to indicate where the program is during the process of segmenting and analyzing the signals.

When complete, the user will be notified if the analysis results were saved to a new file or added to an existing one.

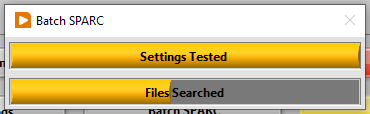
### SPARC Settings

Graphical user interface, application

Description automatically generatedThis button will open a menu to allow users to change the SPARC analysis settings (Cut-off frequency, amplitude threshold, and pad level).

These settings are saved in a text file (aplty named ‘SPARC Settings’). The program will use the settings found in that file so the user doe not need to update the settings every time they user the program.

### Batch SPARC

This will run SPARC analysis on a folder of exam segments. The segments are created for each event that is analyzed during the regular analysis. Thus, regular analysis needs to be completed for a subject before this can be used.

The user will be prompted to run analysis using the current settings or to run through different permutations of the settings. The permutations option should only be used if the user wants to see which combination of setting produced the best ROC curve.

### Run NMD

This is very similar to the SPARC analysis. The user is prompted to select the bounds of the swallow, then NMD analysis is run, and the results are displayed to the user.

### Create Figures

Opens a menu allowing the user to select different figures to create. The different figures are described in the next subsections, starting on the next page.

#### Graphical user interface, application Description automatically generatedCreate Spectral Plot

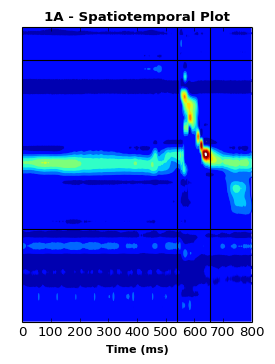
The user is prompted to select a segment then what they want the lower bound of the bar plot to be. They are then presented with a figure displaying the pressure traces, speed profiles, the full Fourier transform spectrum, the trimmed spectrum, and the SPARC values for each sensor. Each part of the figure shown is saved in its own PDF.

#### Create Bar Plot

Chart, box and whisker chart

Description automatically generatedThe user is prompted to select the ‘Subject Means’ text file that is created after the user clicks the **Compile Data Reports** button on the main menu. Using the data in the ‘Subject Means’ file, averages (bar lengths) and standard deviations (error bars) are calculated. These are them compiled into a bar chart.

#### Save Spatiotemporal Plot

This will save a PDF of the spatiotemporal plot for whatever event the user selected in the Pick Event & Sensors stage.

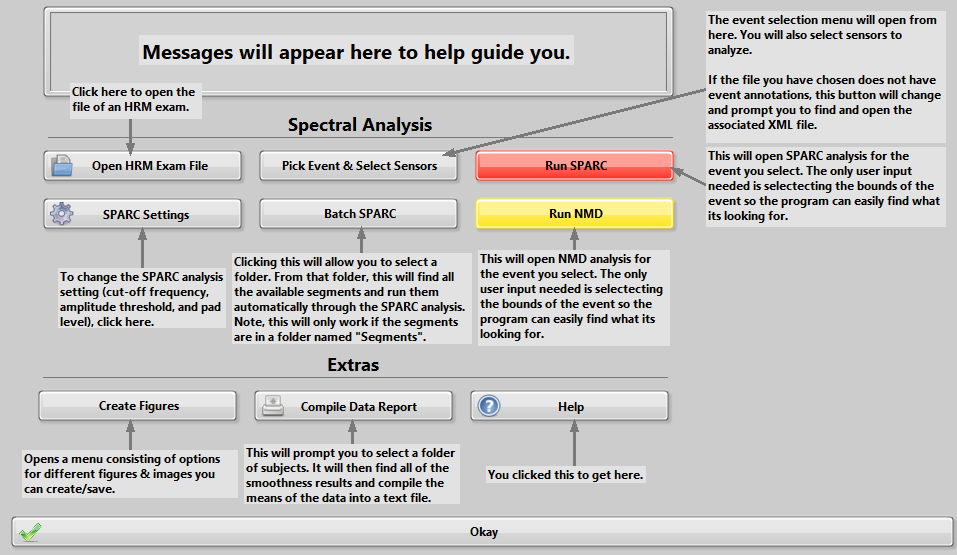
If no event was loaded and/or no sensors were assigned to the pharyngeal regions, the user will receive a warning.

Before the plot is saved, the user is prompted to mark the start and end of the swallow. This is done through the same window that appears when running analysis

### Compile Data Reports

This prompts the user to select a folder. It then compiles the SPARC data from all the smoothness analysis files in that folder and saves it into one file.

### Help

This just opens up a window that describes what each button does.

# Block Diagram

## Main Menu – Initialization

## Main Menu – Event Handling

### Open

### Add Annotations

### Event & Sensor Select

### Batch

### Settings

### SPARC

### NMD

### Figures

### Extract

### Help