Simulated Pediatric LVAD Training System: User Manual

I. Using the Breaking VAD Simulation Website

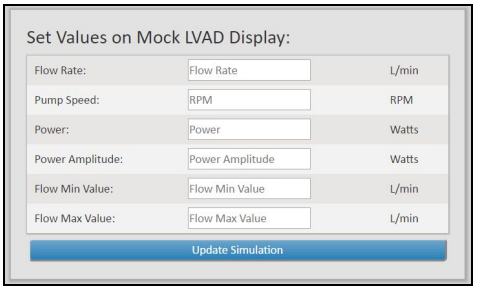
For Instructors:

Logging In

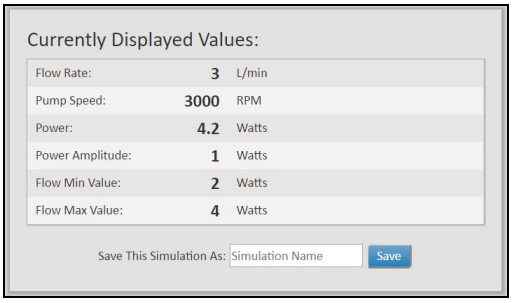
1. Go to breakingvad.github.io.
2. Click on the “Instructor Login” tab.
3. Log in or sign up for your account.
    a. *First time users:* Input your email address and a password and click sign up to create an account. You will receive an email with a confirmation link. Go to your email and click this link. Then return to the “Instructor Login” tab and use your email address and password to log in.
    b. *Return users:* Input your email address and password and click Log In.
4. When you have successfully logged in, the page will be redirected to the Breaking VAD Instructor Interface.
5. If you have forgotten your password, use the “forgot password” feature below the log in textboxes.
6. The Instructor Interface includes 5 main tabs. See below for how to use each tab.

Set LVAD Values

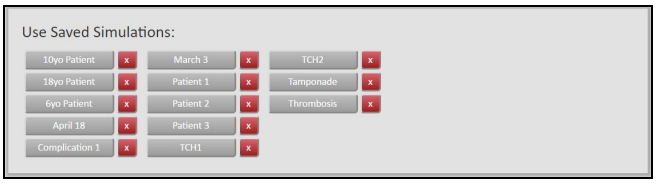
- On this page, you can:
    - **Set values for Flow Rate, Pump Speed, Power, Power Amplitude, Flow Min Value, and Flow Max Value**. Type any number into the corresponding input boxes, click Update Simulation, and the values will immediately update on the Mock LVAD Display. You can update one or more values at the same time. Note that trainees can also change the Pump Speed from the System Page on the Mock LVAD Display.



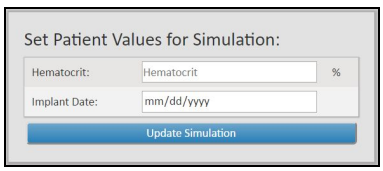
- **See the values that are currently being displayed** by the Mock LVAD Display, under “Currently Displayed Values”.
- **Save the preset simulations.** Type in a name to save it under in the “Save This Simulation As:” box, and click “Save”. This will save the values shown under “Currently Displayed Values” under that name. The saved simulation will save to your instructor account and will be there every time you log in.



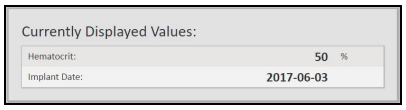
- **View, delete, or use a saved simulation.** All saved simulations can be seen under “Use Saved Simulations”. Each saved simulation has a red “x” button next to it, which can be used to delete that simulation. When you click on the saved simulation button itself, the simulation will immediately update with that set of saved values.



- **Set values for Hematocrit and Implant Date**, which are displayed under the System Page on the Mock LVAD Display. Simply type in a hematocrit value and/or type or select a date for Implant Date and click “Update Simulation” to set those values. Note that trainees can also change the Hematocrit value from the System Page on the Mock LVAD Display.

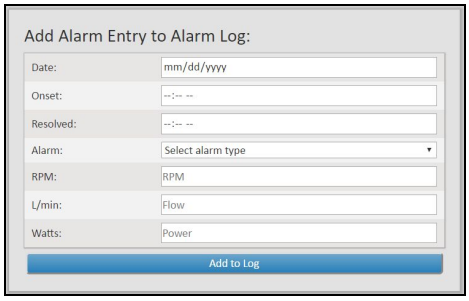


- **See the Hematocrit and Implant Date currently being displayed** by the Mock LVAD Display, under the “Currently Displayed Values”.

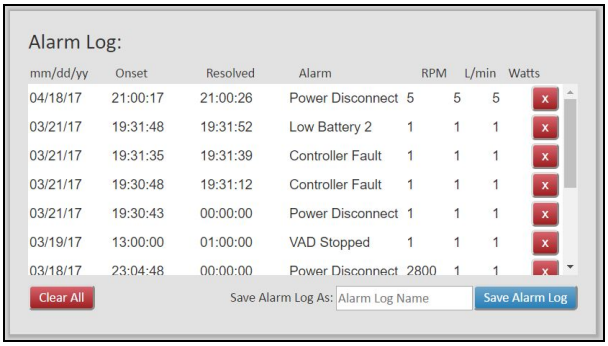


Edit Alarms

- On this page, you can:
  - **Add alarm entries to the Mock LVAD Display’s Alarm Log.** Fill in all of the fields listed (Date, Onset, Resolved, Alarm, RPM, L/min, and Watts), then click “Add to Log”. That alarm entry will be added to the log that trainees will see under the Alarm Log tab of the Mock LVAD Display.

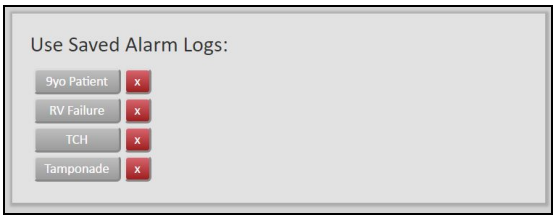


  - **View all alarm entries in the Mock LVAD Display’s Alarm Log.** The full alarm log displayed on the Mock LVAD Display is also displayed under the “Alarm Log” block on this page.
  - **Delete individual alarm entries or clear the whole log.** Click the red “x” button next to each entry to delete individual entries. Click the “Clear All” button to remove all entries from the log.
  - **Save an Alarm Log.** You can save a set of alarm entries as an alarm log to use later. Do this by typing a name to save it under into the “Save Alarm Log As:” box, and clicking “Save Alarm Log”.



  - **View, delete, or use a saved Alarm Log.** Similarly to the “Set LVAD Values” Tab, all saved alarm logs are listed under “Use Saved Alarm Logs”. You can click

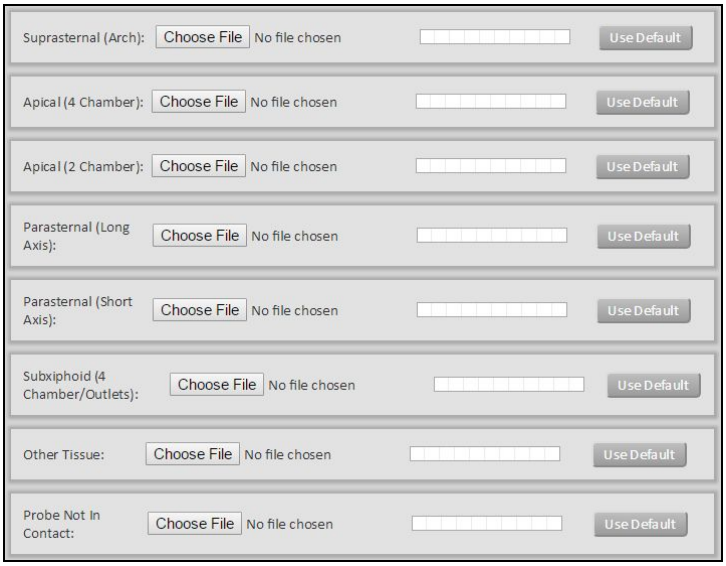
on the saved log's button to replace your current alarm log with the saved one. You can click the red "x" button to delete that saved log.



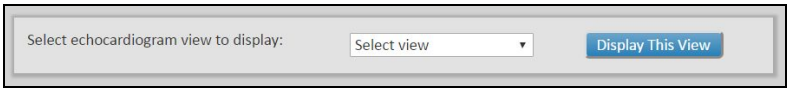
- **Set off active alarms on the Mock LVAD Display.** Under "Add Active Alarms", you can select an alarm type, and click "Add Active Alarm". This will immediately cause the chosen alarm to appear as a banner at the top of the Mock LVAD Display. The Mock LVAD Display should also start beeping. This alarm will also automatically be added to the alarm log.
- **View and resolve active alarms.** All currently active alarms will be listed under "Active Alarms". You can click the "Resolve" button next to those alarms to resolve the individual alarms, which will add a "Resolve" time to the entry in the alarm log and remove the alarm banner from the Mock LVAD Display.

Upload Echo Images

- On this tab, you can:
  - **Upload echo videos for the Echocardiogram Simulation.** Videos should be in MP4 format. For each of the eight echocardiogram views listed, click "Choose File", and a window will appear where you can choose files from your computer. Select an MP4 file of an echo taken from that view. If you do not have your own video for that view, you can click "Use Default", and a default image will be used instead.

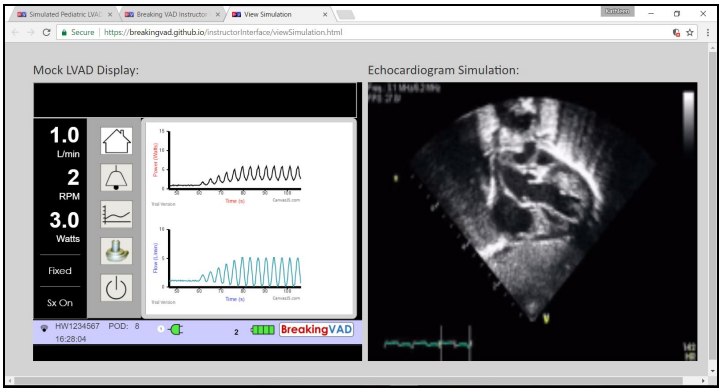


- **Manually control the Echocardiogram Simulation.** If you do not have access to the Echocardiogram Simulation Hardware, or if it is malfunctioning, you can use this to control what view is seen on the Mock Echocardiogram Display. Choose one of the eight echocardiogram views from the dropdown menu and click “Display This View”, and the Mock Echocardiogram Display will immediately show that view.



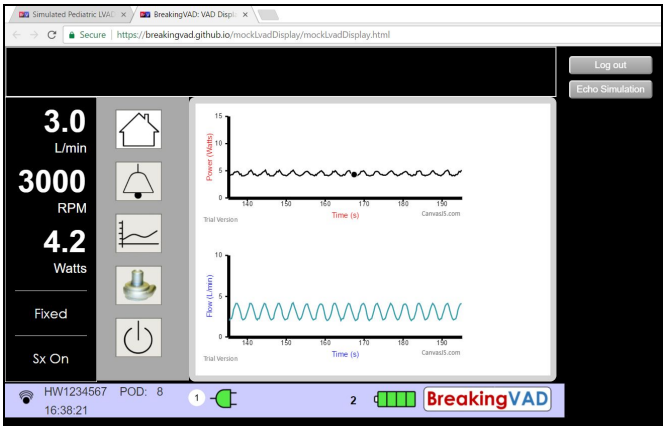
View Simulation

- Clicking “View Simulation” will launch a new window or tab that shows both the Mock LVAD Display and the Mock Echocardiogram Display (as seen below). Note that your popup blocker may block this. Depending on your browser, you might see a popup block notification on the top right of your screen, where you can click and allow it to open.

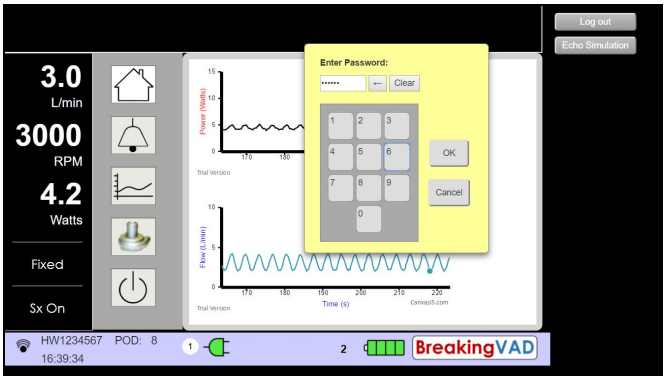


For Trainees:

1. Go to breakingvad.github.io.
2. Click on the “Trainee Login” tab.
3. Type in the email address for your instructor’s account and click “Join Session”.
4. If your instructor is currently logged into their account, the page will redirect to the Breaking VAD Mock LVAD Display.



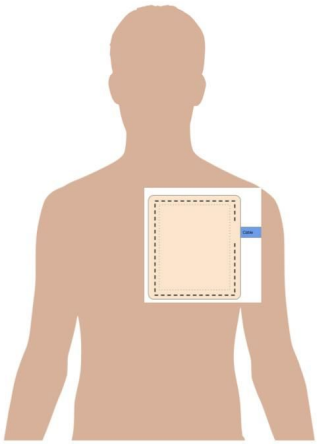
5. From this page, you can interact with the Mock LVAD Display and look through different pages within it.
6. To access the System Page, click on pump icon, and you will be prompted for a password. The password is “123456”. Once you enter the password, the trainee can change the RPM and Hematocrit values on this page.



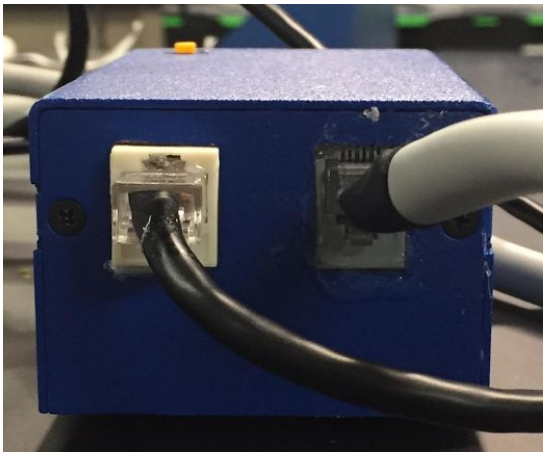
7. Click the Echo Simulation button on the top right to view the Mock Echocardiogram Display. The page will be redirected to the Mock Echocardiogram Display.
8. Click the Log Out button on the top right to end your training session.

II. Setting Up the Mock Echocardiogram Simulation

1. Place the chest pad on the manikin with the wire coming out on the manikin's left side (when looking from above, the wire will be coming out on your right side).

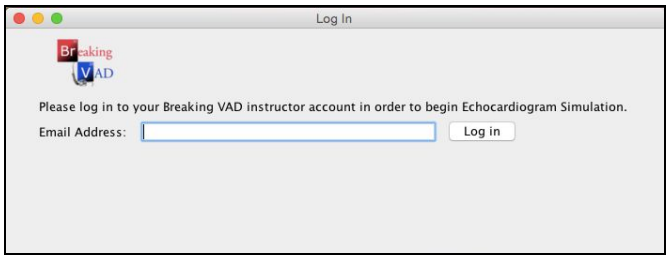


2. Overlay the plastic sheet with four rectangles onto the pad to help position the pad on the manikin. The tick mark on the side of the sheet should line up with the cord coming out of the pad. The rectangles correspond to where the echo imaging locations are, so place them on the chest accordingly.
3. Use double sided tape to secure the chest pad onto the manikin. This will help the pad stay in place instead of sliding around when the echo is performed. Avoid taping the edges of the pad down if possible, as this can interfere with the pressure sensors.
4. Make sure both the echo probe cord and the chest pad cord are properly plugged into the blue electronic box.

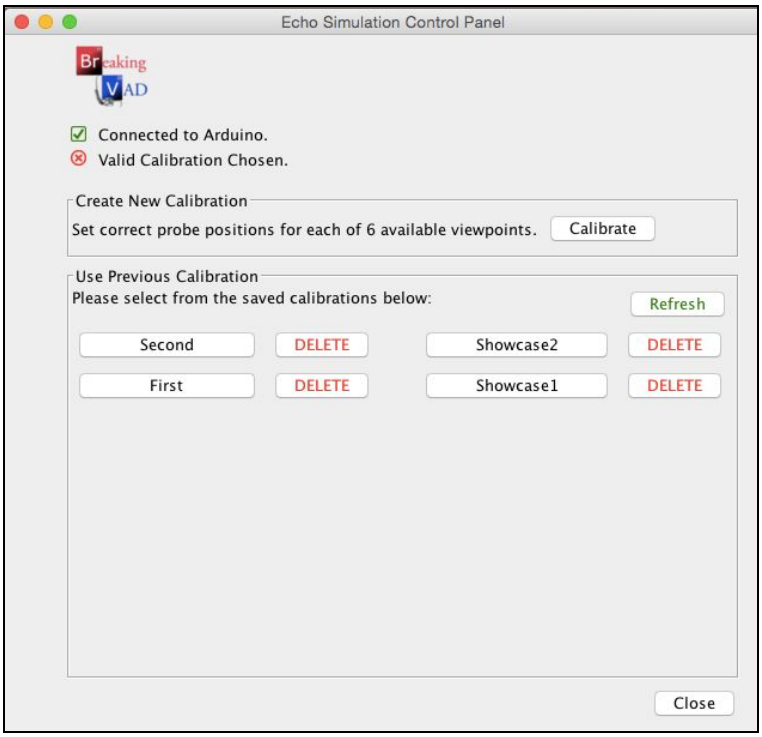


5. Plug in the USB cord to the electronics box and to the computer that you will use for the Echocardiogram Simulation.
6. Press the orange RESET button on the top of the blue electronics box.

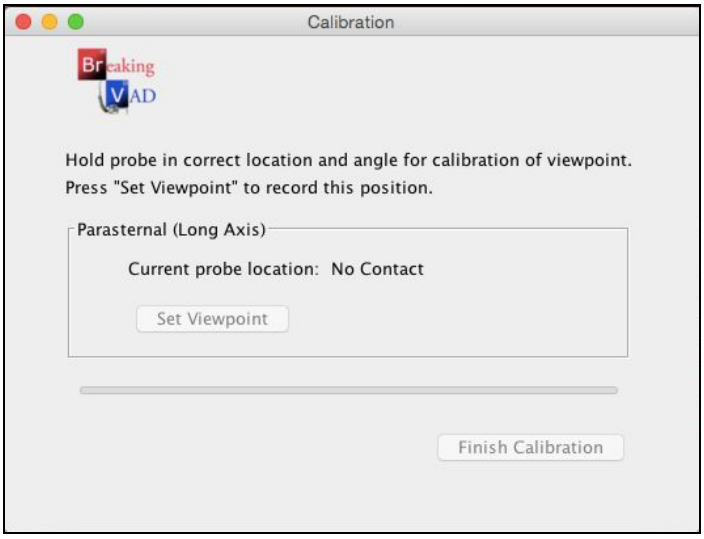
7. Go to the BreakingVADEchoSimulation application that has been pre-downloaded onto your computer.
8. Right click and press open. (Since we are not registered apple application developers, there will be a warning pop up. Press “open”.)
9. The application should launch with a login screen, as seen below. Enter the email address for your instructor account and click “Log in”.



10. Once you log in, you should see the screen below. Click “Calibrate” if you would like to perform a new calibration, or click on one of the previously saved calibrations listed under “Use Previous Calibration”.



11. If you choose to calibrate, you should see the window below. This window prompts you to calibrate the Parasternal (Long Axis) view. Place the mock echo probe onto the manikin chest pad at the correct angle and location for this view, and click “Set Viewpoint”. You will not be able to click “Set Viewpoint” unless the chest pad detects that the probe is on the correct pressure sensor. You can use the plastic sheet again here to determine where the pressure sensors are.



12. Once you set this first viewpoint, you will be prompted to calibrate the next viewpoint. You will repeat this process until all six viewpoints are calibrated. Then, the “Finish Calibration” button will be enabled, and you can click it to finish.
13. The application will then ask if you want to save the calibration, and if so, what you want to name the calibration.
14. Once you have performed a new calibration or selected a previous one, you can start using the Echocardiogram Simulation.
15. Follow the instructions under the “For Trainees” section to launch the website and view the Mock Echo Display.