smartOar®

Windows Based

Software

User's Guide

Version 2.0

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smartOar®

Real-Time Force Curve Feedback

Questions?
Call us at: 303.570.6749   or
Email us at: bob@smartoar.com

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smartOar® The Real-Time Force Curve Feedback System

Thank you for buying our product.

With smartOar® - YOU CAN

- See the actual force curve – per oar, through every stroke
- View and record up to 8 oars – simultaneously
- See the catch and release timing – to an accuracy of 1/100 of a second
- Monitor the check in the boat and see the set – on every stroke (with our in-boat accelerometer)
- Tailor the shape of the curves – to match your coaching philosophy
- Send your crews off on their own and record workouts – for later download and analysis
- Make videos of the data – let your crews see what you see
- See the angle of the oars as they move through the stroke in real-time (with our new oar angle sensor)

The smartOar PC software is available for free download from the smartOar website. The software can be installed on any modern Windows XP/7/8/10 computer. The software enables viewing recorded strokes copied from the Coaches Tablet, as well as, from oars operating in the self-record mode. In addition to viewing the strokes, there is also an analysis section that allows you to generate statistics on portions of the data. You can add the rower's names to the seat positions, as well as, add notes on the workout into the stroke data files for future reference. You can save or print single strokes, as well as, make movies of specific rowers over selected portions of the workout. You can easily identify the impulse of each rower for each stroke and the total impulse for entire pieces, seat races, and actual races.

NOTE: *As with any complex software application, the performance of the program is a function of the power of the computer. The software will not run well on older, less powerful, machines. See website for specific requirements.*

There are three programs in the software package:

- Download Program — Used in conjunction with the USB Download Box to transfer data taken in the self-record mode from oars into the stroke file.

- Display Program — Used for viewing stroke files, it also allows comments to be placed in the files. Individual strokes can be saved as JPEG images or sent to a printer. The Analysis Program is a subset of the Display Program that generates graphs of the rowers' performance.

- Update Program — Used to update the software on an Oarpod or Download Box. It can also be used to "personalize" an oar. The oar letter-number on the shaft of an oar and the name of the oar are all stored in the Oarpod. They can be changed with this software.

1. Installing the Software

Anyone may download this software from the website. The included sample stroke files will allow one to work with the Display Program. The website shows the current revision of the software. It is recommended that you temporarily disable your anti-virus software before installing. The software package is large because it includes the LabView Run-Time Engine which provides the framework for the applications.

After downloading the software, the file "Stroke Analyzer" Ver xxxxx will appear in the area on your computer where downloads are stored. Double click on this file to install the software. Follow the instructions as they will appear and use the default directories suggested in the windows. Installation is a two-step process. The first step installs the smartOar applications.

The second step installs the USB driver for the Download Box. Windows 10 users may encounter a message box saying "Window protected your PC". In that case, click on "more info" then "Run anyway" to continue installation. Contact smartOar immediately if you have any problems and we can help you through them.

Current customers will receive an email notification of new versions of the software.

2. Download Program

To run the Download Program, connect the Download Box to a USB port and double click on the Desktop Icon (orange rower) called "Download". The program will display a screen with a box that shows the operational status of the Download Box. If the Instruction Box says "The smartOar Download Box is operational", turn on the oars you want to download, and then click on "NEXT" to continue. If the Download Box is not found, the Instructions Box gives some suggestions for dealing with the problem.

TIP: *It can take up to 10 seconds for a computer to recognize a USB device.*

In the next screen, the software uses the Download Box to search for oars. The oars should have been turned on per instructions in the previous screen. If they are not turned on, or if there are more oars to download, turn the oars on and click on the "More Oars" box. The identified oars appear in a table on the screen. The software revision for each Oarpod, as well as, the serial number of the oar, will appear in the table. Each oar will also note whether it "HAS DATA" or it has "NO DATA". If an oar in the table is not one of yours i.e., you captured someone else's oar, or it is not part of the set you wish to download, you can click on the oar to remove it from the active list of oars to download. Oars that have been made inactive will have grey text.

If you are satisfied that all the oars are present, click on the "No More Oars" Box. The active oars that have data will appear in a new table. You will be presented with three options: "**DOWNLOAD**", "**DELETE**", and "**EXIT**". To delete the data from the oars without downloading it, press Delete. To leave and do nothing, press "Exit This Program" — the program will turn the oars off and end. Click on "Download" to begin downloading the data.

A new screen lists each oar to be downloaded, along with, the position number that was assigned when the oars were set up to self-record. Any positions that are duplicated are shown in yellow. Since the position numbers must be unique, click on any position number you wish to change, and use the up and down arrows to adjust the position number. There are times when you

want to move an oar to a different seat position – often due to setup errors. When there are no duplicate numbers, the "NEXT" box will appear. If you are satisfied with the assigned positions, click on "NEXT". If there are several sessions of data recorded on the oars, these screens will repeat for each session. Each session is saved separately. Additional sessions may result from multiple attempts at setting up the oars, or if there was data previously stored on an oar. Multiple sessions can get confusing. It's best to delete data after downloading.

NOTE: *This is your only chance to reassign oars to seat positions.*

Having pressed "NEXT", the data will begin downloading. You can follow the progress for each oar on the screen. Once the data has been downloaded, you are given the opportunity to add rowers' names to the oars as well as enter a short description for each piece recorded (This will repeat for each session if there are multiple sessions). When you are ready, press "NEXT" and software will now save the stroke data to a file in c:/stroke_data on your computer's hard drive. The file name is quite long and includes the master oar number, the date, and the time of download. You can rename this to something more meaningful if you choose. If there is more than one session, a separate file will be created for each session.

Press "CONTINUE" to accept the file name or "RESTORE DEFAULTS" to go back to the original, computer generated, file name. The next screen tells you if the data has been successfully saved as a stroke file.

TIP: *Sometimes conditions are not ideal when downloading and you would prefer not to enter any information at this time. In that case, you can add rower's names and piece descriptions later from the Display Program. You cannot change the oar to seat assignments in the Display Program. Lastly, it is easy to get confused regarding what has been recorded. Good notes help.*

Select "NEXT" to enter the screen which invites you to, delete the data from the oars then exit, or to exit without deleting the data. We recommend deleting the data at all times. If different oars have various old recordings on them, you can easily get confused about what you have recorded. This will take you to the final screen, which allows you to jump to the Display program, to

view the last session downloaded or to simply exit the Download program. In either case, the oars will be turned off and then you will exit the Download program.

TIP: *All stroke files end with ".sod" which stands for smartOar® data.*

3. Display Program

A. Select File/Display Strokes

To run the Display Program, double click on the Desktop Icon (orange rower) called "Display". The program will display a menu of the stroke files saved in c:/stroke_data. Use this standard Windows screen to select the file you want to view, or analyze by double clicking on the file, or by highlighting the file then clicking on "OK". You may also navigate to other directories in case you have stroke data files saved in other areas of your computer or on other drives. The Display Program will load and quickly begin displaying the strokes in the selected file.

TIP: *If you right click on a file, a menu appears with a number of options, one of which is "Rename". This makes it convenient to rename the generic file name of the stroke data file with something more descriptive to you.*

B. The Controls

At the top left of the screen, the pieces in the file are listed along with, the option to select another file. When using the tablet, each time you record you create a separate file. In self-record mode, each time you start/stop recording using the Master Oar, you create a "piece".

Up to 31 pieces are allowed—hence the vertical scroll bar in the piece window. When you download the data from the oars using the USB download box, all the pieces are combined into one file or "session". At any time, you can select another piece or new file to watch.

Each curve has a unique color. Click on the text under the rower number to highlight a curve by turning it white. Click again to turn the curve off. This is useful if you want to focus on a single rower or a subset of the rowers.

You can adjust the width and height of the displayed curves, by clicking on the selection boxes to the right of the curves. The boxed number above each rower is the impulse (area under the curve) for that rower. While not power, it is still a measure of how hard and how long (time) the rower is pulling. The units of measure are force times time (Newton-Seconds).

The four buttons on the top right, control playback. They are named, "**Press to Pause/Press to Play**", "**Back**", "**FWD**", and "**Fast Play**". Selecting "**Back**" or "**FWD**" will put the display in pause mode. "**Fast Play**" is useful in getting an overview of the course of a piece and is useful in looking at consistency in the rower's strokes.

At the top of the display, there is a slider bar. You can left click on this at any point and the stroke display will switch to that portion of the piece. It also tells you where you are in the piece that is being displayed.

<u>**Print Stroke**</u> — Sends an image of the display to the default printer on the computer. It is best to **Pause** the display before printing to make sure you get the stroke you really want.

<u>**Save Stroke**</u> — Will save a JPEG image of the current stroke to a location of your choosing. A standard Windows box comes up allowing you to rename the file and to select a location in which to save it.

<u>**BOOKMARK**</u> — When working with Tablet data, the display width window is replaced by Bookmark controls. The Tablet allows you to mark strokes you find significant and wish to review at a later time. The lower box tells you how many strokes were bookmarked and the last bookmark viewed. The **<Bkmrk** and **Bkmrk>** buttons allow you to move back and forth between bookmarks.

Edit Sod Data — This allows you to add information to the stroke file. You can add the rowers' names to the oar positions and also add a short description of each piece. There is a **NOTES** section in which you can add more detailed descriptions. You have the options to go back to the display without saving changes, going back to the display while saving changes, or exiting the program.

The Cursors — There are two active cursors on the display graph. The time differential between the cursors is shown on the upper left corner of the display. Typically, a user will pause the display and move the cursor, by left clicking and dragging them to the points they want to measure. This is useful if you want to know the duration of a stroke or how far off rowers are in their catch or release timing. If you have an angle sensor, you can use the cursor to measure the "slip" at the catch.

C.   *The Boat Button*

A new addition to the software is the "boat" button just to the left of the 8 rower buttons. It is there for the smartOar accelerometer. An accelerometer product can be velcroed into a boat to measure the boat's acceleration through the stroke, as well as, indicate the set of the boat through the course of the stroke. If an accelerometer is present, pressing the text above the boat label cycles through the various options.

Note: *The data in the box is present at all times.*

ACCELERATION: The acceleration of the boat through the stroke is displayed. The box above the boat button shows the peak value of the deceleration of the boat which usually occurs coming into the catch – for example -1.7m/s^2.

DELTA SPEED: The acceleration data is integrated over the stroke to show the change in boat speed over the stroke. The box above the boat button shows the change in boat speed for that stroke – for example V0.75 (in meters/second).

ROLL: The changes in boat set are shown through the stroke. The box above the boat button shows the set of the boat, at the catch, in degrees and whether it is down to Port or Starboard. The vertical yellow line on the display is the "catch" point.

If the boat is down to one side at the catch, the data in the box could be something like P1.0 or S3.0. It is important to note that good crew shows very little change in the set of the boat and the accelerometer reading is affected by other activities in the boat during the stroke. The zeroing of the accelerometer is important to get useful data about the set of the boat.

OFF: Turns the curve off.

TIP: *The accelerometer must be zeroed in the boat in order for the roll to be accurate. The instructions to accomplish this are described in the smartOar Accelerometer User Guide.*

4. Display Program — Analyze

The **Analyze Strokes** button allows you to analyze subsets of the piece that is currently being displayed. Each stroke has an associated stroke rate and each rower has an associated impulse for each stroke. The impulse is the area under the force curve for the duration of the power phase of the stroke. This is not the same as "power" as measured on an erg.

When strokes begin displaying on the screen, they are also being read into the program and analyzed in the background. When analysis is complete, the text in the Analyze box turns to Analyze Strokes. Pressing this button jumps to a new set of screens as indicated on the left side of the display. The first screen is "START HERE". In this screen, graph of the "Impulse vs. Time Since Start of Piece" is displayed for each rower. A table beneath the graph relates colors of curves on the graph to the oar number/letter concatenated with each rower's identity. These curves can be turned off and on to isolate rowers by clicking on the DISPLAYED box to the left of each rower

TIP: *Occasionally you may desire to change the scale on this graph – possibly to focus in on vertical detail. For this graph only, if you hover the cursor over the label on the axis of the graph, a pop-up will appear inviting you to right click to allow you to change the y axis scale. You can enter values into the top and bottom values on the axis to rescale your data*.

There are two cursors you can drag to select a subset of the strokes in the piece for closer analysis. There is also a **ZOOM** button that magnifies the graph within the cursors for better resolution when there is a lot of data. Left click on the cursors and move them to the desired place on the graph. Notice the messages beneath the **ZOOM** button. The leftmost cursor corresponds to the Stroke Number on return to Display. This is usually set to the start of the section of the row you want to examine. Setting the cursors is important because the statistics displayed in the table are for strokes between the cursors. This allows you to isolate on specific portions of the workout.

The second message tells you how far into the piece the leftmost cursor is positioned. Since the cursors are most often used for concentrating on a period of interest, the last two messages give the time between cursors and the number of strokes between the cursors.

The last area of interest is the statistics located on the right side of the table. The **Sum of Impulses, Mean Impulse, Standard Deviation, and Variance**, are calculated from the strokes between the cursors and are updated as the cursors are moved.

At the top of each screen are options to print the page, save an image of the page, and save the impulse data for each stroke and rower in a file that can be easily imported into a spreadsheet. **SAVE SUMMARY** provides the total impulse for each rower for the region between the cursors. **RETURN TO DISPLAY** will get you back to the display strokes portion of the program.

The tabs on the left side of the display allow you to view specific plots about the strokes between the cursors. Click on a tab to view a plot.

A. Impulse/Second Graph

This plot is an indicator of the effort for each rower/second. For example, rowing at a higher rate may not increase the effort if the impulse for each stroke drops as the stroke rate increases. The cursor on the graph is used to identify a particular stroke number which you can find and view when you return to the stroke display section. Comparisons can be made by examining the relative changes in impulse/second of the rowers as the piece progresses.

Impulse per second is the impulse multiplied by the stroke rate divided by 60. This number is plotted against time. The graph begins at the location on the first cursor and ends at the location of the second cursor.

TIP: *Individual curves can be turned off/on by clicking on the leftmost box in the table below each graph. The options are DISPLAYED and blank. This is true for all the graphs. This feature is useful when you want to focus on an individual rower.*

B. Sum of Impulses Graph

The Sum of Impulses graph shows the accumulation of "effort" for each rower over time. Stronger rowers really stand out in this graph because their total contribution becomes larger as a piece progresses.

C. Impulse Histogram

The Impulse Histogram is way of looking at the variability of impulses for the rowers throughout the piece. It can provide some insight into a rower's ability to make good strokes under adverse conditions. Again, the ability to turn curves on and off will help you focus on individual rowers.

D.   Make a Movie

The MAKE VIDEO button is located at the top right of the START HERE graph. If you click on it, a MP4 movie will be made of all the strokes between the cursors. This is a two-step process; the strokes are imaged into individual JPEG files and then those files are converted into a move. The movie resides in c:\stroke_data\video in a folder with the filename of the stroke data file. You can email this file to your crews for their viewing enjoyment! Only those rowers whose curves are turned on in the Impulse vs Stroke Number graph will be part of the video. It can take a while to make the actual video. You can move around the analyze section but you can't return to the stroke display until the video is completed.

5. Update Program

To run the Update Program, double click on the Desktop Icon (orange rower) called "Update". The program will launch and ask you to plug in the Download Box if you have not already done so. After the program recognizes the Download Box, you will see two buttons indicating the two main parts of the Update Program. They are **"Update Firmware"** and **"Personalize"**. Select the choice you want by clicking on one of the buttons.

NOTE: *Sometimes you need to try several times to get the Download Box recognized.*

A.   Update Built-in Software (Firmware)

Select   "**Update Firmware**".

All smartOar products contain firmware (software programmed into a micro-controller) that can be updated with the exception of older tablets (they lack the boat button) and some very early Oarpods. The process is meant to be self-explanatory by following the sequence of steps in the Update Program.

The first task is to select the product you want to update. Oars, accelerometers and footstretchers are considered one product and have the same update file.   Angle sensors, and newer tablets (with boat button) each have their own update files.

Select "DOWNLOAD BOX" to update the download box.

Note: *The newest versions of the tablet (they have a dedicated "boat" button" can also be upgraded without having to return the tablet to the factory*.

Click on the product you want to upgrade. A window will open showing the available updates for the product you selected. Oarpods/Accelerometers/Footstretchers share the same file which will be named something like OarAccelerometerFootstretcher4_8_3.hex where the 4_8_3 is the current revision number. You can ignore the last digit. The download box filenames will be something like DownloadBoxRev2_4_2.hex where 2_4_2 is the revision number. Double click in the file you want or single click and select OK.

Follow the on-screen instructions carefully. If an upgrade fails, the product is left in a state in which allows you to try again, so you don't have to worry about making mistakes – even if you leave the program and come back.

To maximize communications reliability, make sure the download box is close to the oar you want to upgrade. If both LEDs are flashing when you turn the product on, you can still update the oar by restarting the update process. Follow the onscreen instructions.

B. *Personalize Oars*

The Update Program allows you to personalize your oars. When the oars are manufactured, each oar is given a letter/number that is stickered onto the oar and programmed into the Oarpod. The Update Program allows you to change this. Additionally, there is a 17-character oar name that

you can customize. Typically, this has the name of your rowing program and "Port" or "Starbd" to help identify the oar.

After selecting "Personalize", a screen will appear telling you to turn on the oar you wish to customize. Only one oar should be turned on. The screen will show the oar id and name and the green led on the Oarpod will begin flashing rapidly. Click on the Letter, Number, and Personality boxes to enter your data. Click Personalize and follow the directions in the Instructions box.

TIP: *Use the tab key to switch between fields. The whole field will be highlighted in blue, and anything you enter will replace everything that is highlighted, so that you don't have to hit the delete or backspace keys.*

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