

Hi!

So the View3D and ViewsVideosAndCreatesTables (V-VACT) programs are meant to be used in conjunction with the white PVC apparatus in the back of the biology classroom with the zebrafish.

The apparatus, a box made of PVC pipe, is meant to hold one of the medium sized zebrafish tanks. Then there are two pieces of PVC pipe jutting out of the tank-holding portion. There you slide in two phones with video capability. If you don't have one, or yours doesn't fit, you can ask Darby Thompson for the phones being used in robotics and tell her it is for use with this project.

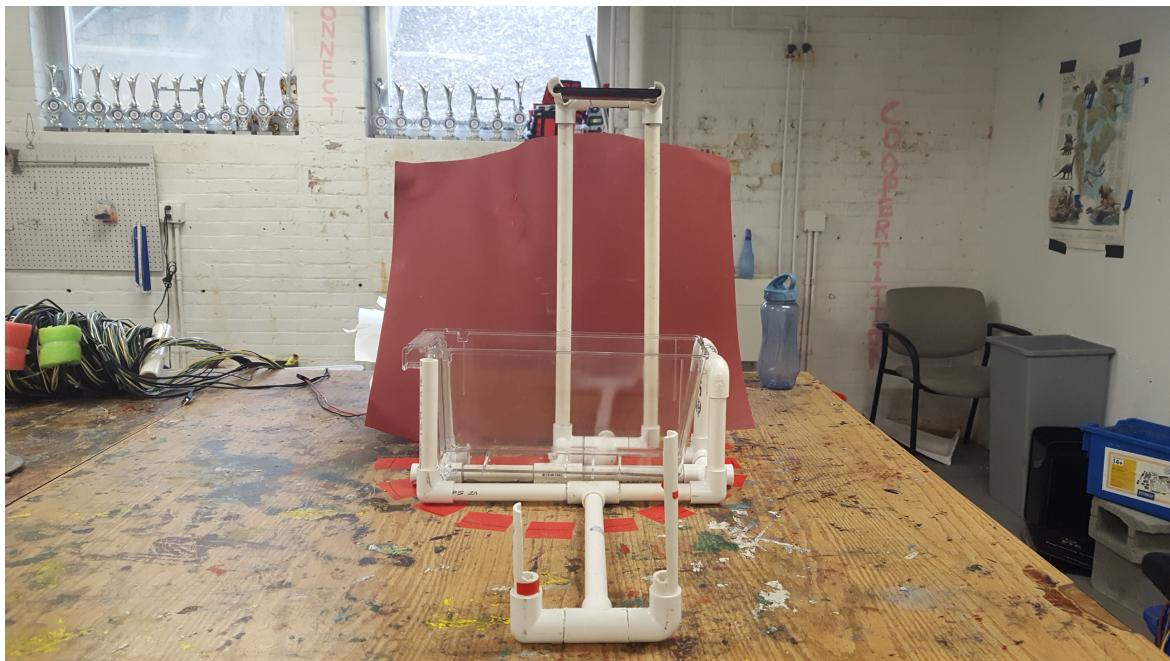


Fig 1. The white PVC apparatus

Once you have your materials: the apparatus, two video capable phones, the fish being recorded, a medium tank, and water for said fish you can begin setup.

SETUP:

1. Place the tank to get a sense of how it fits into the apparatus. If there is already a tank in there, look how it is positioned. If not put an empty tank into the apparatus and gently shift it around until it seems sturdy and level.



Fig 2. Sturdy and level tank

2. Put water into the medium tank and the fish into the tank. Then place the tank into the apparatus as observed in step 1.
3. Observe the color of the fish. Find a sheet of paper with a color that would contrast with that of the fish. The default paper is white, but if your fish is of a white or off-white color, you may want a different colored background to maximize computer recognition.

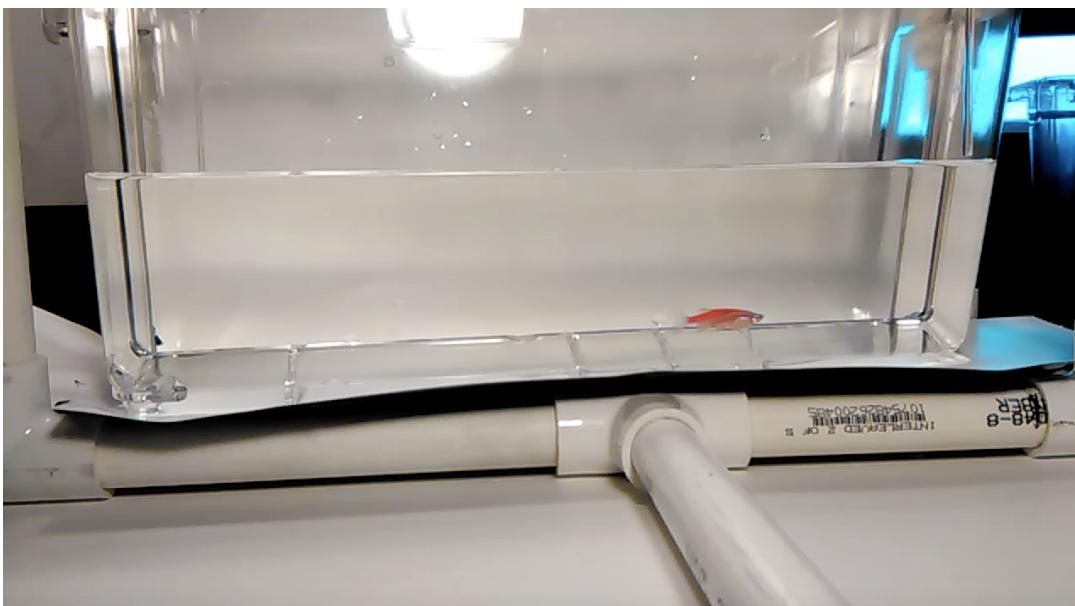


Fig 3. Good choice of background color for fish, the fish is the only red thing in the frame, so its easy to identify it.



Fig. 4 Bad choice of background color for fish, it even takes a human a second to find the fish because it is a similar color to other objects in the frame.

4. Prop up the paper so that all of the background is that color. You also need that color to be under the tank as you will be also filming from above.

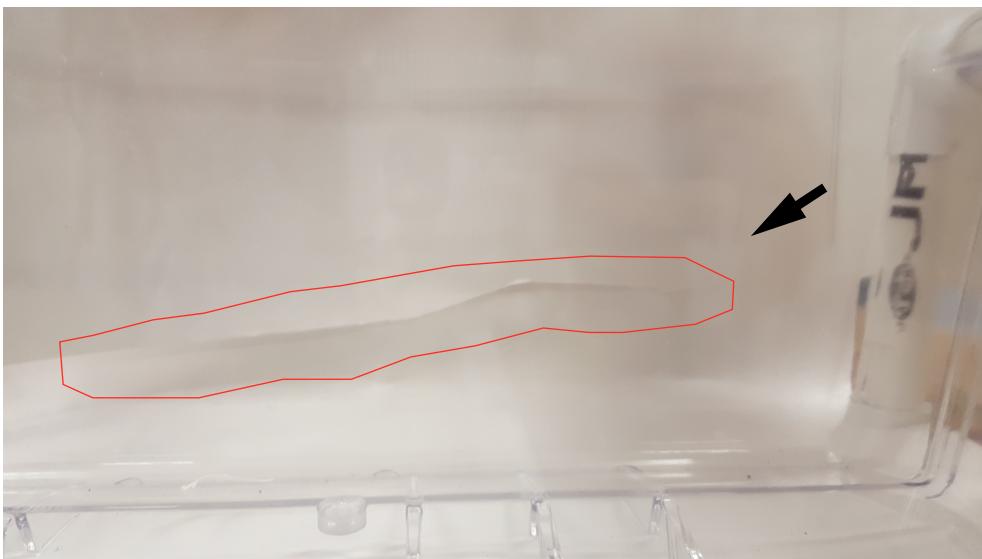


Fig 6. Bad background setup, shadows created by bad overlapping of paper may disturb program (shadow on page circled).



Fig 5. Good paper background set up, looks like one piece of paper.

5. Place the phones in the holders and open the video app.

6. Look into each phone. On the side phone, make sure the top of the tank aligns with the top of the frame and the sides align with the sides of the frame. You may have to flip or reorient the phone to do so, also look for a "L" written on the side of the side phone holder. It may help to place the phone so its camera is next to the "L". You can also shift around the phone holding attachment to get the perfect angle, as you can disconnect it from the main structure.



Fig 7. Good side phone setup: entire tank in frame, no bright colors in the background, top edge of tank aligned with top edge of screen.



Fig 8. Bad side phone setup: taken at an angle, bright red below, sides and top of tank not aligned with frame.

7. For the top phone make sure that its left side is on the left side of the frame and that its top and bottom are along the top and bottom of the frame, make sure that you get the whole thing though.



Fig. 9 Good top phone setup: entire tank in frame, bottom of tank aligned with bottom of frame, no outside bright colors (aside from part of the table).



Fig. 10 Bad top phone setup: bright colors, angled and far away video, not aligned with bottom of the screen.

8. Look through the cameras again. Is the frame well lit? We are aiming to have a high contrast between the fish and its background so that the computer has a better time distinguishing the two. You may want to light up the frame with lamps to get better contrast, however, if you do so make sure the light is even so that there aren't random dark spots that could confuse the computer. If you have a good background you may not have to do this.

FILMING:

1. Start both of the cameras. Try to start filming with each at the same time. This may be easier to do with one person controlling each phone. The aim during filming is to have the videos start at the same time to help keep them in sync.
2. After starting recording, make a very loud clap or beep. Something short but loud. This is called a audio spike and will appear on both videos allowing them to sync.
3. Film the fish for the amount of time you need. Be careful to keep all variables constant. That means don't move the tank, obstruct/cast shadows with light, or ding anything else which could interfere with the recording.
4. Try to stop the recordings at similar times, however, this doesn't need to be as exact as the start times.

VIDEO PROCESSING:

1. Load the videos onto the computer being used. If you are using an Android phone the video is probably located in the DCIM folder. If you can't find the video use Google, try looking at all of the folders on the phone, or ask Darby/another person for help.
2. Match up the time of the audio spike in each video to be at the beginning of the video and that way both videos will start at the same time. You can use a video processor to trim the videos to start at the audio spike. Some video editors even let you see the sound in the clip which could help you greatly in the trimming. Try to be exact, the more exact, the better your data will be.

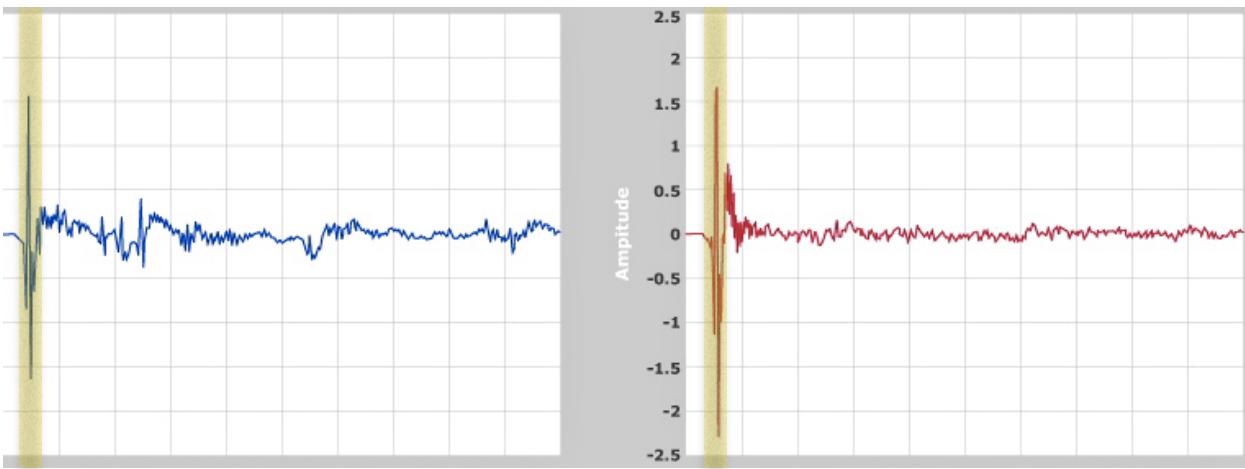


Fig 11. Audio spike processing, audio spikes are highlighted in yellow. If blue is for one video and red is for another, then you would trim so that both begin at their audio spike.

3. The program should convert your video to 640 by 360 pixels but if the program is acting up you may want to convert your video to that is just to be sure that is not what's breaking it.

4. Also make sure the wide part of the tank is along the width of the frame. Make sure that the videos are in landscape orientation, so wider than tall. Like in the default video.

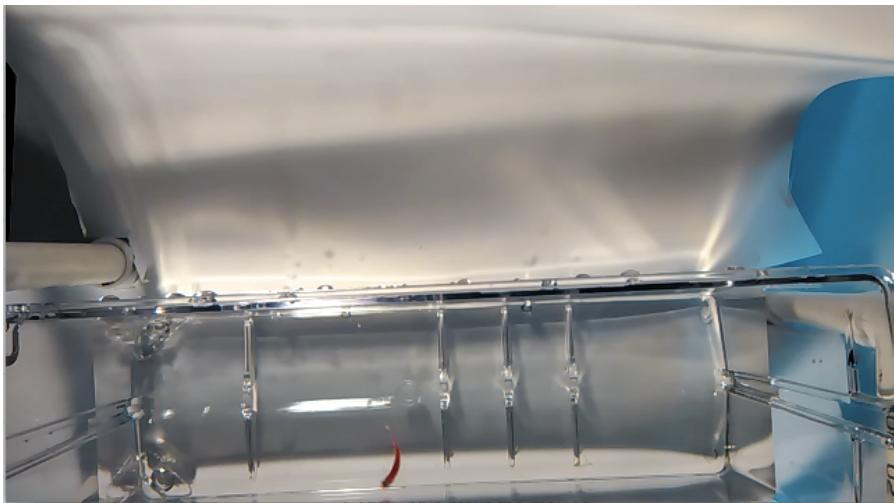


Fig 12. Proper video orientation



Fig 13. Not proper video orientation

V-VACT PROGRAM:

BUTTONS:

1. Toggle Fish- This button toggles between showing what the computer sees as the fish and not showing it.
2. Toggle History- This button toggles between showing where the fish has been throughout the video and not showing its previous locations.
3. Recent History- This toggles between showing only the past few seconds worth of positions and showing all history.
4. Pause- This pauses the movies.
5. Play- This plays the movies.
6. Restart- This restarts the movie and erases prior history.
7. Load Videos- To load videos there are two scroll down menus. Put the files you want into the data folder before opening the program and they will pop up in the menus. Then load the view of the fish from the top into the Tank Top View menu, and side view into it's. (outlined in blue in Fig 14.)
8. Select Fish- To select what colors the computer sees as a fish click on the fish in both videos with your mouse. In the upper right hand corner is a box showing you what color you are currently over so you don't accidentally click on the tank.

9. Reset Color- This resets the colors which the computer thinks are fish. After pressing this you can reselect the needed color range.

10. Name Table- This will make a box pop up. After typing in the table name in the text box, press enter to name the table. You need to name the table something new each time you analyze a video so it doesn't overwrite prior data.

11. Save Frame- This takes a picture of the screen and puts it in the "saved frames" folder.

12. Set Tank Size- Currently not working so don't use it or things will break.

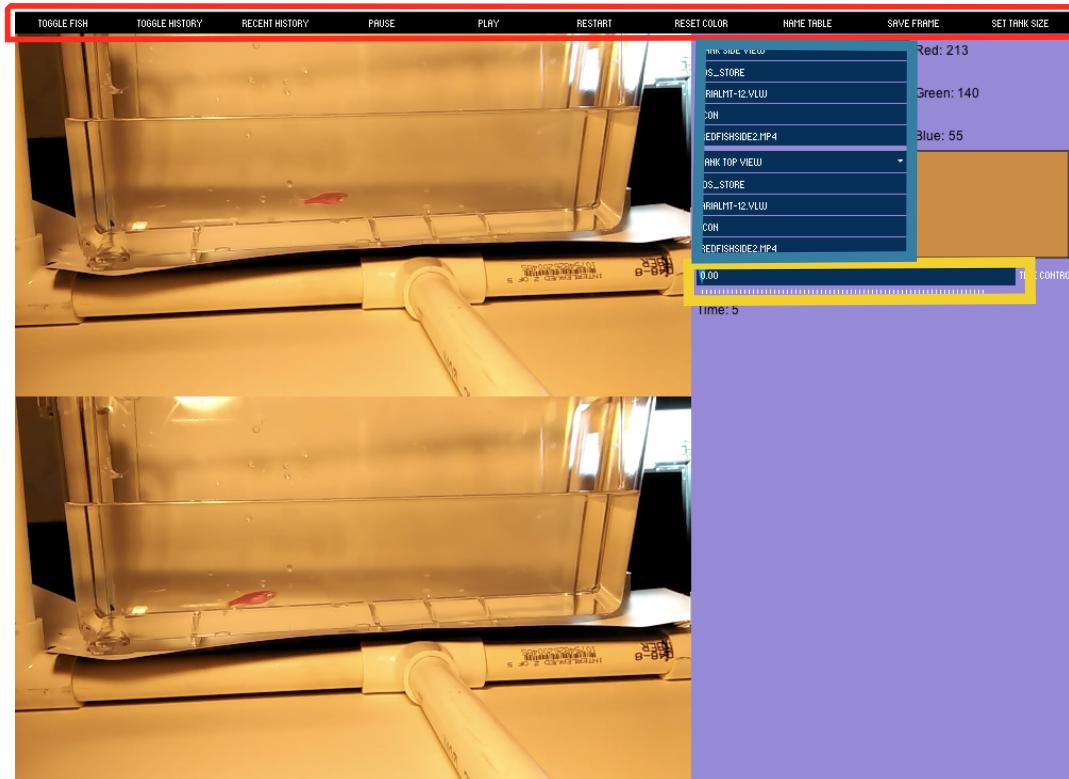


Fig 14. Location of aftermentioned buttons (circled in red)

SLIDER:

1. Time Control: Allows you to jump to a specific time in the movie. The number on its left shows seconds into the movie. Drag it to jump. (outlined in yellow in Fig 14.)

TEXTFIELDS:

1. Table Name- Enter the name you want for the table in it. Pops up when you click the Name Table button.

ANALYSIS:

1. Now save the edited videos into the "data" folder in this file NOT the "data tables" folder.
2. Load the videos into the program. Find the name of each video including their extension(.mov,.mp4,etc.). For example "topvideo.mov".
3. Currently a default video is loaded so to change it to your specific video find the video name in the video selection scroll menu. Click on the name.
- Fig 16. Scroll menus, top one corresponds to Top video, bottom one corresponds to Side video.
4. Your videos should pop up on the screen.
5. Now select the fish colors by clicking on the fish in each movie. Try to find a color unique to the fish to click on. The rectangle on the right shows what color you are hovering over.



Fig 17. Clicking on fish: after you click on each fish a couple of times, one is dotted with pink, the other blue.

6. Press play.
7. Wait until the end of the video.

DATA:

1. Currently V-VACT saves two types of data. It saves images/screen captures when you press save frame. These can be found in the "saved frames" folder.
2. It also saves an excel spreadsheet of the fish's position over time. These can be found in the "data tables" folder.

X-Position	Y-Position	Z-Position	Time-Stamp
458	175	459	0.24062498
458	175	459	0.24062498
458	175	459	0.24062498
458	175	459	0.24062498
458	175	459	0.24062498
458	175	459	0.24062498

Fig 18. Data sheet created by program

DATA DISPLAY (3D VIEW Program):

1. Under construction.

QUESTIONS:

If you have any questions feel free to email me at valentineawilson@gmail.com. You can also contact Darby Thompson who is in the Computer Science lab. I can also skype if I am in China, just email me to let me know.

-Valentine Wilson