

## Foundations Lab 1: Sight vs. Hearing ~ Reflex Lab

### Event Marker Setup

1. Locate the EM-220 event marker. You will also need headphones (A-HP-320) or you can use your own ear buds with an audio jack.
2. Plug the connector to the EM-220 event marker into the EM1 Channel input on the back of the IXTA.
3. Plug headphones or earbuds into the “Audio” port on the back of the IXTA.



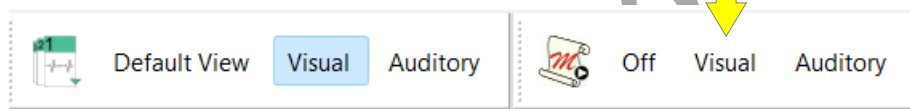
## Exercise 1: Reaction Time and Sight

Aim: To measure the reaction time of a subject to a visual signal.

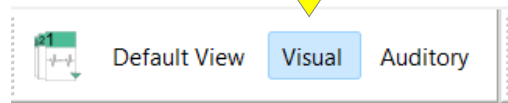
Approximate Time: 15 minutes

### Procedure

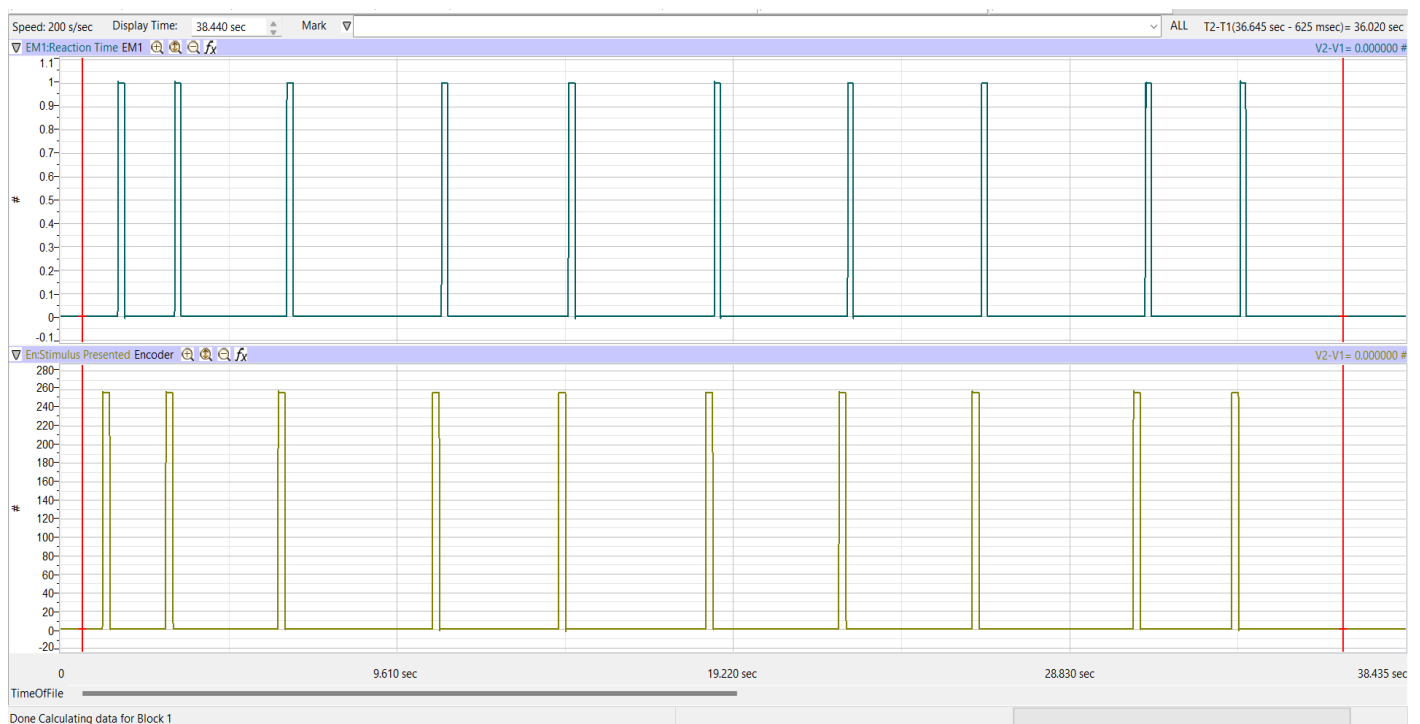
1. Read all instructions carefully before beginning to record.
2. Information for the subject:
  - Instruct the subject to sit in a chair and face the IXTA box.
  - Watch the LCD screen and quickly press the event marker when screen flashes a white square.
  - Note – the screen will alternate between black and white. Only click when you see a white square.
3. The subject will perform ten trials.
4. Choose the “Visual” macro from the Macros panel.



5. Choose Visual from the Views Panel.





6. Click on the Record button. The macro will start automatically.
7. Instruct the subject to press the event marker as soon as he or she sees a white square on the LCD screen.
8. There will be no squares showing after the 10<sup>th</sup> time.
9. After the tenth response, click Stop to halt recording.
10. Select Save As in the File menu, type a name for the file. Click on the Save button to save the data file.

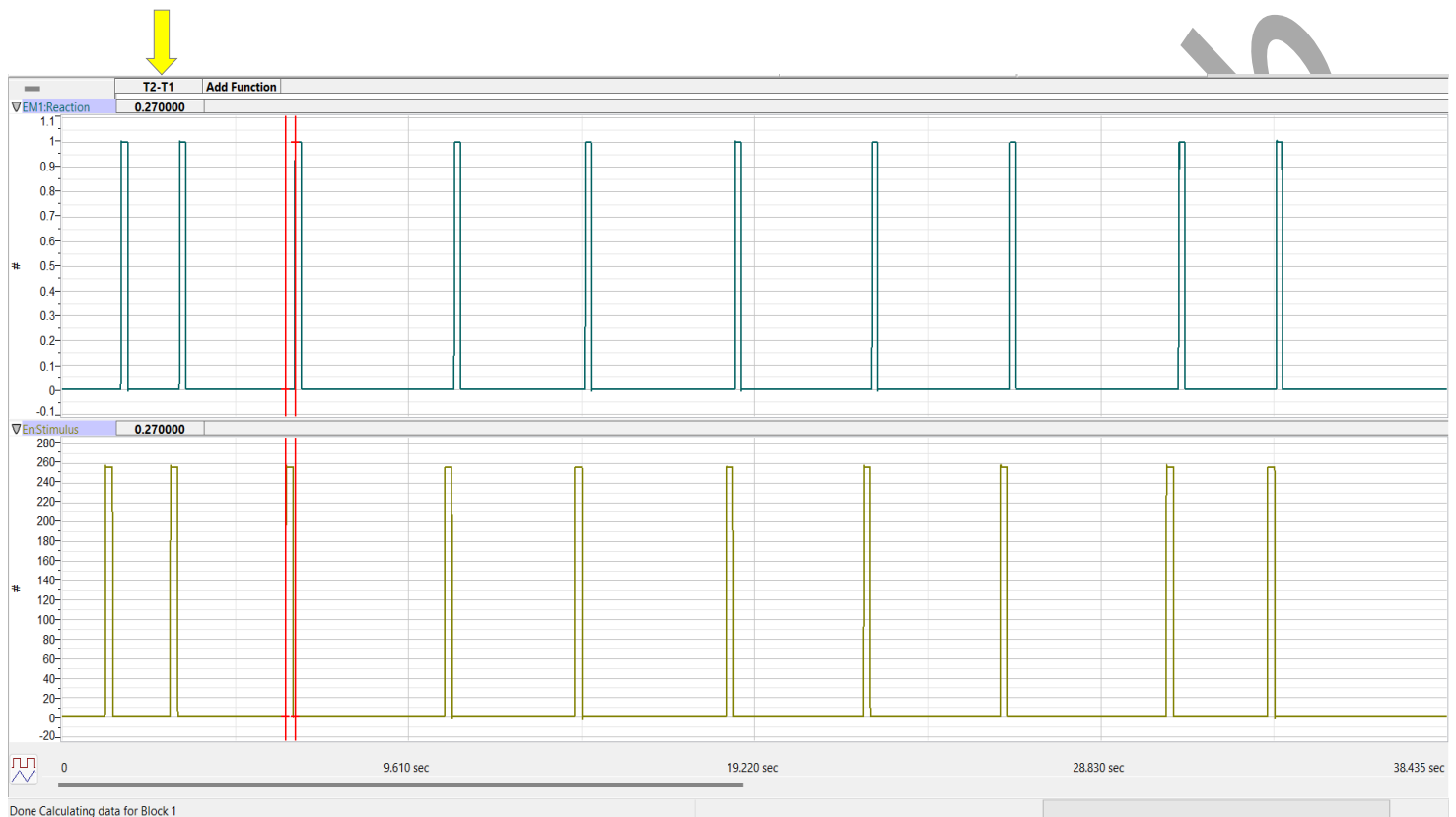


## Data Analysis



1. Click the Double Display time button until all 10 trials show on the screen.
2. Data Analysis can be done in either the Main window or the Analysis window.
  - Main window -
    - Use the mouse to click on and drag one red cursor to the start of the visual signal – the top left corner of the peak of the “Stimulus Presented (Encoder)” square wave. Drag the other cursor to the mark made by the subject clicking the event marker responding to the signal.
    - Look at T2-T1 (upper right corner) and record that number.
  - Analysis window -
    - Click the Analysis icon 
    - Use the mouse to click on and drag one red cursor to the start of the visual signal – the top left corner of the peak of the “Stimulus Presented (Encoder)” square wave. Drag the other cursor to the mark made by the subject clicking the event marker responding to the signal.
    - Look at T2-T1 in the upper left
    - Click the Journal icon 
    - Click Tools
      - Click Add Title to Journal
      - Right Click in the recording window and click Add Channel Data to Journal

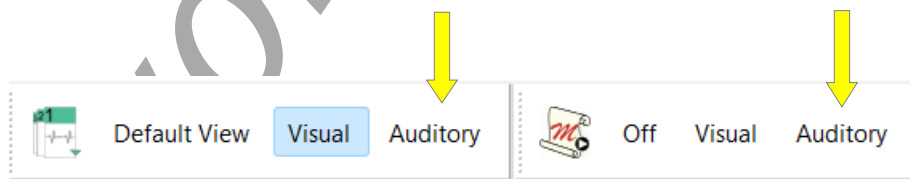
3. Repeat for the next 9 trials.



## Exercise 2: Reaction Time and Hearing

### Procedure

1. Instruct the subject to face away from the computer screen and listen carefully for the “chime” to sound.
2. Put on the headphones or use your own earbuds, plugged into the Audio port of the back of the IXTA.
3. Choose the “Auditory” macro from the Macros panel.
4. Choose Auditory from the Views panel.



5. Click on the Record button. The macro will begin automatically.
6. A “chime” sound will play.
7. Have the subject press the event marker as soon as they hear the “chime”.
8. After the tenth response, click Stop to halt recording.
9. Select Save in the File menu.

### ***Data Analysis***

Use the same technique explained in Exercise 1 to measure and record the reaction times of the subject presented with auditory cues.

### ***Questions***

1. How does the subject’s mean reaction time to visual cues compare to his or her mean reaction time to auditory cues?
2. What would cause a longer reaction time to one type of cue as compared to another?
3. How do your subject’s mean reaction times compare to those of other subjects?
4. Do all subjects respond more quickly to the same cue?

## Experiment GB-7: Venus Flytrap ~ Reactions

### Exercise 1: The Effect of Delayed Stimuli on Trap Closure

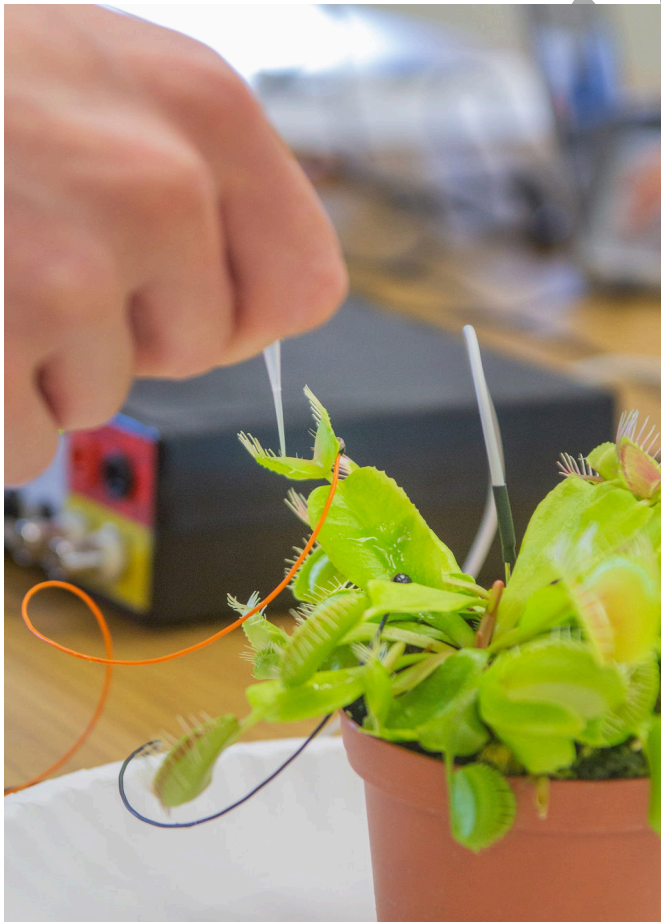
Aim: To observe how the timing of stimuli affects trap closure.

Approximate Time: 15

**NOTE: Timing is important. The person operating the computer needs to be ready to immediately mark the recording when the internal spines are touched.**

#### Procedure

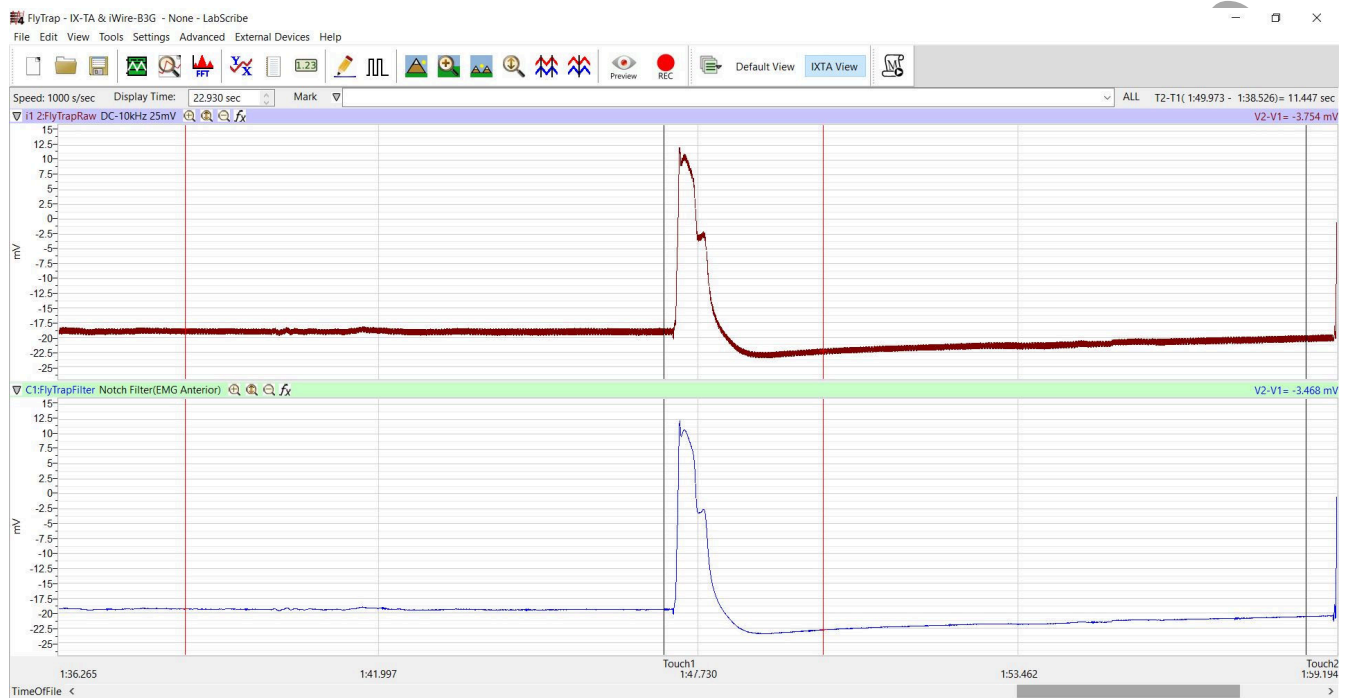
1. After the electrodes have been placed on the Venus Flytrap, make sure they are adhered well.
2. Click Record.
3. Type **Touch 1** in the Mark box.



4. Drag the pipette or coffee stirrer along the internal spines – make sure to click the Mark button on the toolbar to annotate the recording as soon as this occurs.



5. You should see a reaction as seen below.



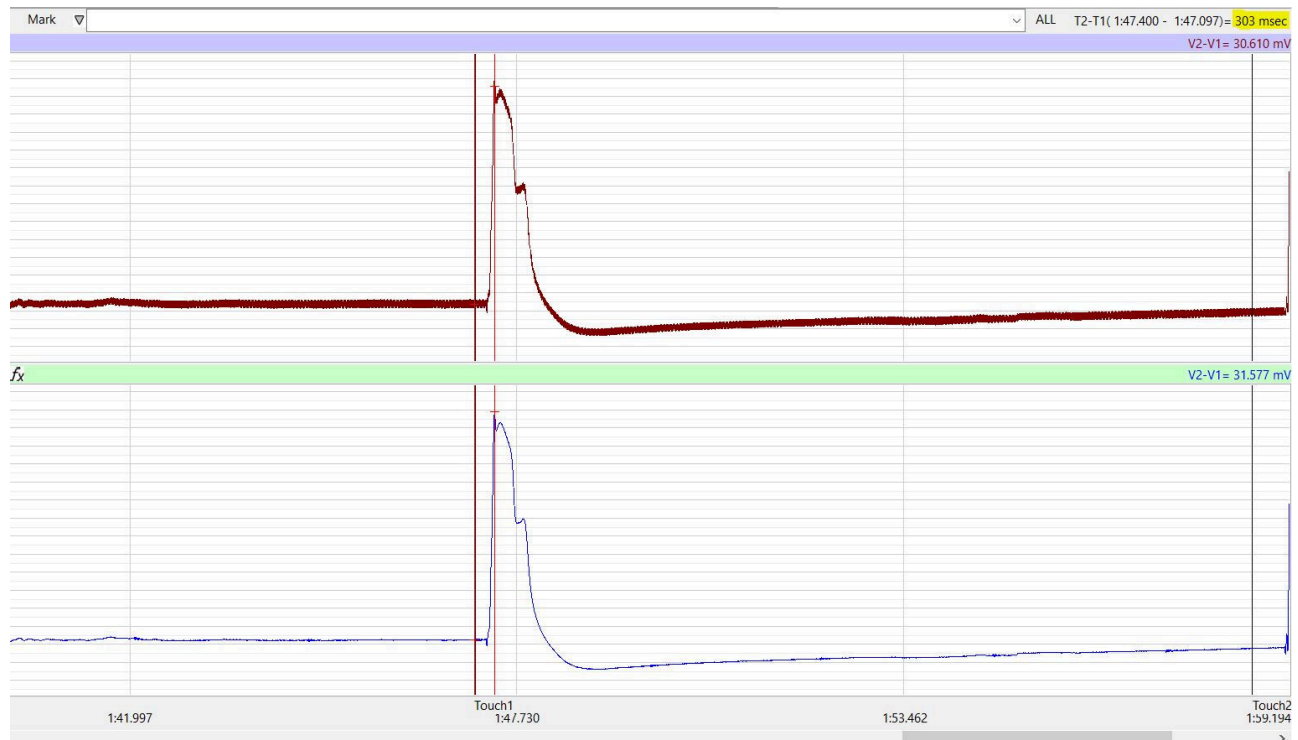
6. Continue recording but wait **AT LEAST** 30 seconds before doing the next touch.
7. After 30 seconds has elapsed – type **Touch 2** in the Mark box, drag the pipette across the internal spines and immediately click the Mark button.
8. Wait a few seconds and then click Stop.
9. Click Save As in the File menu. Save your data to the desktop or USB drive.

### Data Analysis

1. Scroll to the section of the data file when you did the first touch.
2. Place one cursor on the ‘Touch 1’ mark and the other cursor on the peak of the reaction.
3. Measure T2-T1 in the upper right hand corner of the screen.
4. Scroll to the ‘Touch 2’ mark and repeat steps 2 and 3.

### Questions

1. Did the trap close after the first touch? Why or why not?
2. Did the trap close after the second touch? Why or why not?
3. Hypothesize what would happen if you touched a 3<sup>rd</sup> time, but still waited the full 30 seconds before doing so.



### Exercise 1: The Effect of Multiple Stimuli on Trap Closure

Aim: To observe how the timing of multiple stimuli affects trap closure.

Approximate Time: 15 minutes

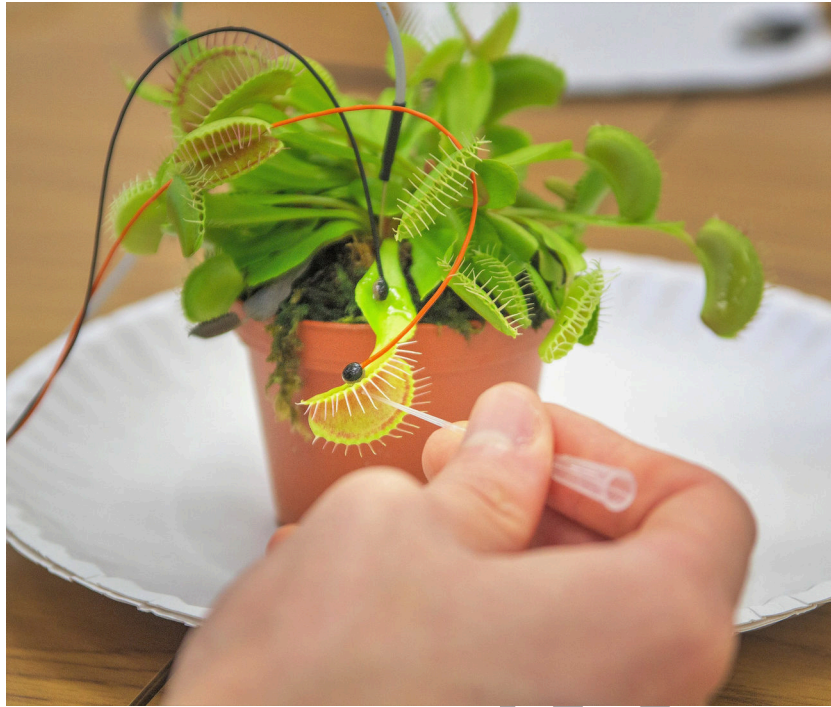
**NOTE: Timing is important. The person operating the computer needs to be ready to immediately mark the recording when the internal spines are touched.**

#### Procedure

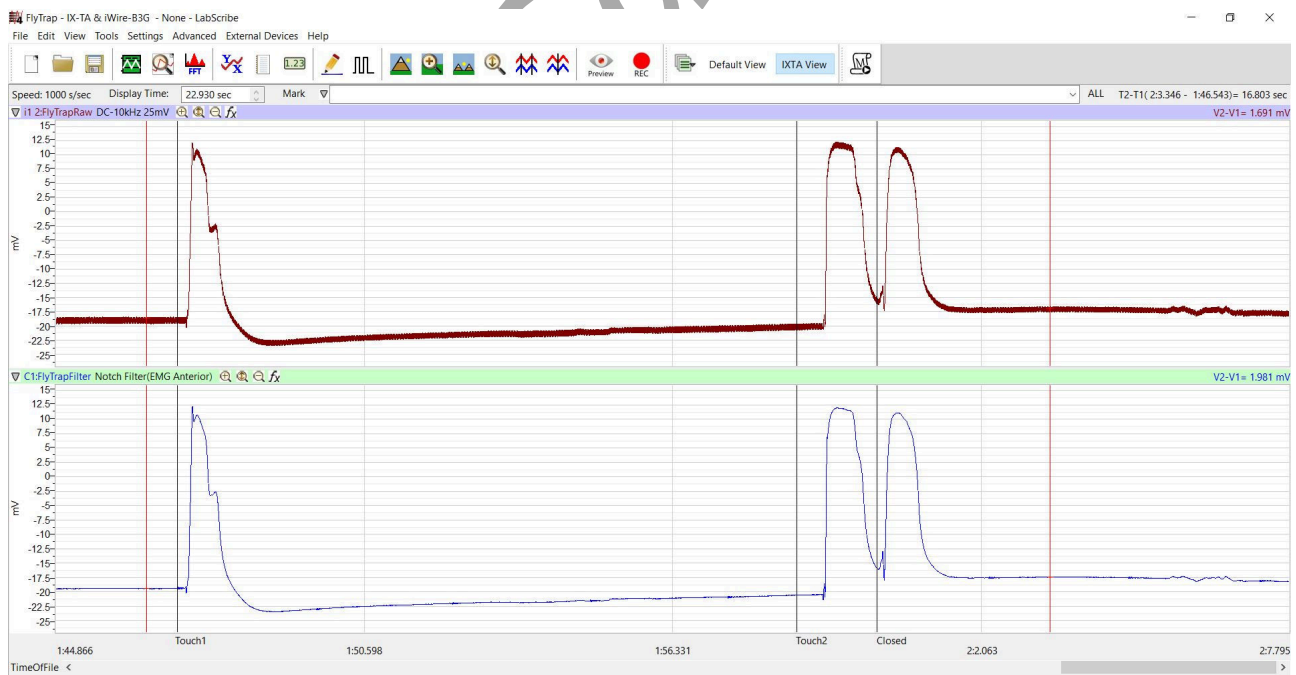
1. After the exercise 1, double check the electrodes to make sure they are still adhered well.
2. Click Record.
3. Type **Touch 1** in the Mark box.
4. Drag the pipette or coffee stirrer along the internal spines – make sure to click the Mark button on the toolbar to annotate the recording as soon as this occurs.
5. You should see the same reaction as in Exercise 1.
6. Wait **5** seconds, type **Touch 2** in the Mark box and repeat step 4
7. If the trap does not close, repeat the process.



**Note: If the trap still does not close, double check the electrodes. Reattach them with tac gel if needed and repeat Exercise 2.**



5. Wait a few seconds and then click Stop.
6. Click Save As in the File menu. Save your data to the desktop or USB drive.



### ***Data Analysis***

1. Scroll to the section of the data file when you did the first touch.
2. Place one cursor on the 'Touch 1' mark and the other cursor on the peak of the reaction.
3. Measure T2-T1 in the upper right hand corner of the screen.
4. Scroll to the 'Touch 2' mark and repeat steps 2 and 3.
5. Place one cursor on the peak of the first action potential when the trap closed, and place the other cursor on the 2<sup>nd</sup> peak. Measure T2-T1 to find the time between the 2 successive reactions.

### ***Questions***

1. Did the trap close after the first touch? Why or why not?
2. Did the trap close after the second touch? Why or why not?
3. Explain how the Venus Flytrap knows when to close or not to close.

### ***Comparative Labs***

This lab is an excellent comparative lab with frog, earthworm and human action potentials.

These are the Animal Nerve and Human Nerve labs:

- Action Potentials-Worm
- Compound Action Potentials (Frog)
- Human Nerve Conduction