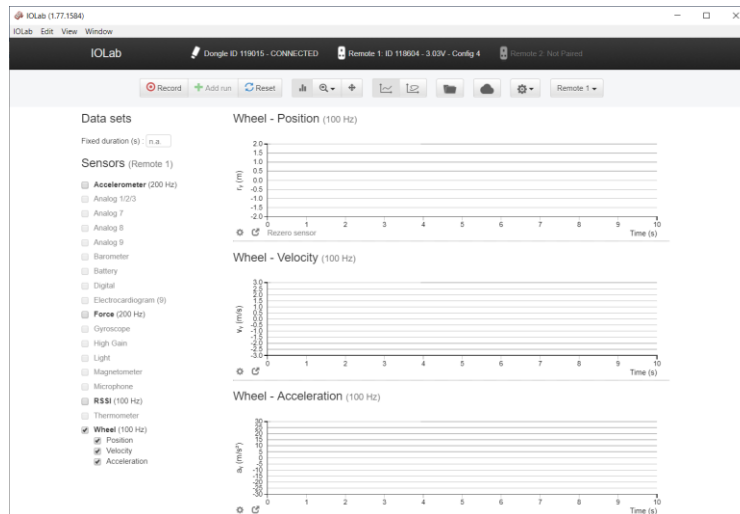


# iOLab Back and Forth

**Purpose:** To become familiar with the relationships between position, velocity and acceleration.

Place your iOLab on a table or shelf that is at least a meter long. On the iOLab window, select the Wheel Position, Velocity and Acceleration displays as shown below. Make sure that the +y axis is pointing away from your right hand and toward your left hand.



While recording data, push the iOLab on the table or shelf from your right hand to your left. Wait a few seconds, and then push the device from your left hand to your right. Then stop the data-taking.

Now adjust the y-axes on your position, velocity and acceleration displays so that you can see clearly what is going on in all three.

Make a screen shot of the iOLab display showing all three graphs, and insert that screen shot into a Word document in which you also answer the following questions. When you are done, submit your document via Canvas.

- 1) At what times does the acceleration have the largest magnitudes? Is it when the iOLab is rolling in between your hands or when it is in contact with your hands? Is the acceleration positive or negative when the iOLab is interacting with your right hand? Is the acceleration positive or negative when the iOLab is interacting with your left hand? Does that make sense, given that the +y axis is pointed to the left?
- 2) Is the velocity positive or negative when the iOLab is traveling from your right hand to your left? What about when traveling from your left hand to your right?
- 3) The velocity is supposed to be the time derivative of the position. Is your velocity graph consistent with that? Why do you say it is or isn't?

4) The acceleration is supposed to be the time derivative of the velocity. Is your acceleration graph consistent with that? Why do you say it is or isn't?