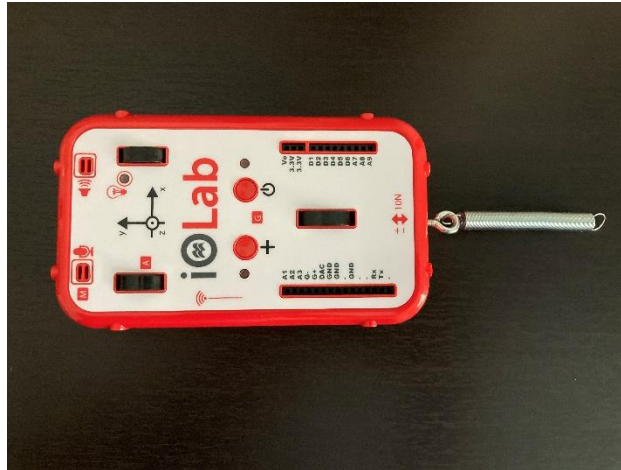


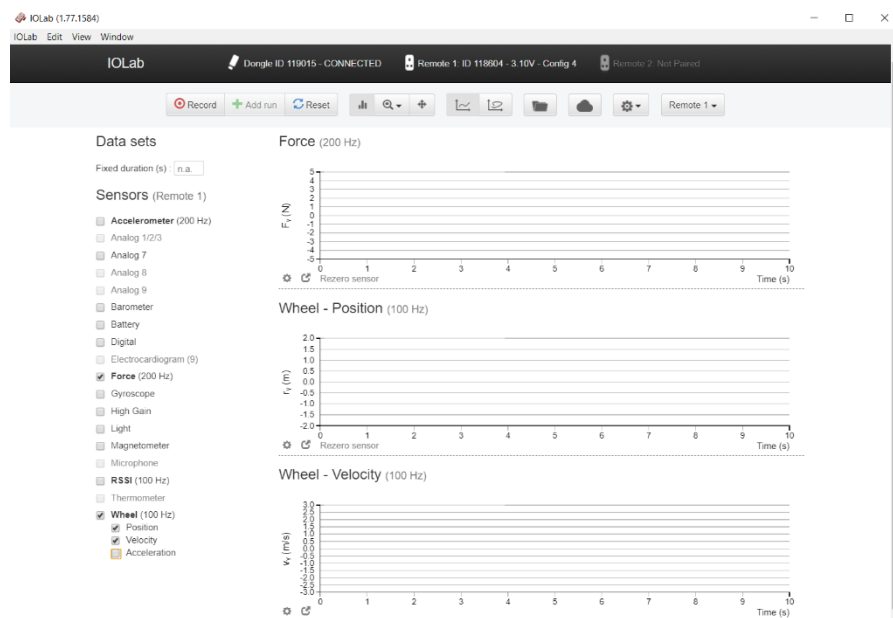
iOLab Spring Work and Energy

Purpose: To observe the relationship between spring potential energy and kinetic energy.

Screw the screw eye in your iOLab kit into the force sensor. Make sure that you screw it all the way in – it takes many turns. Then attach the spring from your iOLab kit in the screw eye. When you are done with this, your iOLab device should look like this:



Place your iOLab wheels down on a table or shelf that is at least a meter long. Open the iOLab app, and in the window select the Force and Wheel Position and Velocity displays.

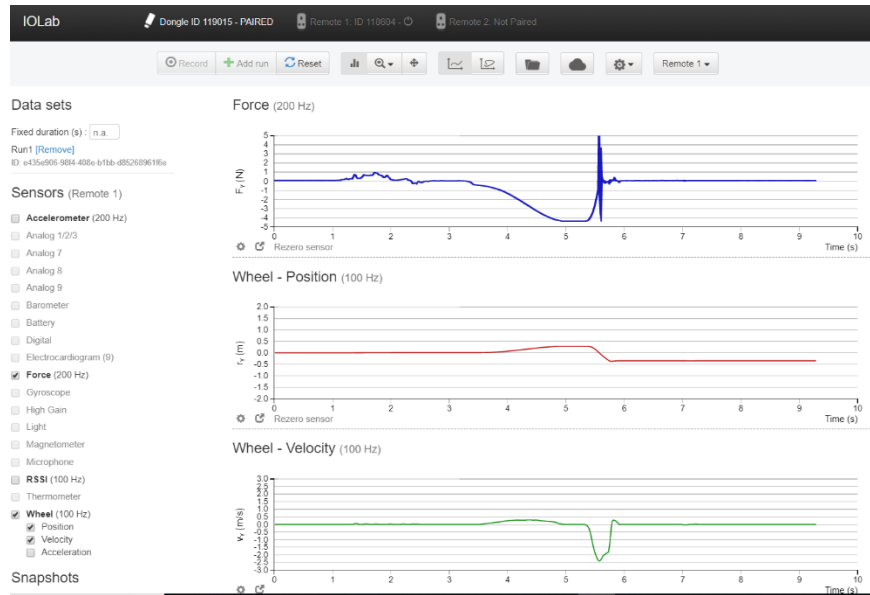


First we will determine the spring constant – the “ k ” in the equation $F = -kx$. Start recording data, and then hold the free end of the spring while stretching the spring by pulling the iOLab device until the force sensor reads about 5 N. Stop recording data. Then read the force and

wheel position from the graph when the spring is maximally stretched. F/x gives the spring constant k .

Determine the mass of the iOLab by hanging it from the spring and recording force data.

Now start to record. Hold the free end of the spring in one hand and pull back the iOLab device (which is wheels down) with the other hand until the force sensor reads 4 or 5 N. Then release the iOLab. It will accelerate and eventually collide with the spring or your hand. Stop recording. You will have force, position and velocity graphs that look something like this:



Take a screen shot of your iOLab window and paste it into a Word document.

You have already determined the spring constant k . Determine how much you stretched the spring from the position graph. Now you have the information necessary to calculate the potential energy stored in the spring when you stretched it and therefore the work you did in stretching the spring. Then find the maximum speed the iOLab reached from the velocity graph. That allows you to determine the maximum kinetic energy the iOLab achieved.

Are those two quantities the same? Was all of the potential energy stored in the spring converted to the kinetic energy of the iOLab before its motion ended?

Answer these questions in your Word document and submit it via Canvas.