

Mini-Lab Rotational Kinematics

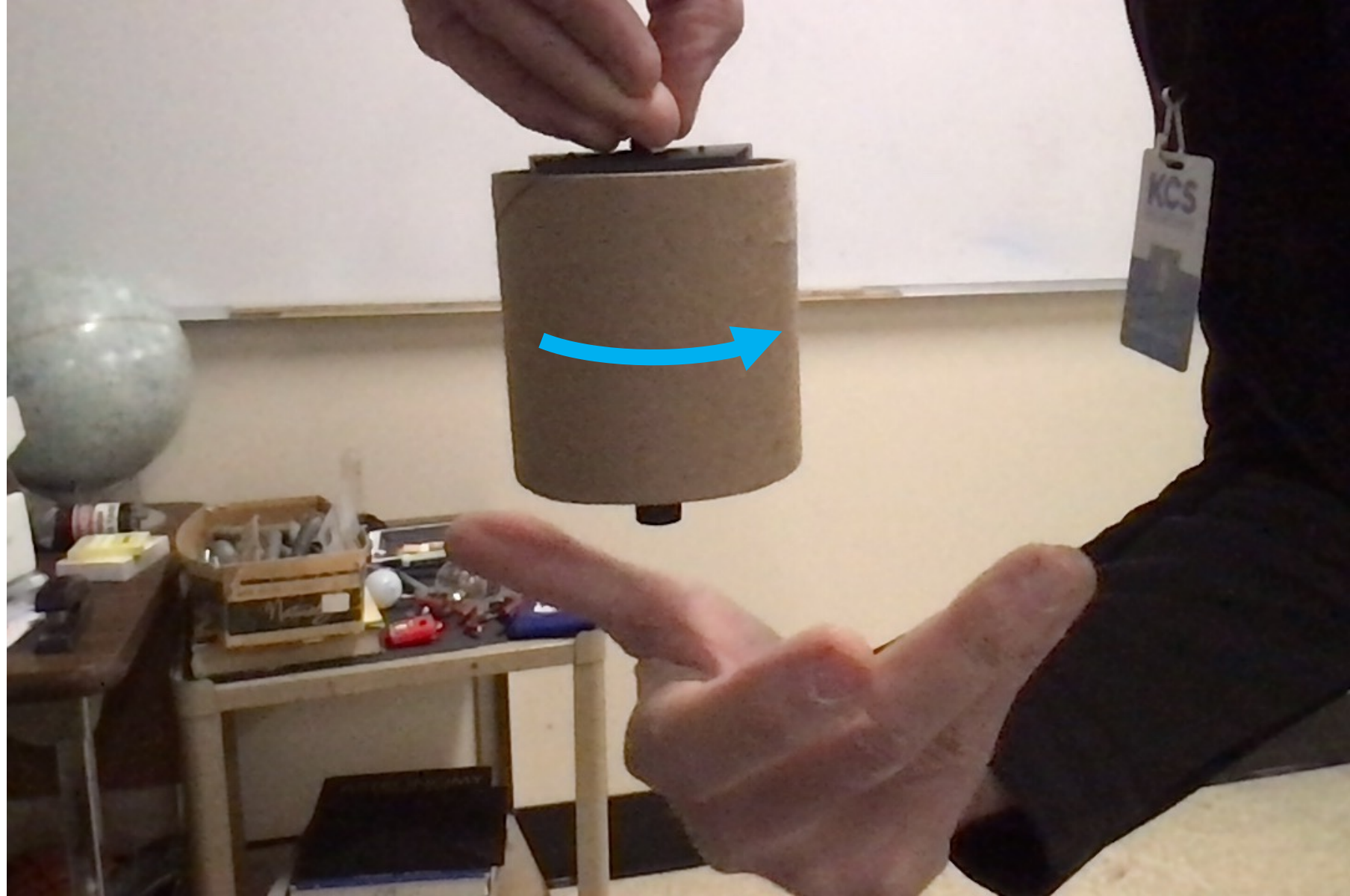
GoDirect Gyro in a Cardboard Tube!



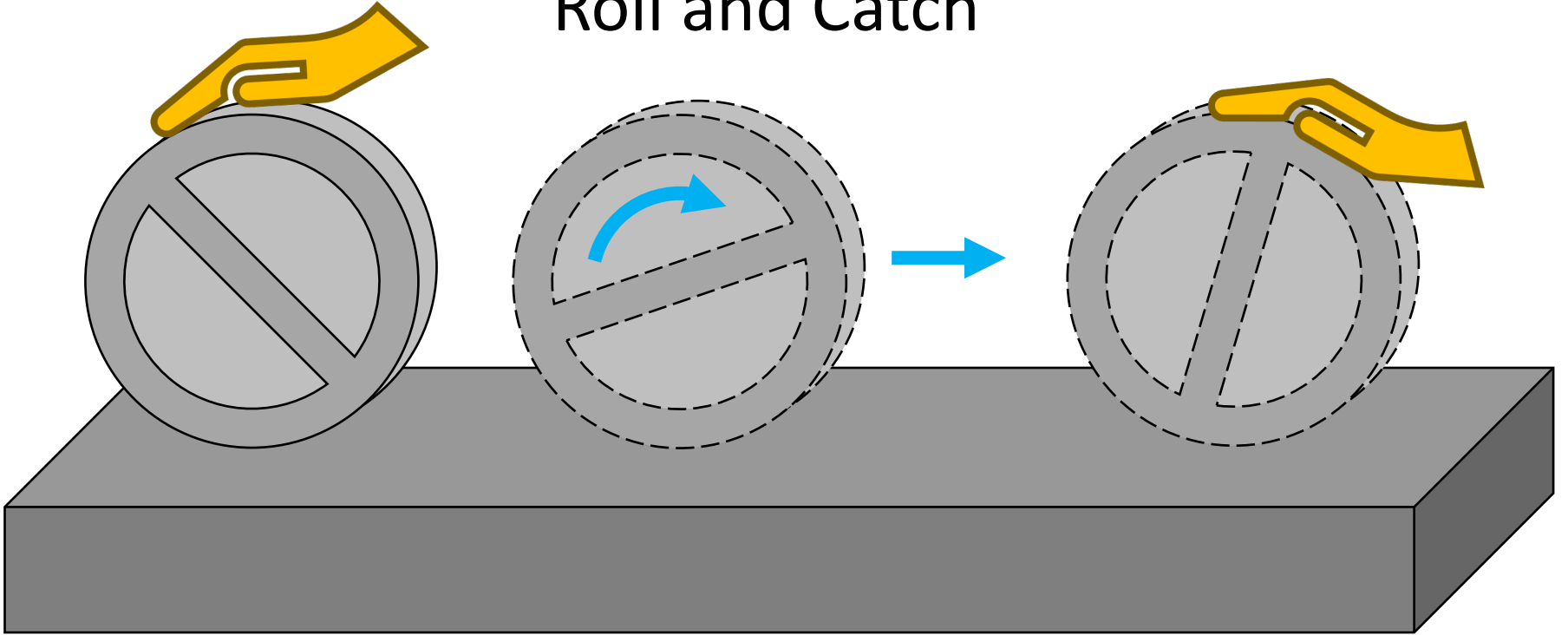
1. Connect sensor via Bluetooth – under Sensor Channels use only X-axis gyro.
2. Maximum angular speed that can be measured is about 35 rad/s – try not to exceed this value.
3. Use foam to secure the sensor, centered inside the cardboard tube, with x-axis along the axis of the tube. Use the rubber bumper, not the hook.







Roll and Catch



1. Hold the sensor by the plastic screw, grasp the cardboard tube, spin it, and release. Determine the angular acceleration in either direction. Is it constant angular acceleration? Use angular acceleration and initial angular speed after release to calculate the angular displacement that occurs as it spins to a stop. Compare the calculated value to the area under the curve.
2. Place the tube on the table. Start it rolling and then stop it. Measure the distance it rolled. Use the graph to determine the time that it rolled. Calculate its average speed. Create a new column of values equal to speed by applying the formula $v = r\omega$. Graph these values and compare. Find area under curve and compare to distance rolled.
3. Fun challenge: create an “odometer” – device to measure distance. Then try using it to measure the width of a table or a known distance along the floor (each tile is precisely 1.00 square foot).