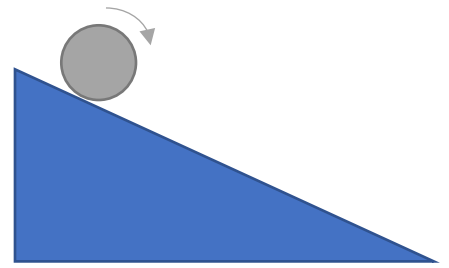


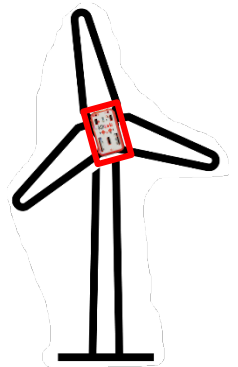
Experiment 4: Rolling rigid body.

You should be able to

- plan and execute an experiment.
- sketch an experimental setup.
- collect and organize data.
- estimate uncertainties on measured and calculated data.
- analyze data via e.g. statistics, transformations of data, and regression analysis.
- compare independently determined values for a physical parameter.



The Engineering Company 'WindmillsRUs' designs new windmills. During testing, they would like to monitor a windmill's behaviour by measuring the wings' angular velocity under different conditions. Due to the significant cost of building a new windmill, the tests are always done on a scaled model. In practice, they attach an iOLab to the center of the wings, and the iOLab rotates with the wings, see illustration.

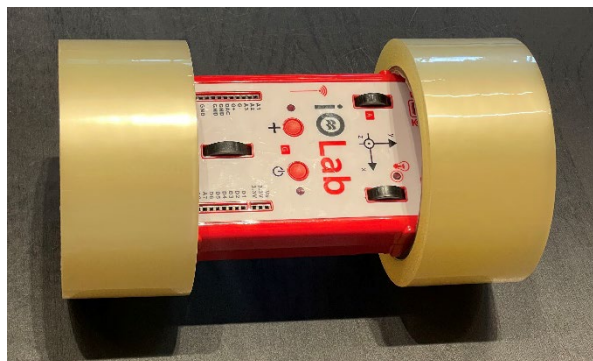


Unlike the actual windmill, the iOLab is not very small compared to the scaled windmill. This means the iOLab contributes to the moment of inertia of the model's wings. Hence the engineers need to correct their measurements taking this additional moment of inertia into account. In this exercise, you will determine the moment of inertia of the iOLab to be able to correct its effect on the scaled system. This makes it possible to relate the scaled model to the actual windmill.

The exercise:

You should plan and execute several attempts to determine the moment of inertia of a rigid body. The rigid body under investigation is the iOLab with two tape rolls attached, however, it is the moment of inertia of the iOLab with respect to the y-axis that should be determined.

You should make two independent determinations of the moment of inertia, one based on an energy consideration, and one based on the rotational analogue of Newton's second law.



(OBS: Do not press the tape rolls past the small notches on the iOLab.)

Write a short lab report about the experiment.