VISUAL CORTEX INSTRUMENTS

Lab 4: Force Evaluation

The Project: Force Evaluation

Company X is designing a new lab space to test prototypes for future projects, and needs to evaluate a series of frictional and force properties of the equipment that will be used in the lab's construction. They need to be able to select materials with appropriate frictional properties to prevent unwanted sliding, slipping, and tipping.

Using your skills in visual odometry, you and your team are asked to characterize a set of potential materials to be used in the construction of this new lab. Frictional properties of materials must be characterized for both static and kinetic conditions.

Your team has now been hired to characterize the frictional properties of various materials.

Equipment:

- Meter stick
- Inclined plane
- Block with various surface areas and surfaces
- Stickers

The Requirements:

In order to demonstrate that you have a full understanding of the frictional and force properties of the new lab equipment, we ask that you use visual odometry and object tracking and location to execute the following:

1. Experimentally determine the static and kinetic coefficients of friction between both surfaces of the provided block (with rubber coating and without) and the inclined plane.
2. Characterize the dependence of the coefficients of friction on the surface area of contact. (Each block has a large and small rubber-covered area, and a large and small uncovered area.)
3. Determine a 95% confidence interval for the average kinetic coefficient of friction, using a minimum of 9 trials in calculating your average.

Presentation of the solution:

Your team must prepare a 2 to 3 page report on the approach that you are using for this project. The report must include:

- A description of the basic physics principles used in your project, including equations and diagrams used to calculate the frictional properties of the materials. Any combination of data, graphs, pictures, etc. demonstrating how the static and kinetic coefficients were determined should be included.
- A clear description of your experimental procedures.
- Final estimates of the values of the coefficients of friction (static and kinetic) for both types of surface, and both sizes of surface area (large side and small side of block).
- A 95% confidence interval estimate of your average kinetic coefficient of friction for the rubber surface (with a minimum of 9 trials used to calculate the average).