

LAB 4: Robotic Vision

Preparation:

Calculate the position of the object on the image captured by the camera using the *Canny edge detector* and *Hough lines*.

Exercise:

Create a Python function *imgproc*, which calculates the pose (position and orientation) of the object captured by the simulated camera, in the camera's coordinate system.

This function has the following **inputs**:

- an image in the form of a *matrix*
- camera parameters defined by the *dictionary*
- the height of the camera in relation to the working plane
- the size of a cube-shaped object placed on the work surface in a random position.

The **outputs** of the function are:

- angle *alpha*, which represents the orientation of the object
- vector *t* of three components representing the position of the center of the object in relation to the camera coordinate system.

The function *template* can be found in the *LV4.py* script along with the *task4* function, which

- creates a *CameraSimulator* object, which simulates a camera viewing the working plane with a cube-shaped object placed on,
- starts the camera simulation,
- calls the *imgproc* function,
- evaluates the position calculated by that function,
- shows the error of estimating the position and orientation of the object.

The dictionary that defines the camera parameters has the following keys:

- *img_size* - a vector of two components, where the first component is the width and the second is the height of the image
- *focal_length* – focal length of the camera in pixels
- *principal_point* - origin of the camera represented by a vector of two components.

Report:

The report should contain:

A modified Python script *surname_4.py* that performs the tasks assigned in the Exercise (LV4 - Robotic Vision) and a written report with a description of the exercise and 3-4 images obtained during work on the exercise with the associated parameters *alpha*, *t* and estimation errors.

Zip the files and upload them by **May 18, 2023**.