

# Shelve Project RoboHub Eindhoven



## Backstory:

In a Robocup@work arena there are multiple kind of service areas, including the shelf. Thus far the shelf is not implemented in RoboHub Eindhoven's Robocup@work robot Suii. Since the shelf comes with some extra challenges compared to a "normal" horizontal table. During the challenges objects must be picked and placed from and of the shelf, this can be on the upper shelf or bottom shelf.

## Description Shelf Robocup@work rulebook 2019:

Service areas may foresee the use of shelves and shelf units as depicted in Figure 3.11. Objects to be delivered or removed from shelves have to be placed or picked sideways. The height of the shelves should be not lesser than 5 cm and not be more than 40 cm. The shelf surface may be specially designed in order to serve specific purposes, e.g. holding objects.

## What do we want:

To score more points in the Robocup@work competition, we want Suii to be able to pick and place object from and of the shelf.

- [MUST] Picking from top shelf
- [COULD] Picking from bottom shelf
- [MUST] Placing on top shelf
- [MUST] Placing on bottom shelf
- [MUST] Implementation in Suii's manipulation code
- [COULD] Implementation in Suii's statemachine

## The end product:

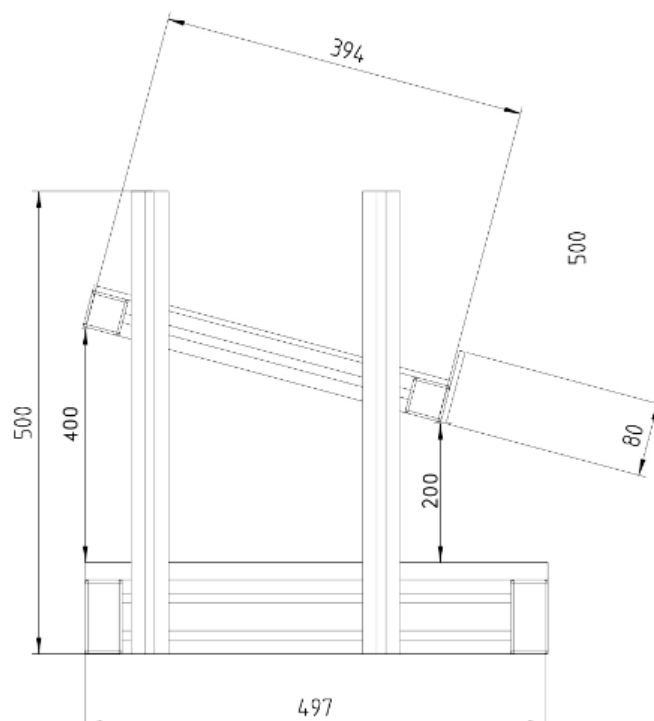
- Implemented code for handling shelves
- The documentation has to be done in Markdown or AsciiDoc so it can be published on GitHub.
- The end product has to be on GitHub where the actual workflow can be followed.
- A class and data flow diagram of the software.
- A demo for the team when the project is finished.

## Known hard parts:

- Picking objects from top shelf:
  - Picking the object in the right orientation, because the bottom part of the object is blocked.
  - How should the camera be positioned for object recognition with the camera that's mounted on the gripper?
- Placing object on top shelf:
  - Placing the object in the right orientation, because the bottom part of the object is blocked.
- Picking objects from bottom shelf:
  - Not hitting the top shelf when moving the robot arm under the top shelf.
  - Detecting object with the camera that's placed on the gripper.
  - How can the arm pick the object without hitting the top shelf?
- Placing object from bottom shelf:
  - Not hitting the top shelf when moving the robot arm under the top shelf.
- Implementing shelf manipulation
  - How is the manipulation code going to know when it must handle a shelf?

## Project requirements from Fontys:

- Money: Expected 0 eu (parts for making a test shelf are ordered)
- To get it working you will need 2 motivated people that want to learn about robotic arms. For implementation in state machine a student with experience in software is recommended.



- It should be doable on the laptops of the students (Ubuntu 18.04 LTS OS).