



Gripper 3.0 with pressure sensor

Background:

To **pick and place** objects from the tables a gripper is needed. Last year we designed a completely 3D printed gripper where the camera and lighting are integrated with the gripper. There are still a few details that can be **improved** and need to be improved. Also, it can be aesthetically more **attractive** since there are now, for example, a lot of cables hanging around.

What we want:

- Sturdy design that is able to pick and place all objects **(Must)**
- Easy to unmount from UR3 **(Must)**
- Easy to replace broken components **(Must)**
- Camera and lighting integration **(Must)**
- Cable management with no hanging cables **(Must)**
- Good 3D drawings and documentation for choices that are made **(Must)**
- Easy integration with UR3 arm in terms of controlling the gripper (motor control etc.) **(Must)**

- Object depending, pre-picking position of gripper arms for cluttered picking challenge and objects that are close together (**Must**)
- Detect miss picks (**Should**)
- Easy upgradable (**Should**)
- Completely 3D printable (**Should**)
- Lightweight (**Could**)
- Make it ROS compatible (URDF, API) **Must**
- Dynamixel servo (**should**)

End product:

- Easy to mount and unmount gripper with **pre-picking gripper arm positions**.
- Easy to **replace or fix** with preferably **3D printed** parts.
- **Integrated** camera and lightning.
- Looks **neat** without **hanging cables** etc.
- Miss pick detection of some sort, or **documentation** about what is **better** (force feedback or pressure sensor)
- The **documentation** has to be done in Markdown or AsciiDoc so it can be published on **GitHub**.
- A class and data flow **diagram** of the software.
- The end product has to be on GitHub where the actual **workflow** can be followed.
- A **demo** for the team when the project is finished.

Research before starting:

Look good at the previously made design and find out what should be better. Furthermore, gather some **inspiration** from the internet and integrate it into the gripper. It is useful if a design is made to make a little **documentation** about it and how to mount it etc. Furthermore, dive into how the gripper can be **controlled** from the UR3 control box. Currently, this is done by an Arduino micro but there might be better options. Furthermore, the **pressure sensor** might be worth looking into because currently, we use the force feedback on the Dynamixel servo, but the same goes for this, there might be better options available.

Project requirements from Fontys:

- 3D printers
- Money: Expected +-50 euro's
- Should be doable from students laptops with the correct licences for **Solidworks, Arduino programming application (or similar), and Cura**
- It is doable for 1 student who has some experience with 3D printing. Else 2 students is preferred.

Extra's:

It is important that you keep the team mates up to date about your status, and ask for input for the design and if there are things that you should add to the gripper.