

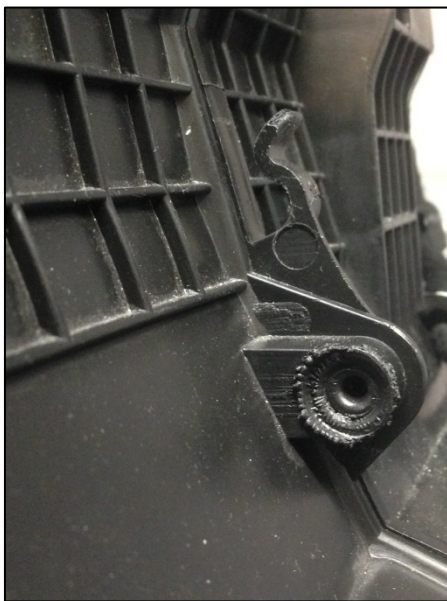
Geometric description and challenges

This deliverable add-on describes the geometric appearance of different hooks from an air-conditioning system and the challenges to thread a cable through the system with the shadow robot hand-lite.

General procedure:

The camera has to locate the cable every time before the cable can be put in the right place. As a result of the recorded data the robot arm combined with the hand-lite from Robot Shadow moves to the given coordinates and the hand-lite has to grab the cable. After holding the cable the controllers of the different joints of the robot hand have to switch from position control to effort control. Then the robot arm can move the hand-lite to the different hooks and push the cable into the hooks. After a successful performance the controllers from the robot hand can switch from effort control to position control for opening the hand without overtaxing.

Hook 1:



Geometric description: s-shaped hook

- Challenges:
- space problem (free space is limited by the casing of the air-conditioning)
 - scheduling of the path for the robot arm to reach the hook with the hand-lite
 - grabbing the cable while robot arm pushes it into the hook
 - hand opening after successful performance without overtaxing the hand-lite

Hook 2:



Geometric description: s-shaped hook with a parabolic cover

Challenges:

- space problem (free space is limited by the casing of the air-conditioning and the parabolic cover)
- for reaching the hook the robot arm has to circumvent the parabolic cover
- grabbing the cable while robot arm pushes it into the hook
- hand opening after successful performance without overtaxing the hand-lite

Hook 3:

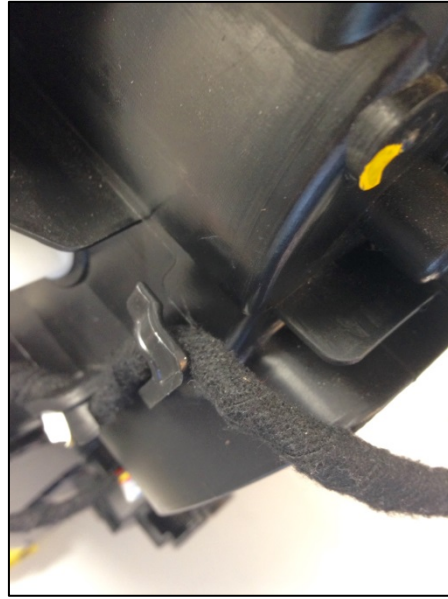


Geometric description: s-shaped hook (much smaller than hook 1)

Challenges:

- detection of the small cable part is more difficult
- space problem (free space is limited by the casing of the air-conditioning)
- scheduling of the path for the robot arm to reach the hook with the hand-lite
- grapping the small cable while robot arm pushes it into the hook
- hand opening after successful performance without overtaxing the hand-lite

Hook 4:



Geometric description: right angled hook

Challenges:

- space problem (free space is limited by the casing of the air-conditioning)
- getting the cable into the hook is more difficult because of the right angled construction
- grasping the small cable while robot arm pushes it into the hook
- hand opening after successful performance without overtaxing the hand-lite