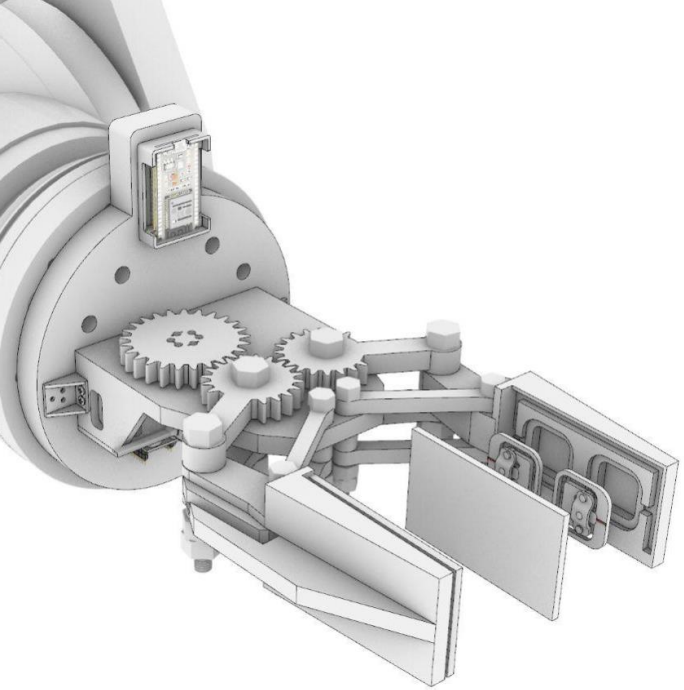
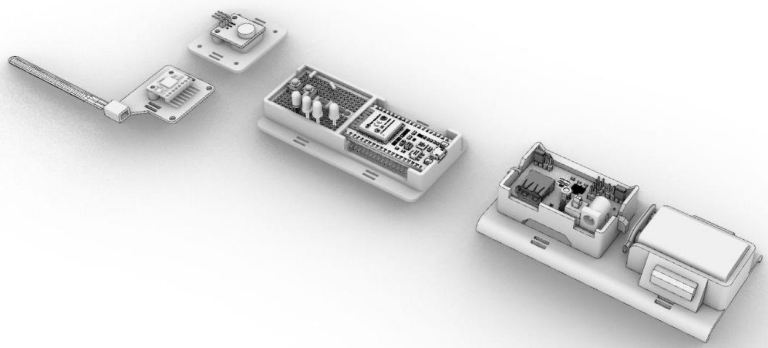


FlexiSleeve

Computational Design and Digital Fabrication

July 2024

Group: Pouria Shahhoseini Nia, YuLun Chiu, Jonas Gorges
Tutors: Nils Opgenorth, Tobias Schwinn, Tim Stark, Xiliu Yang



ICD ITECH

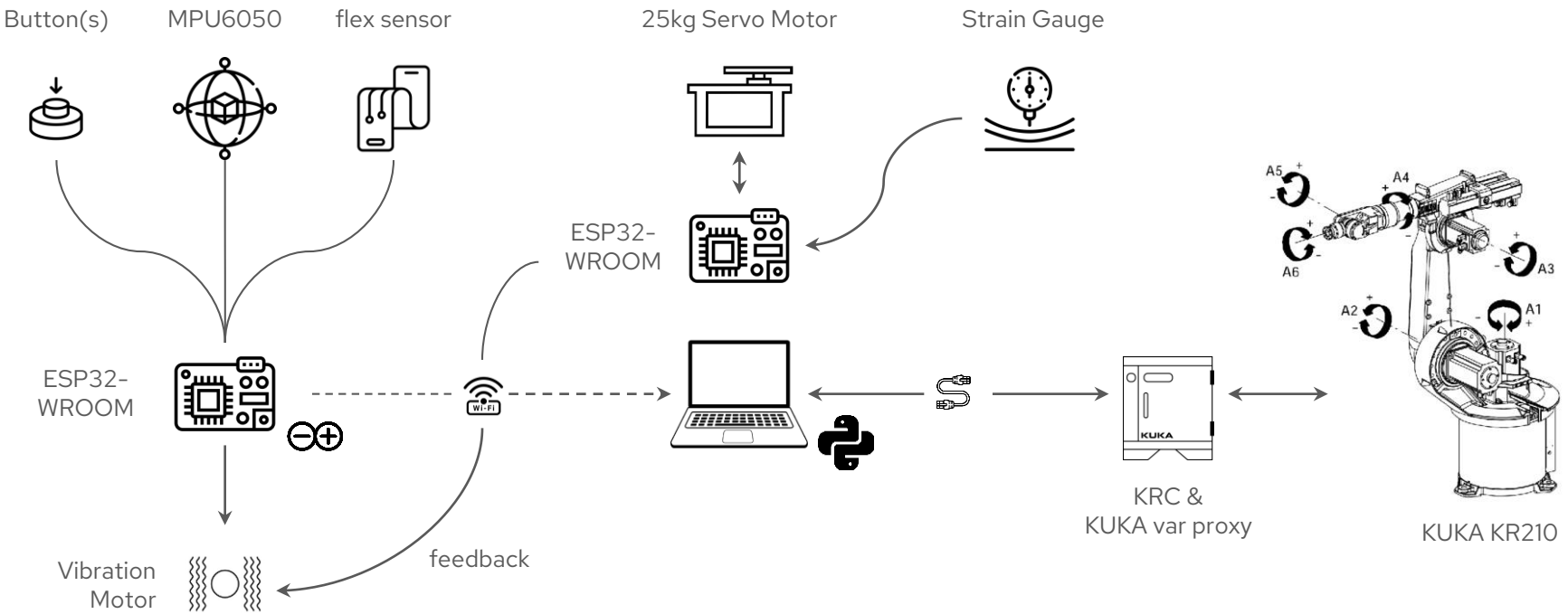
Aim

“Our Aim is to develop an easy and intuitive way to handle any (sensitive) material with a KUKA robot based on the user’s natural hand movement.”

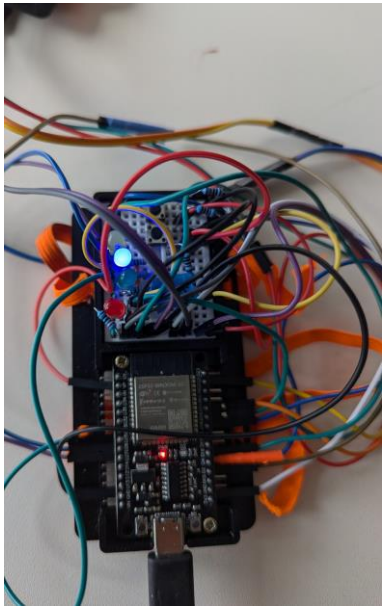
Context

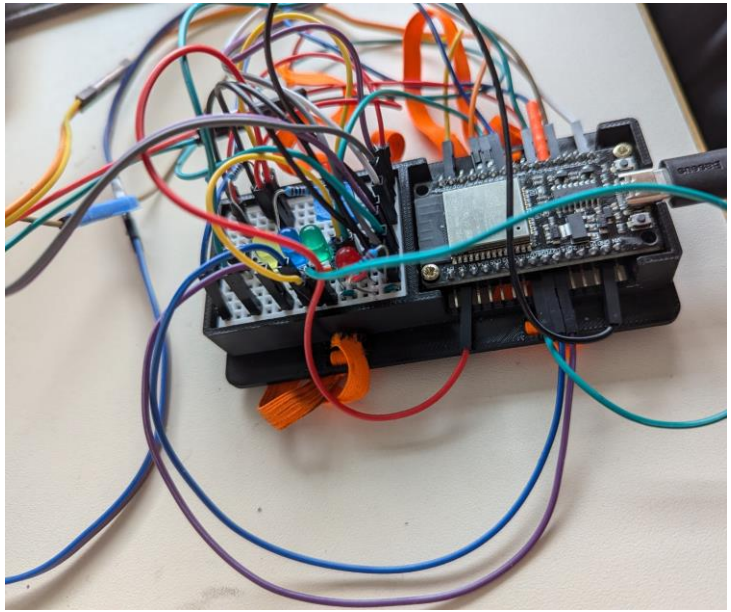
- https://www.universal-robots.com/media/1808294/product-image.jpg
- https://www.kuka.com/en-de/products/robot-systems/robot-controllers/smartpad
- https://www.thekitchn.com/4-easy-ways-to-clean-up-broken-glass-tips-from-the-kitchn-208743

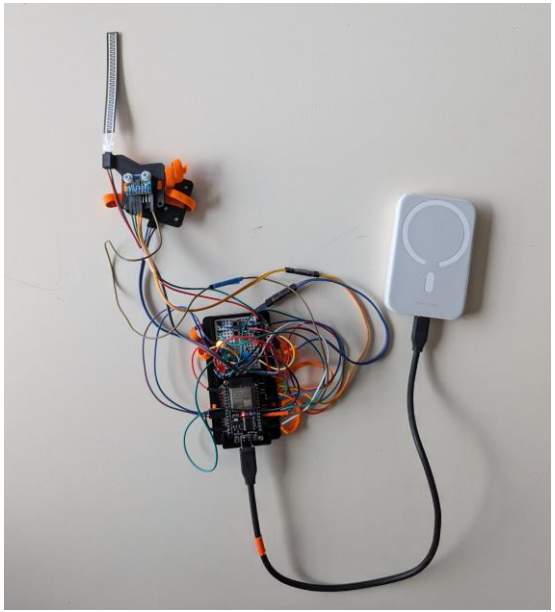
Control Logic



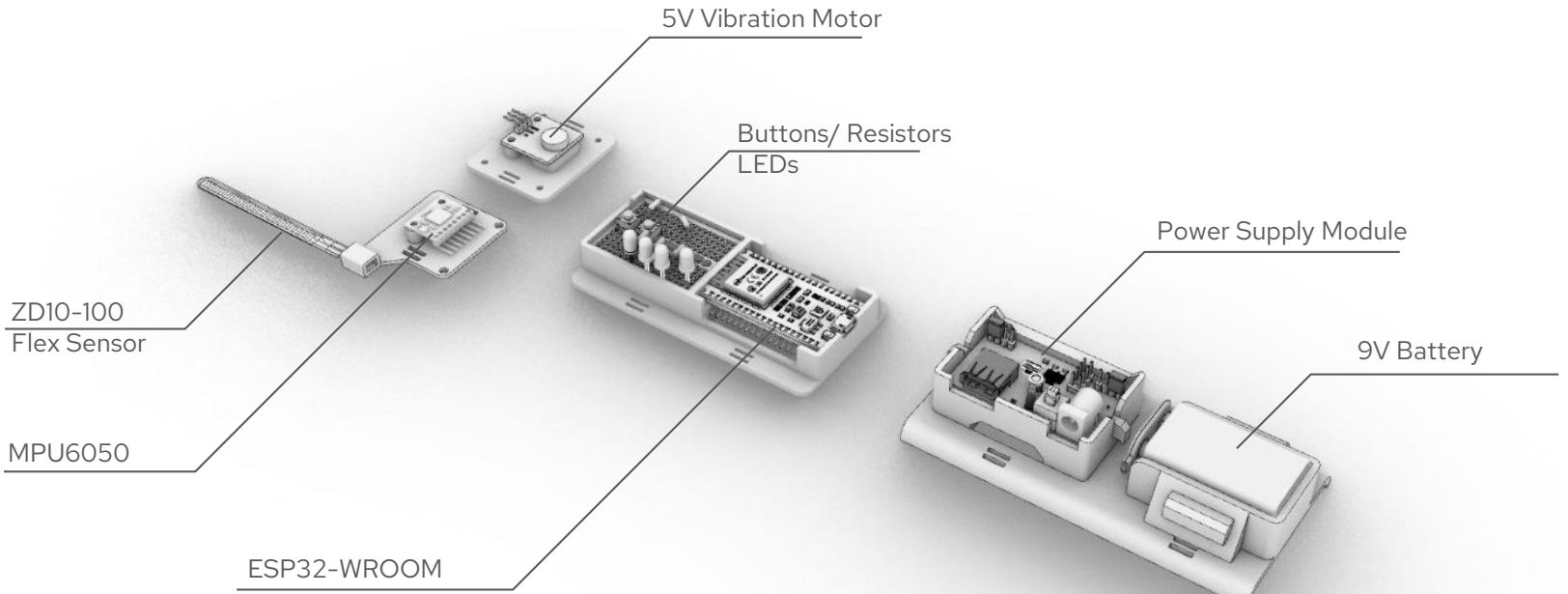
Prototype Development - Sleeve



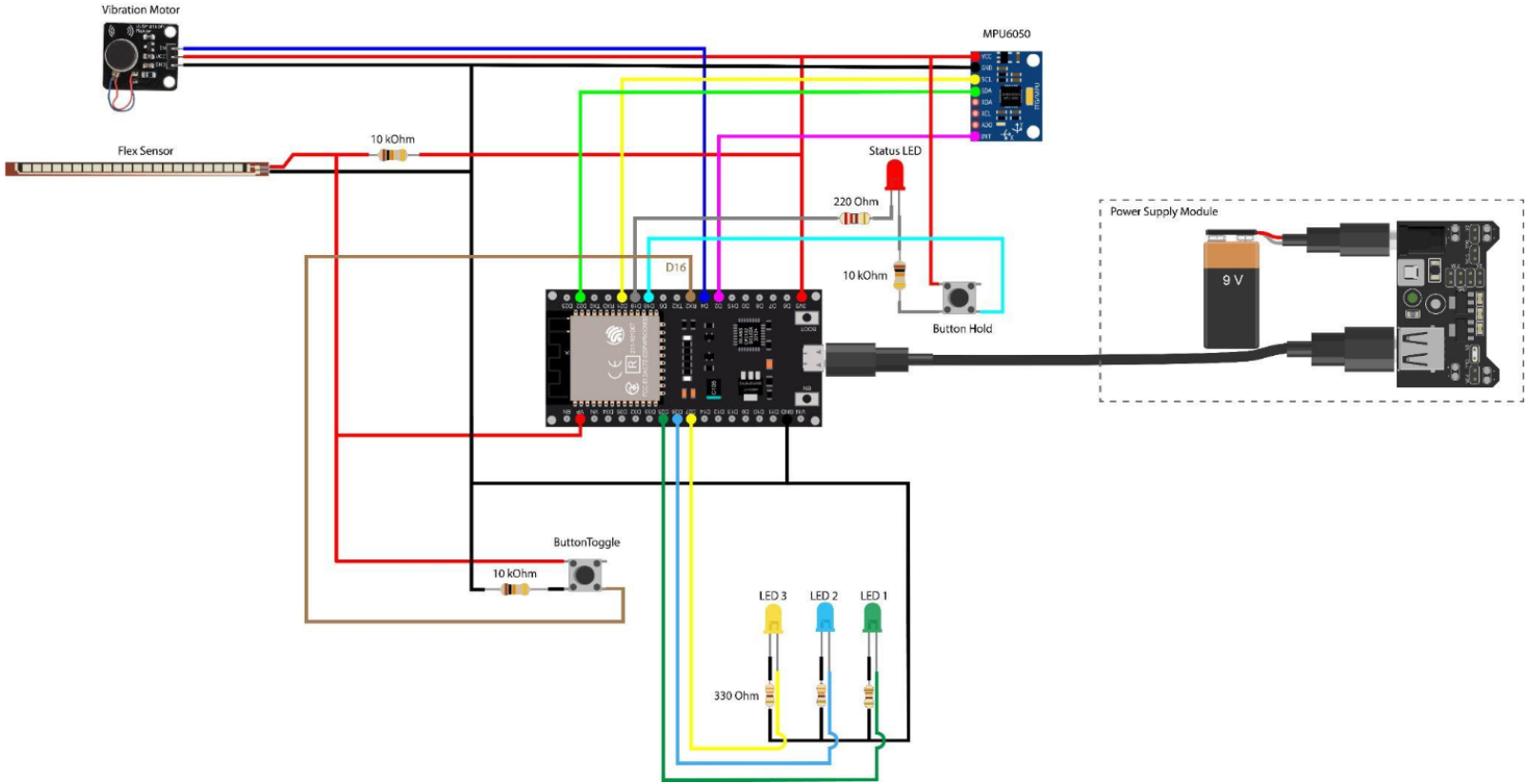




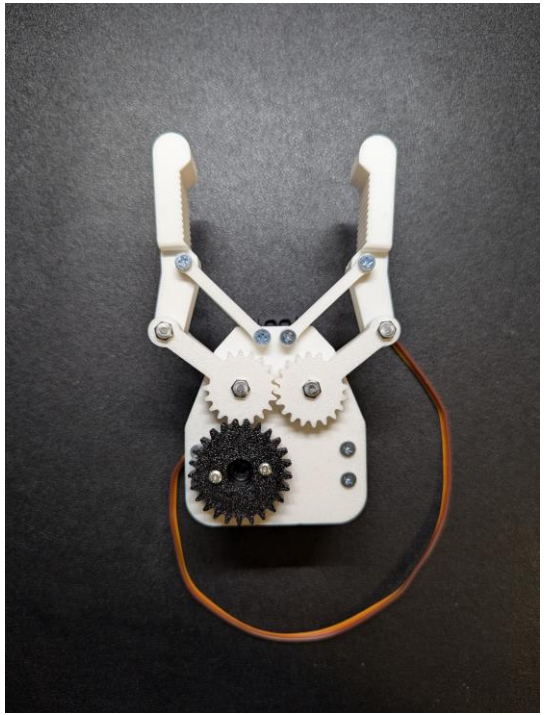
Prototype Development - Sleeve

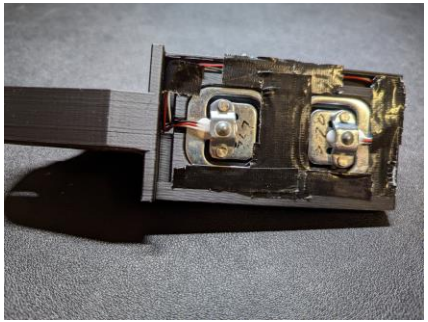


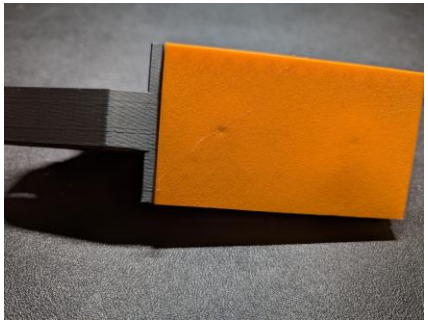
Sleeve Wiring Scheme

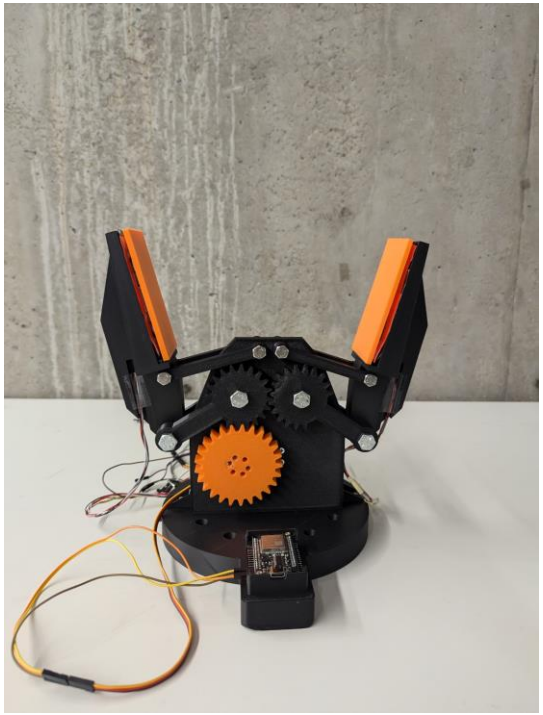


Prototype Development - Gripper

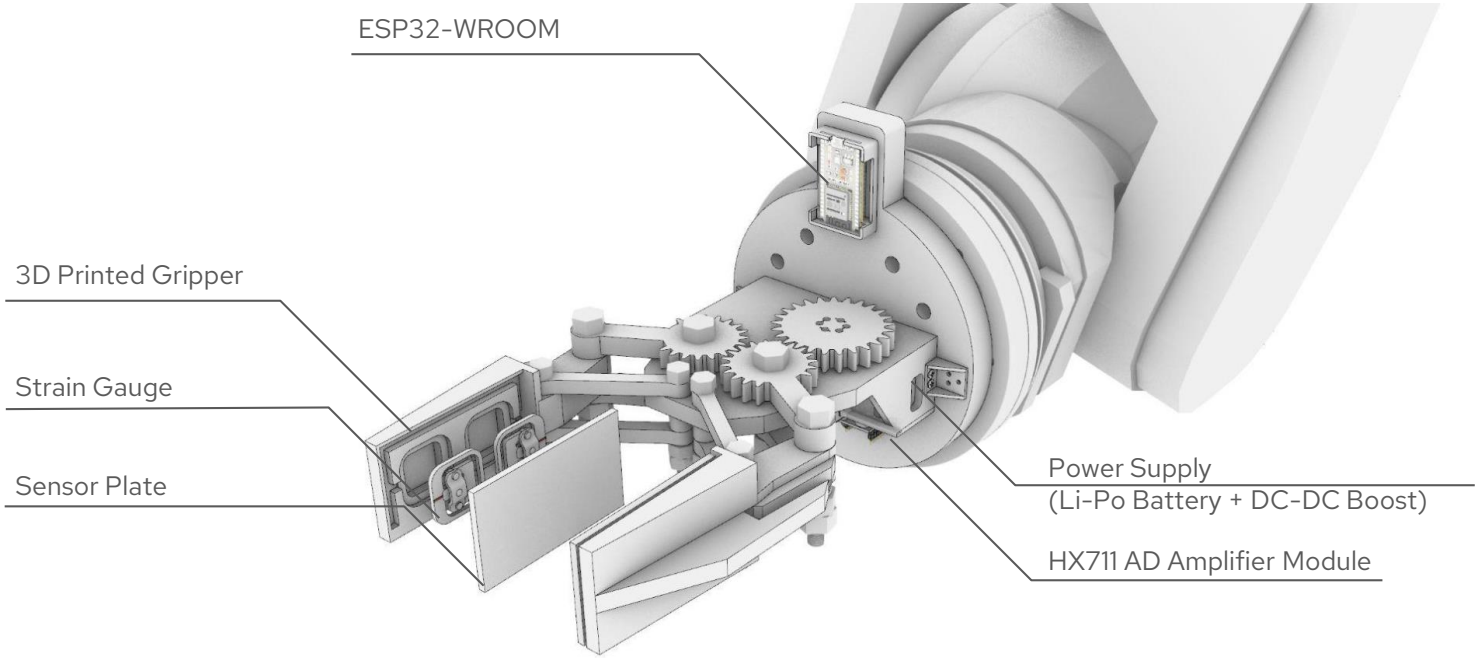




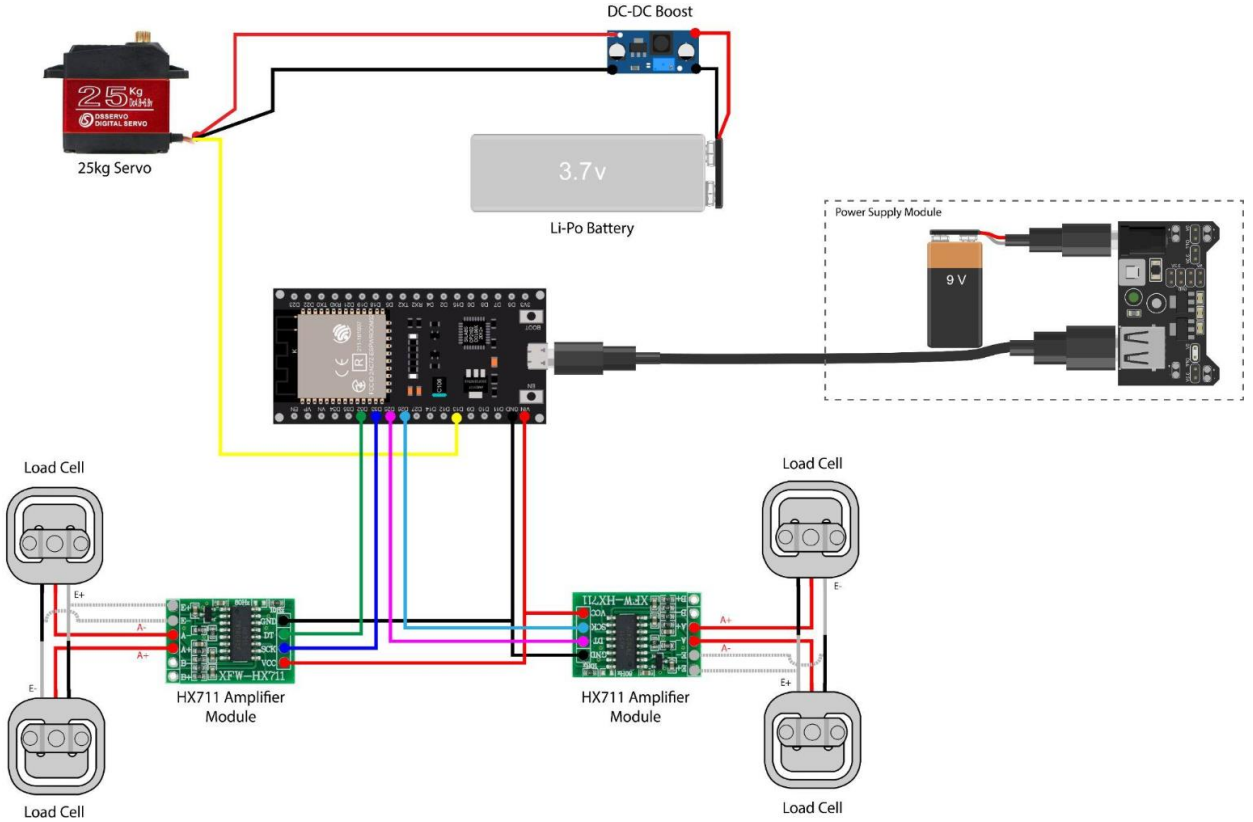




Prototype Development - Gripper



Gripper Wiring Scheme



Code Logic-Motion Control

1 : position mode

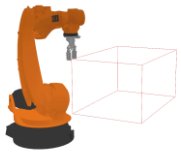
2: rotation mode

3: neutral mode

roll → Y/B-dir.

pitch → X/C-dir

pitch + True → Z/A-dir.



connect to websocket (thread)

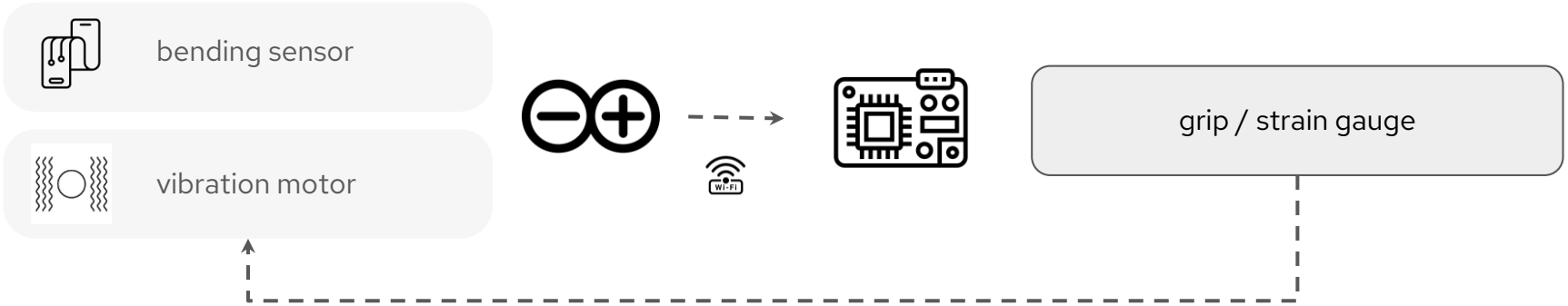
moving average filter

global variables

conditions (main)

- moving mode
- threshold
- moving / rotating direction
- safety area
- send command

Code Logic-Gripper Control

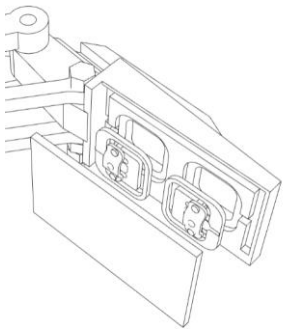


Conclusion

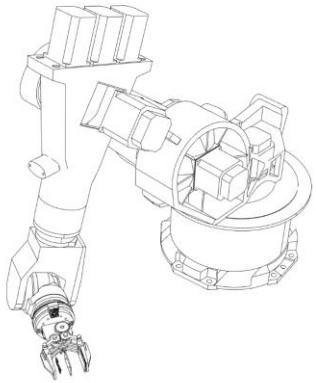
"The outcome of this project includes enhancing human-robot interaction through wearable technology and advanced sensors."

Outlook

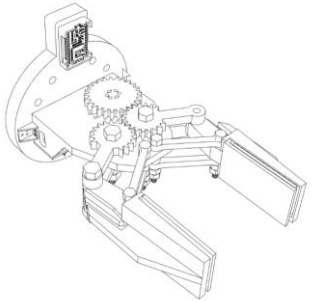
Implement Pressure Sensing



Test in Wangen with robot



(Optional) More precise Gripping/ Movement



FlexiSleeve

Feedback Robot Control Sleeve + Gripper

Computational Design and Digital Fabrication
SoSe 2024

ICD Institute for Computational Design and Construction

ITECH

Submitted to the University of Stuttgart Germany

Group: Pouria Shahhoseini Nia
YuLun Chiu
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