ROS experiences in education and research

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Rokokoo project

[Rokokoo | SELVITYS ROS-ROBOTTIEKOSYSTEEMISTÄ]

https://rokokoo.github.io/rokokoo/

ROS courses in SAMK

Current courses:

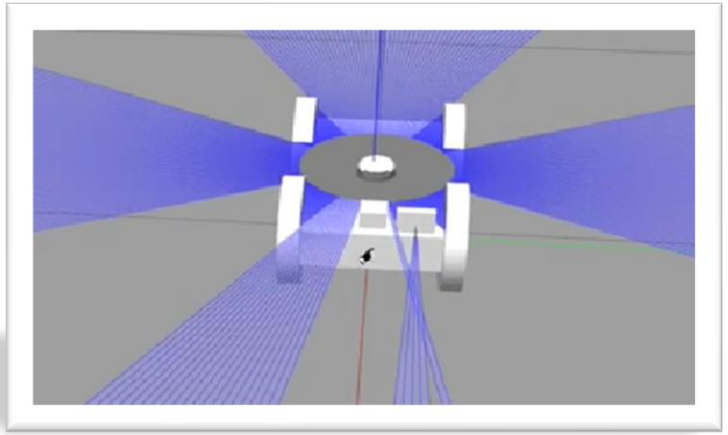
- Open-Source Robot Platforms
- AITheme1

Courses not running at the moment:

- Open-source systems in industrial robotics
- Artificial intelligence in open-source robotics
- Open-source systems in mobile robotics

Open-Source Robot Platforms

Basic ROS course, lecturer in English and Finnish.



There is also open samk/campus online non-stop implementation running.

Starting from very start, installing virtual machine, linux commands etc.

End in building a Gazebo 3d simulated ROS robot.

Autograded coding exercises, for nodes for different pub-subs, launch files ….

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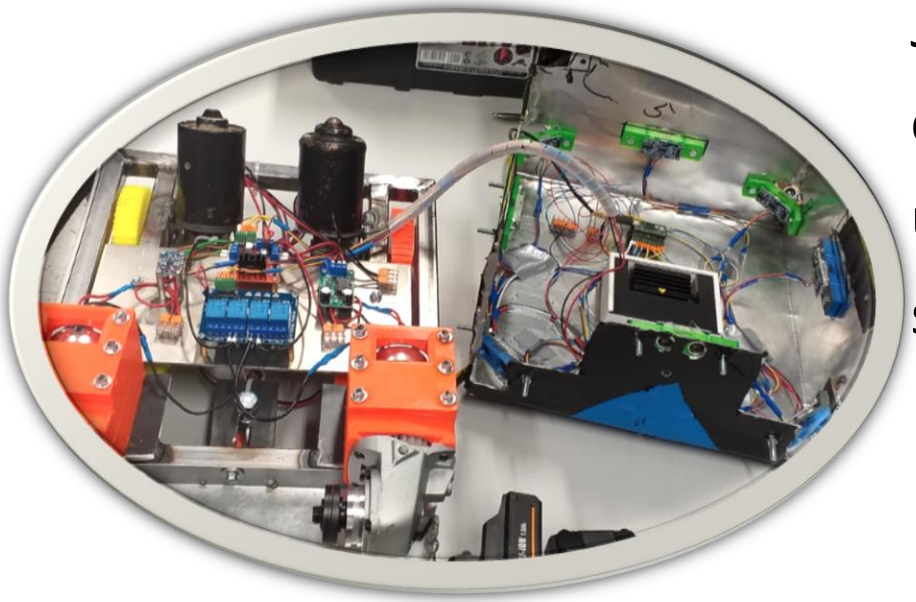
AITheme1



Hands on ROS course for AI students, lecturer in English.

Jetson nano as computer running ROS melodic

cameras with object detection(yolo)

ultrasonic sensors for positions(tensorflow)

some robots have 2d lidars for detection and position

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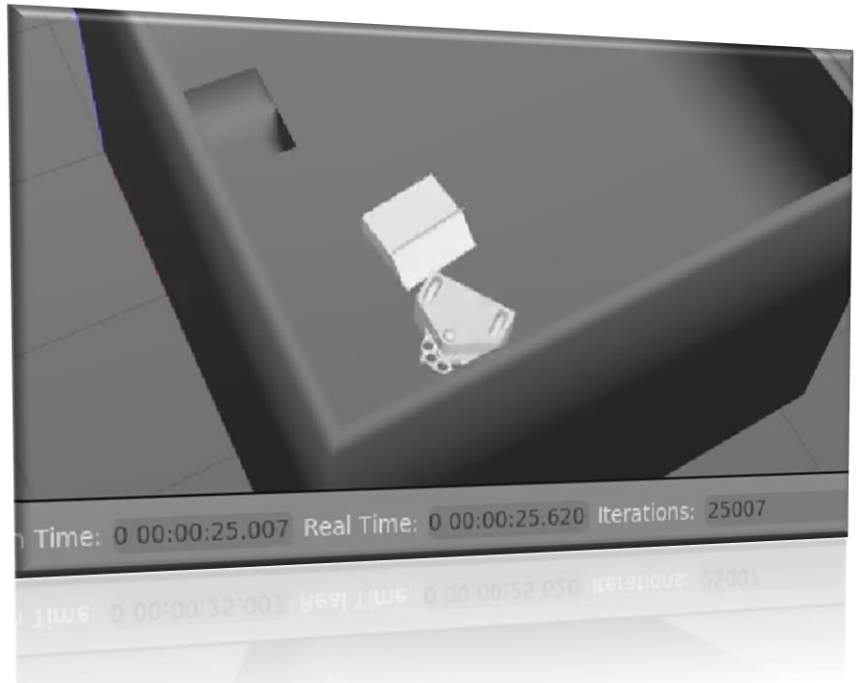
AITheme1

Students can attend from distance, then they use simulation



20+ solid works robot models exported to gazebo.

In simulation we can test and train many algorithms.

collecting of positional data for training.

part of the object detection dataset is also collected from simulation

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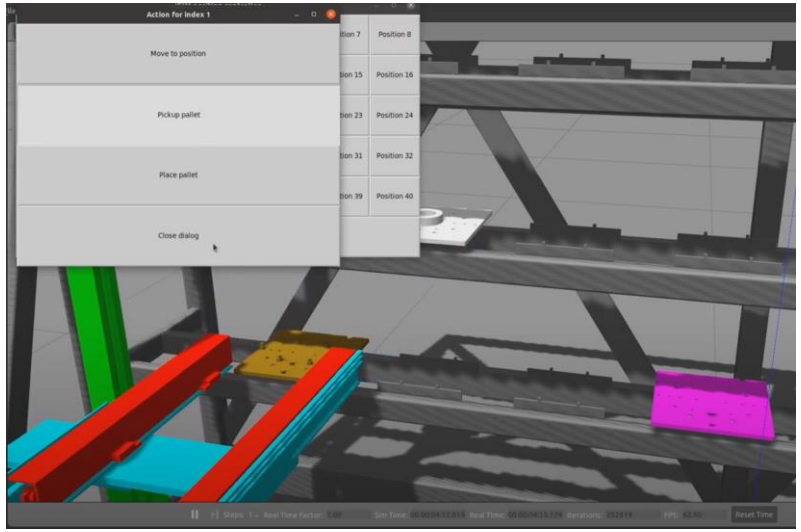
Open-source systems in industrial robotics

Master level course, lecturer previously in Finnish



Robot arms, how to use them in ROS, moveit etc

ROS in industrial automation, storage robot. From exported 3d model to working example with: GUI, database, controllers

[iCIM pallet working and intentional crash in the end - YouTube]

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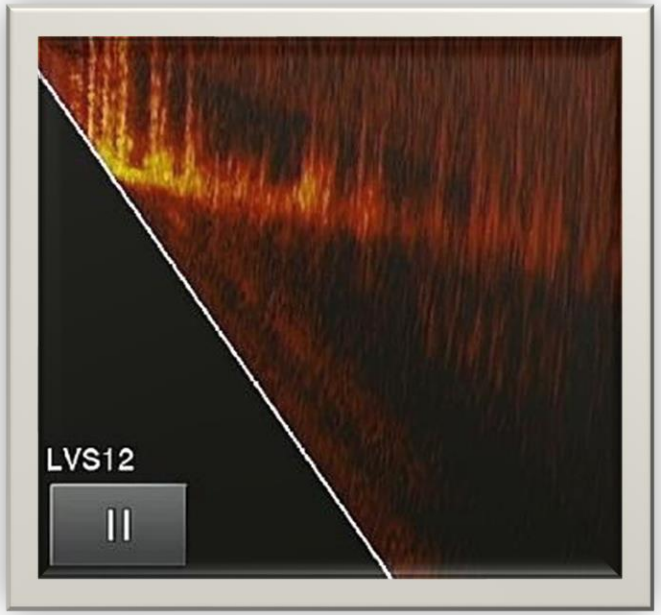
Artificial intelligence in open-source robotics

Master level course, lecturer previously in Finnish



Data collection, in different formats.

Extracting data from rosbags.

Teaching dnn models, and integrating them to ROS.

(yolo, tensorflow, darknet)

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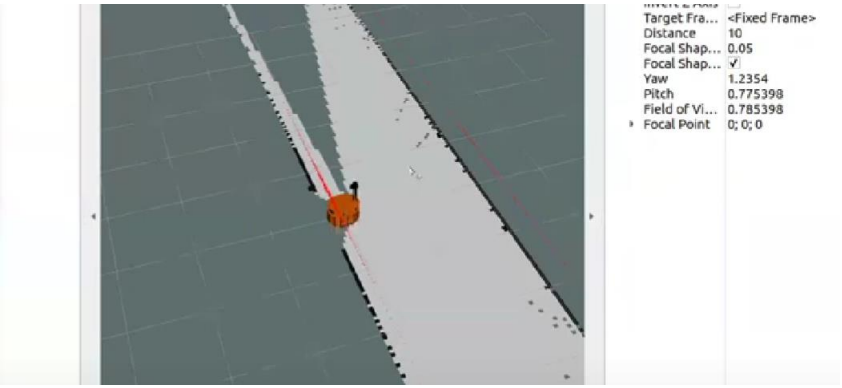
Open-source systems in mobile robotics

Master level course, lecturer previously in Finnish



ROS in docker, ROS in multiple machines

Kalman filters

mapping, SLAM

frontier exploration

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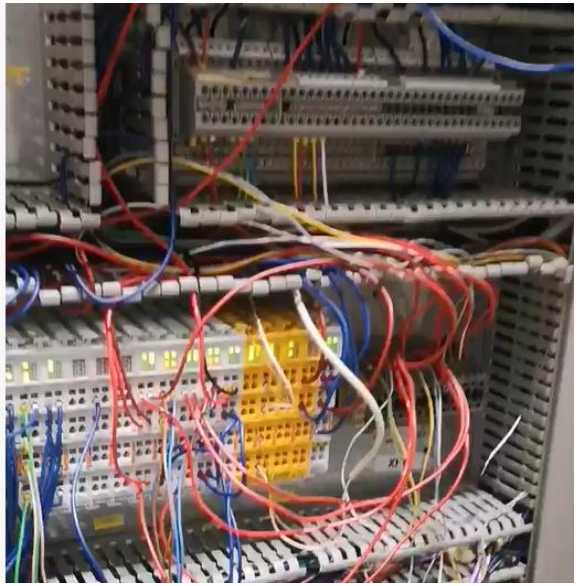
ROS in industrial automation

Beckhoff industrial automation io modules, with ethercat connected to ROS running in raspberry pi



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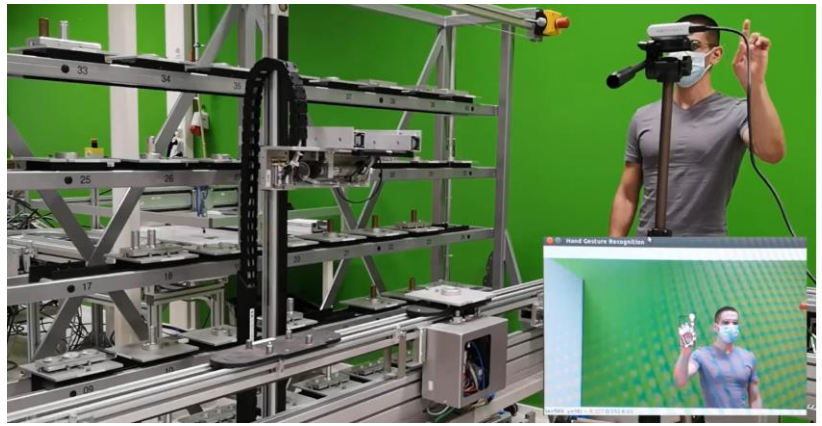
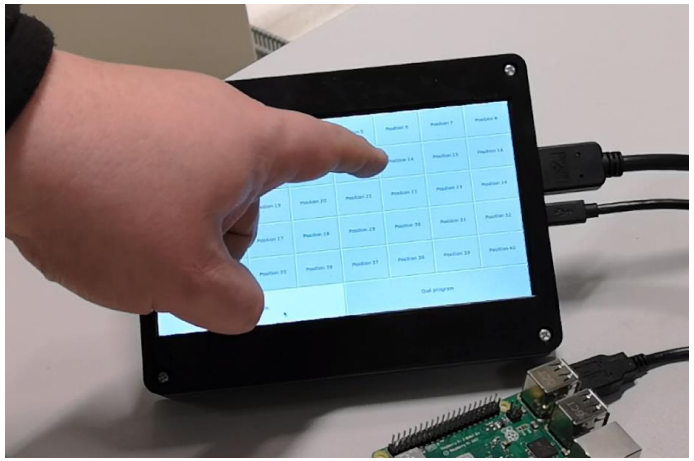
ROS in industrial automation

Controlling storage robot with game controller, touch screen and hand with pose estimation.





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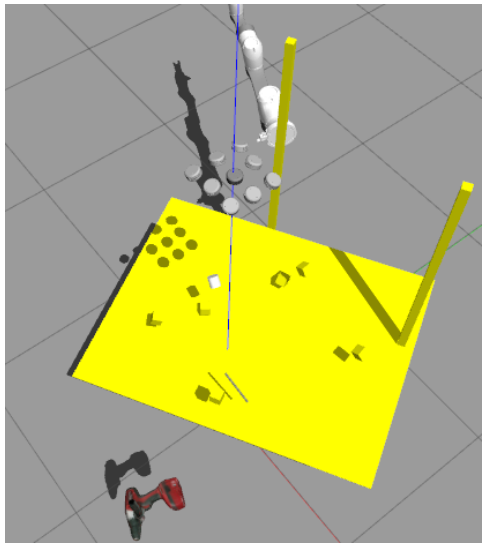
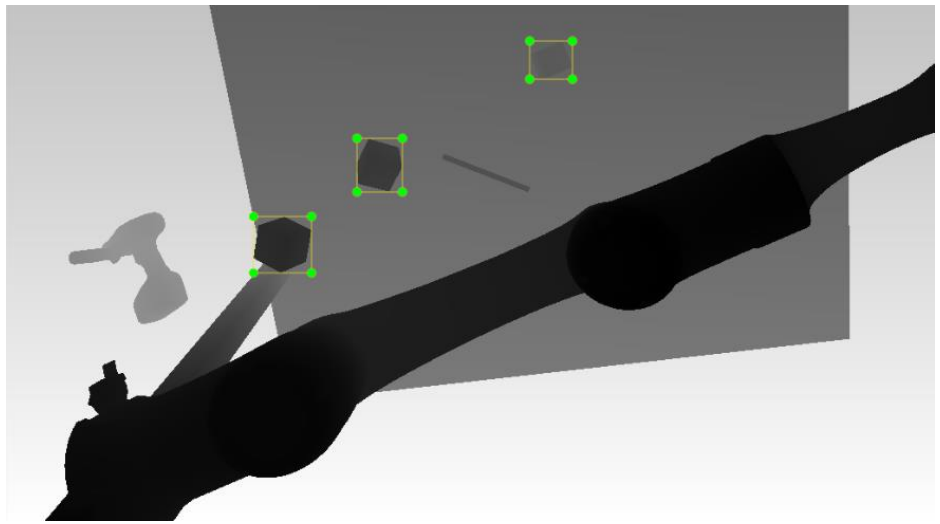
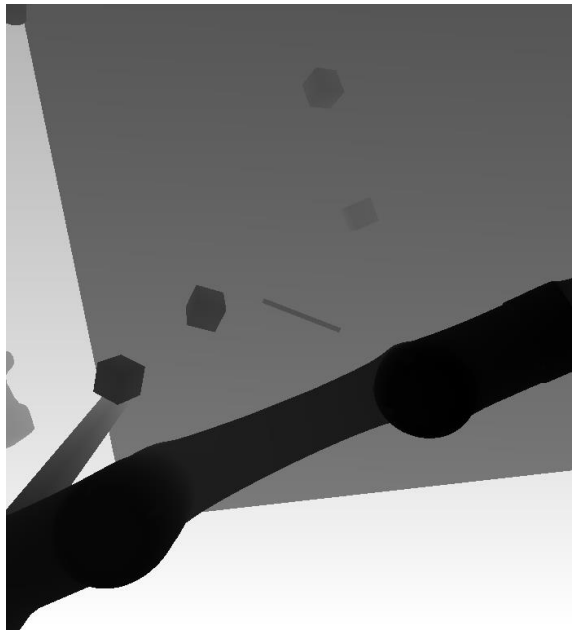
ROS in AI



Using Gazebo and self supervised data collection/annotation from 3d camera





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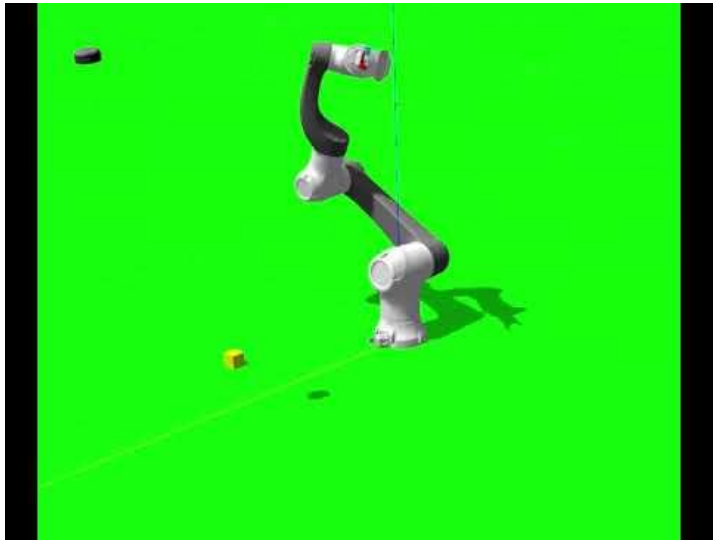
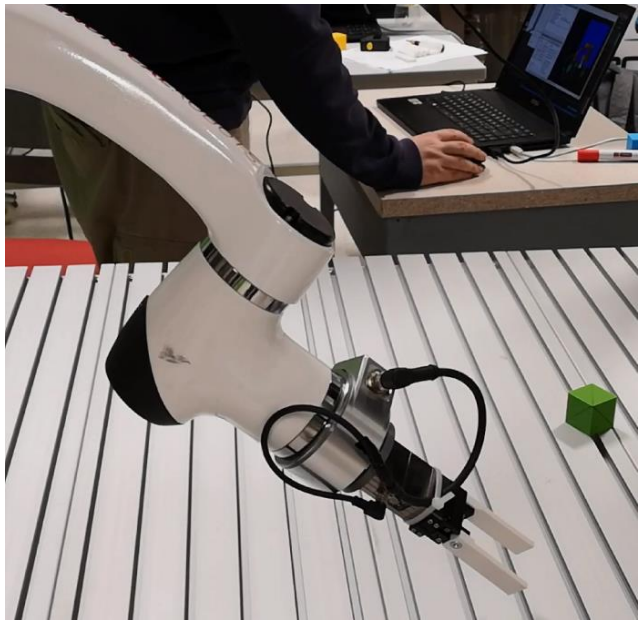
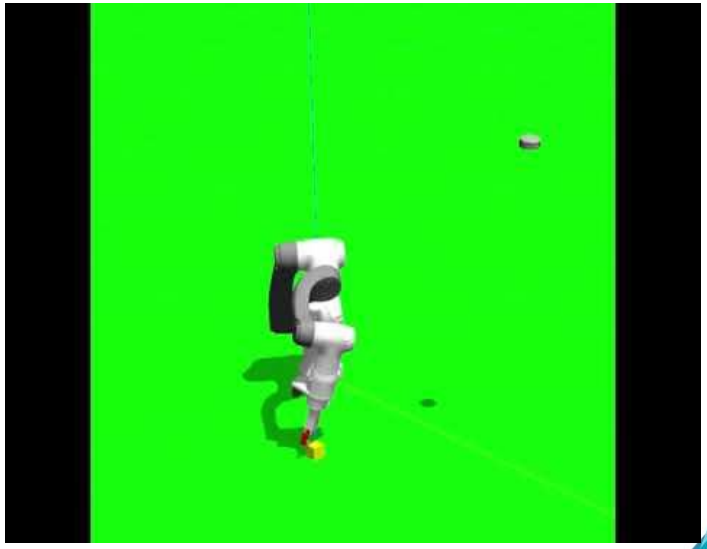
ROS in AI

Reinforcement learning, learning by trying, robot is trying to learn how to find a way to cubic.







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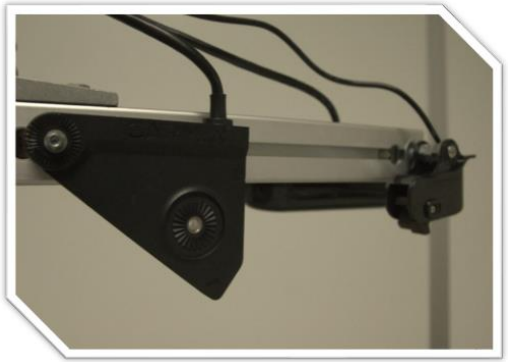
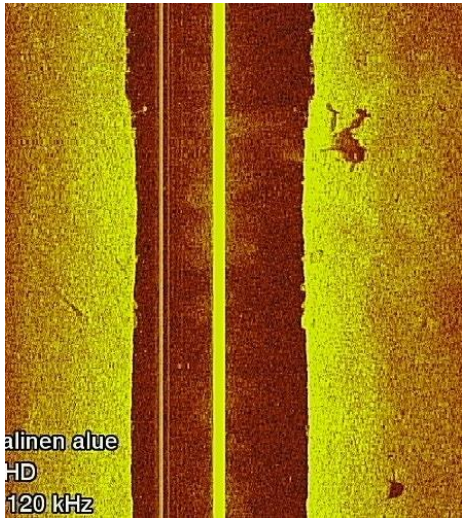
ROS in data collection

Data collecting to rosbag from different sensors, imu, nmea2000, sonar, waterspeed.





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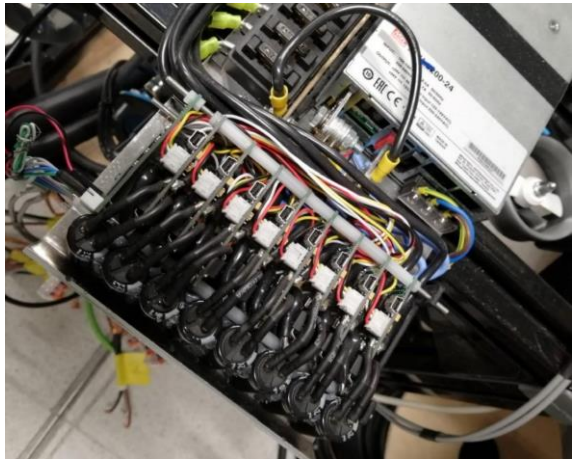
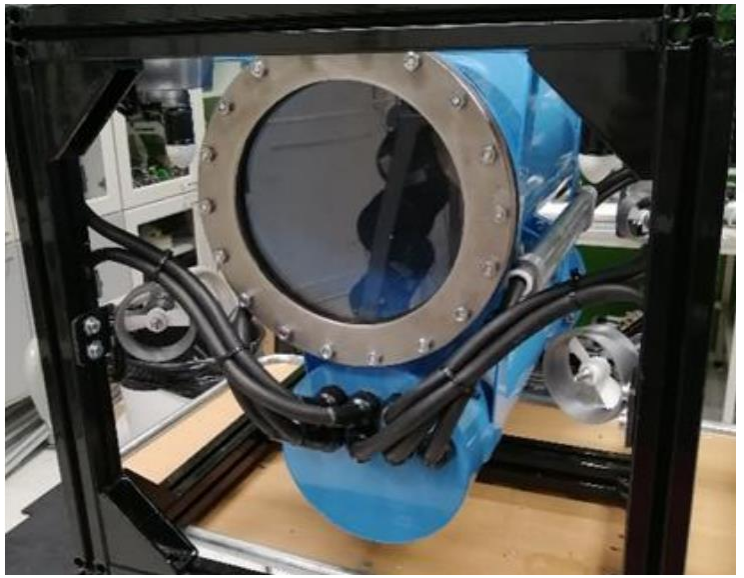
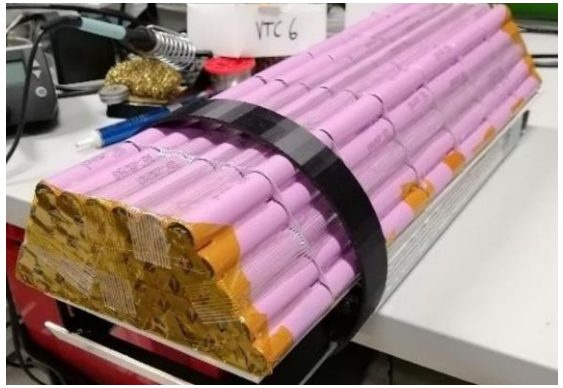
ROS in AUV – project continues today







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Thank you

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