# Introduction to Lego Kits

Building an Embodied AI Mobile Platform

Gian Paolo Currà, gicur22@student.sdu.dk

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# Outline

- Last Lecture’s summary
- Behaviour-based Architecture
- Kit Sensors and Actuators
- Pybricks in Wonderland
- Line Follower

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# Lego Mindstorm EV3 kits


https://www.ev3dev.org/
https://www.ev3dev.org/docs/kernel-hackers-notebook/ev3-processor/

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# Video For Setting up an executable script

[MINDSTORMS EV3 Support | Everything You Need | LEGO® Education]


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# Behaviors concept

Behavior-based – “Think the way you act”

- A “Behavior” refers to a specific set of actions or responses exhibited by a robot in response to its environment or certain stimuli

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# Example subsumption architecture

- Implement each behaviour as a self-sufficient function

- A mechanism must exist to prioritise behaviors by ordering them in an **infinite loop** that gives each behaviour a chance to execute (as long as the processing is fast)
- Only one behaviour (the highest priority, active behaviour) controls the actuators
- Every behaviour writes directly to the variable(s) that control actuators, but, defers acting upon it. Only the “last”, highest priority behaviour gets control

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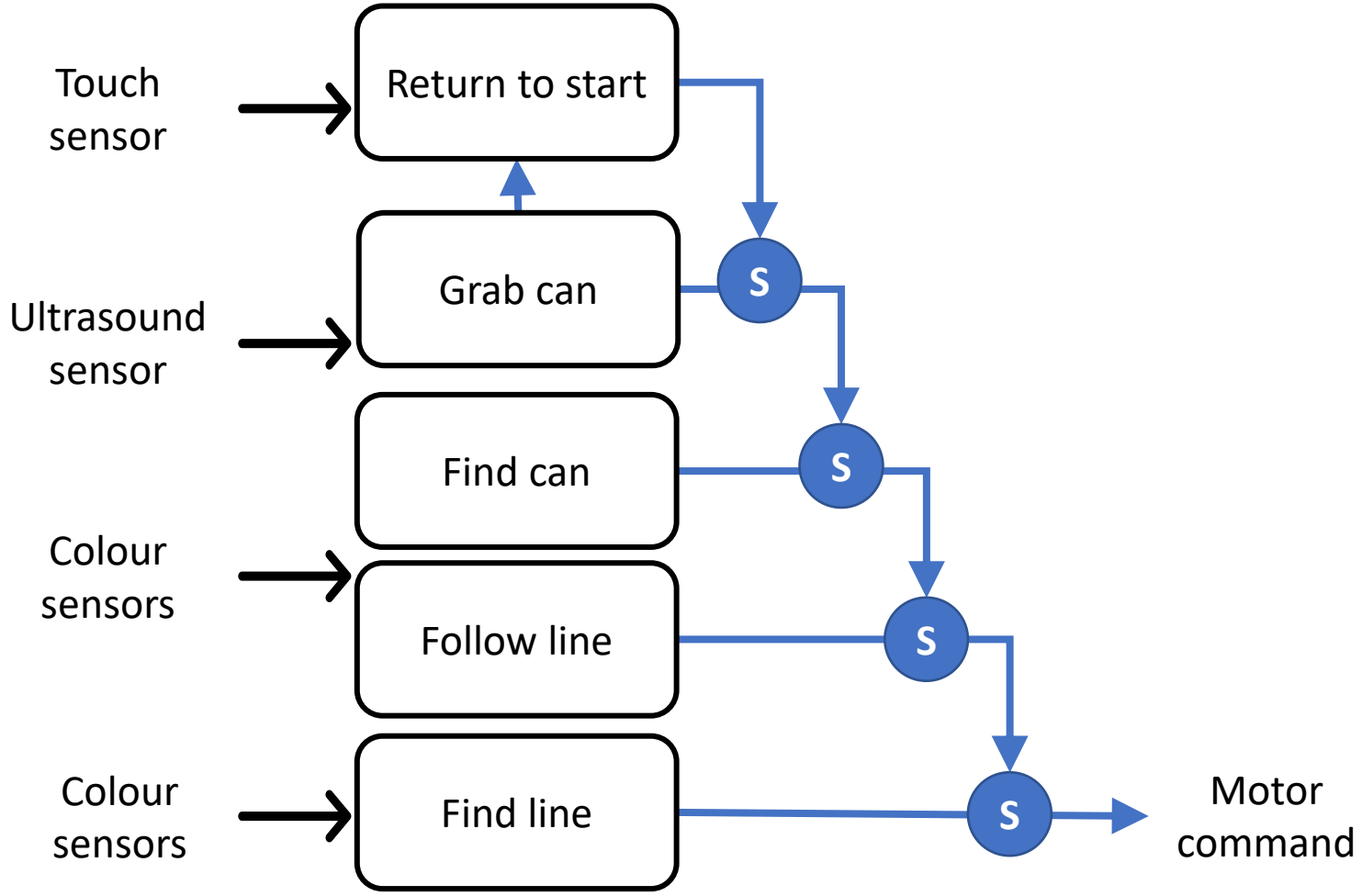
# Example subsumption architecture

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# Pybricks in Wonderland

[Pybricks Documentation — pybricks v3.3.0b5 documentation]

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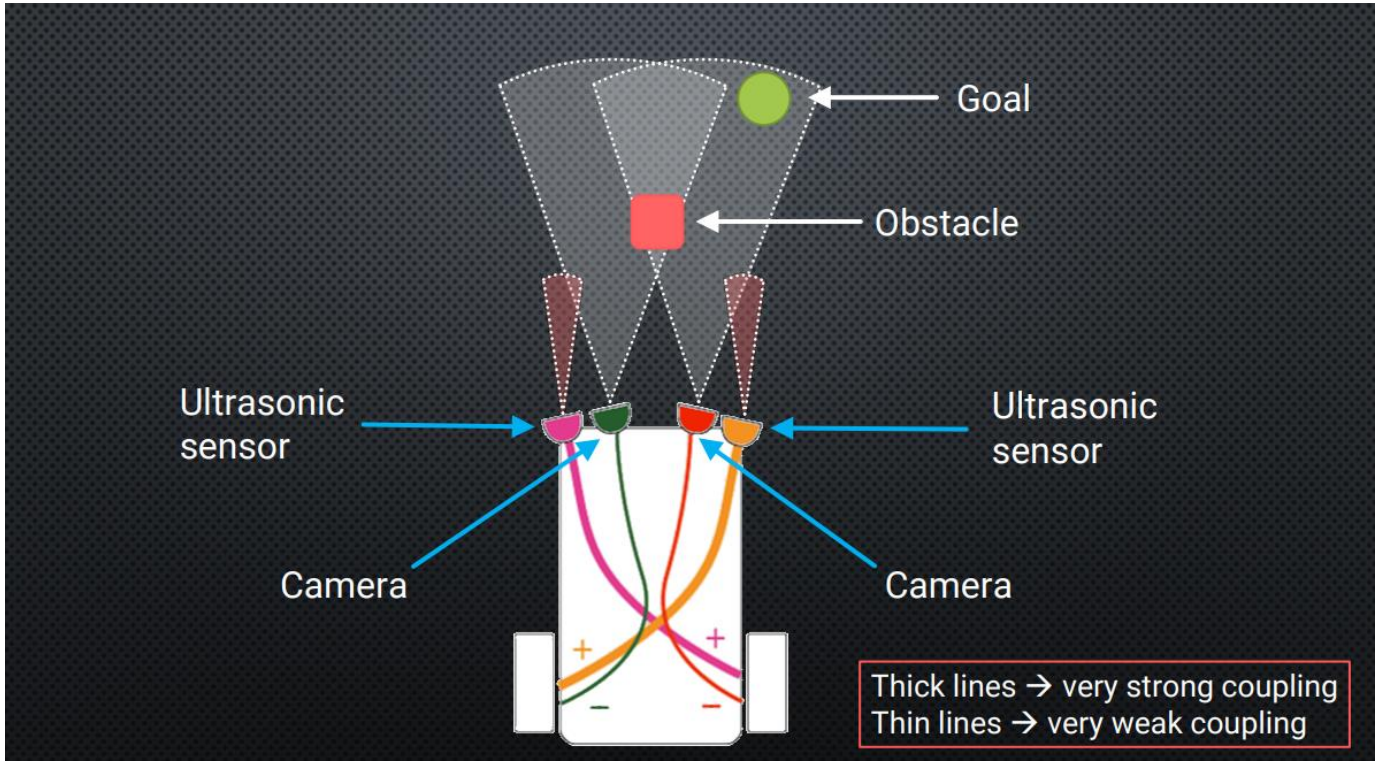
# Braitenberg Vehicle

[Braitenberg vehicles | Harmen de Weerd]

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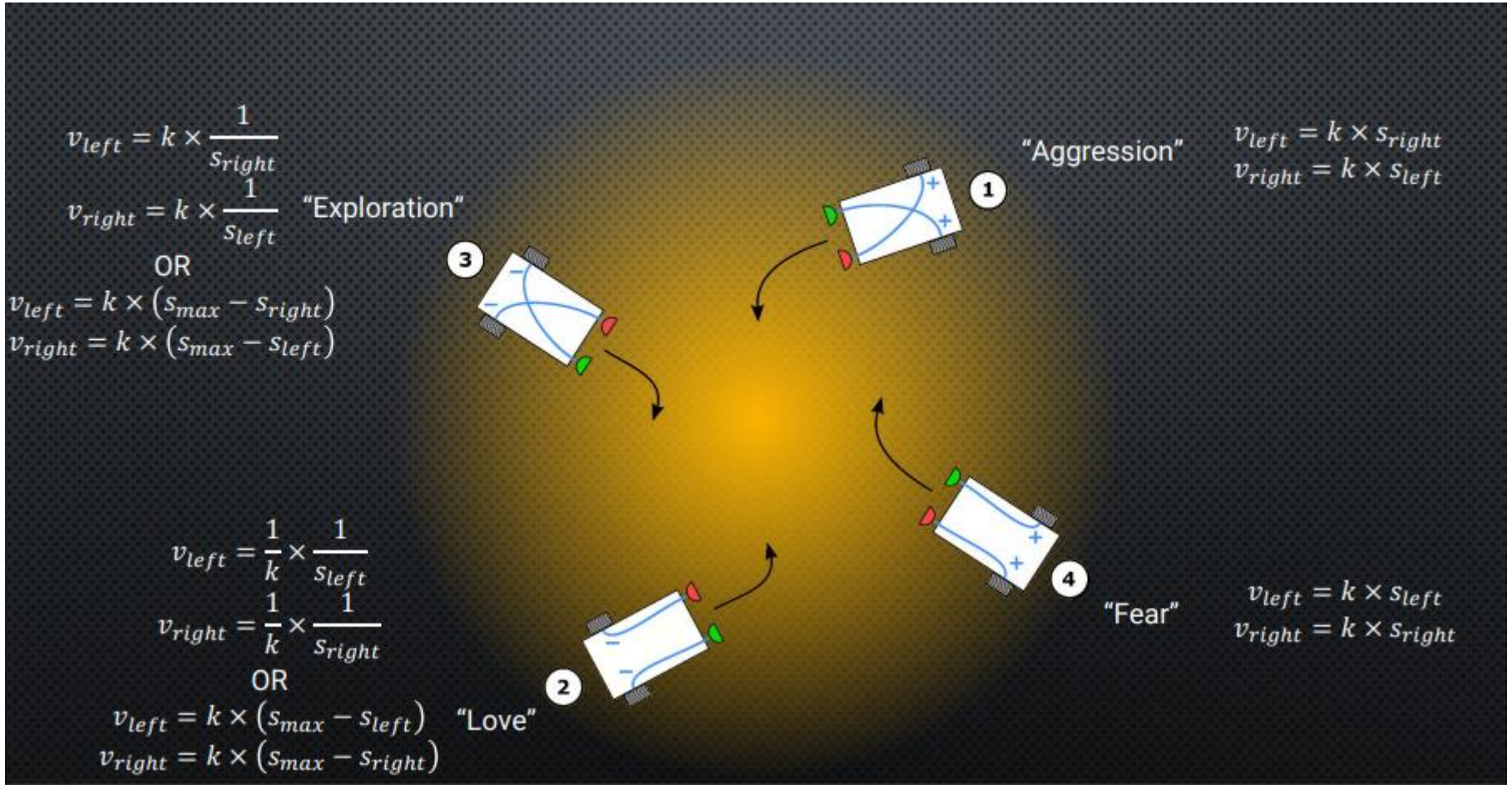
# Line Follower

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# Line Follower

- A sensor **is directly connected** to an actuator (e.g. light sensor to wheel motor)
- Sensorimotor connections can be **ipsilateral** or **contralateral** (location impact) and **excitatory** or **inhibitory** (functional impact)
- Depending on how sensors and wheels are connected, the vehicle exhibits different movement behaviours.

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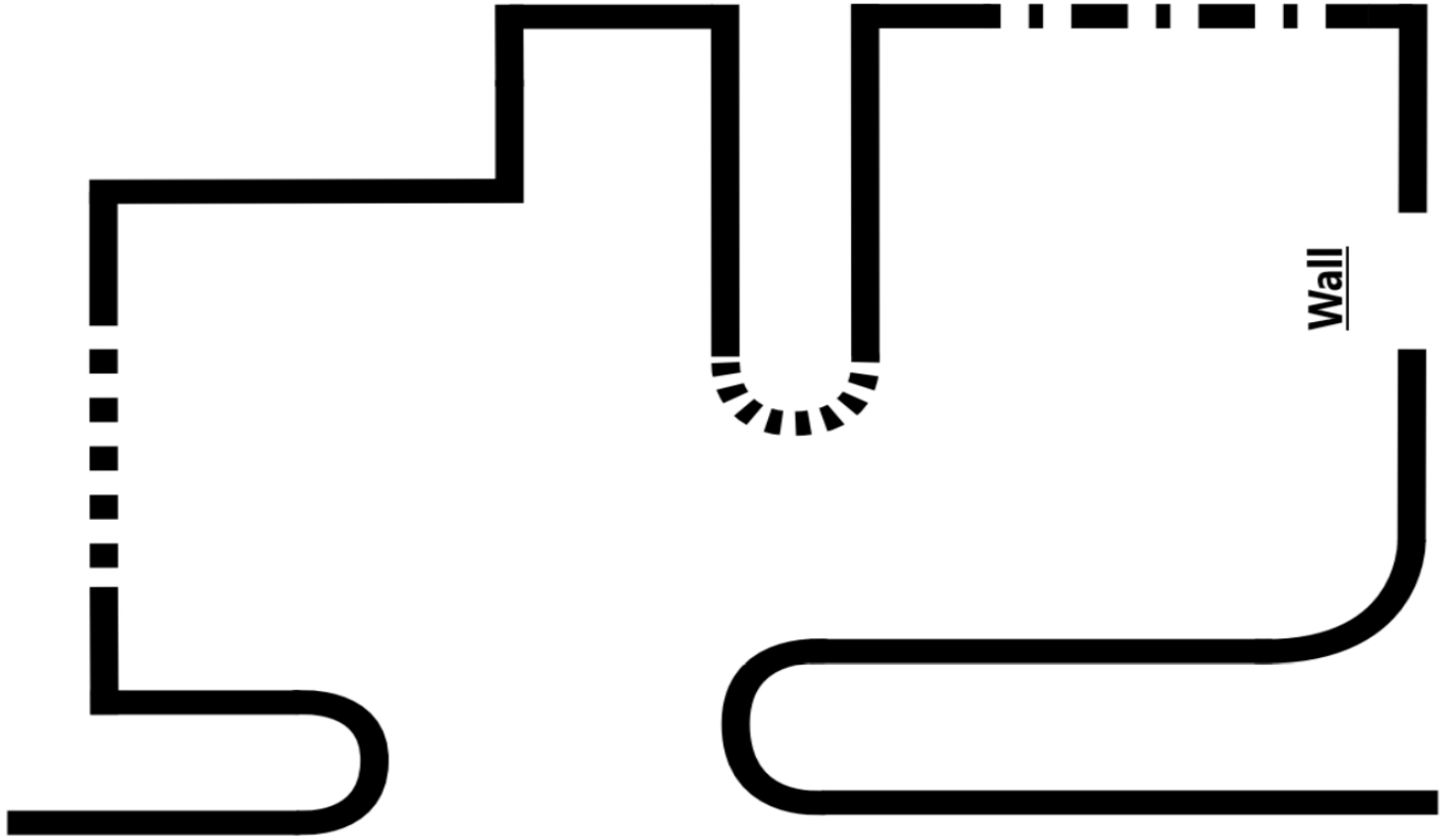
# Map Example

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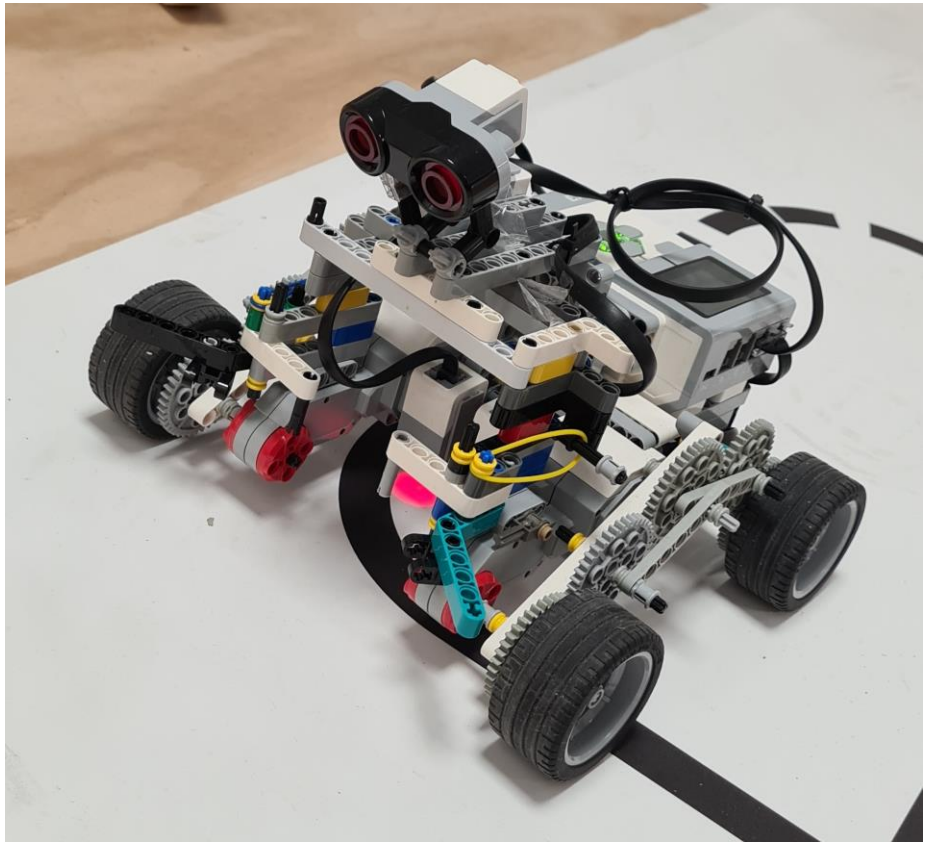
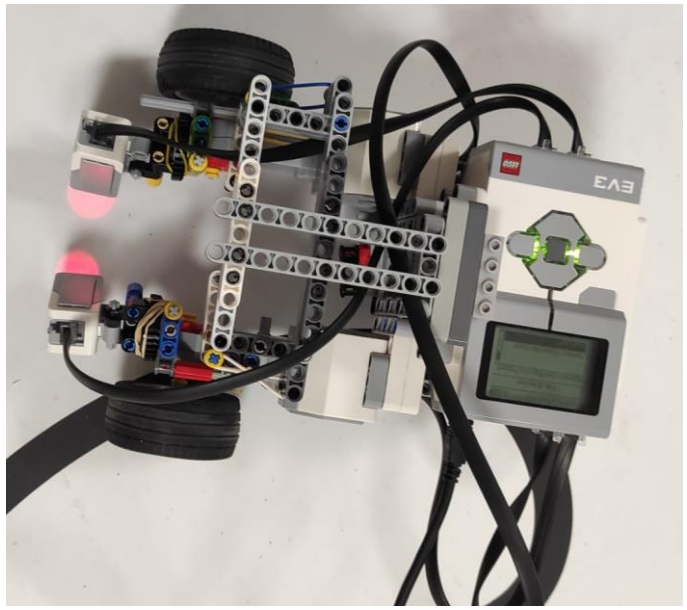
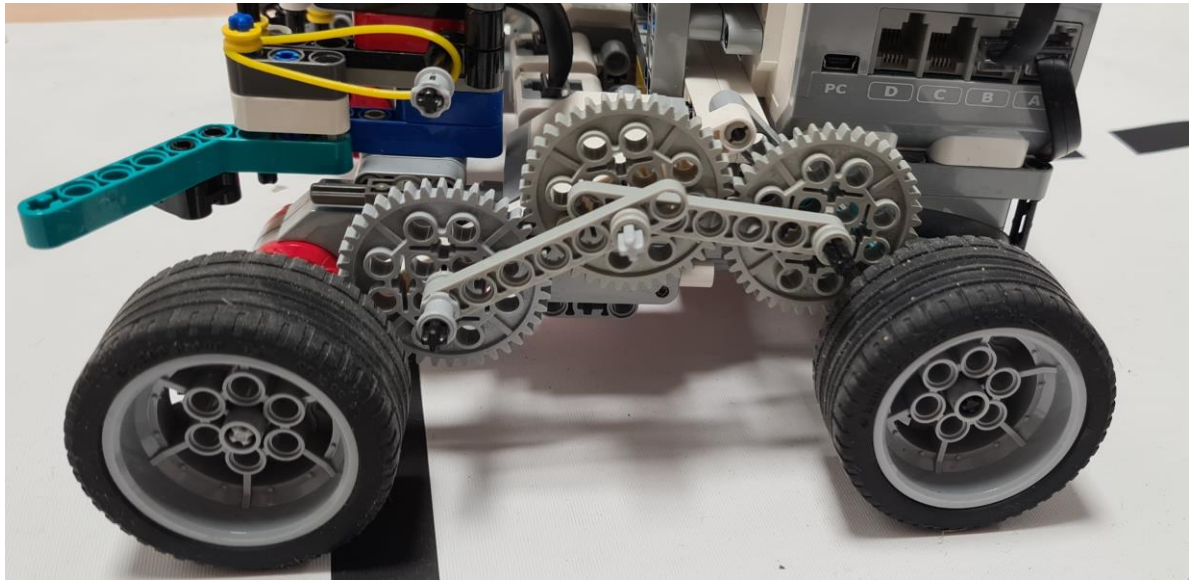
# Setups Examples



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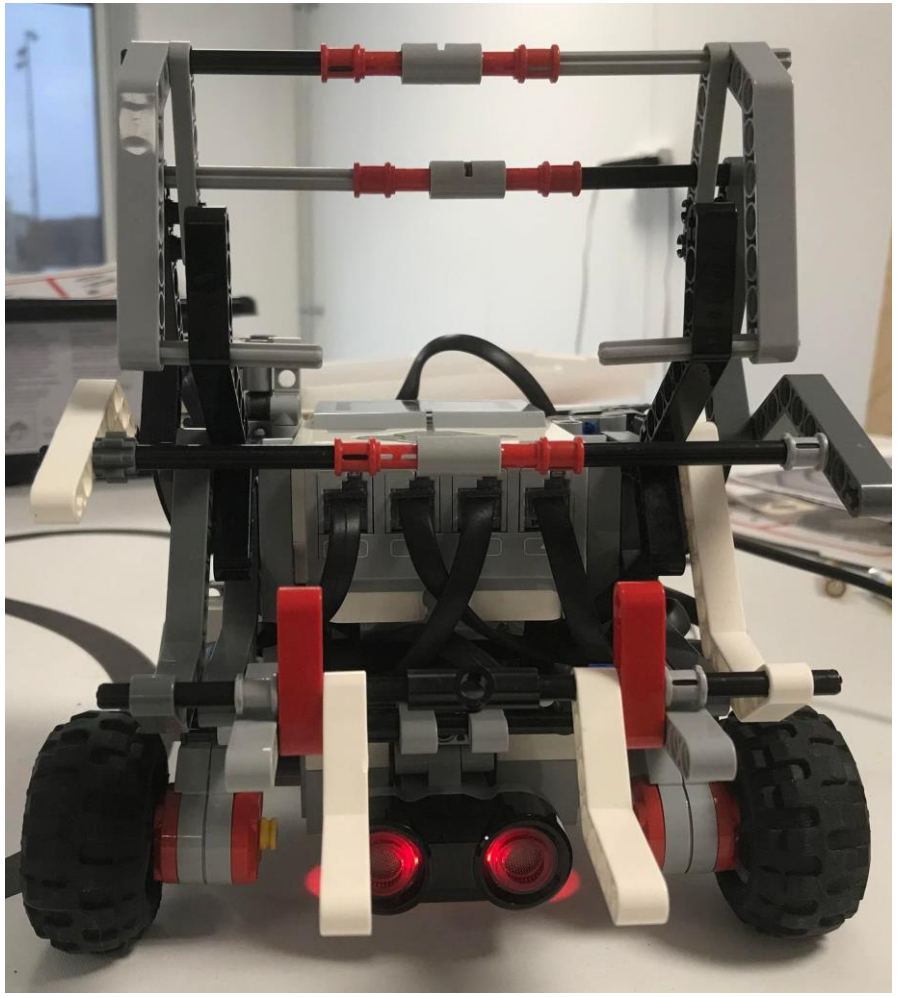

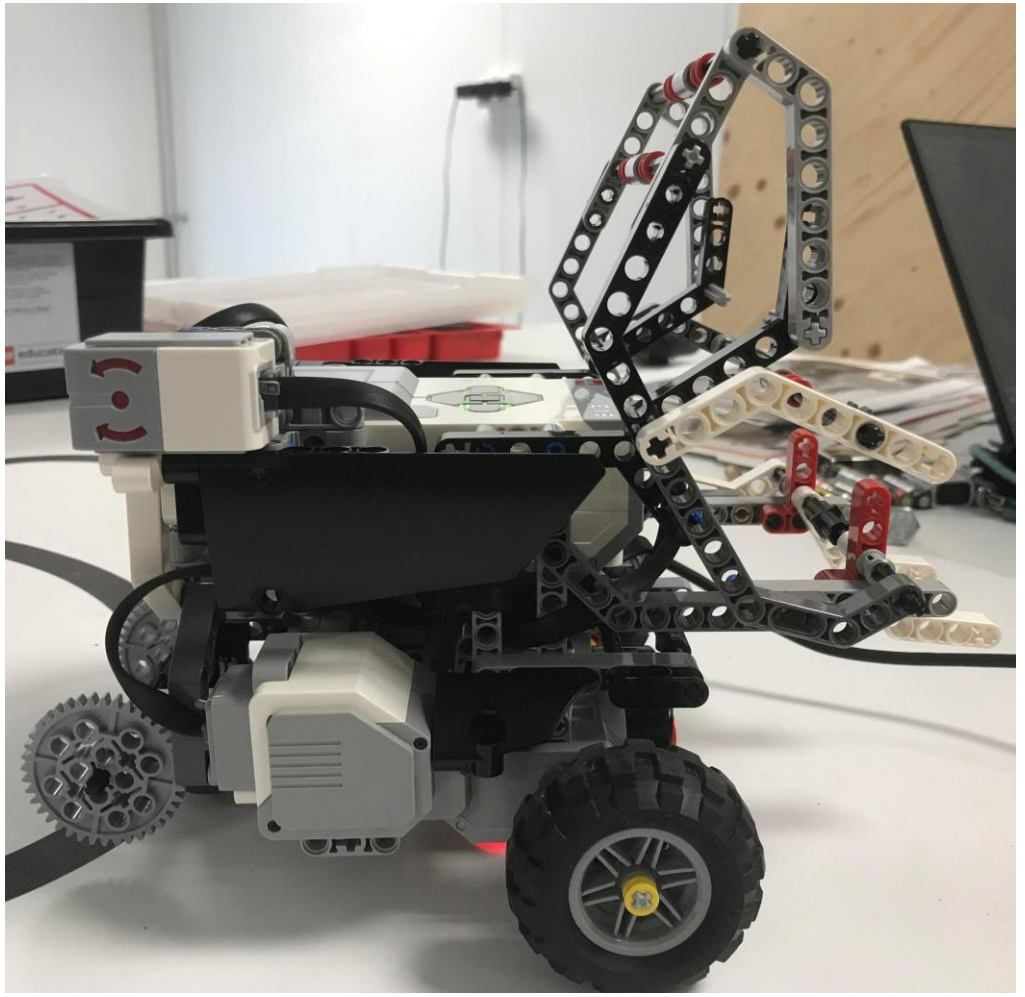

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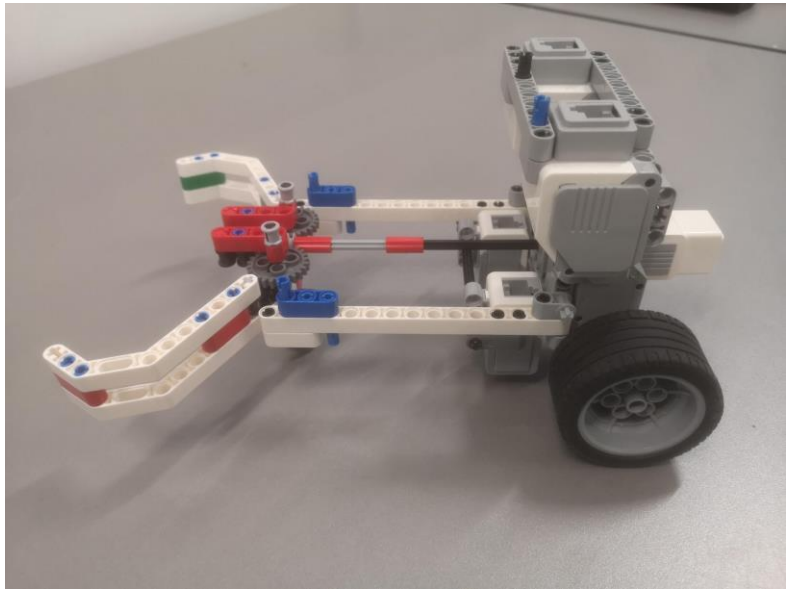

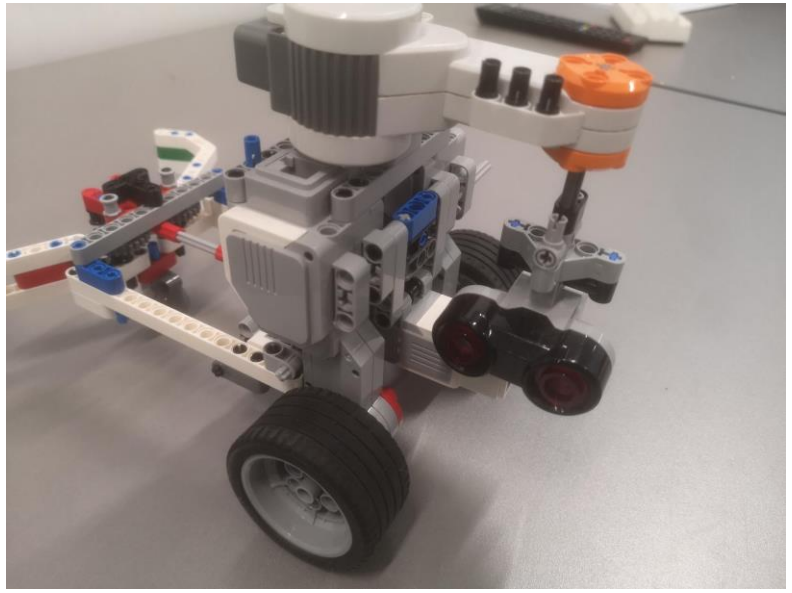

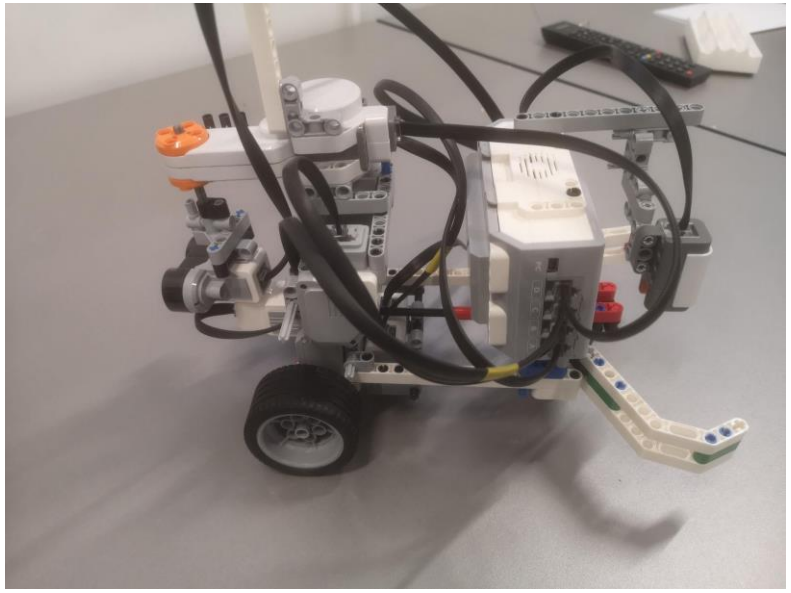

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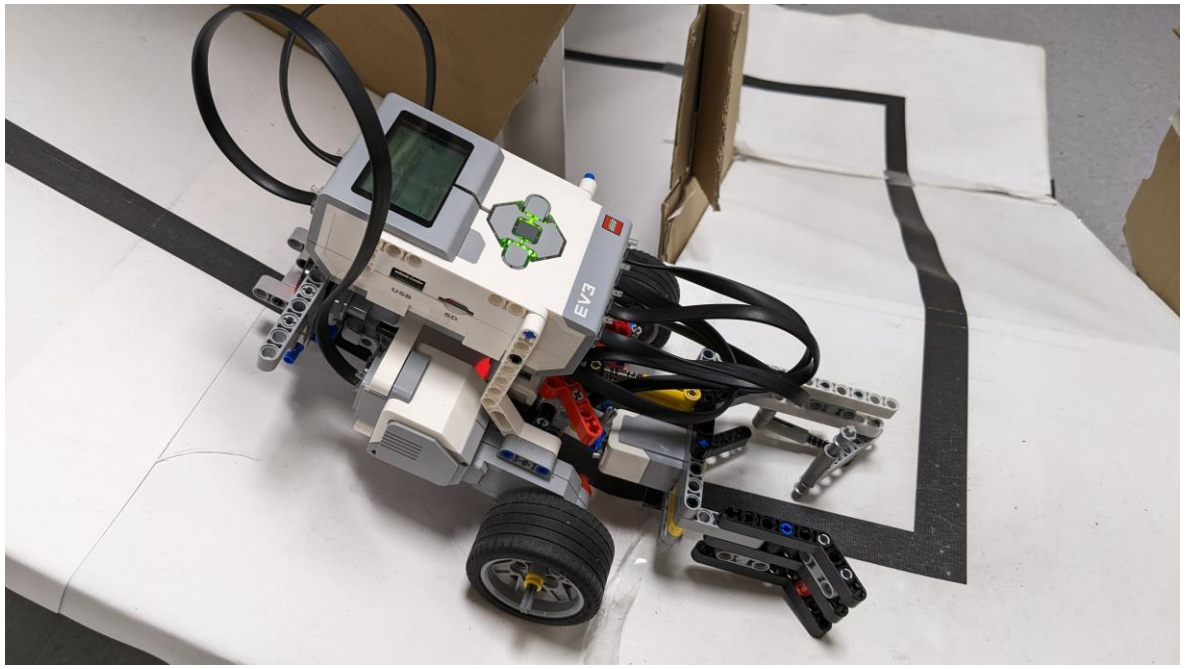


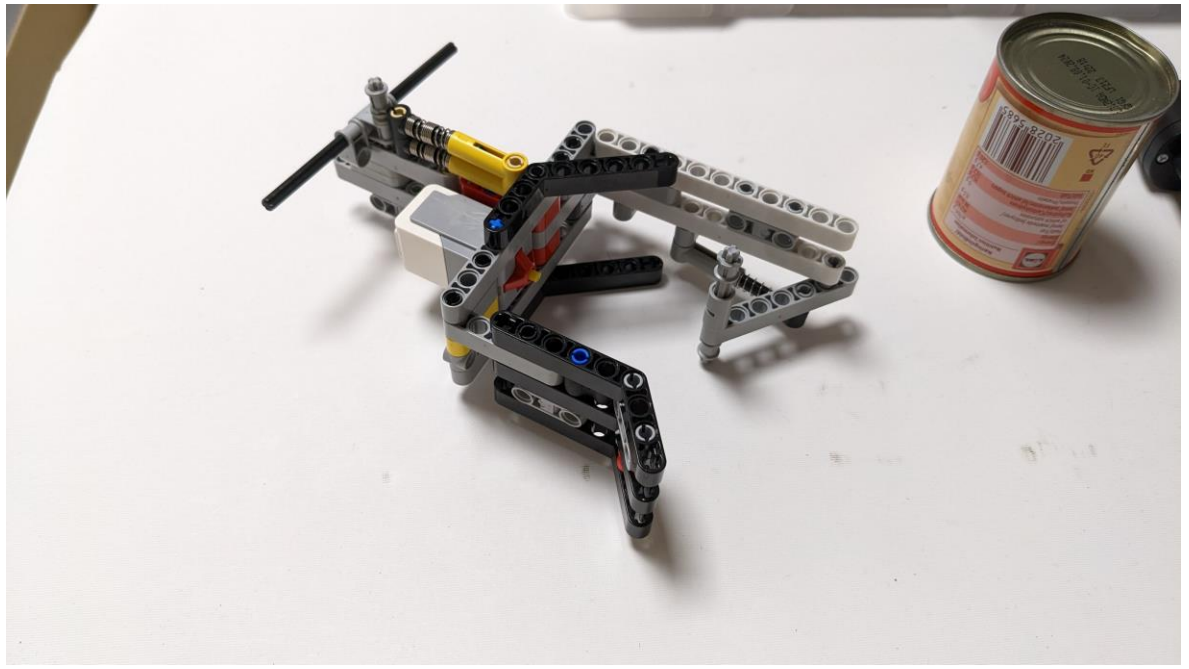

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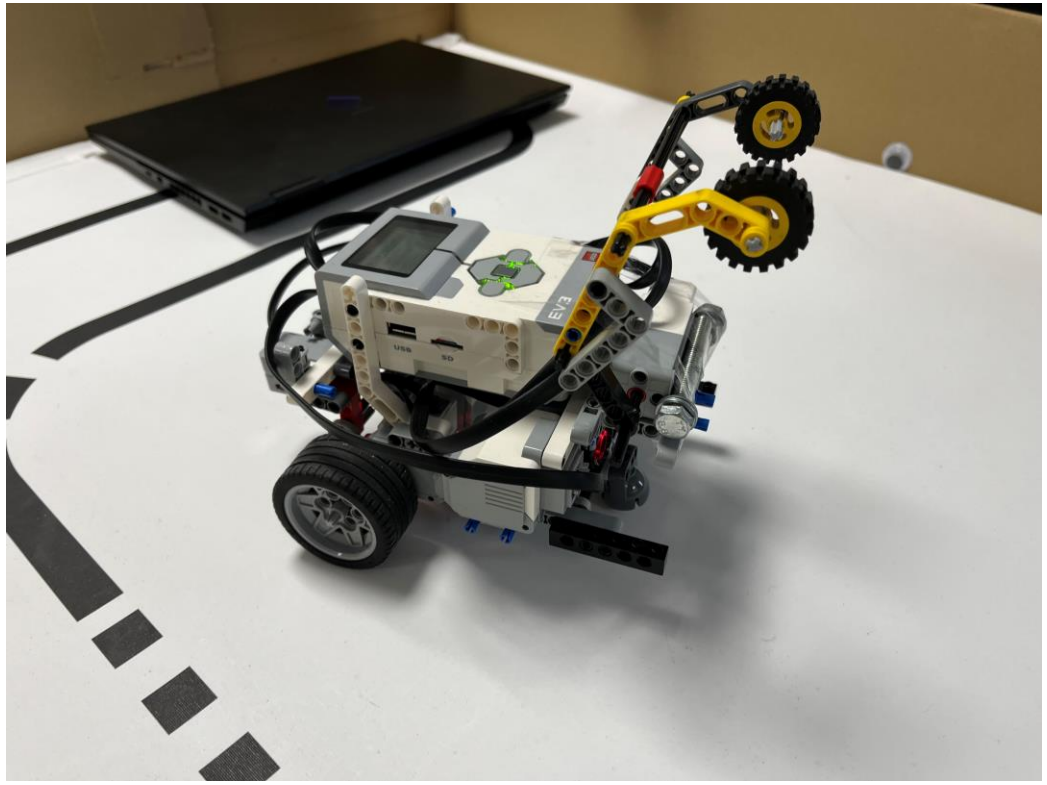

# Advice and Support

- Recommended libraries: **ev3python** OR **pybricks** (better not together)
- Pybricks Documentation (main source for this course)
- EV3dev Documentation
- EV3dev Documentation _v2 (if you are less familiar with Python)

- Any questions, contact me: gicur22@student.sdu.dk

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