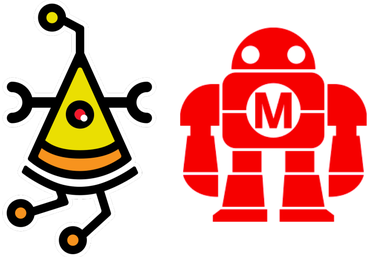
Maker Learn 2022
#makerfairerome

November 16th 2022

Build your AMR

with ROS2_AMR_interface

Giovanni di Dio Bruno



@johnnyrobomeka
gbr1.github.io
https://makerfairerome.eu/ gbr1
@br1johnny

Pizza Robotics

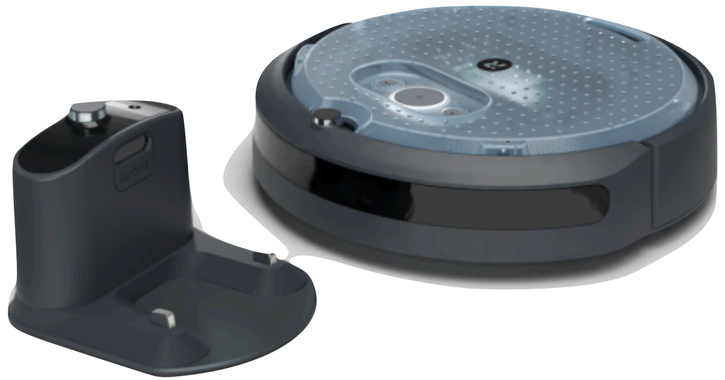
pizzarobotics.org

“AMRs” ?

AMRs

- autonomous
- mobile
- sensing environment

AMRs



iRobot Create 3

AMRs

Clearpath HUSKY

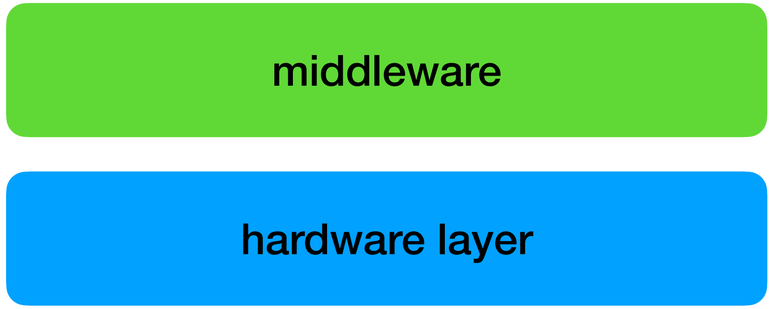
AMRs

Amazon Warehouse

AMRs

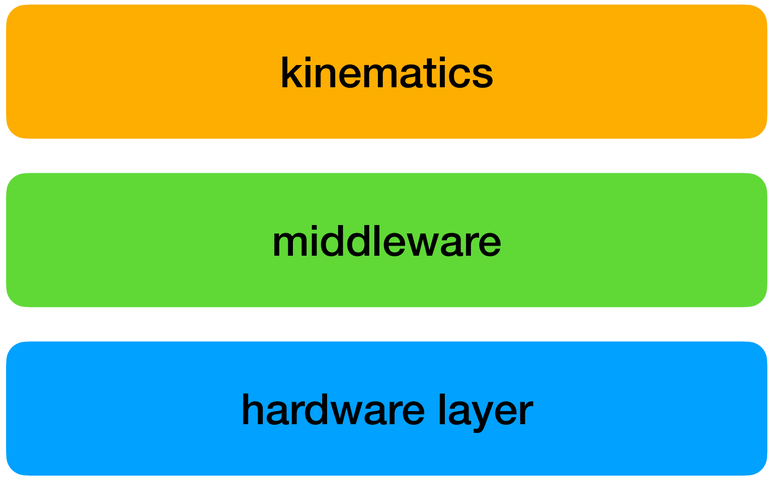
General AMR architecture

AMRs



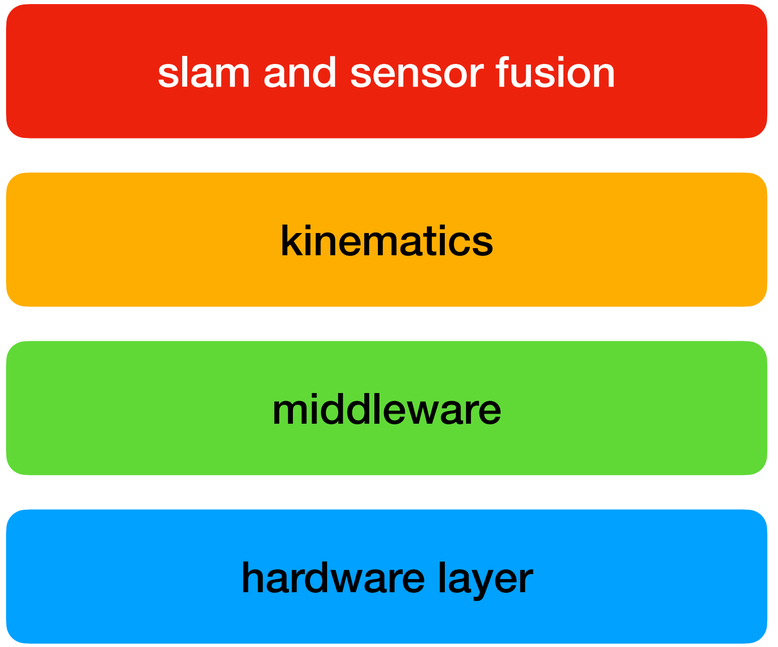
General AMR architecture

AMRs



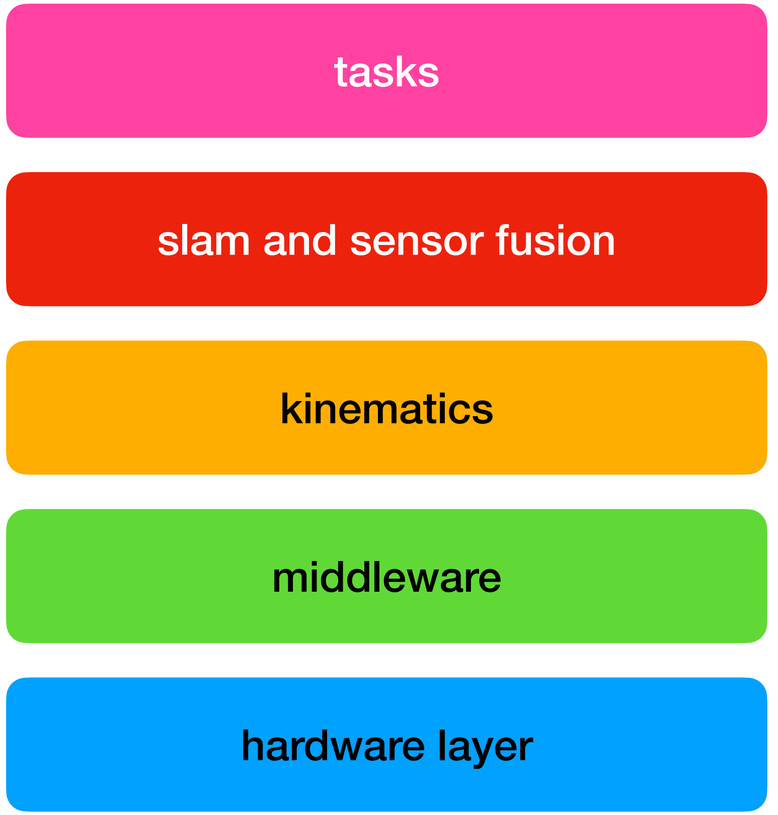
General AMR architecture

AMRs



General AMR architecture

AMRs



General AMR architecture

“ROS2” ?

ROS

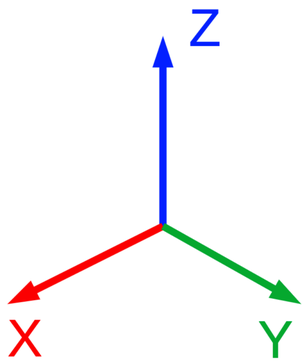
- robot operating system
- framework
- simplify robot development
- key idea: not redesign the wheel
- open source

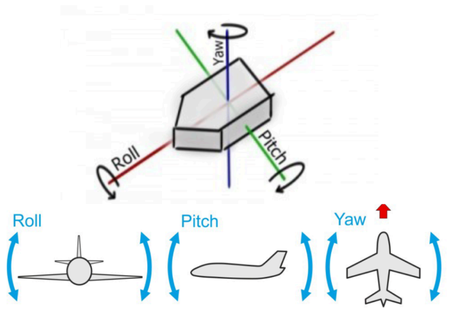
ROS

- nodes
- topics
- no specific language

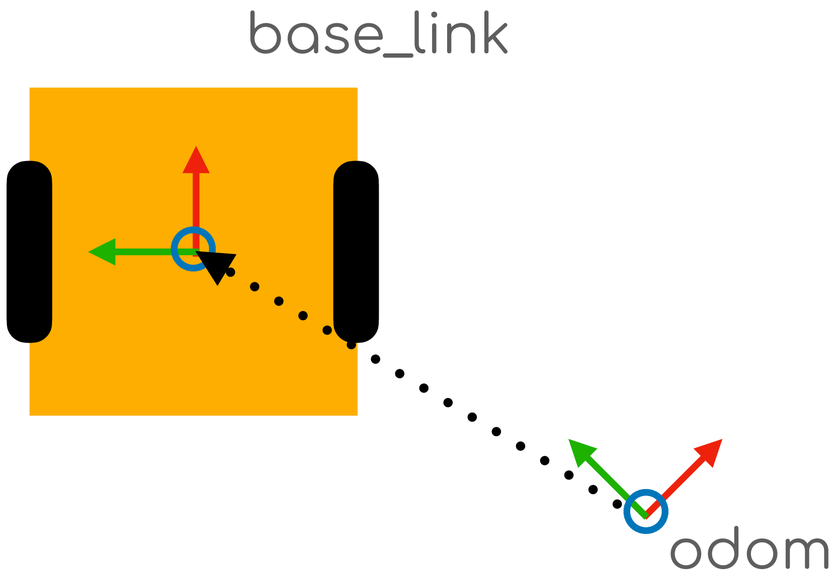
ROS

- kms
- urdf
- xyz and rpy





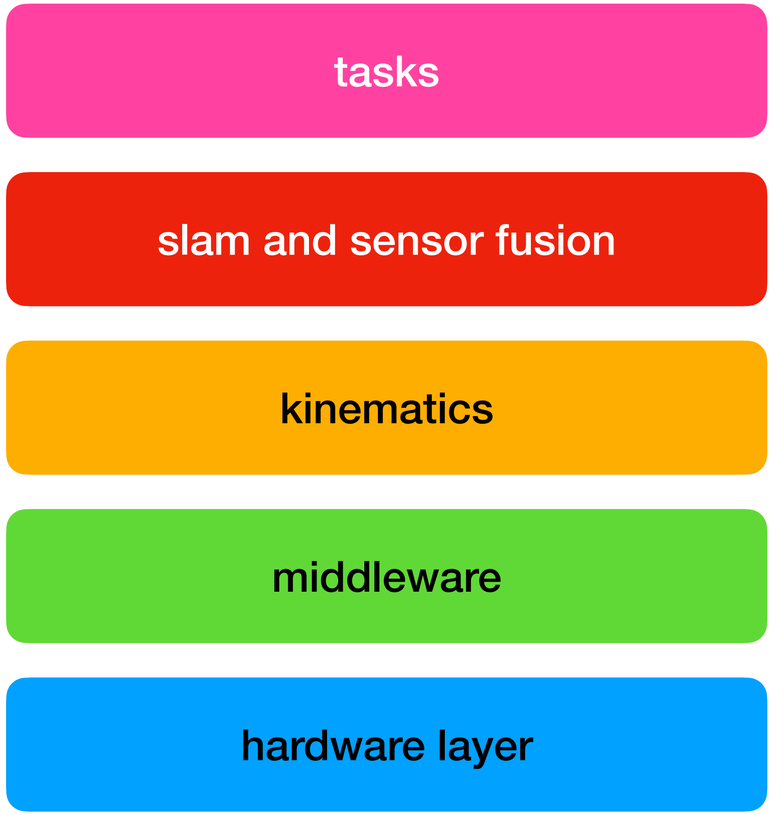
ROS



ROS2

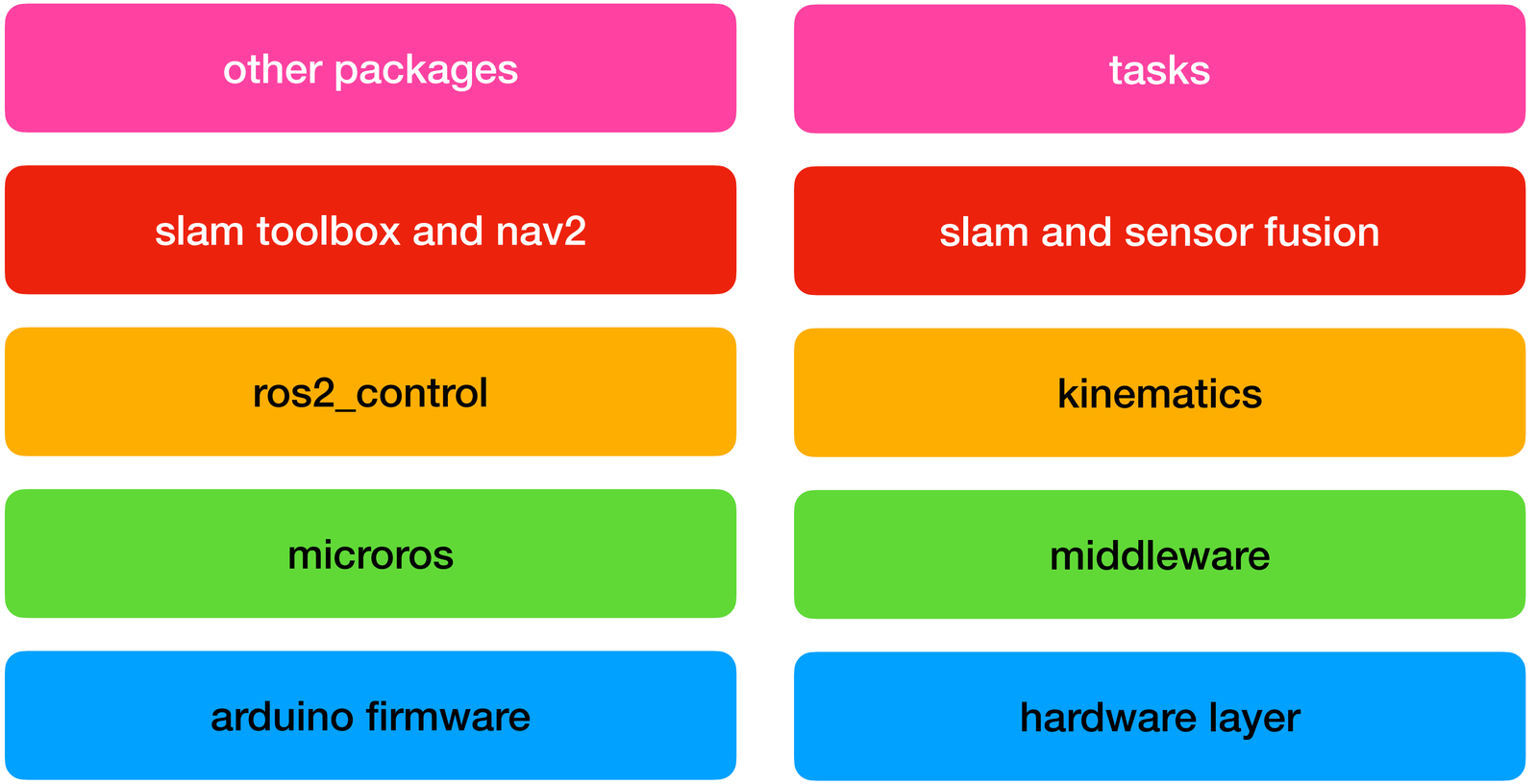
- Real Time
- DDSs
- lifecycles
- QoS
- launch files in Python
- and lots other features

ROS2



General AMR architecture

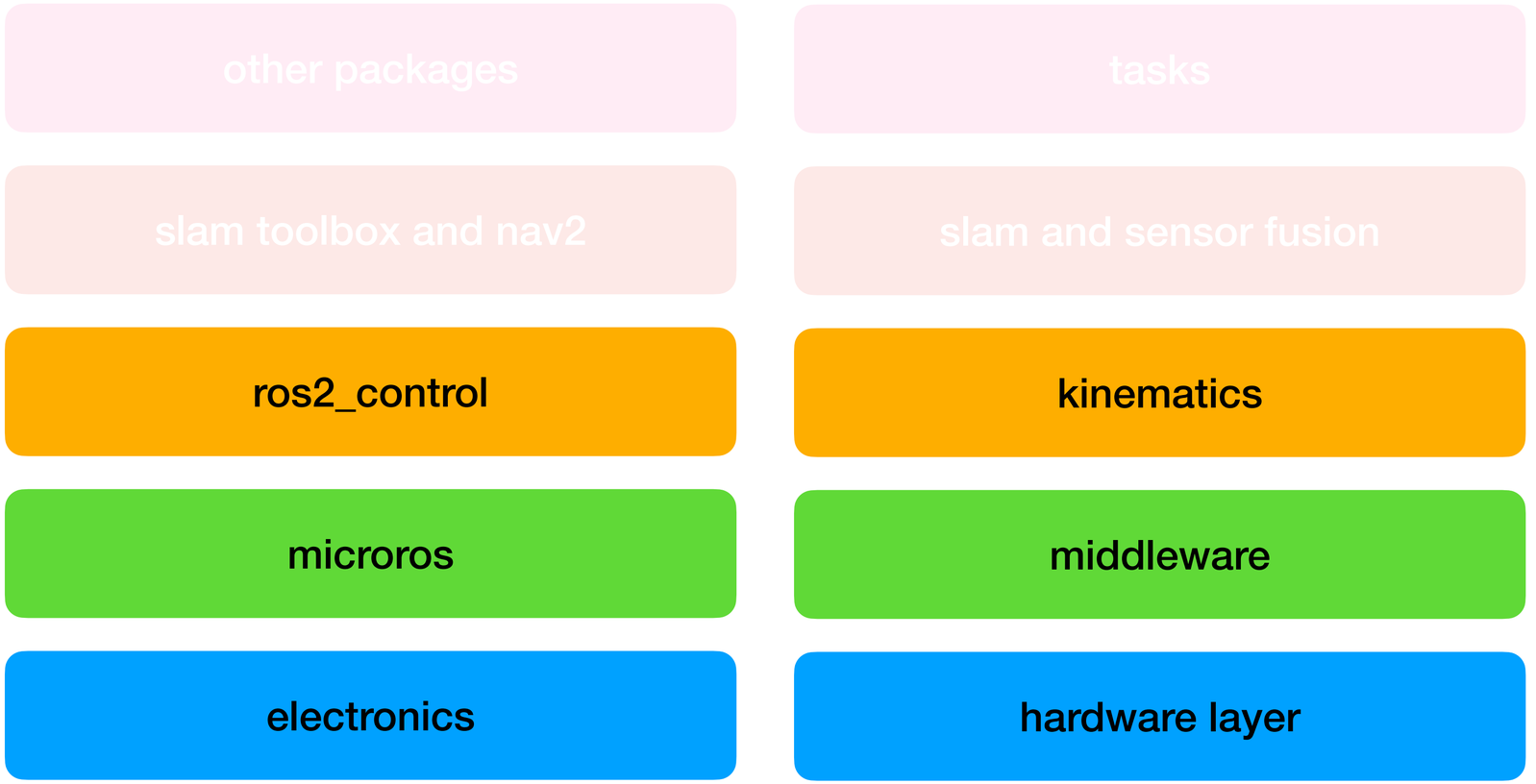
ROS2



ROS2 architecture

General AMR architecture

ROS2



ROS2 architecture

General AMR architecture

ros2_control

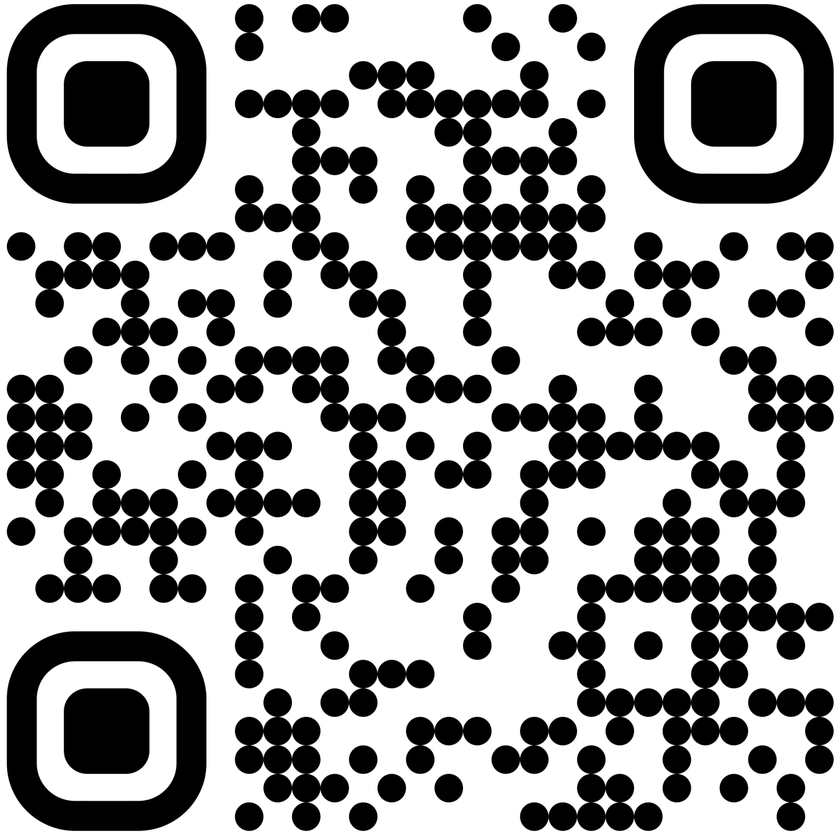
- advanced tools
- joints controls
- state of art
- complex
- lots of parameters

microros

- a ROS2 porting to MCUs
- serial, ethernet, wifi
- compatible with Arduino
- requires high level MCUs

how can you use low-specs MCUs?

ros2_amr_interface



https://github.com/gbr1/
ros2_amr_interface

ros2_amr_interface

- simple
- low-specs MCUs
- serial communication
- all features required
- template

ros2_amr_interface

- manage communication
- manage kinematics
- publish odom
- publish tf
- subscribe to cmd_vel
- publish imu
- publish battery

ros2_amr_interface

- mecanum wheels
- diff drive
- skid drive

ros2_amr_interface

- model.type
- model.size
  - .chassis.wheel_separation
  - .wheel.radius

ucPack

- serialization
- resizable circular buffer
- based on byte type

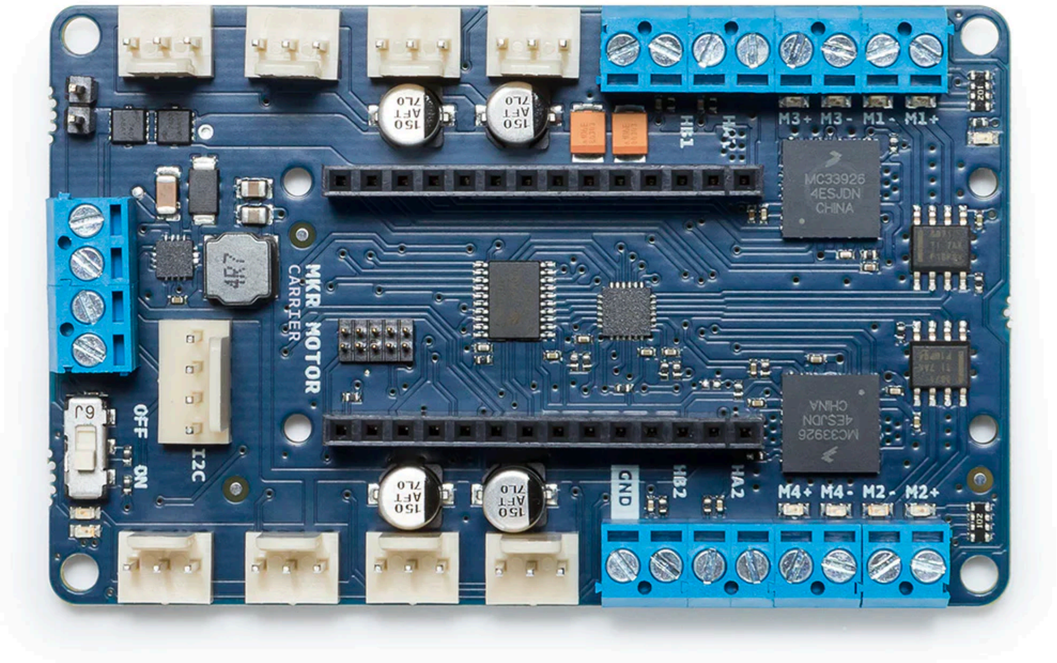
UP
Robotic development kits

https://up-shop.org/ehl-tgl-robotic.html

RAT robot

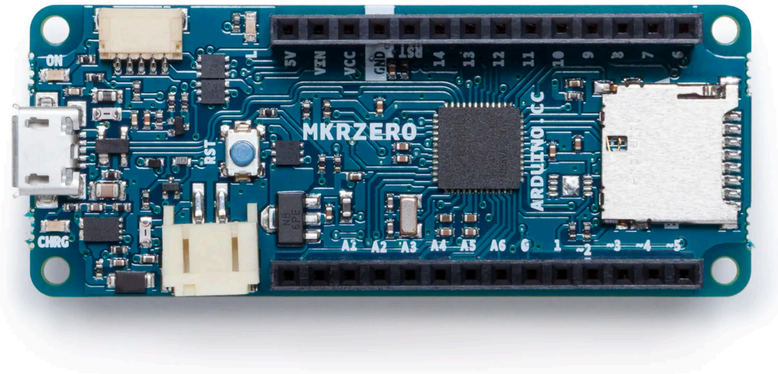
- Robot Aided Teaching
- simple
- Arduino based
- differential unicycle model

RAT: electronics



MKR Motor Carrier

RAT: electronics

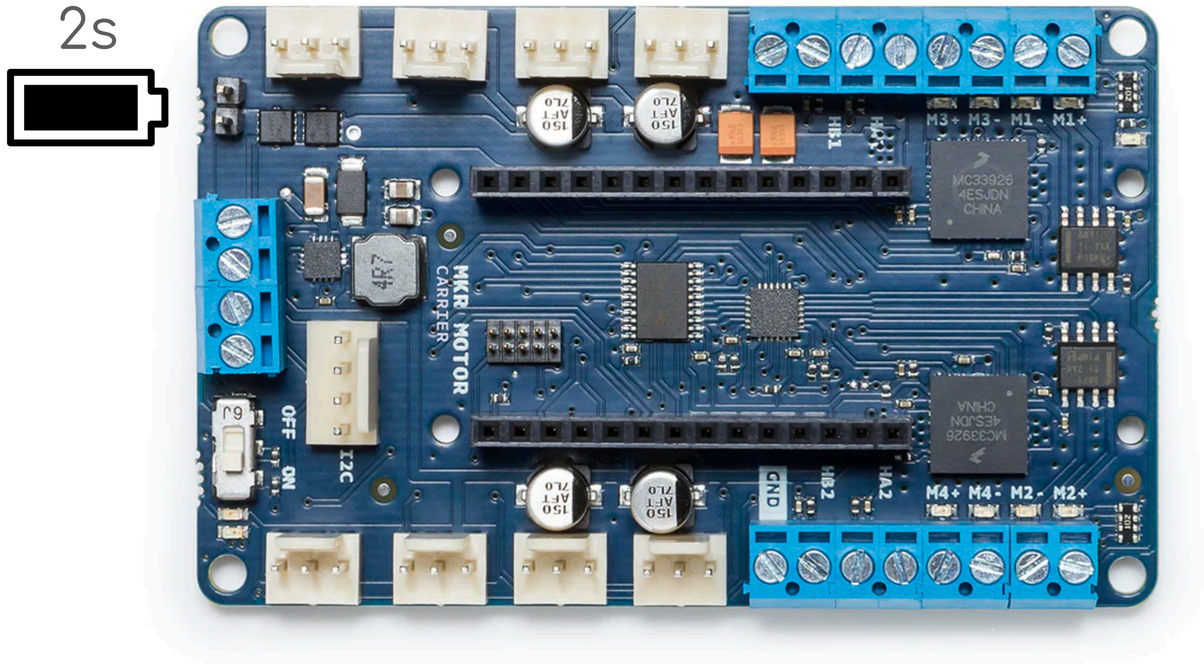


MKR Zero

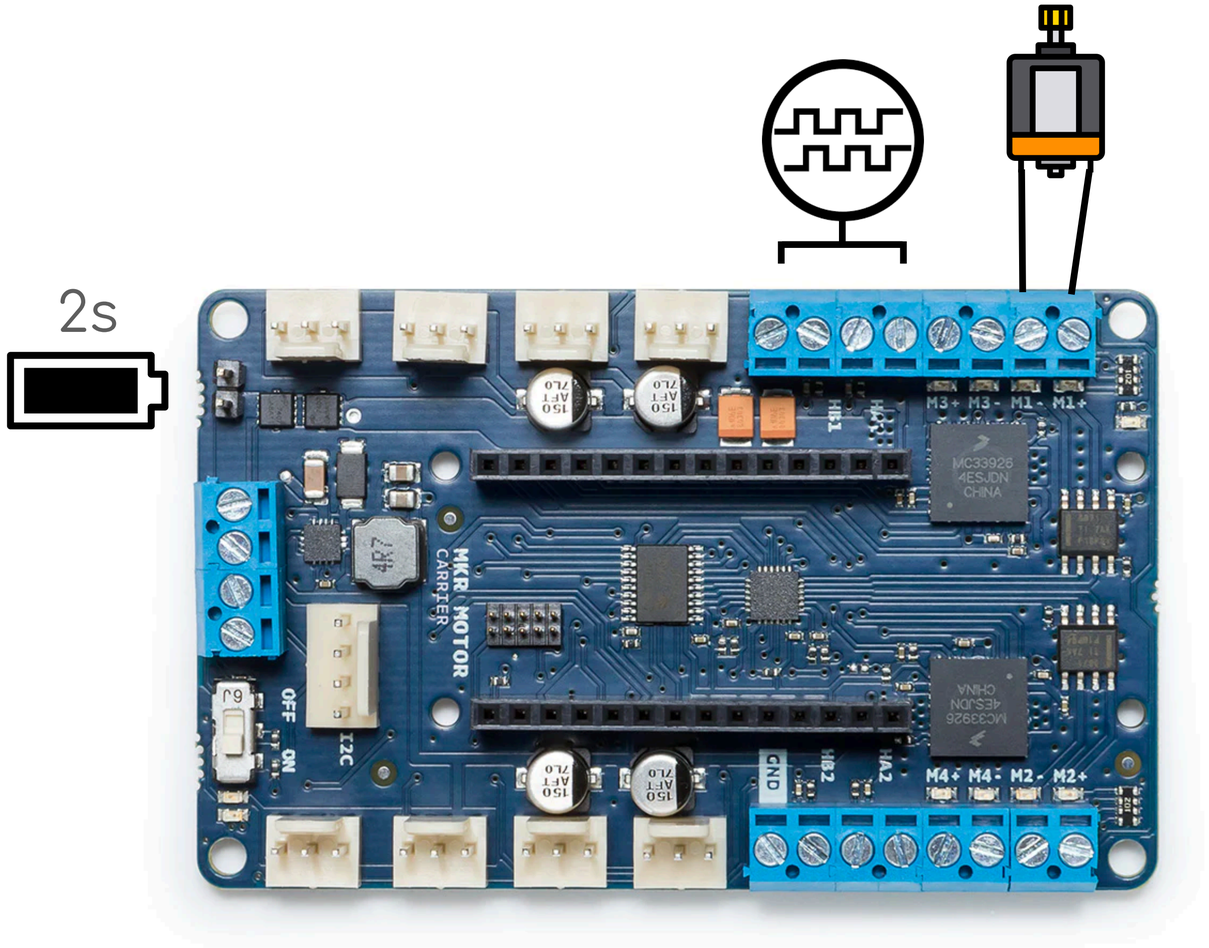
RAT: motors

GS20173 100rpm 6V

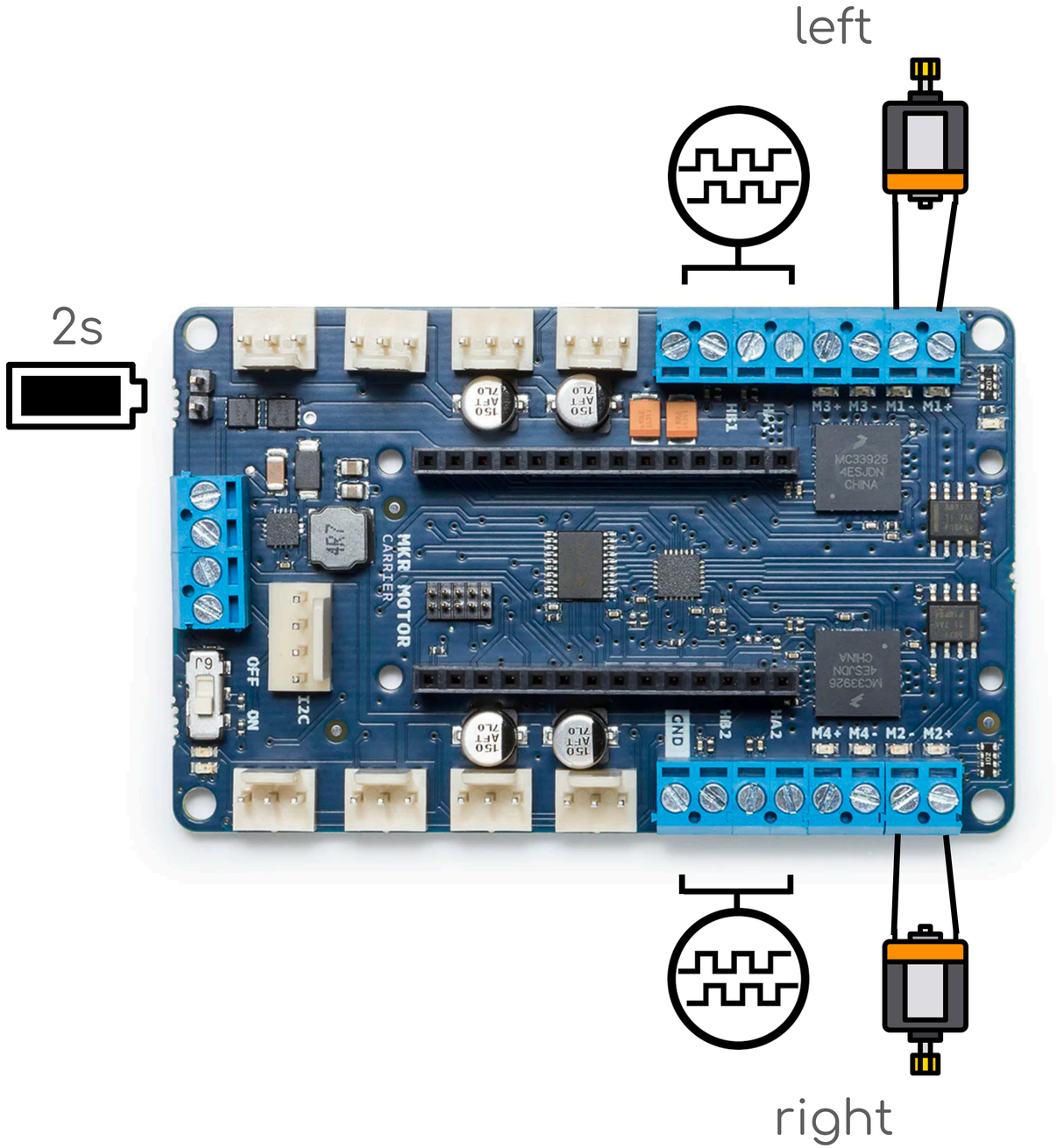
RAT: schematic



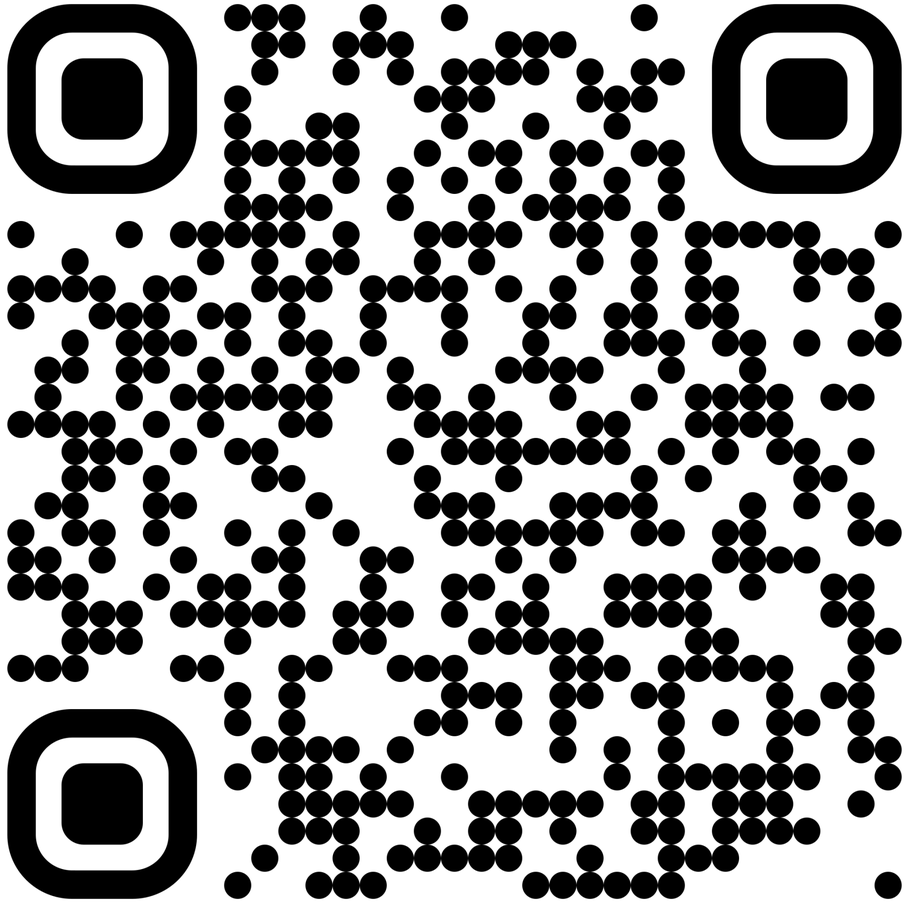
RAT: schematic



RAT: schematic



RAT: how to build



https://github.com/gbr1/MFR22_workshop_ros2

Let’s code!

See you this afternoon for some TinyML!

Contact me

@johnnyrobomeka
gbr1.github.io
gbr1
@br1johnny