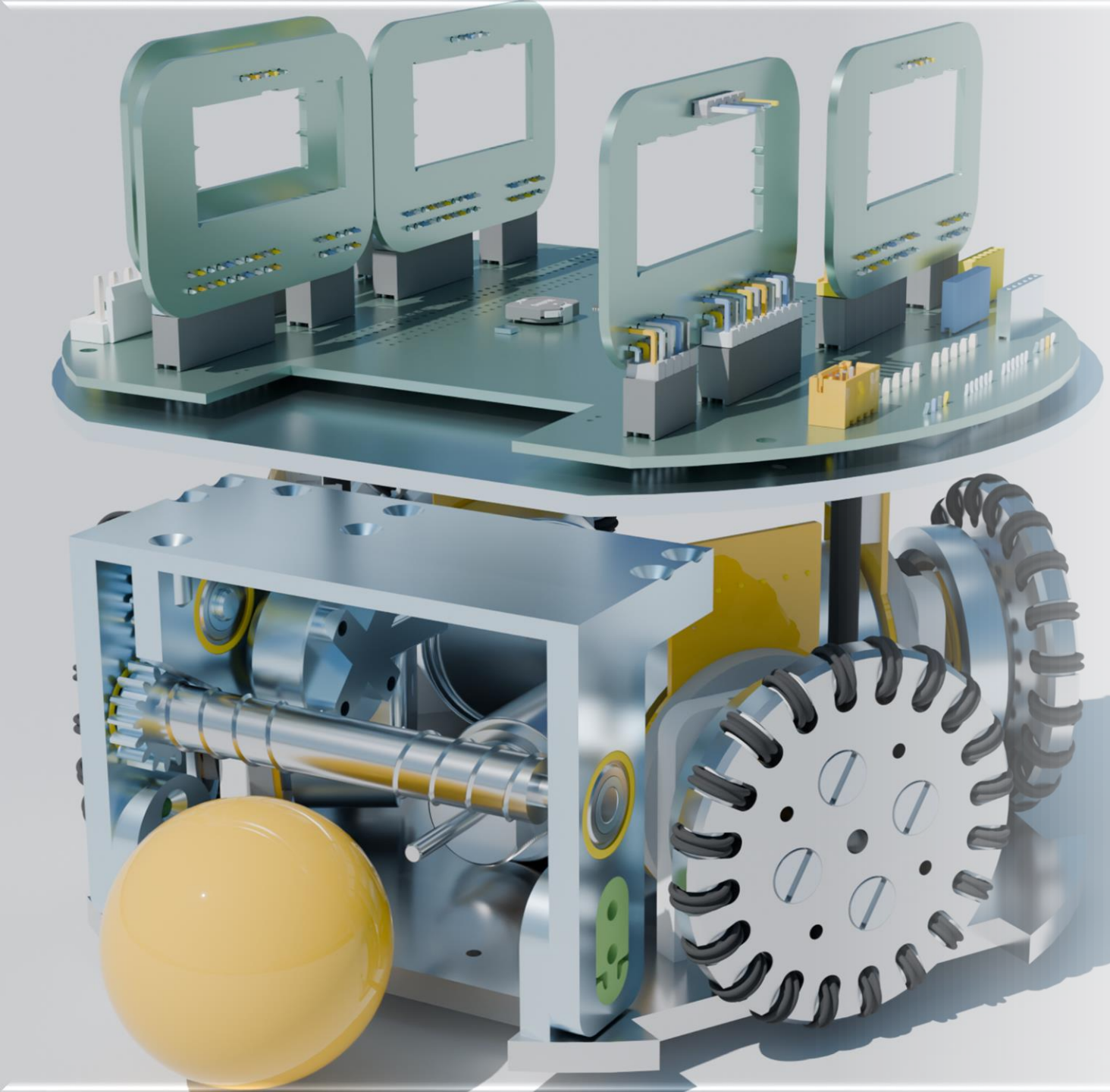
2024-11-13

Agenda

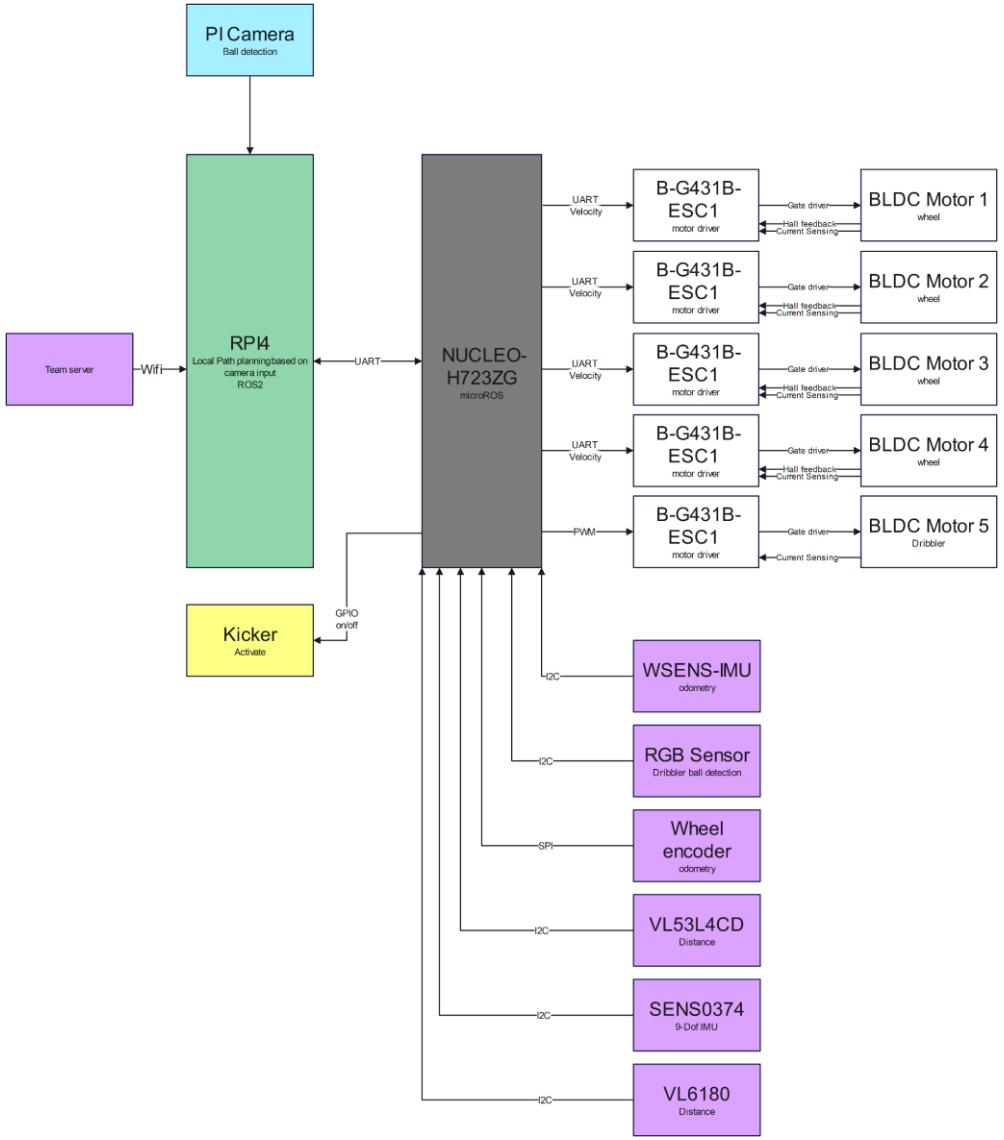
- Status update
- BOM
- Suggested tasks
- Micro-Ros
- Documentation



Status

- Waiting on hardware
  - PCBs are being manufactured
- Writing the firmware for the motor drivers, setup the sensors
- Manufacturing the wheels

BOM



Component	Description	Purpose	#	á price (price per robot) SEK	Price in USD
DF45L024048-A	Brushless direct current (BLDC) motor with integrated hall sensors for the wheels	Used to spin the wheels of the robot.	4	830.4 (3273.60)	74.74 (294.6)
Hobbywing FPV XRotor 3110 900KV	Brushless DC motor	High revolutions per minute (RPM) motor used to control the dribbler.	1	175.20 (175.20)	15.77 (15.77)
B-G431B-ESC1	BLDC motor driver	Motor driver with embedded μController current sensing and hall sensing to form a closed-loop control algorithm	5	208.96 (1044.8)	18.8 (94.032)
NUCLEO-H723ZG	μController	Computational power and real-time processing capabilities, supports μROS	1	322.58 (322.58)	29 (29)
Raspberry Pi 4 Model B/8GB	Single-board computer	Processing camera input and performing local path planning	1	979 (979)	88.11 (88.11)
VL53L4CD ToF	Lidar	Obstacle detection (Could not find VL53X ToF)	2	176.32 (176.32)	15.87 (15.87)
VL6180 TOF	Lidar	Obstacle detection	1	39.62 (39.62)	3.57 (3.57)
APDS-9960	RGB Sensor	Ball detection	1	199 (199)	17.91 (17.91)
SENS0374	9-Dof IMU	Acceleration, Gyroscope, Magnetometer	1	191 (191)	17.19 (17.19)
6s 1300mAh -120C - GNB HV XT60	LiPo-battery	Used to power the robot	1	351.20 (351.20)	31.6 (31.6)
iC-PX2604 + PX01S 26-30	Wheel encoders	Will be used for odometry and determining the RPM	4	224.40 (897.60)	20.2 (80.78)
WSEN-ISDS 6 Axis IMU	6-DoF IMU	Will be used for odometry of the robot	10	N/A	N/A
Raspberry Pi Camera-module 3	Camera	Provide images in front of the robot to detect the ball and obstacles	1	369 (369)	33.21 (33.21)

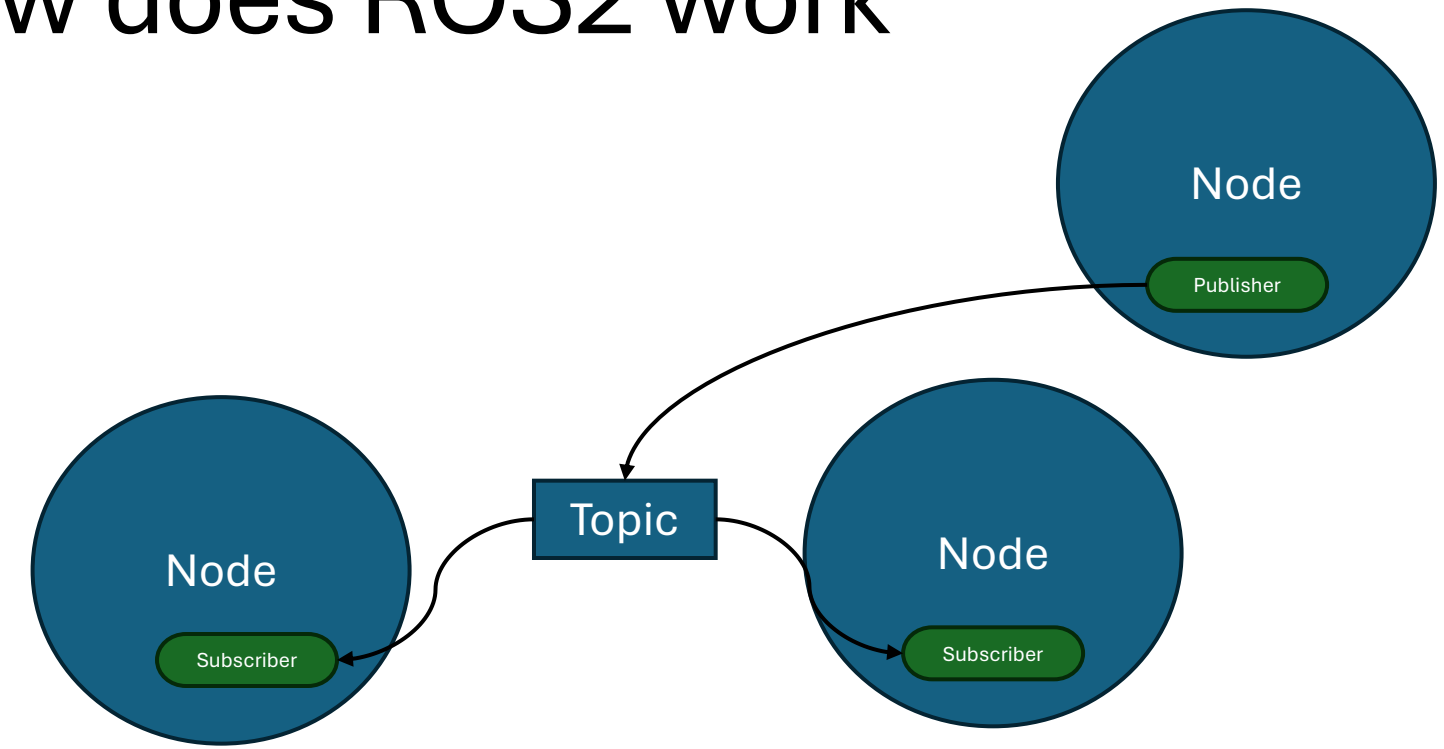
Tasks

- Hardware interface for the sensor
  - VL53L1
    - Get distance
  - VL6180
    - Get distance
  - BNO055
    - Get acceleration
  - AS5600
    - Get angle
  - Motor interface
    - Set speed

Micro-Ros

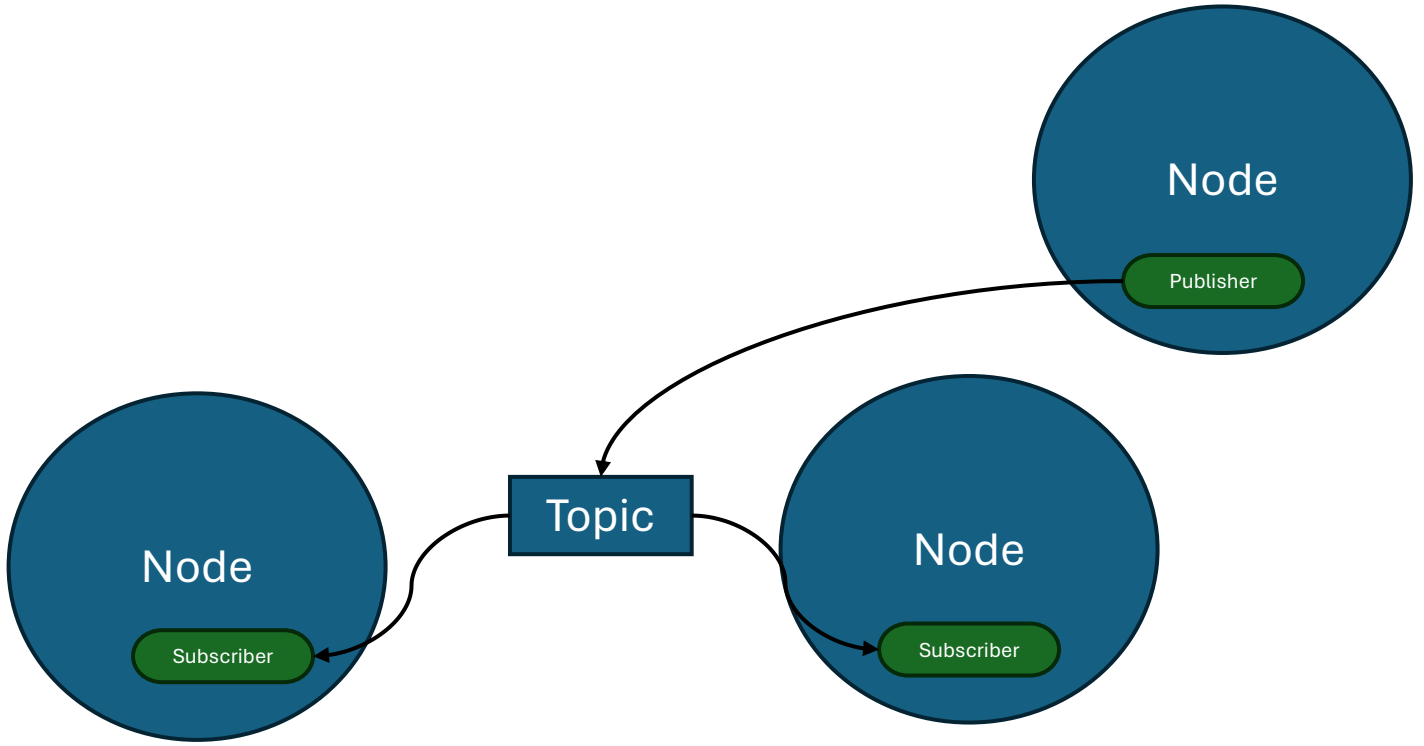
- Why ROS2?
  - Requirement from the stakeholders to use ROS2 in this project.
    - Our software team has been working with ROS2 with the simulation and then to integrate the software with the real hardware, writing the robot firmware using ROS2 would make the integration easier.

How does ROS2 work

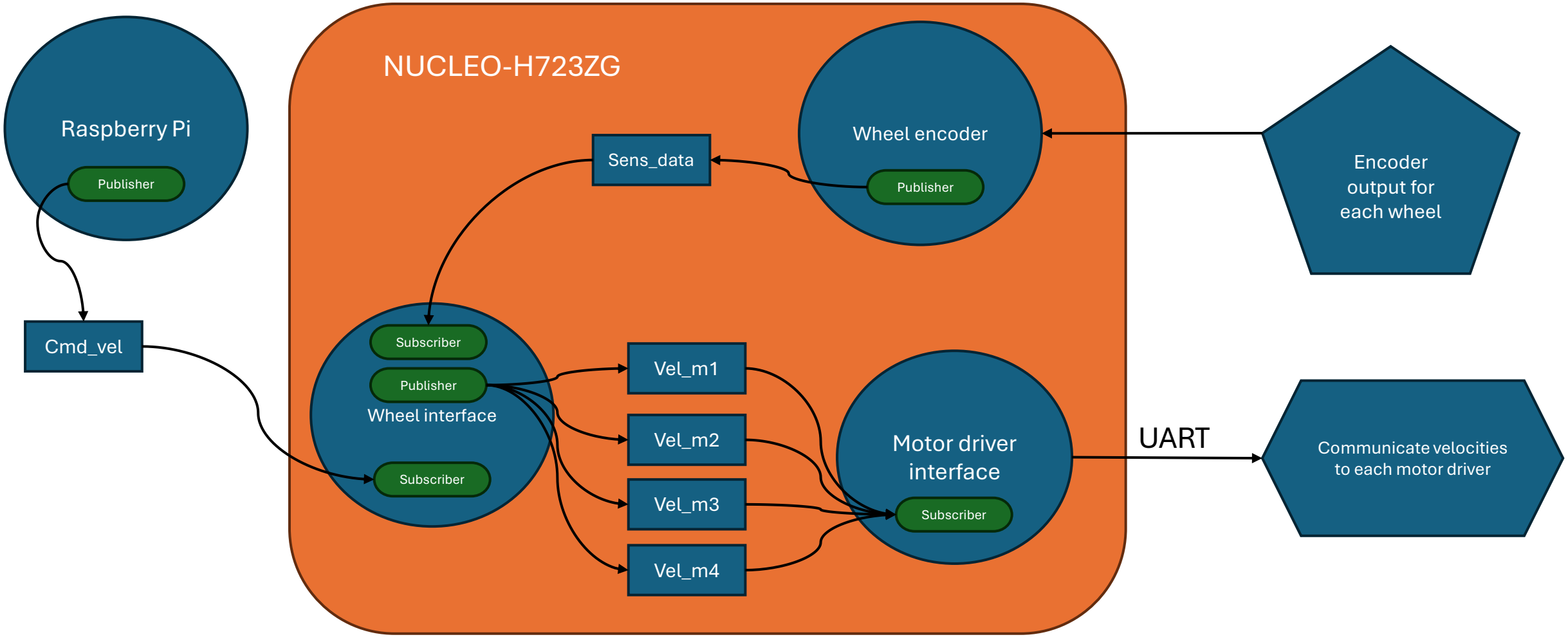


How does ROS2 work

- Node:
  - Performs a specific task in the robot
- Topic:
  - Communication channels between the nodes
  - A node can either publish (write) data to a topic and subscribe (read) to the topic



How does ROS2 work - Example



How does ROS2 work - Resources

- How to setup micro-ros on nucleo: https://github.com/lFatality/stm32_micro_ros_setup
  - Video: https://www.youtube.com/watch?v=xbWaHARjSmk&t=1s
- ROS2 Humble Documentation: https://docs.ros.org/en/humble/index.html
- Micro-ROS Supported hardware: https://micro.ros.org/docs/overview/hardware/