2-1 Robot - Current status

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Software/electronics

- Raspberry Pi 3B+ (RPi)
  - **Only** 1 GB of RAM available
  - Serves as ROS Master and main computer
  - Running graphical interface for linux (~65% of ram being used **just** at startup without ROS running)
  - In change of sending low-level commands (motor control) to OpenCR via usb
  - Has to be physically attached to keyboard, mouse and screen to be programmed and controlled
- OpenCR
  - Acting only as a “translator” between RPi and Dynamixel motors
  - In charge of power distribution (Motors and RPi)

Summary

The current software architecture relies heavily on the raspberry pi as the only processing unit, but due to its limited RAM, it will become a big limitation once more modules are added to the robot (camera, LiDAR, kinect, etc.). A laptop is better suited to act as ROS master and development unit.

Regarding the OpenCR board, we think it’s currently being underused, as its only purpose is to relay raw instructions from the RPi to the robot. However, we believe that its presence is necessary, as it includes a power distribution circuit that the USB2DYNAMIXEL module does not have.

Considering the above, we think it’s possible to offload some of the processes such as low-level motor control and eventually sensor input from the RPi to the OpenCR. This can be achieved by using the ROS libraries available for microcontrollers and using the OpenCR as another slave in the architecture. This also avoids the problem of depending on linux’s task scheduling (not real time) for reading sensors on the RPi.

Next steps (groundwork)

- Mechanical design improvement
  - Design and 3D print adapter for steering wheels
  - Reduce number of links between robot body and steering wheels
- Backup code from RPi
- Install headless (no GUI) linux on RPi to free up RAM
- Setup git repositories on personal machines and RPi
- Setup local lab network
  - A basic router will be needed to connect ROS Master (laptop) and slave (RPi) wirelessly
- Setup basic communication OpenCR ↔ RPi ↔ Laptop