

ShopiPal

Autonomous Carrying Cart



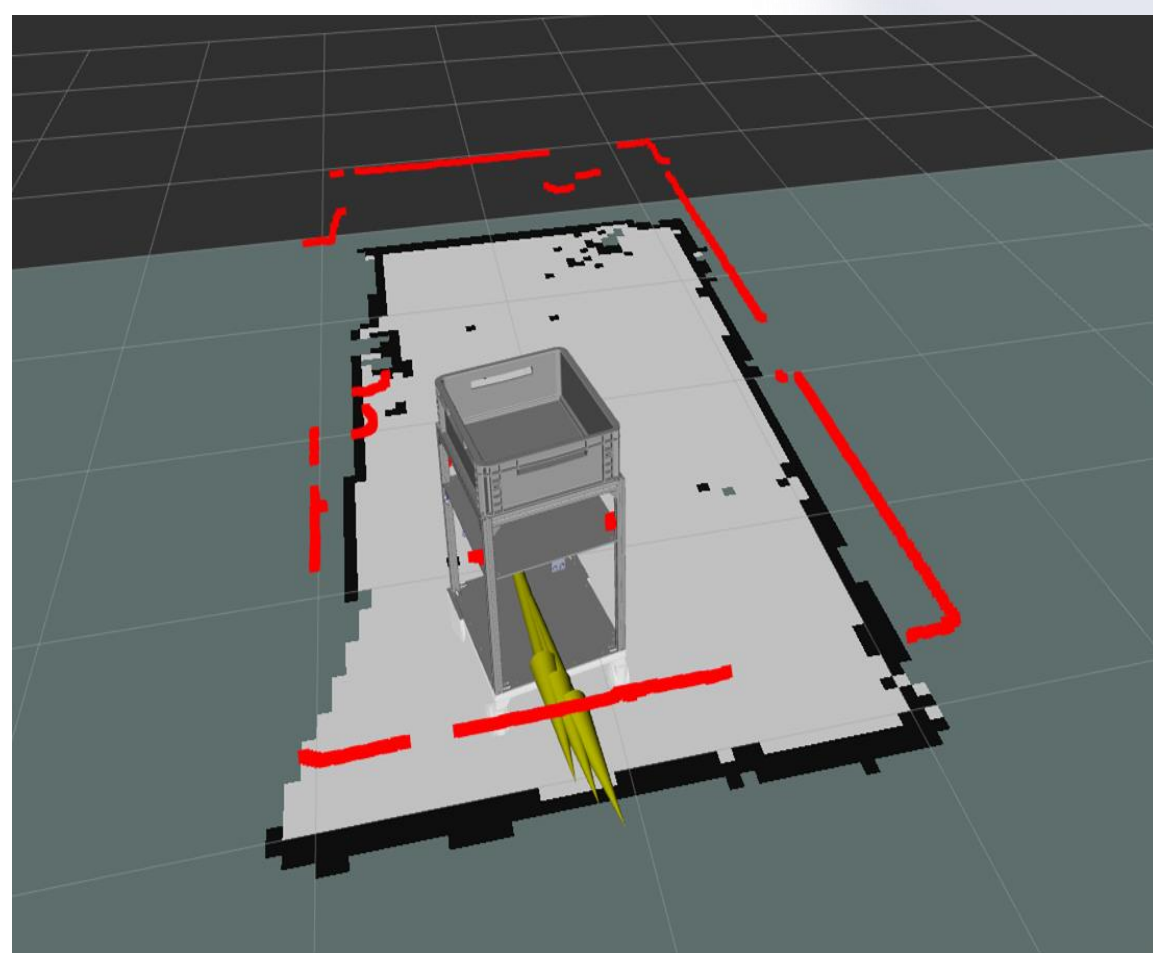
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Project Goals

Development an autonomous mobile carrying cart robot in order to improve the manual picking process in supermarkets and warehouses. The robot can scan the indoor environments in real time to build a completely independent map that is used to localize and self-navigate through an ever-changing facility in efficiently and safely way. By that, this In-Store solution will eliminate the need for infrastructures changes and could be easily integrated and run in minimal time

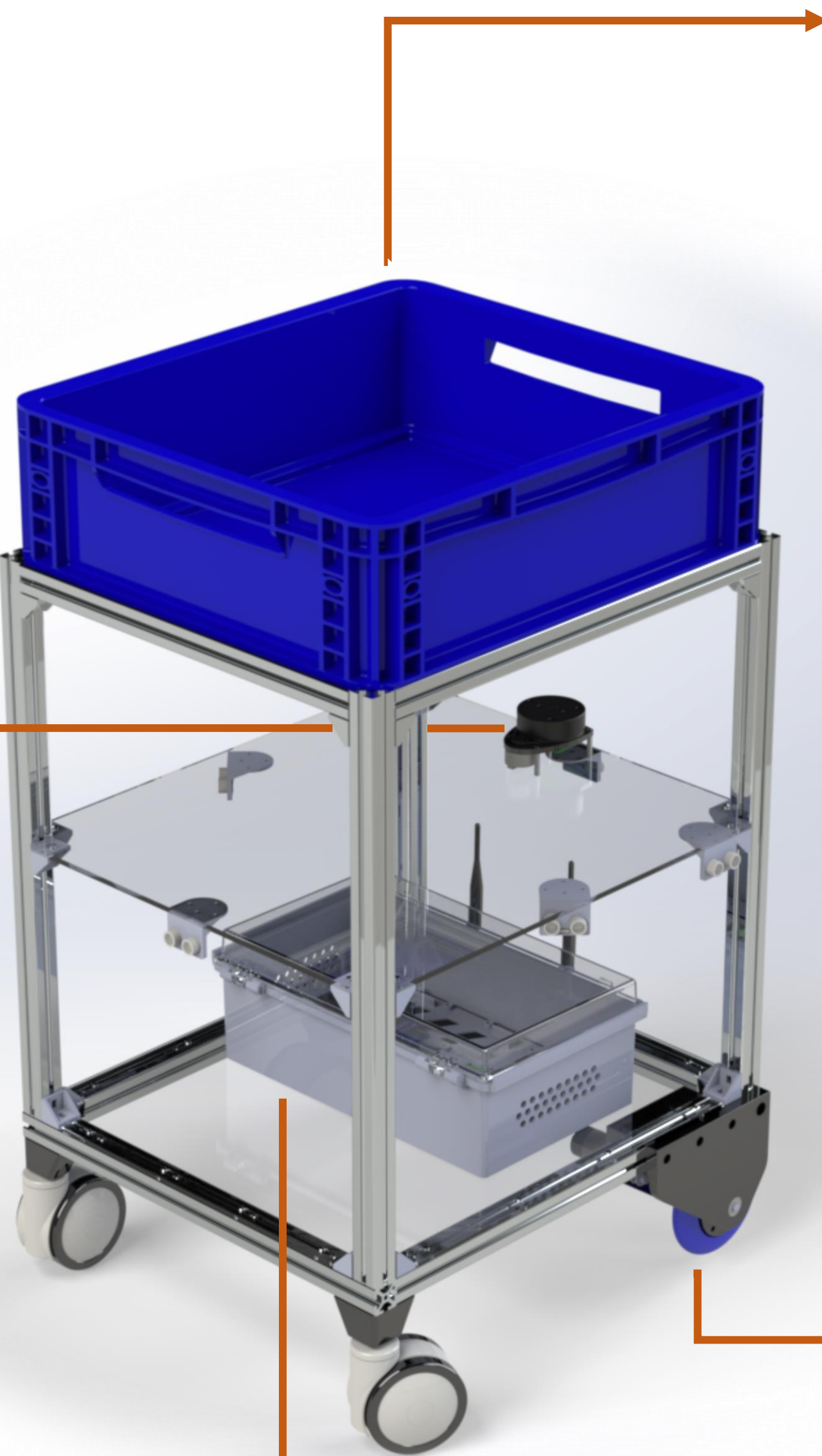
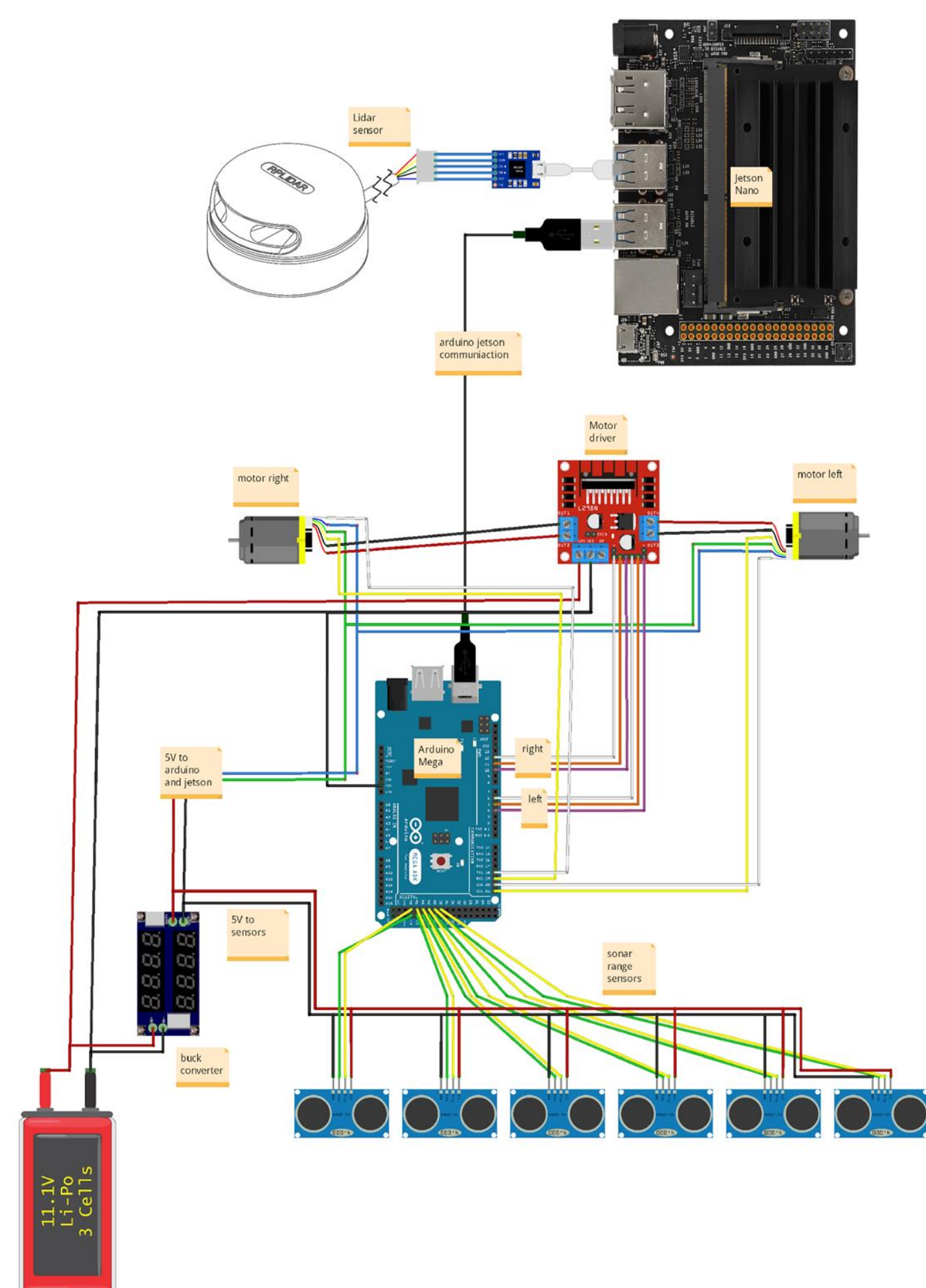
Robot Navigation

Robot Navigation, Localization and Environment mapping using SLAM (Simultaneous Localization and Mapping) algorithms



System Architecture

Using Arduino Mega in order to control system's hardware and low-level tasks, combined with Nvidia Jetson Nano for high-level tasks such as running the Robot Operating System (ROS) and navigation algorithms.



Requirements

Mechanics requirements

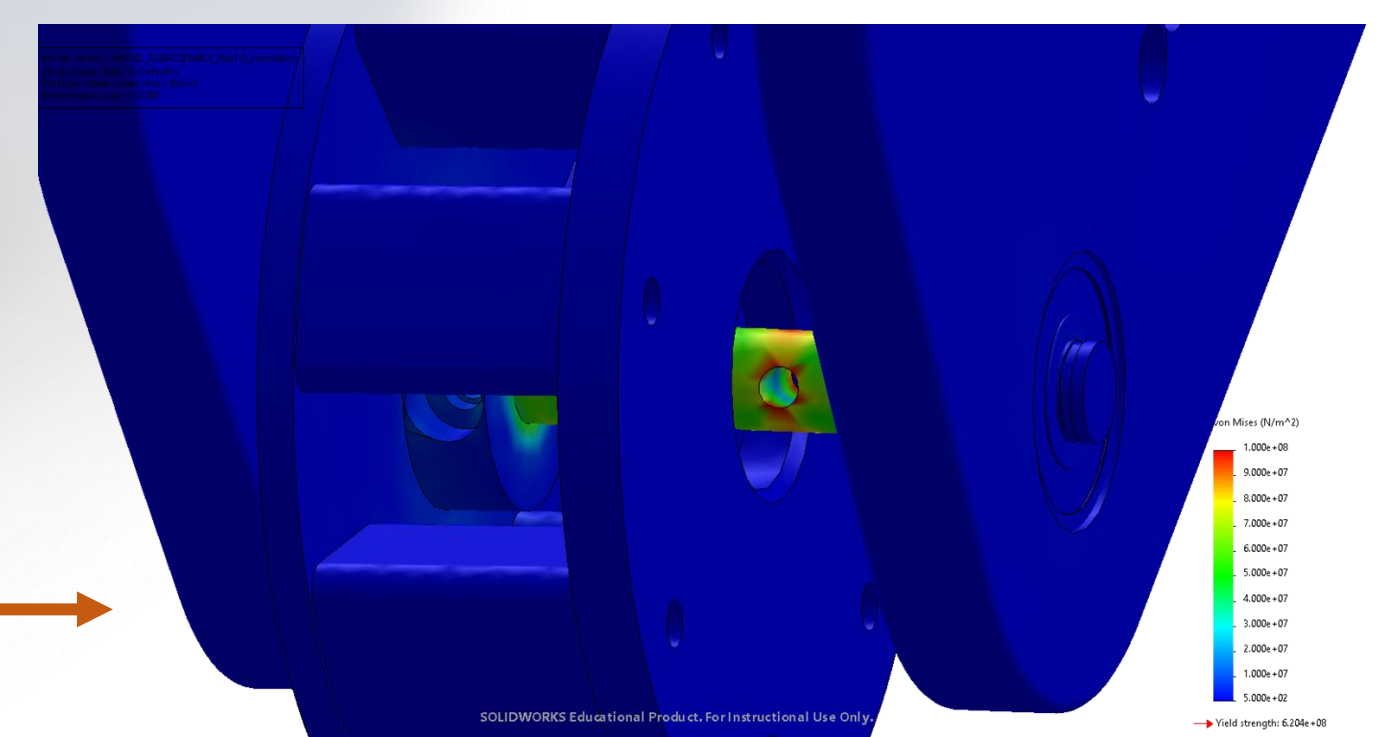
- Max load - 20kg
- Max velocity - 1 m/s
- Max acceleration - 1 m/s²
- Work time - 3h

Algorithm requirements

- Velocity control
- Localization ability
- Autonomous navigation
- Obstacle avoidance

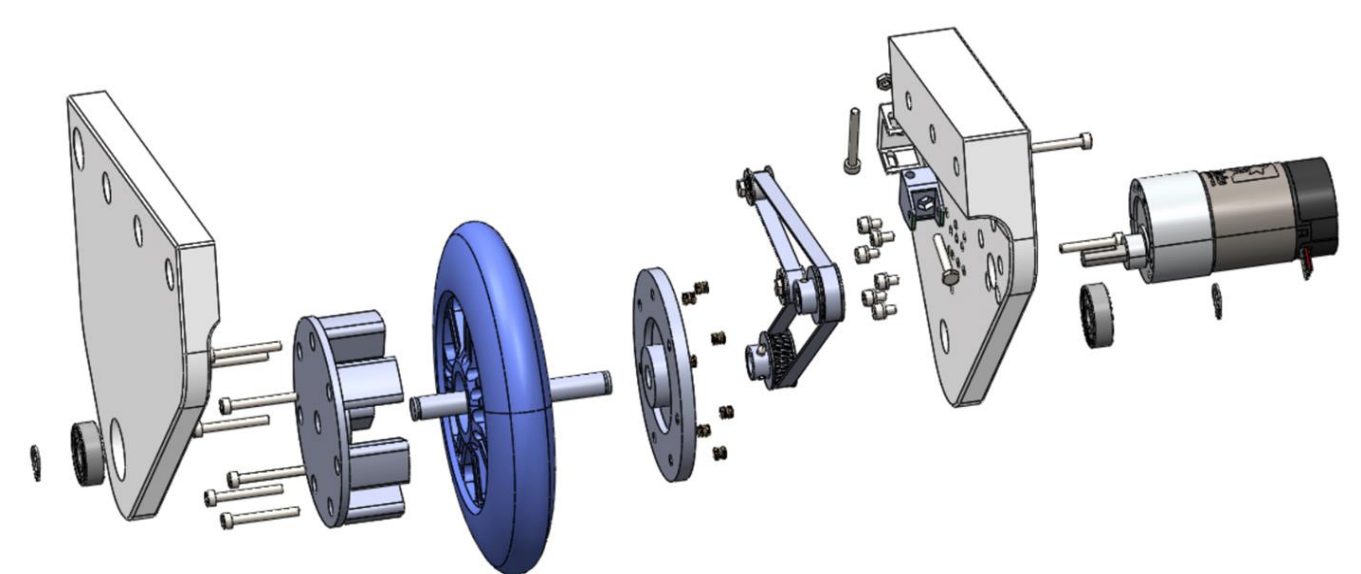
System Drivetrain

Stress Analysis



A successful stress analysis of the system drivetrain under maximal load.

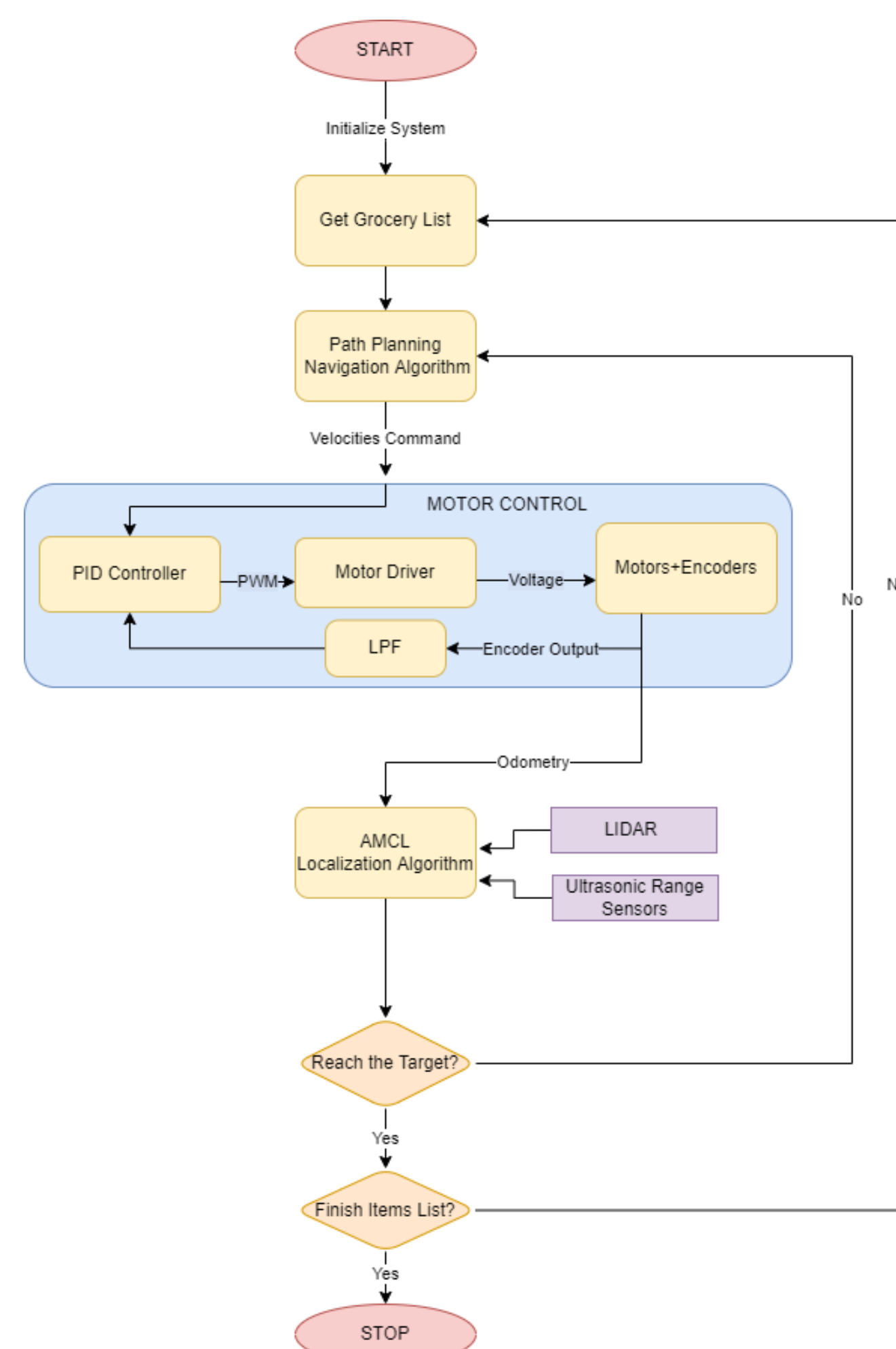
Exploded View



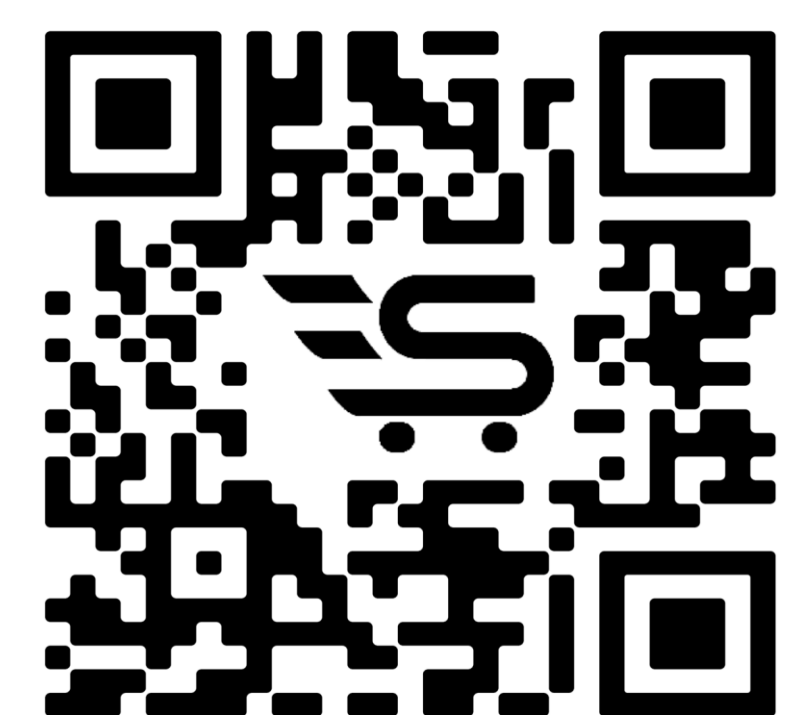
The 1:1 transmission ratio gears include:(from left to right) Drivetrain Mount, Silicon Wheel, Gear system, timing belt and the DC Motor

Block Diagram

System logic flow.



QR Code



Scan Me!