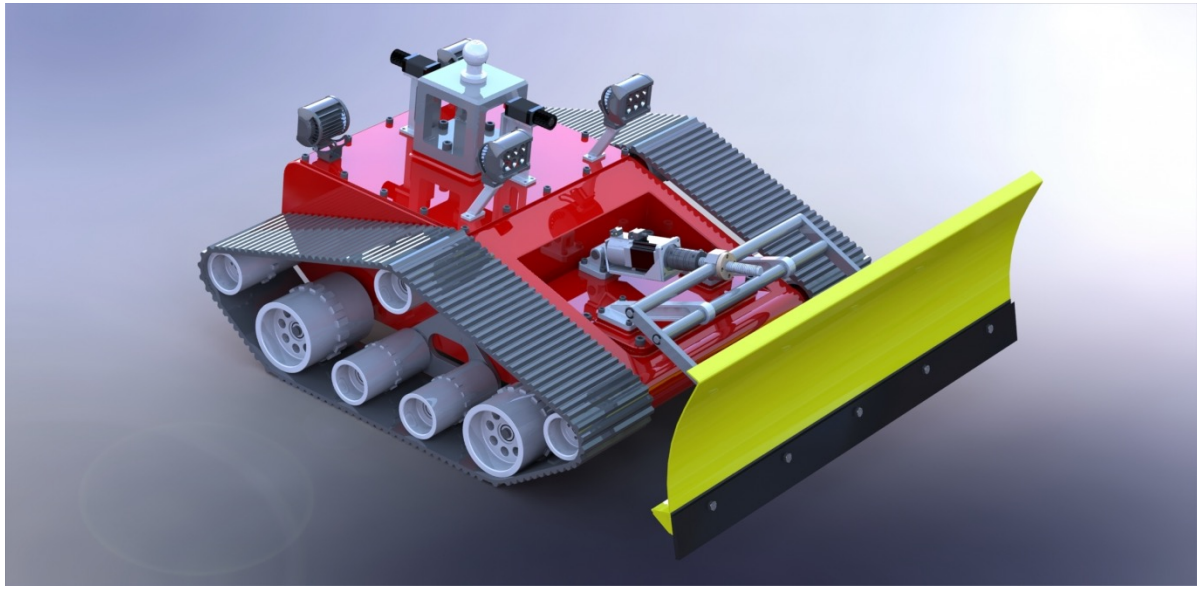
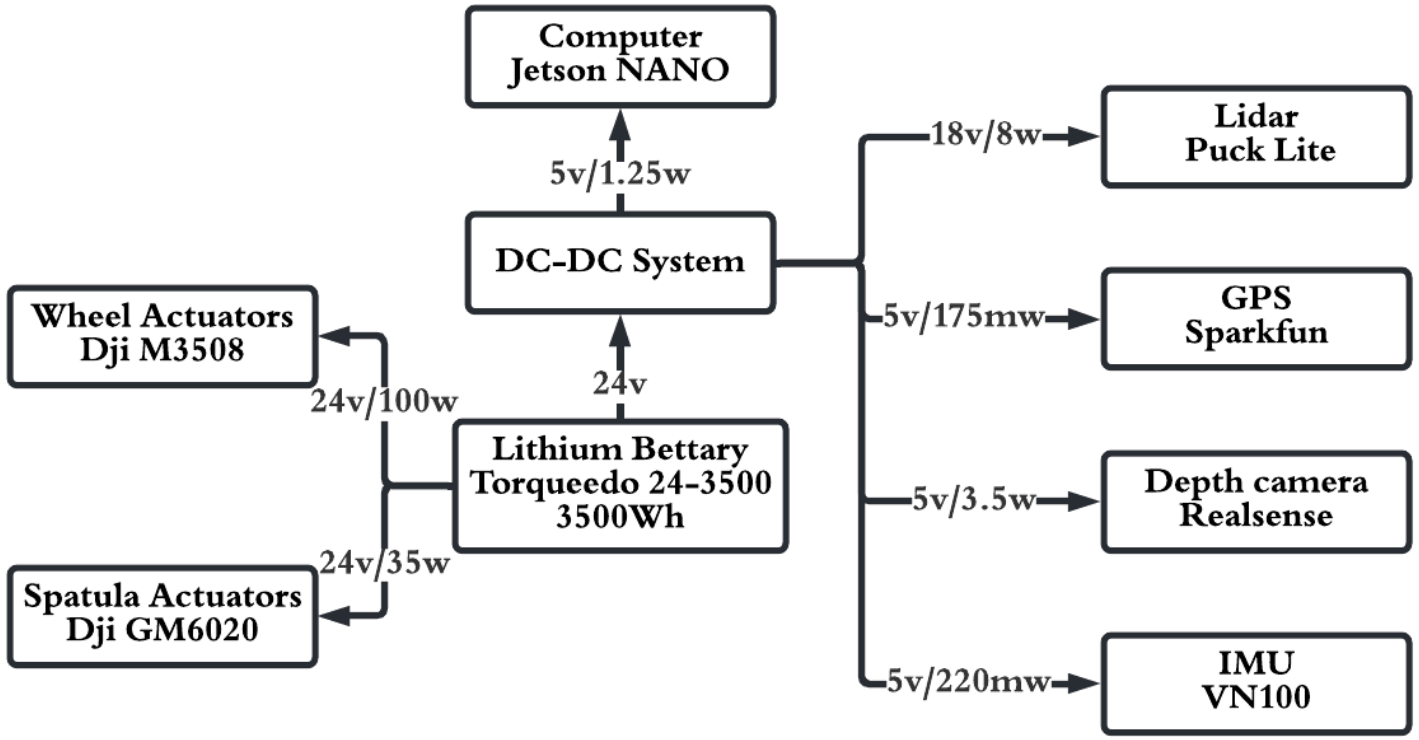
Snow removal robot

Motivation: It often snows heavily in the winter in the eastern United States, and snow removal is necessary to prevent the heavy snow from affecting daily life. Snow removal is a highly repetitive and physically demanding operation, replacing humans with robots would be a more efficient option.



Power

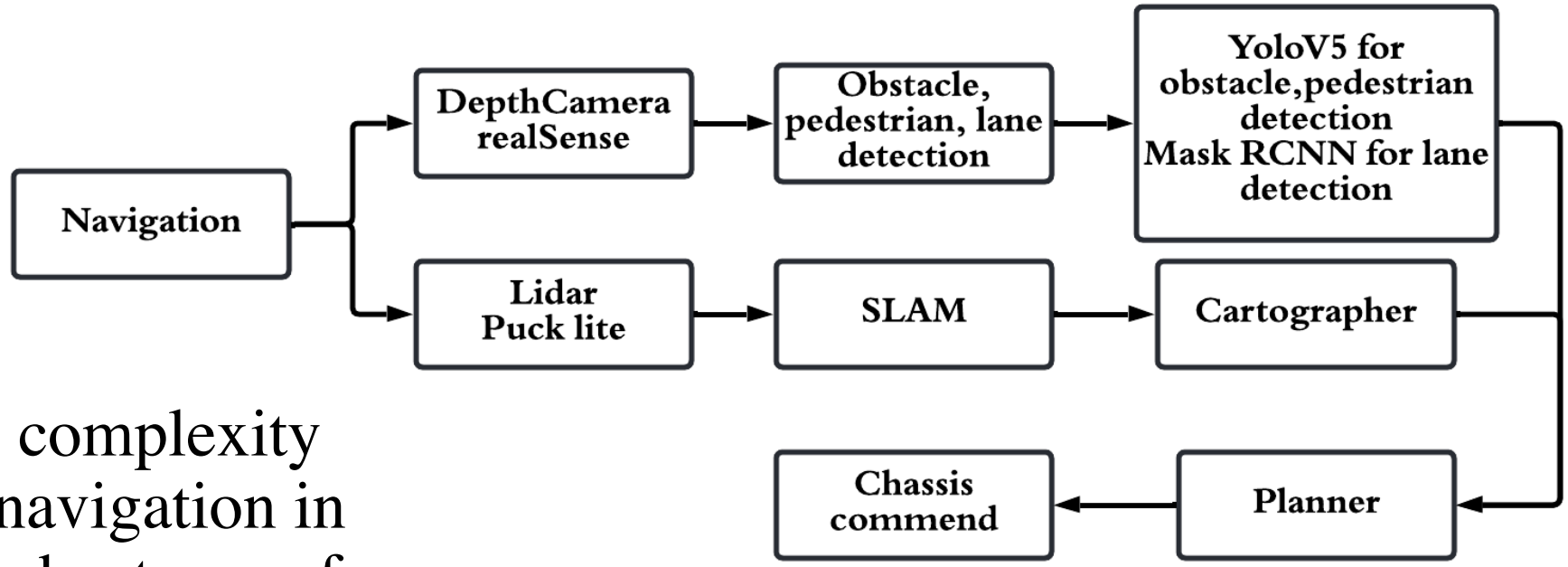
- The power budget of lithium battery is 3500Wh. And the total power consumption of computer, actuators(4 wheel actuators, 2 spatula actuators) and sensors is 483.145w.
- So the total running time of the robot will be 7h.



Sensing

- The sensing system of the robot include GPS, IMU, Lidar and Depth Sensor. The GPS and IMU are used to estimate robot state. And lidar and depth sensor are used for navigation. Using the combination of those sensors, the robot could achieve accurate outdoor self-driving capability.

Navigation



- Considering the complexity of autonomous navigation in real situations, robustness of navigation with a single sensor is not enough. So, the robot used not only lidar but also a depth camera for the overall navigation system.

Actuation and Computation

- The Jetson Nano is the central computer of the robot which runs a ROS. But Dji motor do not support ROS, so it would be necessary to design a ros driver for actuator control.