AutoSail

Edvin Asmussen, Jonathan Fernkvist, Simon Friberg,
Oliver Lagelius, Karl Söderlund, and Fredrik Åbrink
Linkedin: /edvin-asmussen, /jonathan-fernkvist, /simon-friberg,
/oliver-lagelius, /karl-söderlund and /fredrik-åbrink
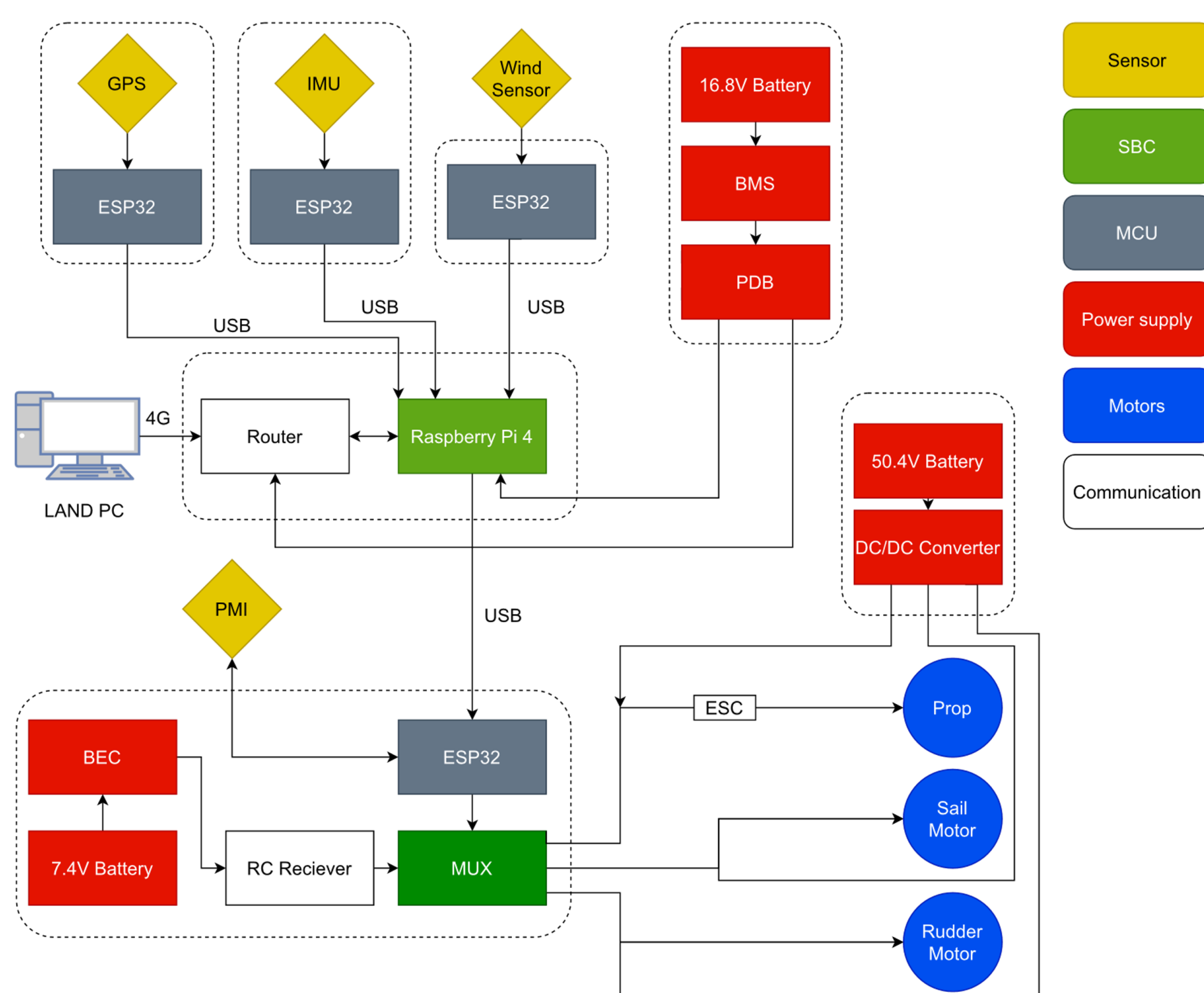
Overview and purpose

- This project is a collaboration between Mälardalen University (MDU), Universidad de Antioquia (UdeA) and Universidad Tecnológica de Panamá (UTP).

- MDU is creating a modular platform to enable transfer to a sailboat built by UTP.

- The platform created by MDU will also be able to integrate a Spiking Neural Network made by UdeA.

- Aiming to compete in the World Robotic Sailing Championship.

Goal

- The goal is to develop an autonomous sailboat capable of sailing optimally to a set position.

- The boat should be able to sail in a figure eight between two points seamlessly.
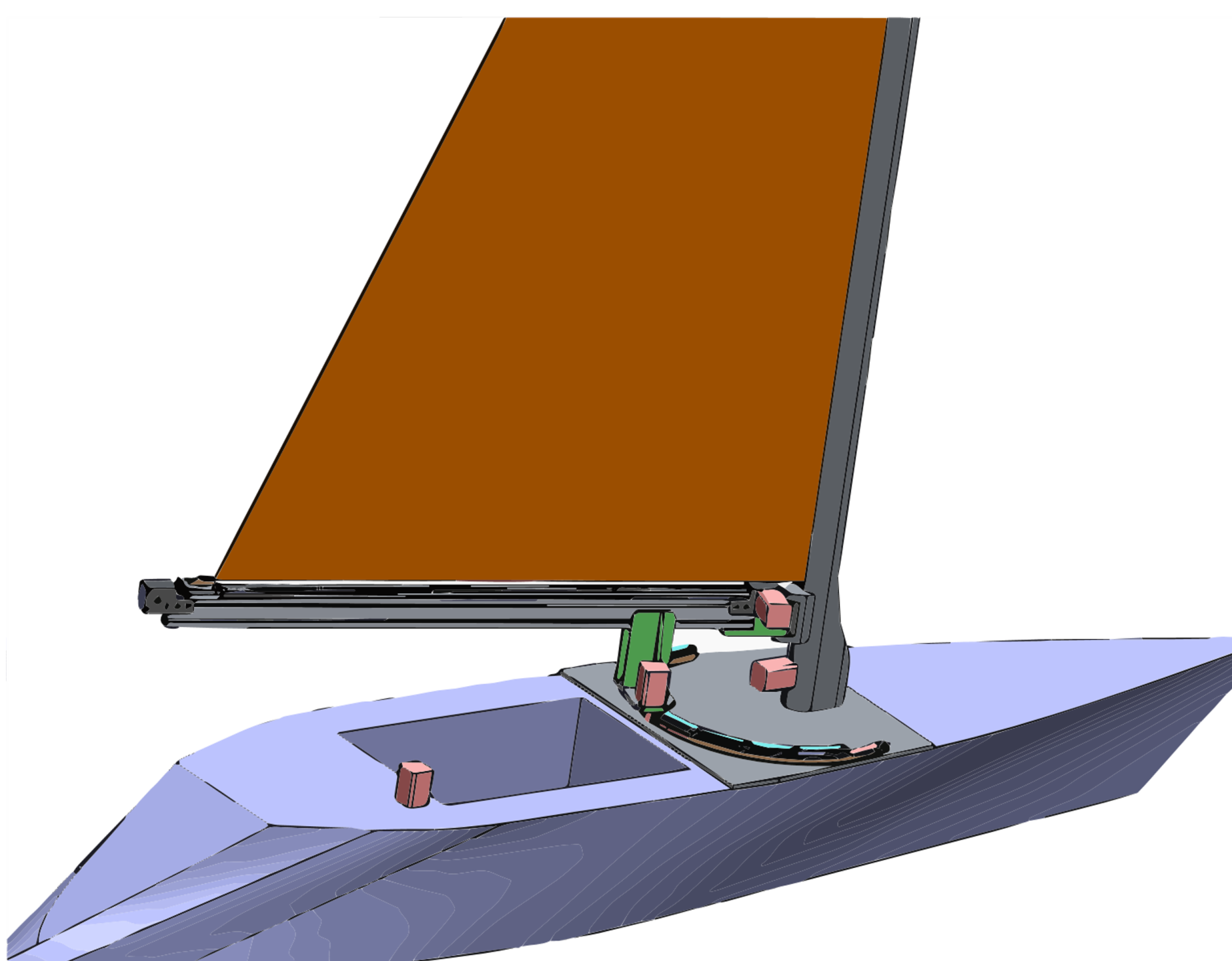

- Picture from the Panama Canal when showcasing previous boat.

Method

- **ROS2 & μROS:** ROS2 as main operating system on Raspberry Pi for controlling the boat and communication between devices. μROS on the microcontrollers for sensors and control of motors.

- **Sensor system:** GNSS and IMU to determine position and orientation. Wind sensor for the wind direction and speed.

- **Sail and rudder control:** Read sensor values, plan path and control motors connected to the sail and rudder.

- **Solution for controlling the angle of the sail.** Mast foot with a sliding cart attached to a chain controlling the boom using a motor.

- **Longevity & modularity**: All systems enclosed in separate modules for easy replacements.

- **Water resistance:** Use of IP67 enclosures.

Outcome

- Mechanical design for controlling sail and rudder using motors.

- Control system for following path by deciding sail angle and rudder angle depending on position and goal.

- Complete sensor system that senses position, orientation and wind forces.

- Water resistant system with IP67 enclosures.

- Picture of the boat with sail control solution made using Computer Aided Design.