Ship thruster interface

Basic information

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Objective

The objective of this project is to provide an intelligent maneuvering system for tugboats, enabling multiple vessels to coordinate their movements efficiently while assisting larger ships while entering and leaving the harbor. The system is a combination of software and hardware:

- Software interface for ship thruster control
  - short-range mobile networks, allowing the tugboats to communicate with each other.
  - Easy to extend with new capabilities
  - Based on standard technologies
- Build a physical demonstration platform
  - Enable the development of prototype applications
  - Gain experience to guide future development
- Hardware for interfacing with the thrusters and sensors of the ships over the network.
- Control software and operator user interface for intelligent coordinated maneuvering.

Approach

The system should firstly offer a control interface for the propulsion system, which allows the user to control and visualize the status of the operational thrusters. The thruster characteristics that shall be kept in focus are operationality, power consumption, revolutions per minute and azimuthal angle. The end user should be able to communicate remotely with the ship, thus a wireless communication system is to be implemented with the aid of the robot operating system (ROS) middleware.

Results

- Redesigned the prototyping platform and the mounting plate of the scale model ship. Guaranteed the stability and water resistance of the model ship.
- Built a ROS-based multi-thruster control system to enable effective coordinated movement of multiple vessels.
- Designed a wireless communication system and a GUI (Graphical User Interface) for controlling and monitoring the status of the thrusters.
The video below is the model ship controlling tests in Aalto ice tank.

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