

VTT's autonomous ship handling simulator pilot

The VTT Autonomous Ship Handling Simulator Pilot (A pilot) maneuvers a simulated autonomous vessel according to COLREGs. The Apilot consists of two systems: 1) a decision making system, which takes COLREGs into consideration and 2) Autopilot, which maneuvers the vessel.

Physically, the Apilot consists of the following components:

- Joystick controller
 - Used in manual operations
- Conning display
 - Shows the state of the autonomous vessel and status of the Apilot system
- Two chart displays
 - 1st display presents the planned route of vessel together with the track limits and waypoint radiuses
 - 2nd display shows the surrounding traffic featuring all vessels
- Virtual reality view
 - Shows a view from the ship bridge (see top right picture)

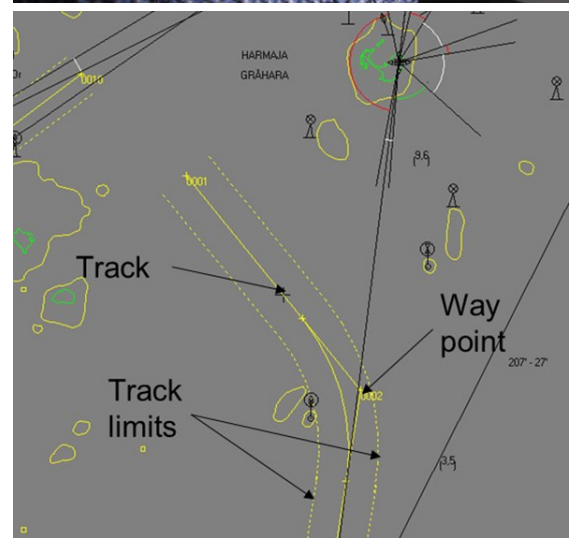
VTT's Apilot demonstrates an autonomous autopilot system for both normal course navigation and docking maneuvers. Three autopilot modes have been implemented:

1. Track pilot for normal cruising condition
2. Heading pilot for the evasive actions
3. Docking mode incl. crabbing

In the track pilot mode, the ship stays inside given track limits (see bottom right picture). If the track limits are exceeded, for example, during evasive maneuvers, the Apilot gives an alert and demands that the manual control joystick mode has to be switched on. An alarm is also shown, if another vessel comes too close to the simulated autonomous vessel. During passing situations, autopilot changes to heading pilot mode (i.e., gives way if another ship is approaching from starboard).

The simulator can be used, for example, for:

- Development of autonomous navigation systems
- Human factors studies with users
- Verification and validation activities
- Scenario tests before real implementations on autonomous vessels



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