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***mtu* NautIQ CoPilot**

Product presentation



A Rolls-Royce
solution

mtu NautIQ CoPilot



Onboard Pilot Assist

mtu NautIQ CoPilot Features & Use Cases

Scope of supply

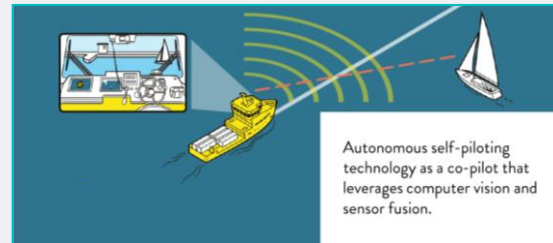
- **CoPilot** enclosure
- **CoPilot** video processing unit
- **CoPilot** camera
- MFD/touchscreen (optional)



Use cases

- **Yacht** (guided transit, crew support)
- **Ferries** (pilot assist/SA)
- **Survey vessels** (pre-planned grids/patterns, vision-based data)
- **Pilot boats** (transit/station keeping)
- **Patrol vessels** (crew support)
- **Tugboats** (mob/demob)
- **SAR** (search patterns & crew safety)
- **Guard and Standby** (crew safety)

Features



Enhanced **situational awareness** through AI and sensor fusion

3 modes of operation from **assistance** to full **autonomy**

Dynamic **collision avoidance**



Enhanced Autonomous Pilot Assist

mtu NautIQ CoPilot brings the latest in **innovative bridge control technology** to the global marine market. It provides a resource to captains, similar to modern automobile Advanced Driver Assistance Systems (ADAS) steering and braking systems, by:

- **Sensing and curating the horizon** for the user with Artificial Intelligence (AI), highlighting impending moving dangers or static obstructions.
- **Audibly alerting and alarming user of impending dangers**, charted or detected via sensor, and can optionally take control.
- **Allowing crew to choose their preferred level of support**: it enables manual vessel control with background AI sensors and alerts engaged or be tasked to autonomously execute plans for dynamic routes and voyages.



Increased safety

Autonomously handles re-routing and collision avoidance, reducing the risk of manual errors that could lead to accidents, thereby increasing crew and vessel safety.



Increased productivity

System independently executes the navigation of routine transit routes, boosting crew efficiency and productivity.



Greater accuracy

Always on the watch, **mtu** NautIQ CoPilot perceives and analyzes more data than a human, detecting objects commonly missed by Automatic Identification System (AIS) and radar



Increased capabilities

Freed from routine navigational tasks, crew can focus on other activities and potentially improve their daily operations onboard.



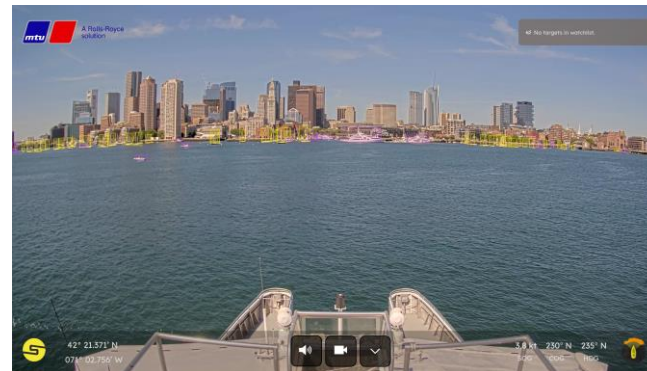
Autonomy-Enabled Guidance



mtu NautIQ CoPilot is our **most advanced autonomous system**, using digital marine sensors, embedded electronic charts, advanced autonomous algorithms and broad-area computer vision to **support human-manual vessel operations with enhanced real-time understanding of objects, obstructions and traffic**. In essence, it acts as a virtual onboard copilot at your side.

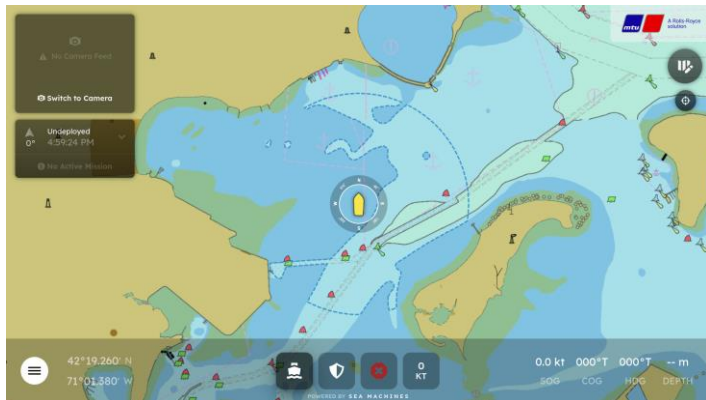


Computer Vision



AI powered computer vision capability powered by database of over **50 million images** of marine traffic and environment, collected from variety of sea states, weather and lighting conditions.

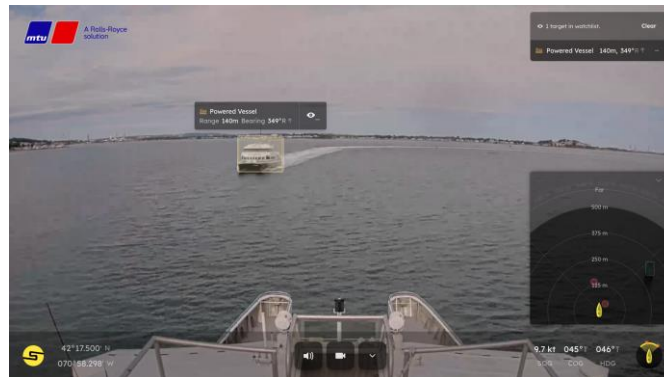
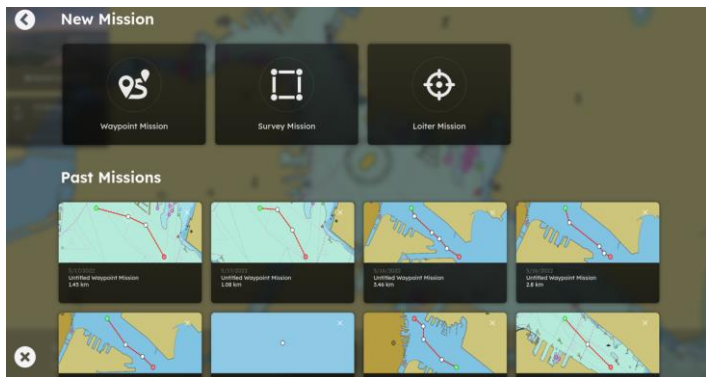
Computer vision **automatically detects, tracks, classifies, and geolocates targets of interest, and can record target tracks and imagery**.



CoPilot user interface can be displayed in existing bridge using a **16" screen or larger** (MFD or standalone touchscreen)

- HDMI input with USB touch output required
- Capable of interfacing with external trackball / keyboard

Automatically displays detected “targets of interest”, operator can track desired targets in a “watchlist”.





Operating Modes

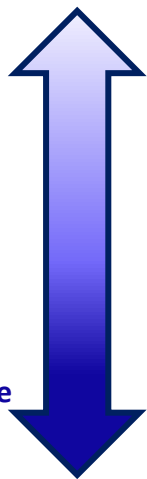
Manual Operation

Guide Mode

Guard Mode

Voyage Mode

Autonomous Operation



Depending on the voyage, **mtu** NautIQ CoPilot allows operators to **choose between three data-driven navigation modes.**

Guide Mode – visual indication and audible alert of potential transit conflicts with vessels or other obstacles as well as low depth. No active control.

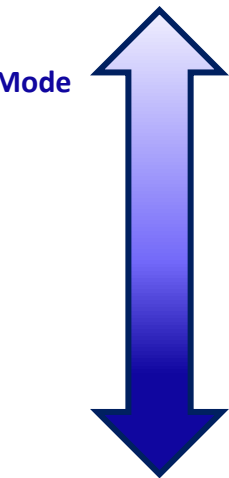
Guard Mode – visual indication and audible alert of potential conflicts, giving operators signal to act. If no action is taken, the system takes over control to avoid dangerous situations.

Voyage Mode – autonomous control of a planned voyage from start to finish with many built-in behaviors and features specially developed to support a diverse set of on-water operations.



Guide Mode – visual indication and audible alert of obstacles ahead or collision risk

Manual Operation



Guide Mode

- Vessel is under manual control by onboard human operator
- No active control by the CoPilot system
- CoPilot displays targets from radar, AIS and computer vision on chart or video feed
- CoPilot displays low depth warnings based on chart data

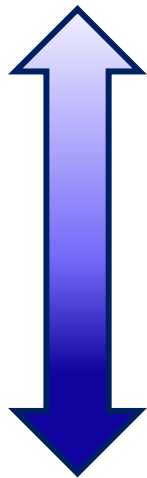
Autonomous Operation



A Rolls-Royce
solution



Manual Operation



Guard Mode

Autonomous Operation

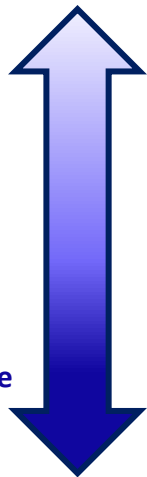
Guard Mode - visual indication and audible alert of obstacles ahead or collision risk, giving operators signal to act

- Vessel can travel at a heading and speed setpoint with collision avoidance
- CoPilot system controls heading
- CoPilot system controls speed by default
 - Operator can override speed with the helm at any time
 - Speed control can then be returned to CoPilot system as desired
- CoPilot system will execute collision avoidance maneuvers if operator does not act
- Will automatically return to previous heading and speed after avoiding obstacles



Voyage Mode – man on the loop autonomy onboard

Manual Operation



Voyage Mode

Autonomous Operation

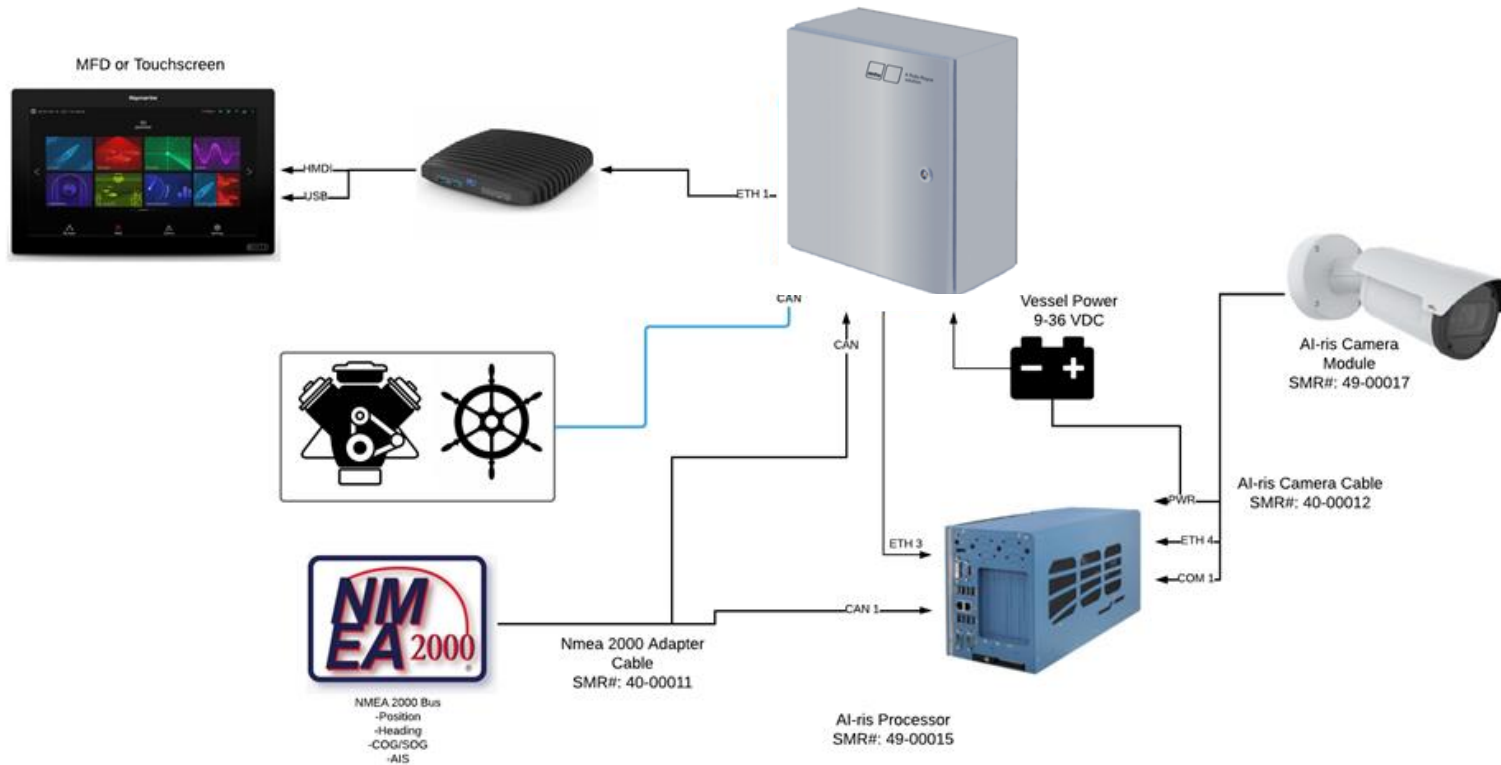
- The vessel travels to a list of user-defined waypoints
 - Optionally performing pauses, station-keeping along the way
- CoPilot system controls heading
- CoPilot system controls speed by default
 - Operator can override speed with the helm at any time
 - Speed control can then be returned to CoPilot system as desired
- CoPilot system will execute collision avoidance maneuvers while active



Mode Overview

Mode	Description	Steering Control	Speed/Throttle Control	Collision Avoidance Enabled
Guide	CoPilot provides navigational alerts	Operator (Helm)	Operator (Helm)	No
Guard	Smart Autopilot, Heading-Only	Operator (via UI) or CoPilot System	Operator (via UI) or CoPilot System	Yes
Voyage	Waypoint Voyage	CoPilot System	CoPilot System	Yes

System Architecture





Key Components

Guidance and Control

- Marine Type Approved PC for “pilot assist processing”
- Marine Type Approved PLC for low-level control (e.g., propulsion)



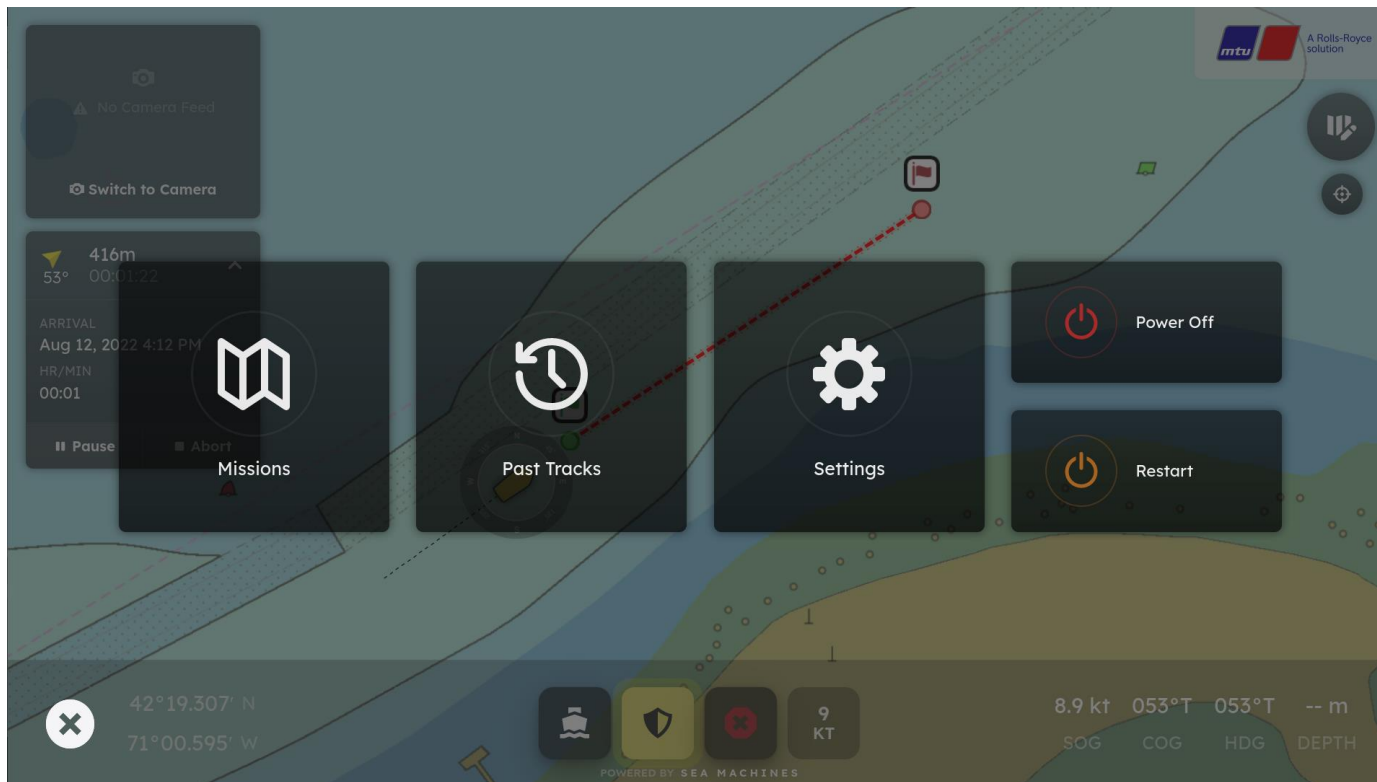
Computer Vision

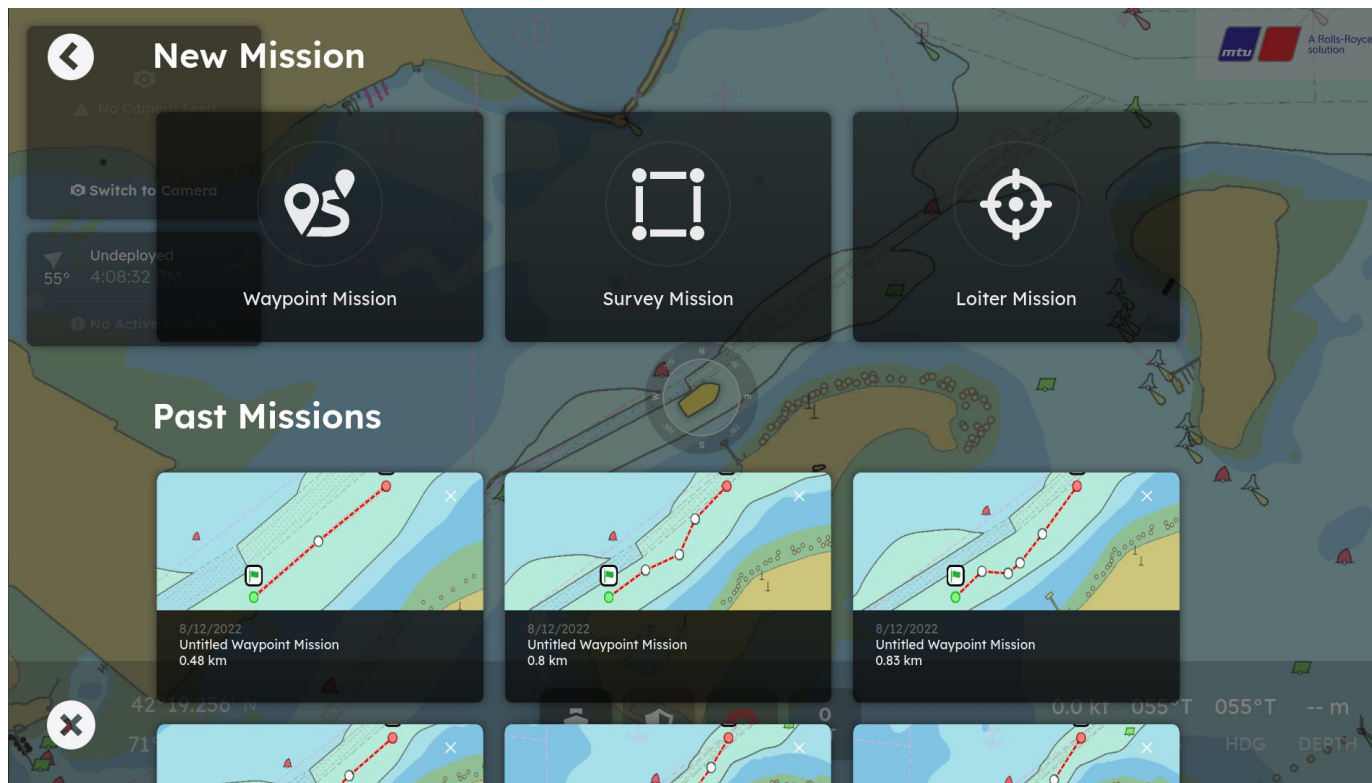
Marine Type Approved PC with high-performance GPU for processing and fusion

90° FOV RGB camera

- High-resolution (4K/10MP)
- 30 fps
- IP66/67 rated
- IMU







Example Screenshots for Reference

