



How haptic feedback enables autonomous shipping

Smart-Ship

Start-up company Smart-Ship is taking haptic feedback technology to the next level. Established in September 2018, the company has a clear vision of the benefits that haptics can bring. "Haptic feedback will help bridge the gap in autonomous shipping with the use of remote interaction," begins Smart-Ship founder Roy Kok

Regaining and releasing control

— *Portable haptic simulator*

The haptic feedback that Smart-Ship can produce is far more advanced than the type that we most commonly experience in our everyday life: a vibrating mobile phone. “The most basic feedback is vibration, but we can generate a variety of different forces in a haptic feedback control handle,” explains Kok. “Resistance is an important method; we can use variable resistance to indicate nearing or moving further away from a goal. We can also create virtual walls or no-go areas.” For remote operation and to support decision making in critical situation’s it’s important to create a quick awareness about the situation.

▼ Portable haptic simulator
created by VSTEP and Smart-Ship





▼ Portable Simulator including Radar, ECDIS, Outside View, Conning Panel and Azimuth Controls

Haptics in training simulators

In cooperation with simulator producer VSTEP, Smart Ship developed haptic handles to reduce training times and increase the quality of training. Kok says that the instinctive nature of haptics is the reason for such a great potential: "From an early age, humans learn to interact with their environment by means of experiencing forces. The use of haptic handles in training, for example, enables a faster and more intuitive training process." Following applications include using haptics to improve the connection between the operator and the vessels, sailing semi-autonomous.

VSTEP nowadays use remote connected simulators to educate trainees all over the globe. For a training course, only one of the available portable training simulators is enough at customer's location, without the need of a trainer on site. This is in fact an important step to remotely operated vessels and autonomous vessels.

Simple & secure

Cyber security is one of the key requirements for a final integration of autonomous shipping. The direct consequences of targeted, destructive access to a vessel steering system are unwanted. Therefore, the main objective is to ensure robustness against disturbances.

It requires an implementation of a well thought-out, layer-based IT security concept, the use of hardware-based cryptographic processes and a hardened operating system to create sufficient protection against the threats of a networked automation world. The implementation of end-to-end encryption of the communication by SSL renders eavesdropping ineffective. All functionality is supported on the Bachmann

PLC hardware. Kok continues: "Beside the support security features, the Bachmann controller is powerful enough to enable the full dynamic model to run in real time – it makes it easier to test new systems, quicker to develop new ideas and allows us to maintain our quality."

Regaining and releasing control

Haptic feedback is undoubtedly an emerging trend in the maritime industry. It is a technology that allows systems and equipment to communicate with an operator. This is crucial because, as automation plays an ever more important role in the maritime industry, haptic feedback is a safe way to ensure that operators maintain and, more importantly, improve control of remote operations.

"As soon as machines perform operations, we are eliminating haptic feedback – making it more difficult for ourselves to control these machines," continues Roel Kuiper, Research & Development Engineer at Dutch subsea specialist Seatools, who is also involved in an advisory role at Smart-Ship. "Haptic feedback creates awareness of what a machine is doing, even when there is poor or even no visibility" The point here is that haptic feedback gives us the possibility to regain the control of semi-autonomous vessels. And it is exactly this function that will help us to make the step to full autonomous shipping.



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