SmartKai: LIDAR based real-time detection and tracking of moving objects in maritime environments

Aparna Nagarajan
OFFIS Institute for Information Technology, Germany. E-Mail: aparna.nagarajan@offis.de

Jan Mentjes
OFFIS Institute for Information Technology, Germany. E-Mail: jan.mentjes@offis.de

Sebastian Feuerstack
OFFIS Institute for Information Technology, Germany. E-Mail: sebastian.feuerstack@offis.de

The goal of the Smartkai project is the development of a ship-independent and portside-installed assistance system using laser technology to support pilots during docking thereby preventing accidents and damages to port infrastructure.

The talk will focus on the current status of the prototype development that provides real-time detection and tracking of moving vessels capabilities to port infrastructure equipped with 2D lidar sensors. The infrastructure of sensor setups in Wilhelmshaven was tested in the last year and the collected data is used for the prototype development and the evaluation of the lidar data quality.

In order to have safe navigation, it is crucial to correctly interpret and perceive the surrounding environment. Situational awareness is well described by detecting and tracking the maneuvering vessels in the marine environment. The processing pipeline of detection system involves clustering the point clouds and the system is able to state the number of vessels and their closest distance to the quay wall. The tracking component uses particle tracking and can accurately estimate the position of the detected vessel, given the lidar measurements. This gives a consistent picture of the current status quo for various target groups approaching port infrastructure.

The talk will give an overview of challenges in development and evaluation of the prototype. We thus introduce the detection and tracking of ships in sea using lidar sensors mounted on quaywall.
Scenario-based-testing is exploited for evaluation of the prototype and the scientific findings will be presented. For the evaluation of the quality of the tracking, positioning information recorded on vessel is compared with the estimated position returned by tracker.

The SmartKai project runs with a total investment of EUR 2.4 million from that 73% are funded by the German Federal Ministry of Transport and Digital Infrastructure.