

RiverCloud – A Multi-sensor UAV/USV Tandem System for High Resolution Data Acquisition of Water Bodies

Ralf Becker, Benjamin Eberhardt, Christoph Effkemann, Thomas Gattung, Issa Hansen and Louis Makiello, Enrico Neumann, Juan Ramirez, Raimund Schwermann, Julian Teege, Jörg Blankenbach (Germany);

Key words: Geoinformation/GI; Hydrography; Laser scanning; Positioning; Risk management; Spatial planning; USV; tandem; waterways; sensor fusion; georeferencing

SUMMARY

In light of increasing urbanization and climate change waterways are already of outstanding importance for the national and international exchange of goods. The development and maintenance of waterways therefore represent challenges for the future, which must be carried out in the European Union in accordance with the EU Water Framework Directive and the EU Floods Directive, among others.

The required geometric and semantic data with spatial reference (geodata), however, are currently not available with sufficient consistency, spatial and temporal resolution, area coverage and/or accuracy. However, increasing digitization and the associated possibilities for data collection and provision now allow improved access to information, which simplifies the balancing of diverse, sometimes conflicting interests. At the same time, the possibilities of data acquisition with regard to sensors and carrier systems have evolved significantly in recent years. These include more powerful scanning and imaging sensors as well as unmanned aerial vehicles (UAV) and unmanned surface vehicles (USV).

The goal of the mFund project RiverCloud, funded by the German Federal Ministry for Digital and Transport (BMDV), is to develop an autonomous and networked UAV/USV tandem system as a basis for the holistic acquisition and provision of spatially and temporally highly resolved data for the development and maintenance of waterways and to support waterway management. The collected data shall be analyzed by combining them with existing macro-scale data (e.g. from sounding vessels) and the results shall be integrated into the models and workflows of the users from the water management sector.

The article first describes the objectives of RiverCloud with regard to the overall system, the used

RiverCloud – A Multi-sensor UAV/USV Tandem System for High Resolution Data Acquisition of Water Bodies (11874)

Ralf Becker, Benjamin Eberhardt, Christoph Effkemann, Thomas Gattung, Issa Hansen and Louis Makiello, Enrico Neumann, Juan Ramirez, Raimund Schwermann, Julian Teege, Jörg Blankenbach (Germany);

FIG Working Week 2023

Protecting Our World, Conquering New Frontiers

Orlando, Florida, USA, 28 May–1 June 2023

carrier platforms, and the employed sensor technology. An essential challenge is the precise georeferencing of all acquired data in a uniform coordinate system. Therefore, one of the key points of the project is the development of a method for the best possible determination of the position and orientation (pose) of the autonomous UAV/USV tandem system based on various sensors. In addition, results and data from a survey campaign are shown. Finally, the RiverCloud data provisioning strategy and the RiverCloud web portal are outlined.

RiverCloud – A Multi-sensor UAV/USV Tandem System for High Resolution Data Acquisition of Water Bodies
(11874)

Ralf Becker, Benjamin Eberhardt, Christoph Effkemann, Thomas Gattung, Issa Hansen and Louis Makiello, Enrico Neumann, Juan Ramirez, Raimund Schwermann, Julian Teege, Jörg Blankenbach (Germany);

FIG Working Week 2023

Protecting Our World, Conquering New Frontiers

Orlando, Florida, USA, 28 May–1 June 2023