ScubaNav

Scuba diving with GNSS **Nav**igation

Many underwater applications require precise and robust positioning and consequently based on a reliable underwater navigation:

- **Diving robots**: Positioning of the autonomously acting (AUVs) or remote-controlled robots (ROVs)
- **Rescue diving**: Support and simplification of the search for missing persons, e.g. for rescue and fire services
- **Surveying diving**: Underwater archaeology, cartography of underwater biology or for topographical surveying of slopes and reefs, harbours, rivers, or reservoirs
- **Scuba diving**: Navigation in a reef or "back to the boat"

Navigation under water is technically demanding because satellite navigation signals cannot be received under water. One solution currently in use is dead reckoning. This is improved with different systems. If this happens with base transponders installed and measured on the sea floor, one speaks of navigation along a baseline (Long Baseline [LBL]). In the case of surface references (e.g., by a support ship), the ultra-short baseline (USBL) or the short baseline (SBL) is used for the calculation. By using additional sensors, the position determination can be further supported (e.g., IMU, gyro compass).

Within the project ScubaNav a solution is considering that, based on a terrestrial GNSS pseudolite system, enables underwater positioning on a terminal device analogous to conventional GNSS-based positioning systems. Transceivers floating on the water (e.g., buoys or beacons) receive the GNSS signals and determine their position independently. The transceivers generate, based on the GNSS clock or time stamp, GNSS-like long-wave signals which are transmitted synchronously by the transceivers underwater. Like a GNSS receiver, the underwater receiver processes the signals and uses them to determine its position.

In project ScubaNav, the basics and technological prerequisites are to be created to evaluate the implementation of such a system. Without excluding future industrializations or applications, a scenario should be selected in the first phase that enables a proof-of-concept up to a depth of 30 m. If successful, it is planned to start a technical implementation and prototype phase with the aim of product maturity and then to sell the system commercially.

Consortium

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