

Avalon

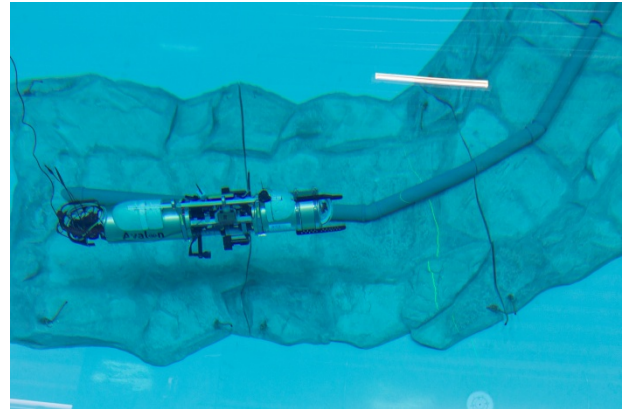
Autonomous Vehicle for Aquatic Learning, Operation and Navigation

System Description

The AUV "Avalon" (Autonomous Vehicle for Aquatic Learning, Operation and Navigation) measures 1.35 meters in length and 24.6 centimeters in diameter. Because of its compact construction Avalon is perfectly suited for operations in narrow obstacle-rich waters while being robust against currents and turbulences due to a weight of about 60 kilograms. Its 6 SeaBotix thrusters provide excellent maneuverability making the most delicate tasks possible while mutually being able to reach a maximum depth of 150 meters. The maximum speed is at about 2 meters per second. Two 800 Lumen LED flashlights enable Avalon to operate better in dark areas.

Avalon is also equipped with two Tritech Micron DST scanning sonar devices. They are installed on top and at the back of the vehicle. The first one scanning horizontally and the second one vertically. They provide sequential 2D all around scans.

For the spacial orientation and navigation Avalon uses three further sensors: To obtain depth samples it is equipped with a pressure meter (Sensortronics CTE8016GY7). It measures the pressure above the vehicle in a 16Hz frequency. The maximal deviation is 0.5cm. For pose estimation we use an IMU (Inertial Measurement Unit) and and FOG (or iFOG - Intelligent Fibre Optic Gyroscope). The IMU has been self developed by DFKI and consists of 3 accelerometers, two gyroscopes and 3 magnetometers. It measures translatory and rotatory acceleration forces and provides in normal mode the spacial orientation of the vehicle. To obtain more accurate values these results are fused with those of the FOG. The used FOG is the 1D version made by Tritech.



Field of application: underwater robotic

Contests & Awards:

SAUC-E:

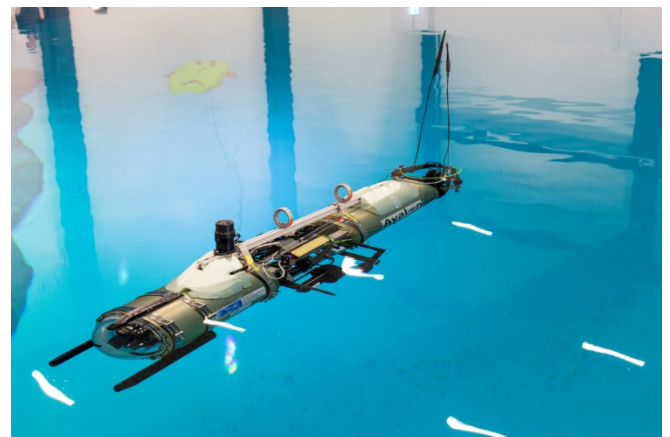
- 2009 3 place
- 2011 3 place
- 2012 „Best Qualifier“
- 2014 1 place

Eurathlon:

- 2014 2 place „Combined scenario“
- 2014 3 place “Leak localization and structure inspection”
- 2014 2 place “Interaction with underwater structures”
- 2014 1 place „Environmental survey of an accident area“

Technical details

- **Length:** 1.35m Diameter: 24.6cm
- **Actuation:** 5 x SeaBotix BTD150, 1 x self build (120W)
- **Sensors:**
 - 1 x Prosilica GC650C (directed forwards),
 - 1 x Prosilica GC2450C (directed downwards),
 - 2 x The Imaging Source DFK 72BUC02 USB CMOS Color (flexible alignment based on task),
 - 1 x Sensor technics CTE8016GY7,
 - 2 x Tritech Micron DST Scanning Sonar,
 - 1 x Xsens MTi IMU,
 - 1 x FOG (Fibre Optic Gyro): KVH DSP-3000,
 - 2 x Internal temperature sensor,
 - 2 x Internal pressure sensor,
 - 1 x Battery management unit,
 - 1 x Green line laser,
 - 1 x Tritech Echo Sounder,
 - 6 x Current sensors for all engines,
 - 6 x Water ingress sensors



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