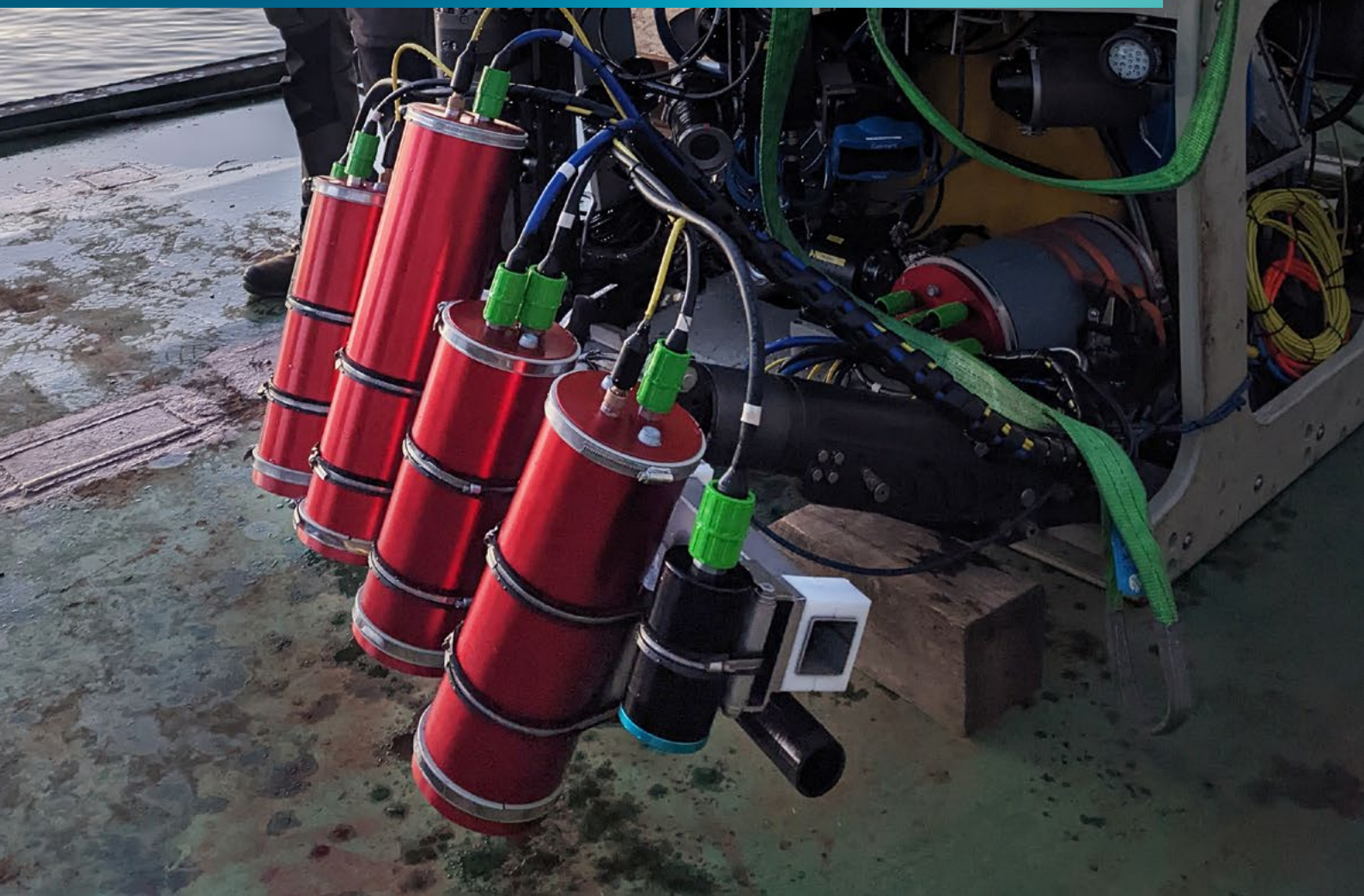




Underwater 3D sensor

Accurate 3D scanning of large complex underwater structures



Underwater 3D sensor

Accurate 3D scanning of large complex underwater structures

Underwater 3D sensor attached to remotely operated vehicle (ROV).

Applications

- Inspection of underwater structures, e. g., foundations, pipelines, cables, anchor chains
- Accurate 3D measurements of fine details, e. g., in cultural heritage documentation

Measurement principle

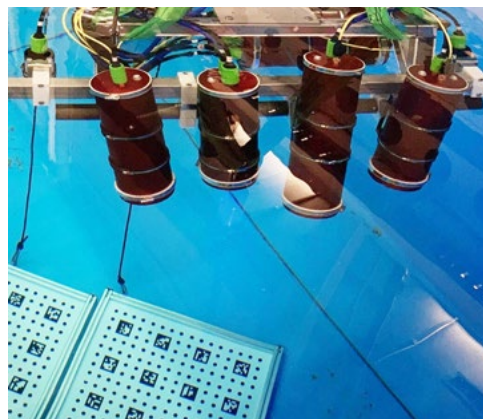
- Dense high-speed stereo 3D reconstruction using high-power aperiodic sinusoidal fringe pattern projection
- Online visual odometry by high-resolution color camera and inertial measurement unit
- Active movement compensation for continuous 3D measurements in motion

Features:

- Easy attachment to remotely operated vehicles (ROVs) by using 24 - 48 V power and single fiber optical cable for data
- Continuous measurements (3D scans and color images) with live streaming to operator
- In-situ parametric adaptation to scene requirements and measurement conditions
- Automatic, markerless scene reconstruction from thousands of scans using acquired odometry data from sensor
- On-site underwater system calibration using supplied marker board

System parameters

- Suited for deep-sea application up to 1000 m
- 3D measurement area: up to 0.9 m × 0.8 m
- 2D camera field of view: 1.7 m × 1.5 m
- Simultaneous 7-megapixel color texture acquisition
- Measurement distances: 1.0 m - 2.5 m
- Movement-dependent measurement rates:
 - ≤ 0.2 m/s: 12 Hz 3D @ 960 × 732 pixel
 - ≤ 0.5 m/s: 25 Hz 3D @ 960 × 732 pixel
 - ≤ 1.0 m/s: 60 Hz 3D @ 960 × 380 pixel
- 3D measurement uncertainty: 0.1 - 0.4 mm (depending on distance and water turbidity)
- Length deviation: ± 1 %
- Position error: < 1 mm
- Sensor dimensions: ~ 1.2 m × 0.7 m × 0.5 m
- Sensor weight: ~ 65 kg



Underwater 3D sensor during calibration.



Contact

Imaging and Sensing Department

Head of Department

Dr. Peter Kühmstedt
Phone +49 3641 807-230
peter.kuehmstedt@iof.fraunhofer.de

Scientific Group

Image Processing and AI

Dr. Christian Bräuer-Burchardt
Phone +49 3641 807-235
christian.braeuer-burchardt@iof.fraunhofer.de

Fraunhofer IOF
Albert-Einstein-Strasse 7
07745 Jena
Germany
www.iof.fraunhofer.de



check
www for
more info