HaloCAM

Precise Verticality and Structure Positioning

Zupt - A Brief Background

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Survey services using uniquely developed technologies

Inertial Measurement Units

Onshore, Offshore, Upstream (subsea field development, onshore pipeline right-of-way), Renewables (Wind Farms)

3D Recon

Photogrammetry/Machine Vision integrated with Inertial Navigation

Halo and HaloNAV

4,000m rated

Commerce Exportable

Smallest Survey Grade AHRS/INS

Full INS navigation solution contained within the unit

AHRS, INS, and combined INS/DVL navigation option

What is HaloCAM?

A compact, 4,000 m rated sensor for subsea structure positioning and the determination of precise pitch, roll, heading and depth for piles, conductor casing or structures

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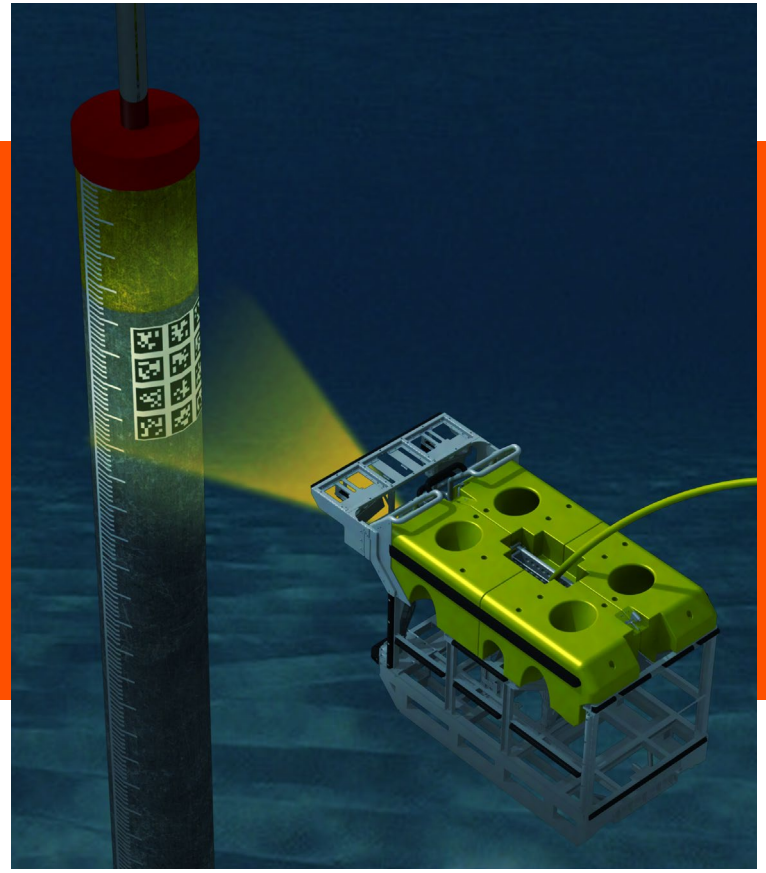
What Does HaloCAM do?



- Structure verticality and positioning
- Removes the need for physical bracketry and acoustic arrays
- Efficient structure/pile installation
- Relative or absolute positioning and virtual positioning

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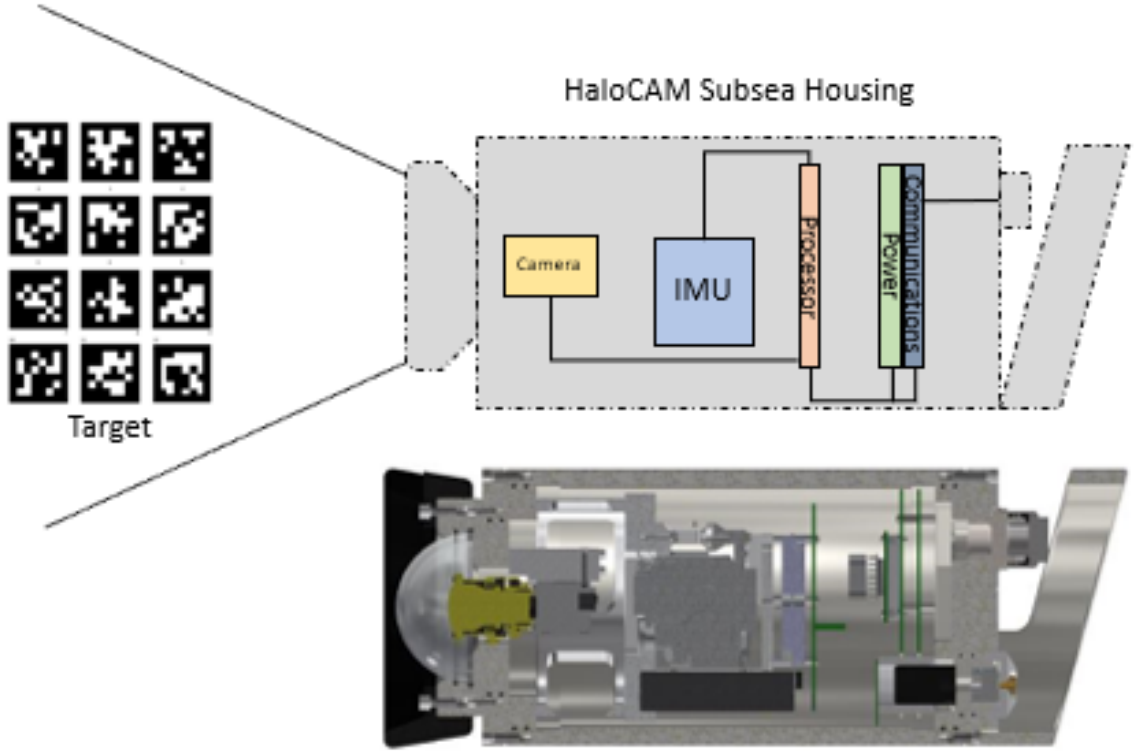
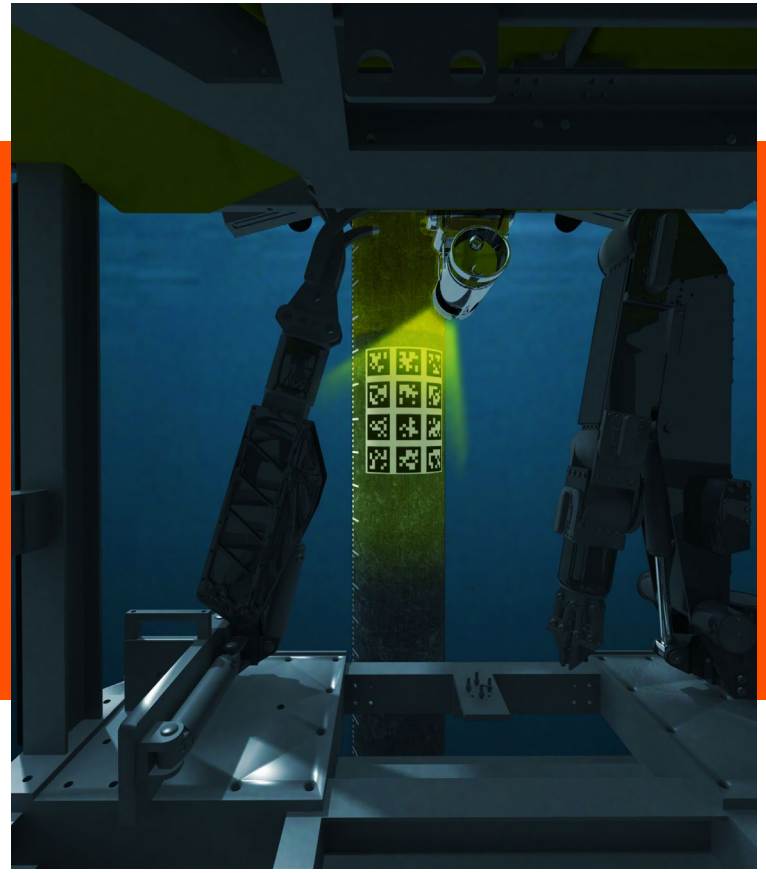
How Does HaloCAM Work?

Combining a very good IMU with an HD camera and existing machine vision internal processing provides us the positioning accuracy that industry requires



HaloCAM’s capabilities



- Structure Heading +/- 0.15° sec Lat.
- Pitch & Roll +/- 0.1°
- Differential Height/Height above seabed +/- 0.1 meter

*Requires DC of targets to the structure

- Position Same as USBL/LBL

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Absolute Positioning with HaloCAM

The targets used by HaloCAM can be mounted to a stab and inserted into already-existing acoustic transponder frames or known subsea monuments.

A pressure transducer is used to precisely determine the depth of the target on the frame.

HaloCAM can travel freely for up to 3 minutes and determine absolute position of another target to within 1 meter

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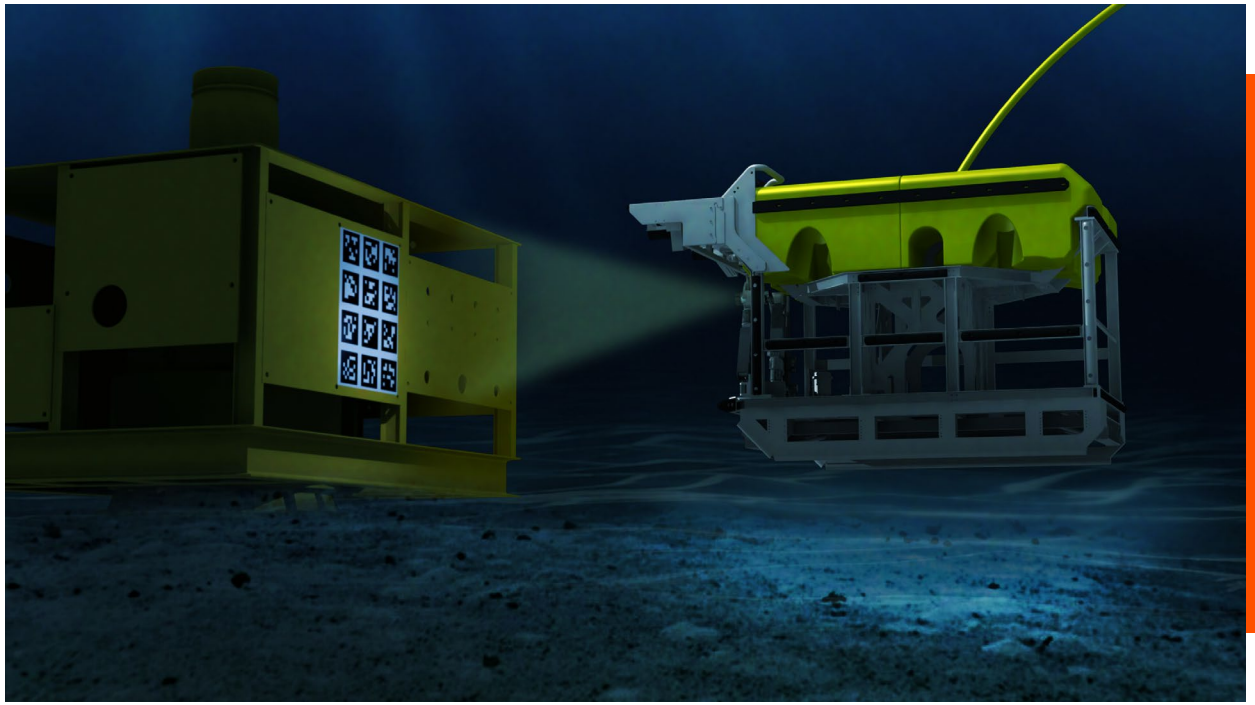
More than Just Cylinder Positioning



- Targets are dimensionally controlled to a structure (ex. hub reference face)
- Automatically calculate attitude and position offsets from structure to target to ROV
- Targets can be placed on flat or curved surfaces

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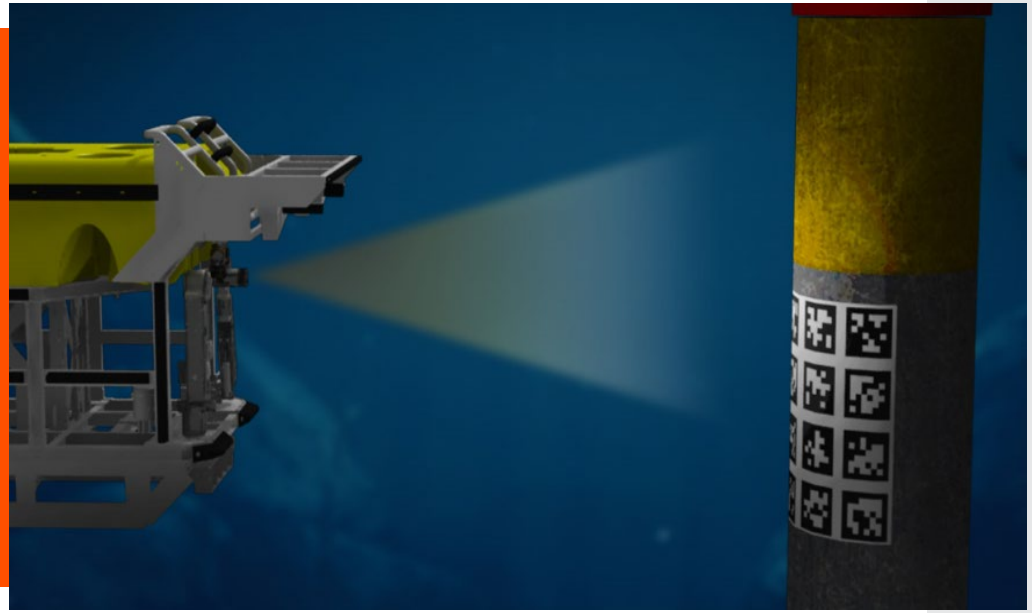
In Air/Surface Applications

While HaloCAM has initially been developed for subsea applications, the sensor (in slightly different physical form) can also be used on the surface for structure pile/WTG monopile installation.

The camera system can be mounted directly onto vibrating outriggers or “jig-arms” as the IMU integrated has a very high update rate.

Image data can more easily be collected and analyzed as data does not have to be delivered through an ROV umbilical.

Why is HaloCAM Different?



- Not effected by shock or noise from hammering
- The IMU is non-ITAR controlled (easy mobilization)
- Can remain on the ROV and work as a normal INS when not positioning structures
- No lever arms to calibrate between camera and INS
- Remote operation capability
- No specialized personnel required
- Works on small ROV’s

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For further information, please contact

sales@zupt.com

+1 832 295 7280

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