Oil in Water Locator - OWL™ and OWL MAP™

Ocean Visuals has developed integrated solution for real-time detection of oil spills in marine environment. Our technology is based on 25 years of R&D and is patent pending.

The Ocean Visuals HLIF LiDAR is a compact device for remote detection of oil on board of moving vessel or stationary platform. The HLIF LiDAR is able to detect and classify oil on water surface and in water column, submerged oil and oil in ice slush. Assembled in a waterproof box with its light weight (less than 40 kg) and low power consumption (less than 150 W) it provides sensing of water at distances up to 30 m with sensitivity for oil detection down to part per million *(ppm)* concentration range and sampling rate up to 100 Hz. It operates continuously and unattended, also in extreme weather conditions like strong wind, waves, low temperature etc.

The HLIF LiDAR operation is based on the method of Laser Induced Fluorescence (LIF). Its hyperspectral detector records the spectral response of oil molecules in water to every pulse of UV light of sensing laser. Thanks to integrated analysis of HLIF spectra the device can distinguish oil from any other substances in water. If found oil content in water is higher than a preset limit, an alarm is triggered. The LiDAR can be easily integrated with any vessel- or shore-based information management system.

Operational vessel with installed HLIF LiDAR

Technical Specification: OWL™ and OWL MAP™

Operational	
Sensing distance	Up to 30 m
Conditions of operation	Continuous, Day and Night
Sensitivity for oil products:	
Min concentration in water column	1 ppm
Min oil thickness on water surface	1 μm
Pulse Repetition (Sampling) rate	Up to 100 Hz
Sensing laser	UV, eye-safe
Hyperspectral detector	Ultraviolet (UV) and visible spectral range
GPS	Integrated
Control and communication	
Operational control	Integrated micro-controller
Data storage	Local and central servers
Setup of device operation	Remote, via local server
Communication line	Ethernet
Alarm processing	Automatically
Data visualization on the map	Real-Time
General	
Power consumption	150 W / (1500 W arctic)
Dimensions (L x W x H)	65 cm x 45 cm x 37 cm
Weight	40 kg

The Ocean Visuals HLIF LiDAR is accompanied with multifunctional software with local and central user interfaces to handle multiple vessels equipped with such device and produce integrated map of oil spill locations and measurements results (type of oil and concentrations) in real-time mode or in selected time window from historical data stored in the database.

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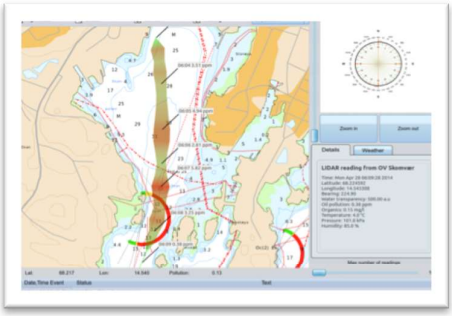
OWL™ and OWL MAP™  	• Oil detection based on real-time spectral response from the oil molecules • Online / Offline data management (collection, initial analysis, distribution) • Online / Offline data visualisation (map-based, graphs) • Possible to provide data to 3rd party applications • Configurable notifications / alarms • Data syncronization to OWL MAP™ cloud service based on data priority • Data syncronization to OWL MAP™ Client interfaces based on data priority
⇕	• GSM, ICE(CDMA), Iridum (satellite), WiFi • Secure connection (HTTPS)
OWL MAP™ cloud service 	• Data collection, management and analysis • Storing processed and raw data of interest • 3rd party API for data access based on customer needs • Remote maintenance / customer support
⇕	• Secure connection (HTTPS)
OWL MAP™ Client interfaces 	• Map-based visualization, graphing (real-time & historical data) • Desktop PC application (Windows, Linux support) • iPad application (iOS support) • Data synchronization across applications (near real-time) • Configurable notifications / alarms.



Ocean Visuals AS
Hundsværgt, 8, N-6008 Ålesund, Norway
E-Mail: info@oceanvisuals.no
Phone: +47 21 50 71 00

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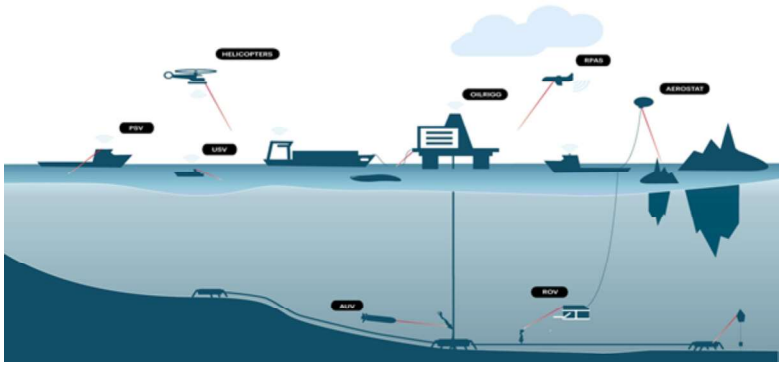
Method Description	
Description principle	• Hyper-spectral Laser-Induced Fluorescence (HLIF) LIDAR (Light Detection And Ranging)
Physical and Instrumental	• HLIF LIDAR sends laser beam to the water column and analyses its spectral response.



System / Technique Characteristics	
Suitability to various forms of hydrocarbon	• Oil
Frequency (continuous / recurring / intermittent)	• Continuous
Detection Range	• For shipboard and fixed installation: 15-30 m (Point detection)
Sensitivity	• Minimal detectable concentration is 0.1 ppm oil in water
Response time (detectable response time)	• Real-time
Leak positioning / Classification possibilities	• No / Yes
Point sensor or area detection	• Point sensor at fixed installation
Technology Readiness Level	• Commercially delivered
Pilot installations	• Norwegian Coastal Administration (2 vessels) • Hurtigruten ASA (1 vessel) • Joint projects together with US Coast Guard, CEPPOL (France), Grand River Authorities in Ontario and Estonian Border Guard
Functional Benefit / Advantages / Strength of the technique	• Operates during day and night • Detects water/oil emulsions • Detects submerged oil and oil in icy waters • Able to detect oil under ice • Able to discriminate oil from non-oil false positives (e.g. natural organics, phytoplankton) • Able to discriminate between oil types • Enable real-time analysis • Can identify oil on any background
Use in other purposes than Leak detection	• Used for trace pollution monitoring, optimal cleaning guidance and post-cleaning control

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Technical description and Prerequisites for the technique	
Form and Dimensions	• Single box unit, max dimensions: 65 cm x 45 cm x 37 cm
Weight (kg)	• 40 kg
Communication type (Signal)	• Ethernet communication
Power consumption	• Power supply 110/220V AC, 150 W (1500 W arctic conditions)
Bandwidth need	• 100kB/s at 50Hz rep. Rate. (Map application adds more data)
Design life (years)	• Estimated 10 years
Temperature (C°)	• -50 - +50 C°

Recommendations and influence of external factors	
Retrofit possibilities (brown fields)	• Possible to retrofit
Recommended implementation (installation and interfaces)	• Local server to gather the data and control the device, internet connection to central server
Recommended combination with other sensors/ techniques	• X-Band radar for shipboard and fixed installations
Weather and sea state dependence	• Decreased sensitivity in strong rain and fog

Human and cost investments	
Human involvement in the daily use	• No. Used in unattended operation
Degree of investments and operational expenses	• Depends on the technical specification • Generally low operational expenses

Installation and commissioning	
Installation requirements	• Open line of sight to water • Minimum 5 m distance to water surface
Mechanical interface	• Fixing holders
Data handling	• Every measurement is accompanied with GPS coordinate and time stamp, and stored in the database on local and central server
Form of an alarm	• Automatic alarm based on setup thresholds of oil in water concentrations
Alarm handling and degree of false alarms	• Alarms are stored in separate log file • No false alarm due to other than oil substances in water
Training and experience required for operating the technique	• Basic technical and computer skills are required • No training is required
Operating procedures	• Continuous unattended operation
Calibration and recalibration	• Calibration is required during the installation • Automatic recalibration is integrated

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