Underwater Optical Communication System
Technology #15724

Applications

- Underwater exploration
- Underwater disaster relief
- Unmanned Underwater Vehicles (UUVs) for oil rigs
- Monitoring ocean life

Problem Addressed

About 70% of the earth is covered in water yet most of the ocean remains unexplored. Currently ocean exploration relies on tethered vehicles to transmit high bandwidth data which restricts mobility and limits the depth that the vehicle can explore. Acoustic communication enables researchers to transmit data wirelessly, but it is limited by low bandwidth and high latency due to the speed of sound. The use of acoustic communication to transmit high quality video over a significant distance is currently not available.

Technology

This invention allows for remote operation of the vehicle with high bandwidth transmission and low latency. This invention specifically discloses a method that allows for high bandwidth and low latency transmission of data in noisy underwater environments. In trials, high quality video was delivered with 98% success rate at 25 yards and within acceptable quality at 40 yards. Latencies were measured around 100 milliseconds, thus enabling telemetry between the UUV and its sensors.

Advantages

- Allows for remote operation of UUVs
- Allows for vehicle operation without a tether
- Allows for high bandwidth transmission with low latency
- Allows for transmission of video with low latency

Categories For This Invention:

- Photonics
- Data Communications
- Sensors (Photonics)
- Cameras
- Life Sciences
- Environment
- Sensing
- Instrumentation
- Other (Instrumentation)
**Research Tools**

**Other (Research Tools)**

**Intellectual Property:**

Underwater optical communication system  
Issued US Patent  
9,031,413

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**Publications:**

*Autonomous, Localization-Free Underwater Data Muling using Acoustic and Optical Communication*  
June 2012

*An End-to-End Signal Strength Model for Underwater Optical Communication*  
Journal of Ocean Engineering  
2012

*Using Optical Communication for Remote Underwater Robot Operation*  
October 2010

**External Links:**

Computer Science and Artificial Intelligence Lab  
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http://wireless.csail.mit.edu/

**Image Gallery:**