

NASA SBIR/STTR Technologies

T10.01-9845 – Luminet Optical Tank-Level Sensing System

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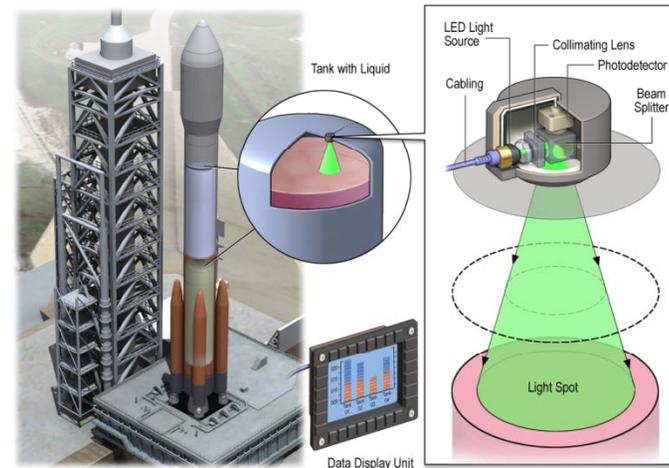


Identification and Significance of Innovation

Luminet Optical Tank-level Sensing System (LOTS) combines a broadband light source (LED), a silicone photodetector, and phase-sensitive light detection to measure liquid levels in LH₂ tanks with an accuracy of ~0.5-1.0%. In Phase I, we designed and assembled a proof-of-concept LOTS capable of measuring liquid levels in tanks up to 60 ft high. The demonstrated results indicate that LOTS will offer NASA the ability to incorporate a compact, rugged, reliable sensor into maintenance equipment for LH₂ tanks.

Phase I evaluation results showed that the high power LED-based LOTS, provides liquid level detection in tanks up to 60 ft high with an accuracy of ~0.5-1.0%.

Expected TRL Range at the end of Contract (1-9): ~4



Technical Objectives and Work Plan

Objectives:

- Analysis and design of the optical liquid level sensor.
- Optimization and homogenization of the light spot shape on the surface of the liquid.
- Development of software for calibration and display.
- Fabrication, assembly, and testing of LOTS components.
- Exploration of the commercial potential of LOTS.

Tasks:

- Design LOTS Optics to Meet Sensitivity and Accuracy Requirements
- Design Camera Module
- Design Illumination Module
- Design and Make Mechanical Package for the System
- Develop Algorithms for Calibration and Data Display
- Assemble and Test LOTS
- Demonstrate Feasibility of LOTS
- Explore Commercial Potential and Product Viability

NASA and Non-NASA Applications

LOTS will enable NASA to improve the accuracy of measurements of liquid level in LH₂ tanks. The LOTS system integrated into LH₂ -tank maintenance equipment will enable NASA personnel to monitor the liquid level. LOTS is a highly-sensitive and safe sensor system, adaptable to measuring levels of other cryogenic and non-cryogenic fluids. The compactness, lightweight, low power consumption, robustness, and high reliability make LOTS suitable for deployment in LH₂ maintenance equipment.

LOTS will find applications in measuring liquid levels in industrial and laboratory tanks, avionics, and the semiconductor material processing industries.

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NON-PROPRIETARY DATA