



## **Program Overview: LightTime MEMScan™ Ladar Sensor and Scanning Mirror**

### **Background**

LightTime LLC is developing components and sensors for MEMS-based scanning Ladar. Current scanning Ladar devices commonly use dual or nodding/rotating galvanometric polygonal mirrors. These traditional mirror systems are relatively expensive, much larger, much heavier, and require far more power than would a miniature MEMS-mirror-based system. The fundamental advantage of LightTime's MEMS-based technology is that it opens up new applications for Ladar where cost, weight, power and form-factor are constrained such as in small drone aircraft and Natural User Interfaces.

LightTime recognized that it would first have to develop the appropriate “second generation” MEMS mirror system as an integral part of its MEMS scanning Ladar program. This mirror in turn forms the basis of LightTime’s new Ladar product, MEMScan™, a scanning-laser real-time 3D image sensor. When available, MEMScan will be a compact, lightweight image-data capturing front-end system that interfaces with customers’ image processing and control systems. The latter will post-process MEMScan’s output data for the purposes of image display, analysis, and/or autonomous system control. LightTime intends to make MEMScan available as an OEM component.

In choosing to develop a specialized MEMS mirror optimized for Ladar, LightTime appreciated the well-known “Valley of Death” (time and cost) associated with MEMS development projects based on semiconductor processing. Therefore, a ‘technology-blind’ approach was taken that did not require clean-room semiconductor type processes. While it is convertible to a semiconductor process for very-high-volume applications, the current mirror is producible in moderate volumes without costly fabrication processes. LightTime intends to make the MEMS mirror available as a standalone OEM component.

### **LightTime Product Offerings**

LightTime recognizes that its potential customers have different levels of system requirements. Some require an entire Ladar sensor, while others may desire only a mirror system component to enable their own Ladar. Therefore, LightTime will offer the following:

- Standalone MEMS-based scanning mirror as designed to LightTime's MEMScan spec
- Standalone MEMS-based scanning mirror designed to customer specifications
- Complete MEMScan 3-D scanning Ladar sensor.
- Complete MEMScan 3-D scanning Ladar sensor designed to customer specifications.



### **Timetable**

The standalone MEMS-based scanning mirror is targeted for sample testing with potential customers by Q2 2011. Sample testing of the complete MEMScan Ladar sensor is targeted for Q4 2011. Design and production of a custom MEMScan sensor or MEMS mirror would be based on quotation. Transition of any of these products to silicon-based MEMS will require an additional manufacturing engineering iteration. Designs of the MEMScan Ladar or standalone MEMS mirror to customer specifications would be performed by contractual arrangement.

### **About LightTime, LLC**

LightTime, LLC is a center-of-excellence for innovation in optoelectronic technologies for Ladar, Microprocessors, Test & Measurement, Telecommunications, and more.

### **Mission Statement**

LightTime exists to develop fundamental, next generation technologies for exploitation with application-specific partners in the following application segments...

#### Compact / Miniaturized Ladar

- NUI (Natural User Interface)
  - Gaming / Entertainment
  - Gesture Recognition
- Surveillance and Robotic
  - Static and Mobile
  - Terrestrial and Airborne
  - Manned and Unmanned
- Autonomous Navigation
- Automotive

#### Hi-Speed Optical Clocking

- Microprocessors
- Telecommunication

### **Proprietary Innovation**

LightTime is not a licensee of others' technology. LightTime's products are based upon internally developed technologies with numerous, corresponding patents and patents pending.