

# Imaging LIDARs for New Space

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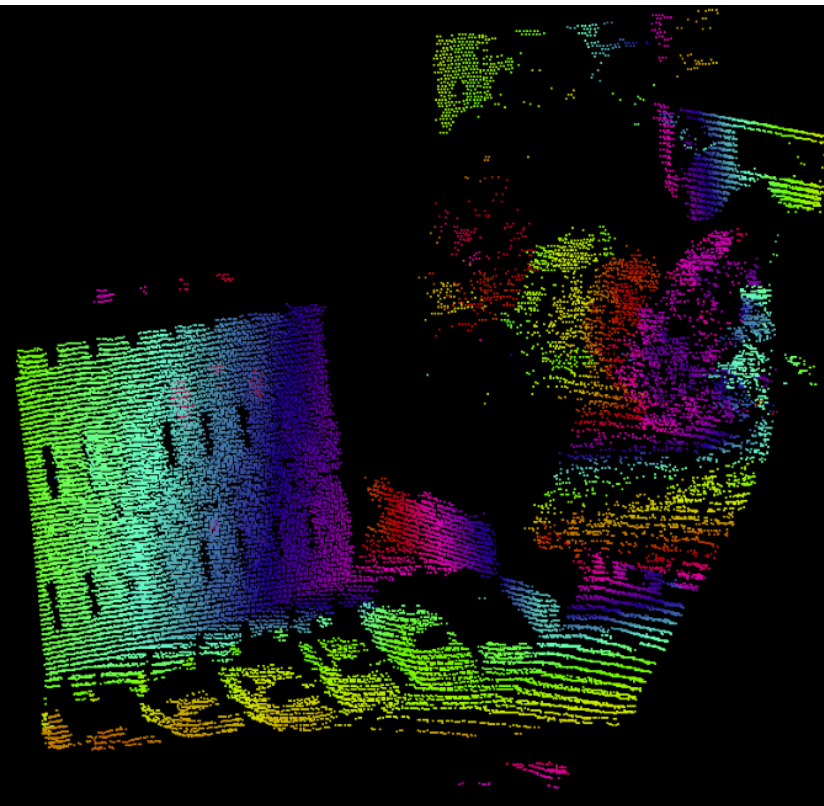
# Multiple imaging modes: 2D + 3D

- Solid-state, real-time, high resolution (0.05deg) lidar imaging (10 patents)
- Real-time data fusion free of parallax error.
- Mixing 2D+3D mean new processing capabilities in object detection and recognition
- Up to 12 imaging modes in a 10x20x20cm box (RGB/NIR/SWIR/thermal/polarimetric...)
- Check videos in <https://beamagine.com/applications>

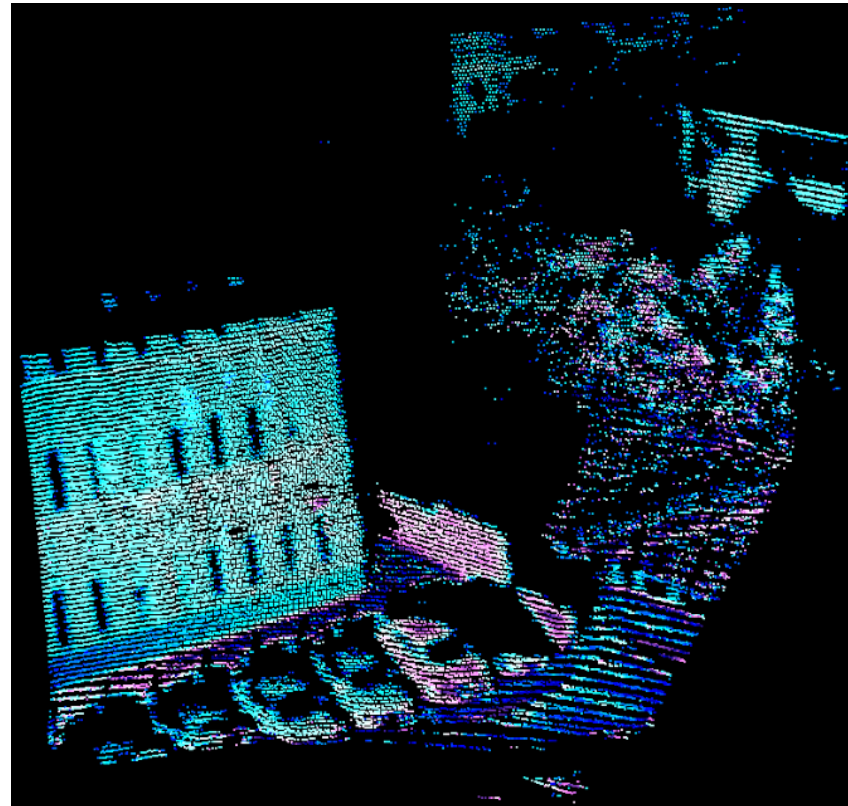


RGB

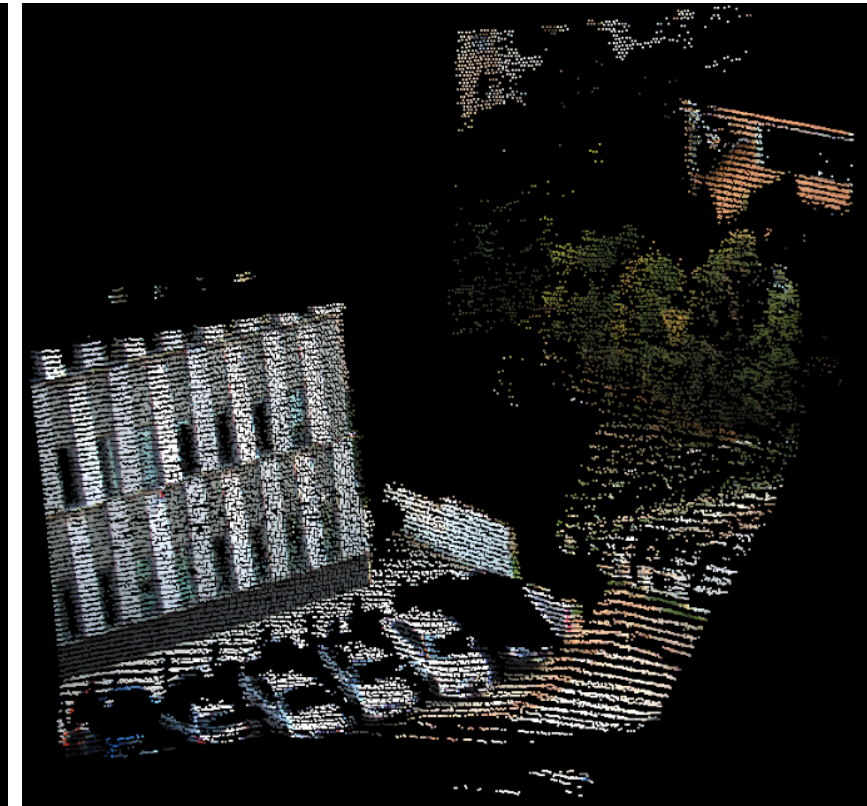
Range



Range + Reflectance

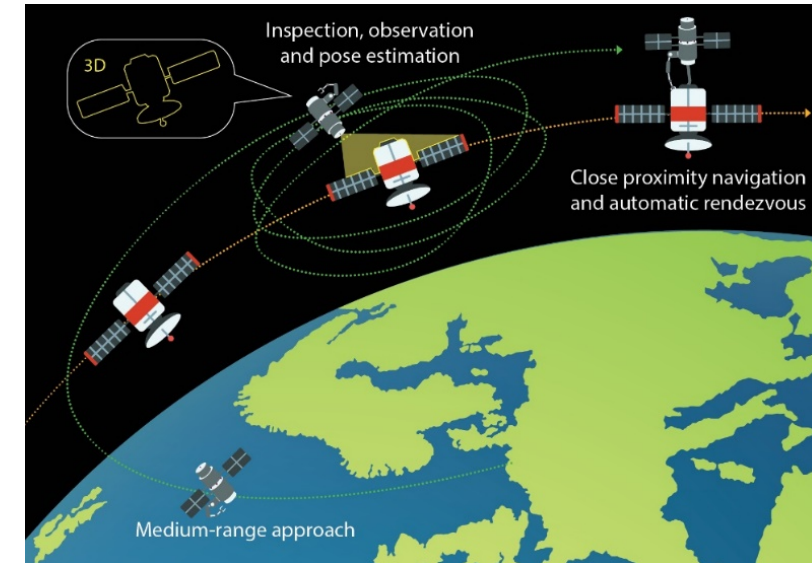


Range + RGB

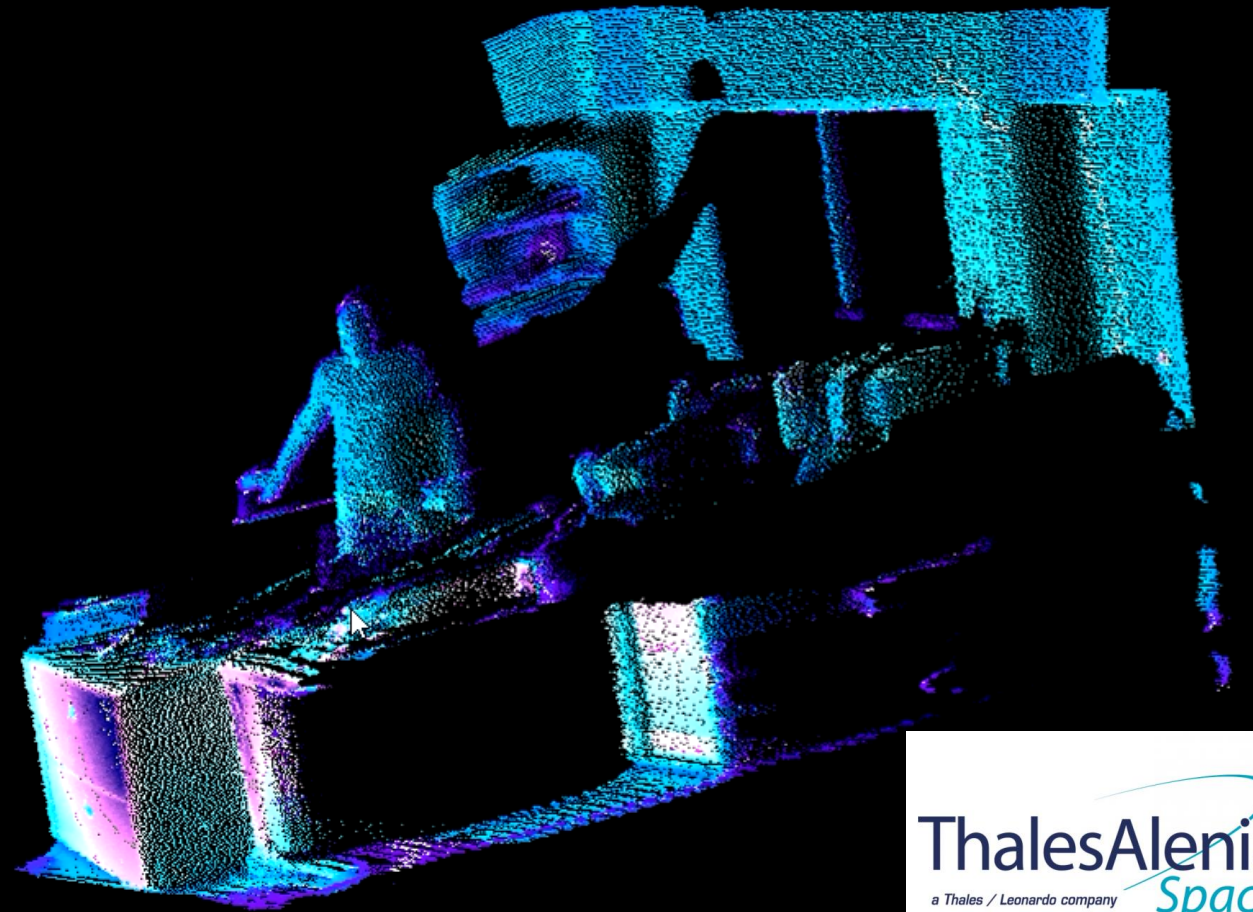
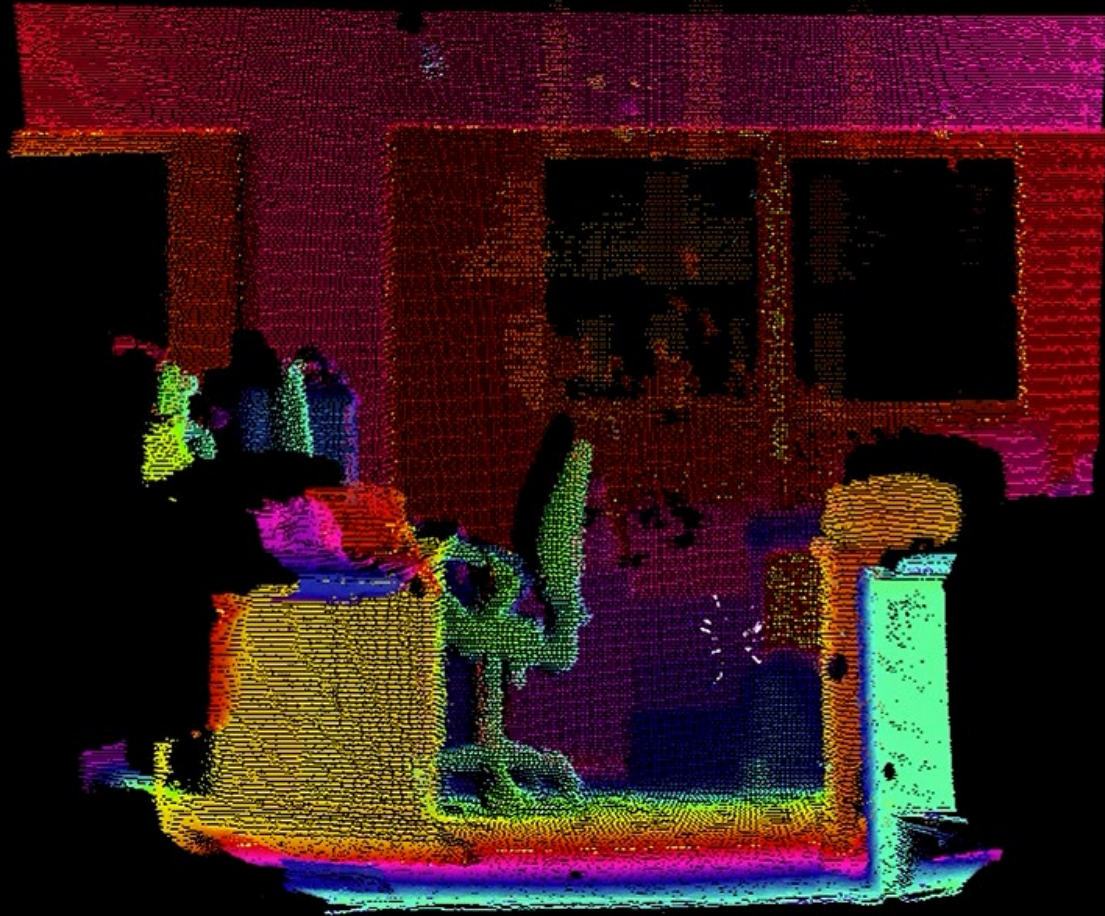


Tailored units delivered for TAS for research purposes at ground level, potential applications in

- Orbital robotics:
  - Satellite docking and pose estimation
  - Close proximity navigation
  - Space debris removal
  
- Planetary exploration
  - Path planning
  - Terrain assessment
  - Obstacle detection & avoidance
  
- Terrain mapping landing aid



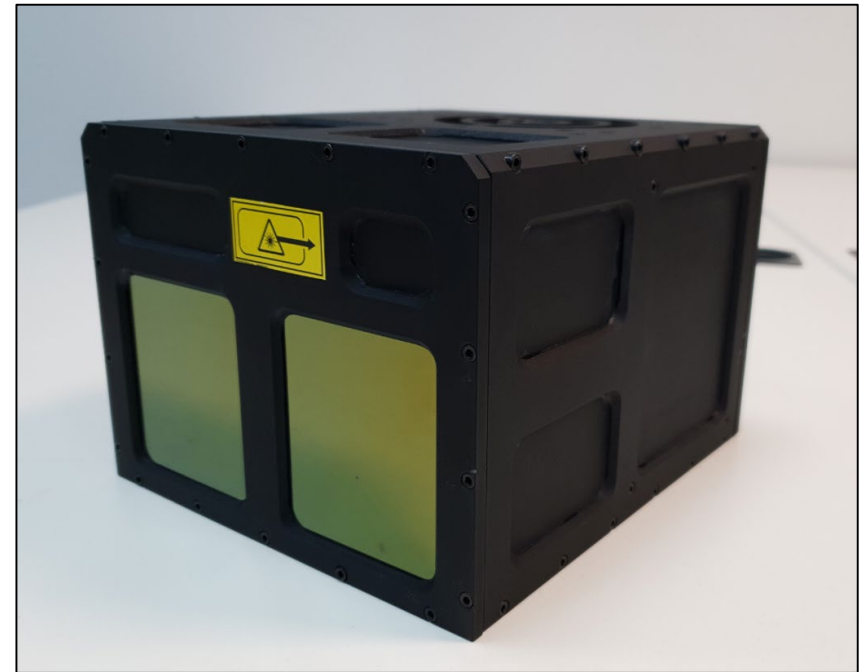
# Sample point clouds





## New project (GSTP) with ESA

- Approved GSTP project in partnership with LIDAX
- **SMARTLID3:** Development of a 100% space functional imaging LIDAR
- **Open Call to receive your space LIDAR application: Open Until 30<sup>th</sup> June!**
- If selected, **an EM model tailored to your application** will be developed for free



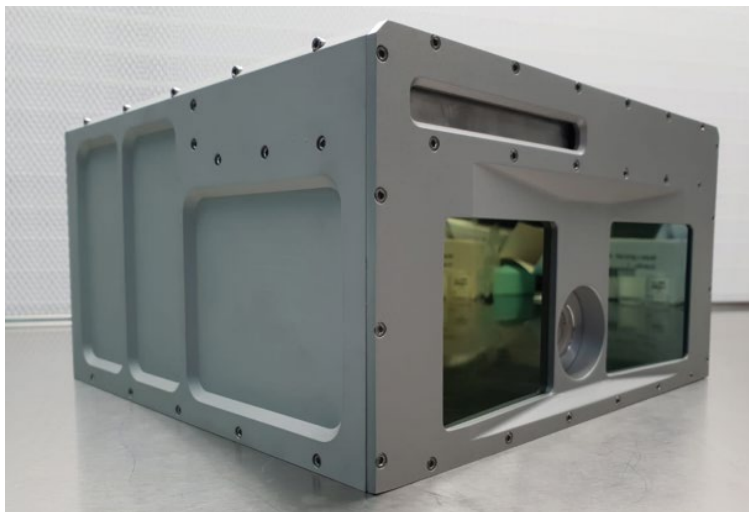
- Some parameters can be **tuned** according to the customer specification during the calibration process:
  - Image spatial resolution
  - Frame rate
  - Angular resolution
  - FOV
  - Point rate
  
- **Tailored imaging modes and specs!**

<b>Specifications</b>	
<b>Electro-optical unit</b>	
Wavelength	1550nm/1064nm - Class 1 full eye-safe
Range	>100m @ 10% reflectivity
Point rate	1.2 Mpoints/s
Image spatial resolution	600 x 200px
Frame rate	10 Hz
Field-of-view (HxV)	60 x 20°
Angular resolution	0,1°H x 0,1°V
Range accuracy	±2 cm
2D imaging modes	Tailored (RGB/NIR/SWIR/Thermal/Polarimetric)
Inertial sensor	Included
<b>Mechanical</b>	
Size (WxDxH)	10x20x20cm
Weight	2Kg
<b>Electrical</b>	
Power consumption	25W
Supply voltage	12 VDC
Machine Interface	UDP Ethernet packets/Video signal
<b>Software</b>	
Integration	Linux driver (ROS compatible available also) DLL for Windows
Test application	RVIZ and Beamagine 3D+2D Visualizer

## OPTICAL AND IMAGING PERFORMANCE

Field-of-view	50x50°
Image resolution	350x350 px
Frame rate	5 Hz
Point rate	612,5 Kpx/s
Angular resolution (x-y)	0.14 - 0.14°
Angular sampling accuracy	<0.01°
Range resolution	±1 cm
# of returns	4

- Sun Simulator: Arrimax 18/12 kW, 1400 W/m<sup>2</sup>, 5778 °K
- Halogen lamp 5 kW: 580 W/m<sup>2</sup>, 3000 °K



## Class 1 (eye-safe)

Irradiance (W/m <sup>2</sup> )	Range @ 80% refl. (m)	Range @ 50% refl. (m)	Range @ 10% refl. (m)
No sun simulator	168	133,5	60
580 – Indirect	127,5	102	45
1400 – Indirect	117	91,5	40,5
580 – Direct	27	22,5	10,5
1400 – Direct	24	19,5	9

## Class 3R

Irradiance (W/m <sup>2</sup> )	Range @ 80% refl. (m)	Range @ 50% refl. (m)	Range @ 10% refl. (m)
No sun simulator	490,5	387	172,5
580 – Indirect	286,5	226,5	102
1400 – Indirect	261	205,5	91,5
580 – Direct	61,5	49,5	22,5
1400 – Direct	55,5	43,5	19,5

## Class 3B

Irradiance (W/m <sup>2</sup> )	Range @ 80% refl. (m)	Range @ 50% refl. (m)	Range @ 10% refl. (m)
No sun simulator	988,5	879	402
580 – Indirect	666	351	157
1400 – Indirect	606	319	143
580 – Direct	144	76	34
1400 – Direct	127,5	67	30

Max range also limited by ambiguity distance between consecutive laser pulses, fixed at 426m.

**THANKS FOR YOUR  
TIME!**

See you at

Member of the Global **IFSEC** Group  
**SECON 2020**   
International Security Exhibition & Conference

**IFSEC**  
INTERNATIONAL

08-10 September 2020  
ExCeL, London, UK

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