National Aeronautics and Space Administration

# EELS

## Exobiology Extant Life Surveyor

The Exobiology Extant Life Surveyor (EELS) platform is a versatile snake-like robot with surface and subsurface mobility capabilities on ice, enabling future exploration of previously inaccessible terrain. The platform has numerous terrestrial and planetary body applications, including the potentially habitable subsurface ocean of Saturn's moon, Enceladus.

Over the next 3 years, EELS will undergo extensive lab and field testing in terrestrial environments to demonstrate capabilities towards the goal of infusion into a future JPL flight project.

**Length**
~4.9 m

**Mass**
~100 kg

**Power**
Tether-based, 80 VDC

**Comms**
Tether-based, Ethernet

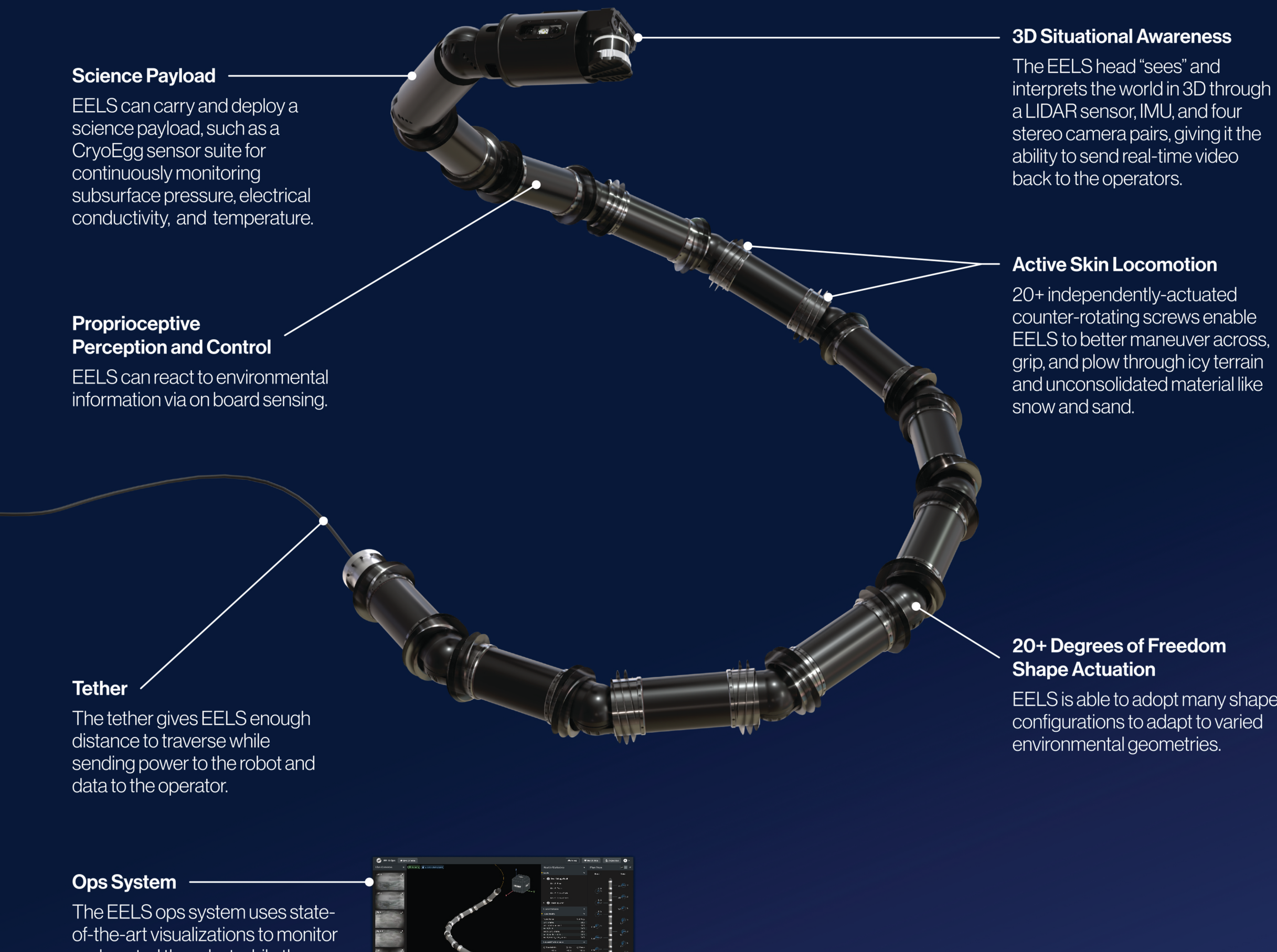
**Mobility Function**
Shape Actuation & Active Skin

**Primary Field Destination**
Athabasca Glacier, Jasper National Park, Alberta, Canada

**Terrain Types**
Icy/glacial surface and subsurface, unconsolidated material (sand, snow)

**Payload Accommodation**
Deployable sensor suite

# EELS Robot Capabilities



**Science Payload**

EELS can carry and deploy a science payload, such as a CryoEgg sensor suite for continuously monitoring subsurface pressure, electrical conductivity, and temperature.

**3D Situational Awareness**

The EELS head "sees" and interprets the world in 3D through a LIDAR sensor, IMU, and four stereo camera pairs, giving it the ability to send real-time video back to the operators.

**Proprioceptive Perception and Control**

EELS can react to environmental information via on board sensing.

**Active Skin Locomotion**

20+ independently-actuated counter-rotating screws enable EELS to better maneuver across, grip, and plow through icy terrain and unconsolidated material like snow and sand.

**Tether**

The tether gives EELS enough distance to traverse while sending power to the robot and data to the operator.

**20+ Degrees of Freedom Shape Actuation**

EELS is able to adopt many shape configurations to adapt to varied environmental geometries.

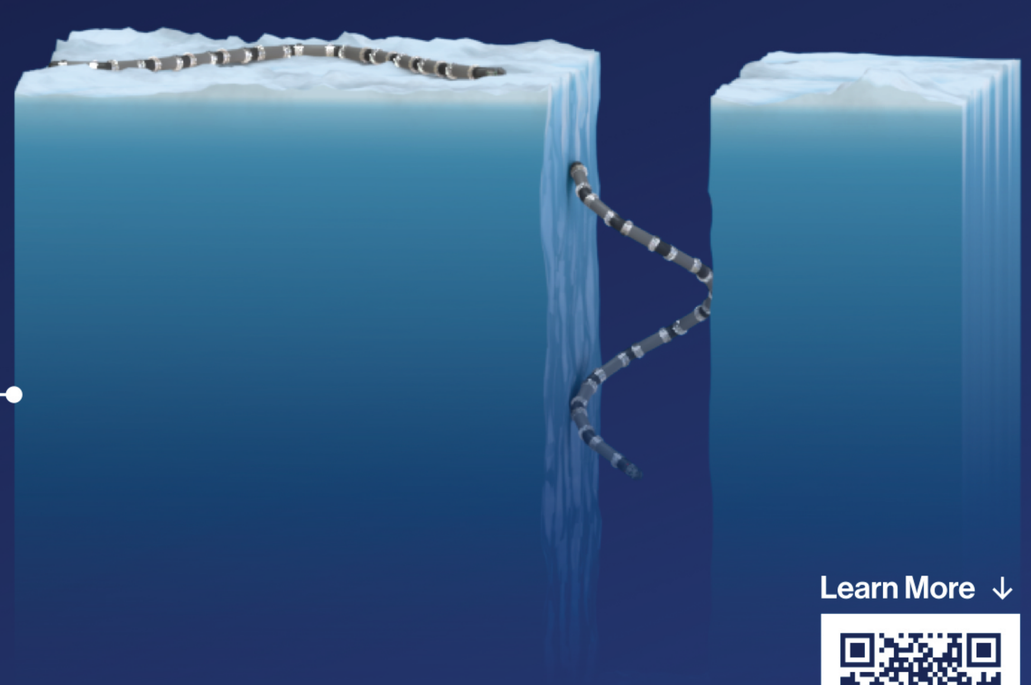
**Ops System**

The EELS ops system uses state-of-the-art visualizations to monitor and control the robot while the user interface gives the operator situational awareness of the robot's local environment, health, and planned movement.



**Risk-Aware Autonomy**

The EELS platform will autonomously traverse across hazardous glacial surfaces and down variable icy crevasse walls with high uncertainty.



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