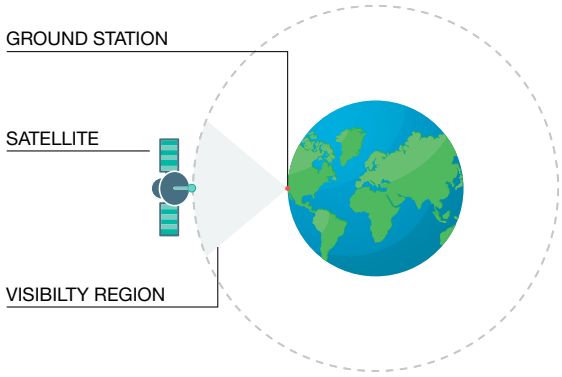
FSMs in Space Applications

Satellites and Ground Stations

When launched, the satellites are most commonly placed in either the Geostationary orbit (approximately 22,000 miles AMSL[1]) or the Low Earth Orbit (approximately 500 miles AMSL). Their ground station counterparts may vary in location but are placed to maximize satellite visibility (visibility region). Since satellites in LEO orbit are in continuous and high-speed motion, it becomes critical to direct the information correctly and precisely.



In an initial state, the satellite mirrors that receive the incoming signal from a ground station may be directed precisely towards the station's dishes (Figure 1). If the satellite were to stay in that exact location relative to the station, FSMs wouldn't be required. In a future moment, the satellite would have moved through its orbit and, if the mirrors were to remain stationary, the signal beam would not be directed towards the ground station (Figure 2). To correct this scenario, FSMs on the satellite adjust the mirrors' tilt to the exact amount to direct the light to the ground station (Figure 3).

Figure 1

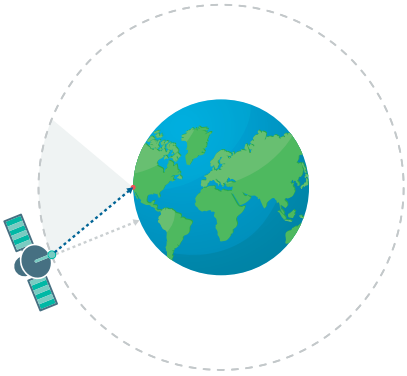


Figure 2

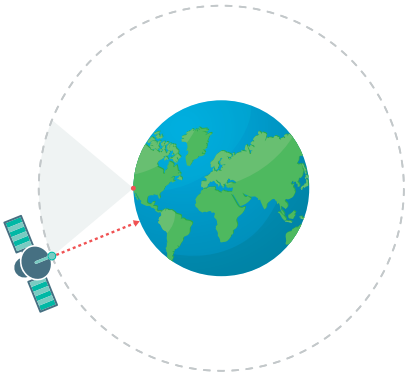
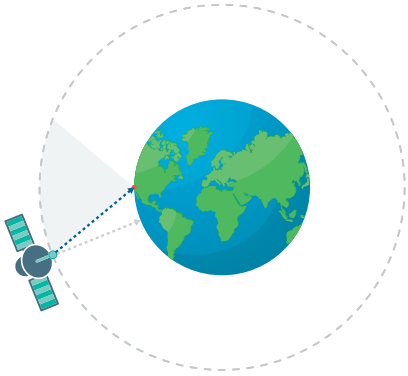


Figure 3



[1] *Above Mean Sea Level*

Critical Specifications

There is a significant distance between the satellite and each of the ground stations it must communicate with, so any mirror misalignments are amplified. The sensors onboard must be capable of detecting the target's position at a nanometer scale so that the displacement is precise. The systems must survive harsh conditions on the satellite's surface. The temperatures vary greatly, and the FSMs operate in a vacuum environment. Since satellites need to be self-sustained while in orbit, the power consumption and added weight of the system must be kept at a minimum.

Lion Precision's EDA 400 System

Based on these market needs, Lion Precision designed the EDA 400 system. It includes two pairs of sensors (for the X & Y axes) and the driver unit. The system features ultra-high bandwidth, nanometer resolution, digital/analog signal output, low power consumption, and very low outgassing compatible with vacuum conditions. The EDA 400 is the ideal system for any Aerospace application, and it can be customized for specific needs. It is also available as a board without an enclosure for space savings and easy integration into a control system.

Ordering Information

Please contact Lion Precision for ordering information.
For additional information on how FSMs work, click here
We can be reached via email at info@lionprecision.com or via telephone at (651)-484-6544

Lion Precision products are subject to U.S. export control regulations. They may be subject to certain licensing requirements and restricted for export.

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