



Press Release: Orbit Logic and MIT Researching Onboard Fault Attribution Solution for Satellite Systems

GREENBELT, MD (March 7th, 2023) – Orbit Logic has been awarded a Phase I Small Business Technology Transfer (STTR) contract sponsored by the Air Force Research Laboratory to develop the Satellite Onboard Fault Attribution and Response (SOFAR) solution. The Space Telecommunications, Astronomy and Radiation (STAR) Laboratory in the Department of Aeronautics and Astronautics at the Massachusetts Institute of Technology is our research collaborator.

SOFAR will attribute faults encountered in satellite systems to their possible causes. In many cases, clues embedded in telemetry data may be so sparse that no single explanation is possible to determine. In these situations, SOFAR will develop multiple hypotheses and the relative likelihood of each. These hypotheses can be delivered to the ground operations center to inform the operators, and can also be used by Orbit Logic’s onboard Autonomous Planning System (APS) to trigger/determine automated responses to mitigate the fault.

As shown in Figure 1, SOFAR will consume data from the hosting satellite bus, its sensors/payloads, and even remote sensors or platforms. Novel approaches developed by MIT will not just isolate the fault, but also attempt to identify its causation category, which can include: Space weather events; Application of physical or energetic effects to the platform; Failures, anomalies or degradation of the spacecraft’s hardware systems; Defects in the flight software that may emerge at unpredictable times or under unique conditions; or Cyber-attacks.

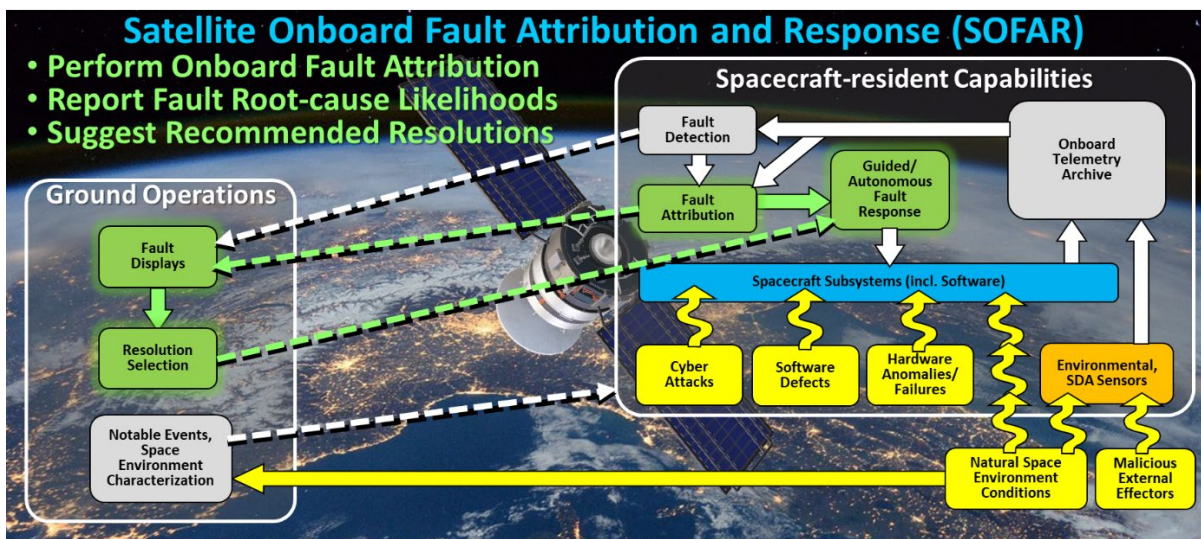


Figure 1: SOFAR’s relationship to satellite onboard planning and ground operations.

APS is a powerful technology that can be leveraged for autonomous planning in *any* domain. The breadth of its applications proves its flexibility; in addition to its use on this program for satellite fault management, Orbit Logic has utilized APS for the autonomous operation of heterogeneous constellations of [Low Earth Orbit \(LEO\)](#)

[satellites](#)¹ with DARPA and AFRL, heterogeneous teams of [unmanned underwater/surface/aerial vehicles \(UUVs/USVs/UAVs\) with the Navy](#)², heterogeneous swarms of [rovers, satellites, and atmospheric vehicles for robotic Mars exploration](#)³, [heterogeneous robotic swarms with astronauts-in-the-loop for Lunar exploration](#)⁴ and [mission-adaptive formation flying control of satellite clusters](#)⁵, with NASA.

About Orbit Logic

Orbit Logic (www.orbitlogic.com) specializes in mission planning and scheduling solutions for aerospace and geospatial intelligence. Orbit Logic's operationally proven COTS products create better plans faster with fewer resources for all mission phases. Orbit Logic services are available to configure, customize, and integrate Orbit Logic's mobile, web-based, desktop, and flight software applications to provide turn-key operational solutions that leverage the latest available technologies to meet customer goals and exceed their expectations.

Approved for public release; Distribution is unlimited. Public Affairs approval #AFRL-2023-0993

¹ Orbit Logic's Autonomous Planning System for the DARPA Blackjack Pitboss Program
<http://orbitlogic.com/uploads/5/7/8/8/57881343/20200206%20Blackjack%20Press%20Release%20Final.pdf>

² Orbit Logic's Navy Phase II SBIR, Robust Cooperative Autonomy with Minimal Information Exchange (MinAu)
<http://orbitlogic.com/uploads/5/7/8/8/57881343/20190709%20MinAu%20Navy%20Phase%20II%20Press%20Release%20Final.pdf>

³ Orbit Logic's NASA STTR, Mars/Interplanetary Swarm Design and Evaluation Framework (MISDEF)
<http://orbitlogic.com/uploads/5/7/8/8/57881343/20200416%20MISDEF%20Phase%20I%20Press%20Release.pdf>

⁴ Orbit Logic's Intelligent Navigation, Planning, and Awareness for Swarm Systems (IN-PASS) solution
<http://www.orbitlogic.com/uploads/docs/20210208%20IN-PASS%20Phase%20I%20Press%20Release.pdf>

⁵ Orbit Logic's On-board Swarm Control for Autonomy and Responsiveness (OSCAR) solution
<http://www.orbitlogic.com/uploads/docs/20210713%20OSCAR%20Phase%20I%20Press%20Release.pdf>