SMARTSAT
COOPERATIVE RESEARCH CENTRE

Kanyini: SA Space Services Mission

Building the South Australian Space Sector

Mission Goal: In partnership with industry, the mission will capitalise on NewSpace opportunities to contribute to a thriving and enduring South Australian space sector and support Australia's national space strategy.

The South Australian Government is investing $6.5M to deliver the SA Space Services Mission in partnership with South Australian companies Myriota and Inovor Technologies, and the SmartSat Cooperative Research Centre (CRC).

Myriota, born out of advanced technologies developed at the University of South Australia's Institute for Telecommunications Research, was founded to revolutionise the Internet of Things (IoT) by offering disruptively low-cost and long-battery-life global connectivity. Inovor Technologies also evolved from relationships with the University of Adelaide and the University of South Australia. Both companies highlight how South Australia's research institutions underpin growth in the state's commercial space sector.

The satellite, named Kanyini by local school students, is part of the South Australia Space Sector Strategy 2030 and is the first state-based satellite for Australia. The Space Sector Strategy is an important element of the South Australian Government's Growth State initiative is aimed at ensuring our state's space industry journey continues its upward trajectory. One of the Missions' goals is to support South Australian industry to further develop its capability in manufacturing and technologies associated with Cubesat production and increase participation across the satellite construction phase.

Data collected from the satellite can be used for a variety of applications including informing decisions around water use, climate policy, mining and emergency management

SmartSat CRC is leading the mission and will manage application prototyping. Once launched, the planned three-year mission in Low Earth Orbit (LEO) provides opportunities to test and develop the capability and inform future missions.

Inovor Technologies, Australia's only sovereign commercial satellite manufacturer, was selected to design, build, test and operate the satellite bus that will be launched into LEO. Its Apogee satellite bus will provide the power, pointing, mission control, telemetry systems and high data rate communication, integrated into a lightweight modular structure. The satellite will be a 6U CubeSat: at this size, it will be large enough and powerful enough to support both the IoT communication payload and a Hyperspectral imaging payload.

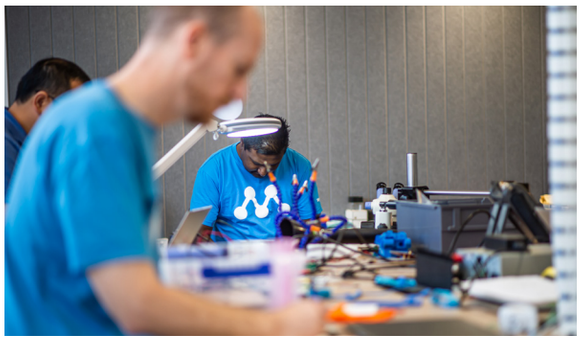
Myriota is the world leader in low-cost, low-power, secure direct-to-orbit satellite connectivity for the IoT. Myriota has pioneered retrieving data from anywhere on earth, either on land or at sea. Myriota's ground-breaking technology is available for partners worldwide.

IN COLLABORATION WITH:

SOUTH AUSTRALIA
Government of South Australia
SOUTH AUSTRALIAN SPACE INDUSTRY CENTRE
Myriota
INOVOR TECHNOLOGIES

Myriota will provide the IoT space services for the mission; sending data from IoT devices and sensors on Earth's surface to the satellite. The data will be securely transferred directly to the cloud and returned to Earth so it can be accessed to improve delivery of emergency services, and environmental monitoring. For example, data will be collected on weather events, including rainfall and bushfires, which have been impacted by climate change in recent years.

Kanyini will also have a key role in inspiring our next generation of space technologists in South Australia and across the country. Associated school engagement programs are underway; the first activity a competition for all SA school students to name the satellite. Kanyini, submitted by Findon High School, is a Pitjantjatjara word describing the principle of connectedness through caring and responsibility for all things. The intention is to undertake future school programs, such as introducing IoT technologies into classrooms using data from Kanyini, as the mission evolves.



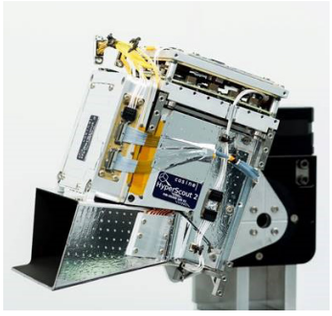
THE PAYLOADS

The IoT payload is provided by Myriota. This payload will join the Myriota network, collecting data from devices and sensors on the Earth's surface, either on land, at sea or in the air.

The payload provides direct-to-orbit connectivity. This means that stationary or mobile devices on the ground can count on coverage without having to plan, deploy or maintain terrestrial network infrastructure .
The payload supports long battery life for remotely deployed devices, which means the devices can last in the field for years without needing to replace batteries, lowering costs and streamlining operations.
The payload benefits from Myriota's patented secure private messaging technology - with all messages being authenticated, and encrypted over-the-air and on the ground with AES-256. The devices will not transmit any identifying information. This means data and the identity of devices are secure.

The hyperspectral imaging payload is the Hyperscout 2, which is provided by COSINE. The imager features 45 spectral bands from 400-1000nm covering the visual and near infra-red ranges of the electromagnetic spectrum. This spectral range allows analysis of many characteristics of vegetation and soil that is not possible from a standard 3 band (red-green-blue) sensor. The pixel size on the ground (ground sample distance) is 75 meters in size, which allows analysis of vegetation in forested areas, crops and coastal regions that will benefit research into the understanding and management of crop health, forests, plantations and the inland water and coastal environment.

The Hyperscout 2 imager also includes a three-band thermal infrared sensor that will allow new types of research and analysis of heat generators in South Australia and have potential environmental monitoring and management applications. It also features an onboard processing capability which provides the opportunity for advanced Artificial Intelligence (AI) algorithms to conduct smart processing of the Hyperspectral data directly on orbit, offering the potential to reduce the data transmission requirements or to support more rapid decision making for time-critical applications.



THE TIMELINE

The goal is to launch Kanyini in 2022, approximately 18 months from the commencement of the project. This allows time for the development of the satellite bus, integration of the payloads, integration testing and delivery to the launch provider. In parallel with the development phase, a research program is being formulated to make the best use of the systems once in orbit. This includes early research and testing in support of future SmartSat Capability Demonstrator missions such as AquaWatch (water quality monitoring) and I-in-the-Sky (Disaster and Climate Change management), involving hyperspectral imaging and IoT communications. This R&D will ensure Kanyini supports the ongoing growth of SA's capabilities in Cubesat design and production.

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Business Cooperative Research Centres Program