Progress in Radar Research 2021

Initial Developments in Australian Space Radar Technology: The NGTF Advanced Radio Frequency Payload Research Network

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The Australian Government wants an agile and potent future defence force to keep Australians safe while protecting the country's interests in a changing global environment. Defence recognizes the importance of space capabilities in achieving this vision across operational and contested areas. The Defence Strategic Update 2020 states assured access to space is critical to Australian Defence Force (ADF) warfighting effectiveness, situational awareness and the delivery of real-time communications and information.

Space Capabilities is a priority theme of the Next Generation Technologies Fund (NGTF), focused on research, development and demonstration of innovative and resilient space constellation technologies for Defence. Large scale commercial adoption of small spacecraft, increased access to space and significant momentum in the Australian academic and industry ecosystem provides the opportunity for affordable Defence space capabilities that contribute resilience, agility and end-user responsiveness to future sovereign and coalition architectures.

Defence established an Advanced Radio Frequency Payload Research Network in July 2021 to leverage the wider science, technology and innovation capability in academia, industry and government research agencies. The focus of this Research Network will be to develop an innovative space qualified Radio Frequency (RF) sensor payload that can be integrated with commodity small satellite bus technology for demonstration in space under the Defence Resilient Multi Mission Space STaR Shot program. The mission concept is based on a constellation of small, affordable satellites (up to 200 kg) operating a reference Synthetic Aperture Radar (SAR) mode on the payload that will collectively provide an affordable space-based layer in a broad area maritime surveillance capability. The Research Network is led by the DST Group who have a depth of experience in the application of space-based SAR and the implementation of airborne SAR systems including concept development, performance assessment and SAR sensor integration.

The Research Network is currently in a Phase 1 concept development where the research and development is focused on several options for SAR modes together with technologies for deployed antennas, software defined radios and a mix of FPGA and GPU processing elements. The presentation will provide an overview of the program and the technologies relevant to SAR wide area maritime surveillance.