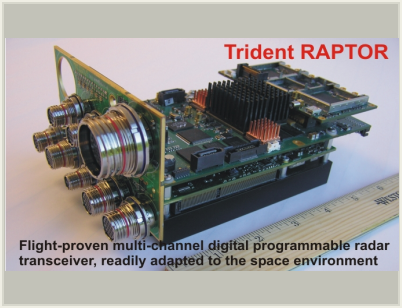
Small Business Innovation Research/Small Business Tech Transfer

Space-Qualifiable Digital Radar Transceiver, Phase I

Completed Technology Project (2013 - 2013)

Project Introduction

Radar technology offers a very flexible, powerful tool for applications such as object detection, tracking, and characterization, as well as remote sensing, imaging, sounding, weather measurement and analysis. Historically, radar systems have tended to be either large, complex, power-hungry, purpose-built systems, or extremely simple systems of limited capability. More recently, miniaturization of high-performance programmable integrated circuit technologies as embodied in field-programmable gate arrays, as well as rapid advances in high-speed data conversion technologies at a gigasample per second and beyond, have enabled the implementation of direct-conversion radio frequency (RF) systems, including radar, that operate almost completely in the digital domain. In addition, solid-state high-power RF device technologies have improved in efficiency and speed to the point where highly efficient pulsed transmit sources are possible. As these device technologies have matured, their application in space environments has accelerated to the point where extremely flexible programmable radar systems can be implemented in a very small size, weight, and power footprint. Trident Systems has developed a powerful radar architecture called RAPTOR, validating it through flight testing on a number of Department of Defense programs; initial analysis has shown the feasibility of transitioning this design to the space environment. Through a comprehensive program of requirements development, trade studies, critical component and design analyses, fault mitigation simulation, and system design, Trident will develop the design for a complete space-qualifiable UHF/L-band radar transceiver in a 96mm x 90mm x 31mm PC-104e form factor that meets all customer mission needs, and is applicable to a wide range of applications (NASA and others). By basing the solution on Trident's proven RAPTOR technology, the system will rapidly achieve a high TRL.



Space-qualifiable Digital Radar Transceiver

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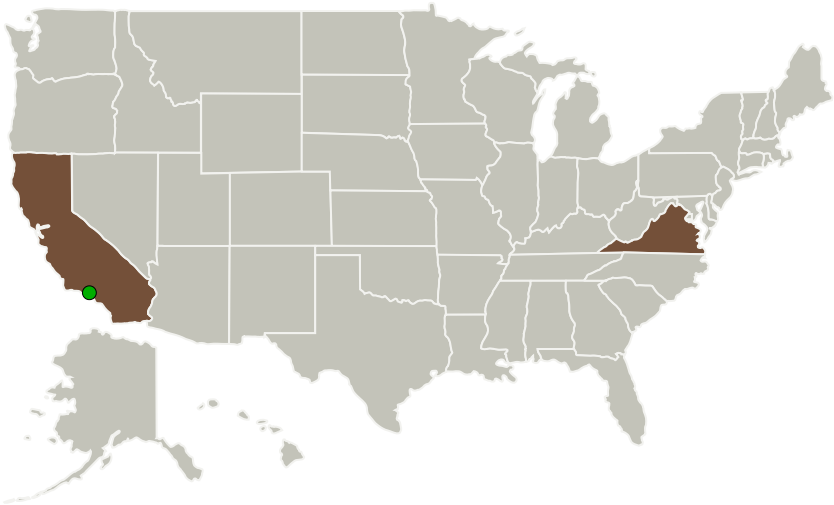
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Trident Systems, Inc.	Lead Organization	Industry	Fairfax, Virginia
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Virginia

Project Transitions

May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140431)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Trident Systems, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

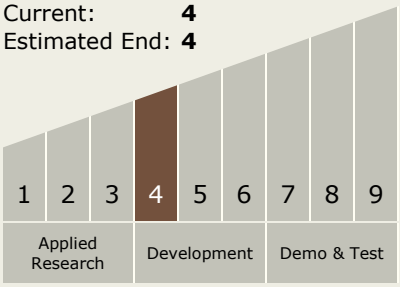
Carlos Torrez

Principal Investigator:

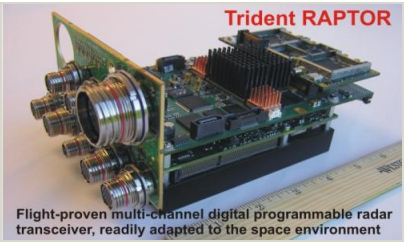
Albert Burgstahler

Technology Maturity (TRL)

Start: **4**
Current: **4**
Estimated End: **4**



Images



Project Image
Space-qualifiable Digital Radar Transceiver
(https://techport.nasa.gov/image/131066)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  └ TX08.1 Remote Sensing Instruments/Sensors
    └ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System