Scalable Beamforming Radar Processor for High Resolution Imaging of Planetary Surfaces

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Target: Mars, Moon, airless body orbital radar for surface and subsurface mapping.

Science:

- Locate regions on Mars with buried ice or brines (penetrate >10 m with <10 m spatial resolution).
- Penetrate through regolith to image and map buried fluvial channels, volcanic flow morphology, and impact deposits.
- Determine surface physical properties.

Objectives:

- Increase the TRL of the digital electronics for a P-band beamforming synthetic aperture radar.
- Design a frequency domain multiplexing (FDM) system that will reduce the power demands of the radar digital electronics by a factor of ~4.
- Develop the requirements and perform a concept simulation and analysis of the FDM.
- Develop/build the RF part of the FDM.
- Develop/build digital electronics for the FDM
- Integrate the FDM system and perform testing and verification.

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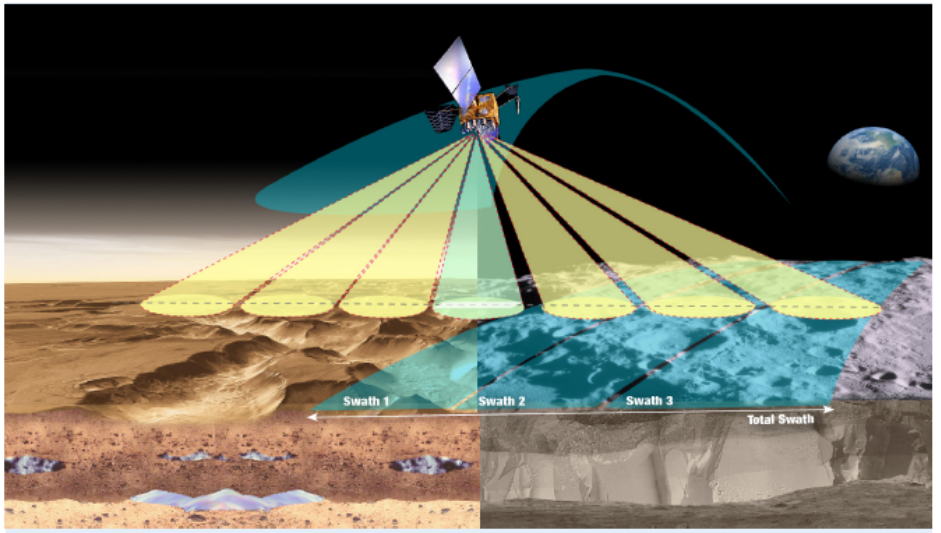

Figure Caption: We will design a low power/mass radar processor that will enable a digital beamforming polarimetric synthetic aperture radar.

Key Milestones:

- Year 1: Perform simulations of the RF FDM electronics and subsystems. Generate RF board design schematics.
- Year 2: Prototype and evaluate an Engineering Test Unit of the RF subsystem. Design and fabricate RF subsystem board. Design and implement FDM firmware.
- Year 3: Integrate RF board with the Digital Electronics into the final FDM board. Perform testing. Demonstrate operation using previously existing antenna array.

TRL (2) to (4)