

FY23 Strategic Initiatives Research and Technology Development (SRTD)

Ultra-compact & Ultra-Wide-Band CMOS System-on-Chip Based Ground Penetrating Radar for a Mars Science Helicopter

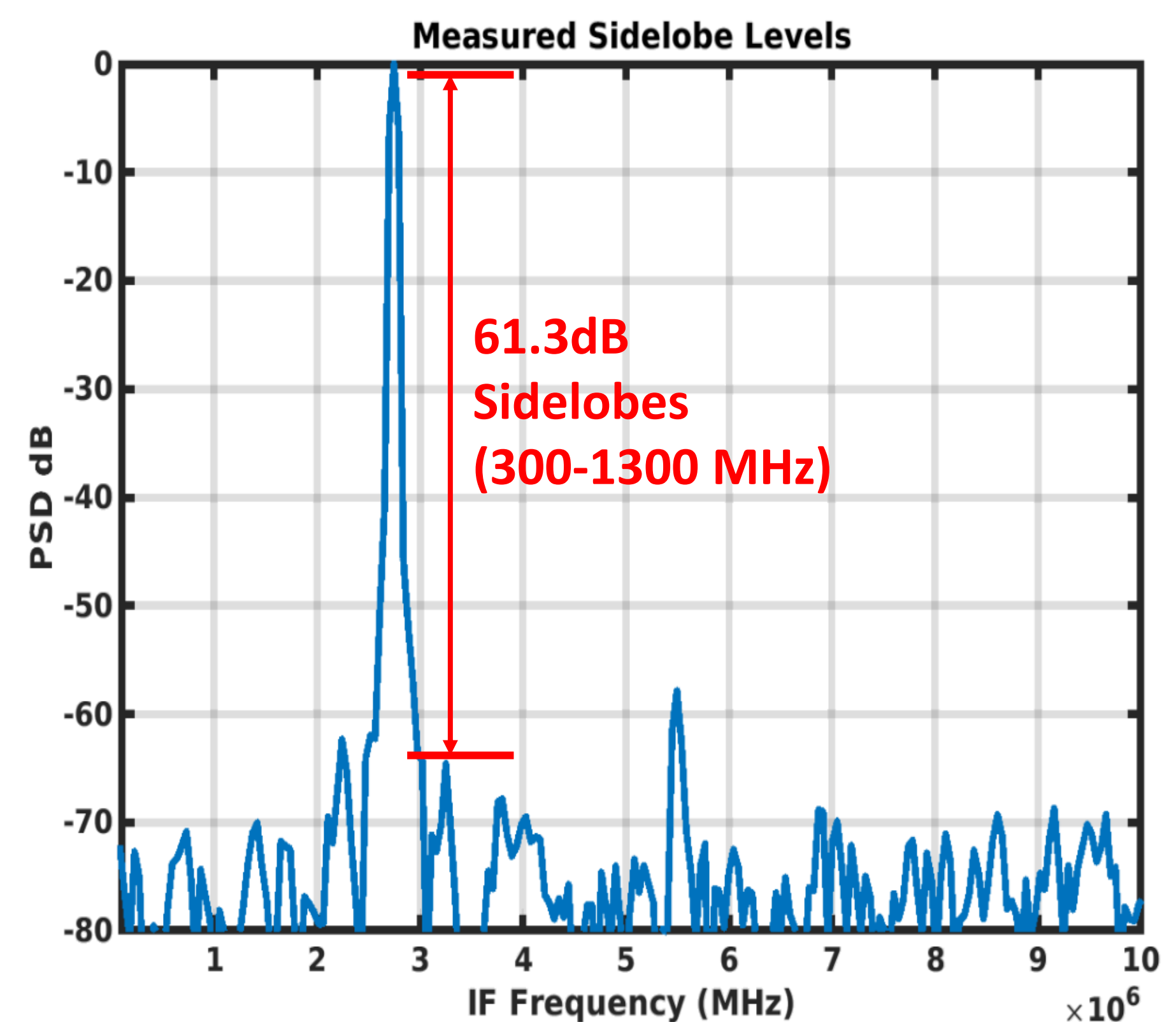
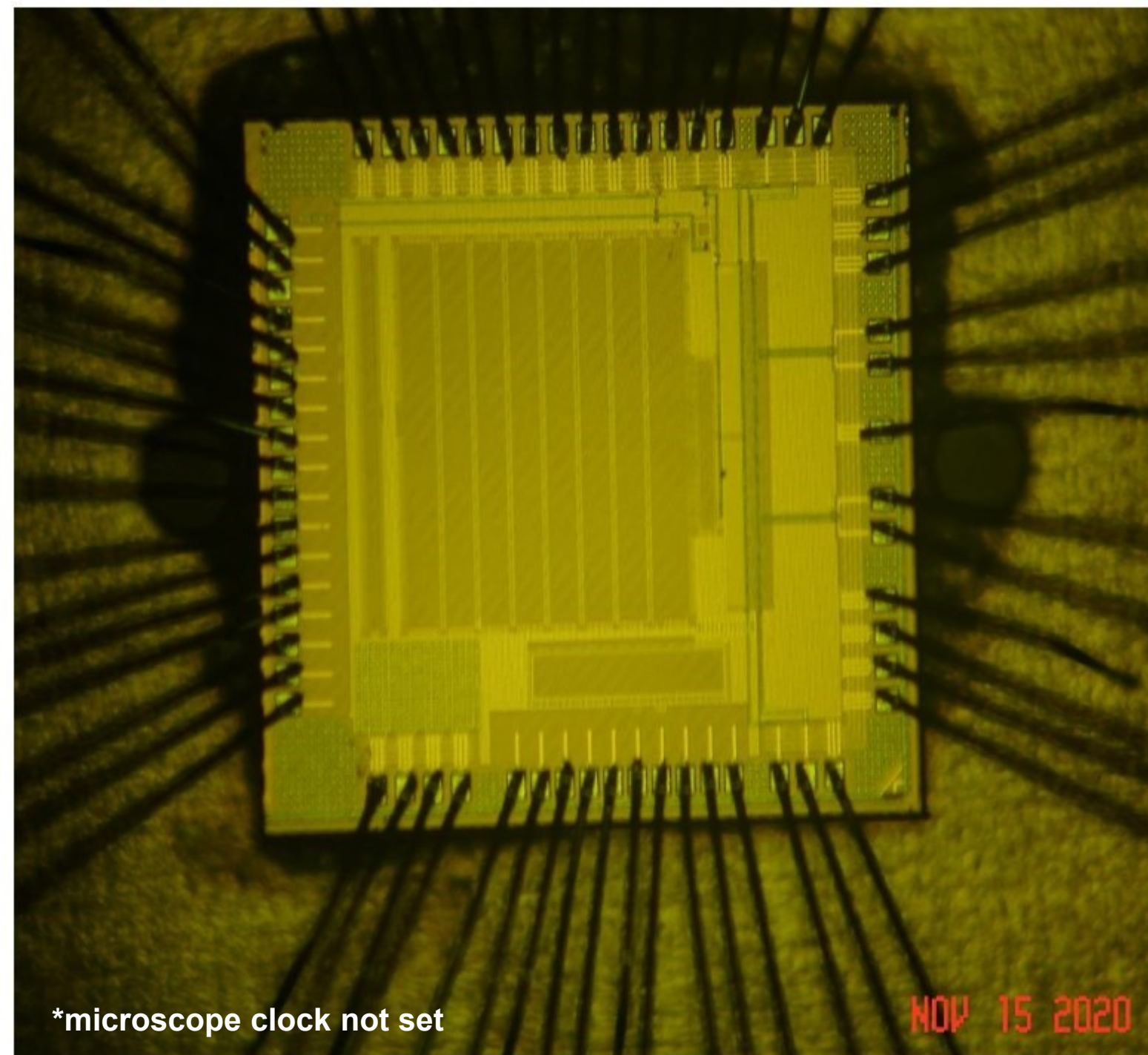
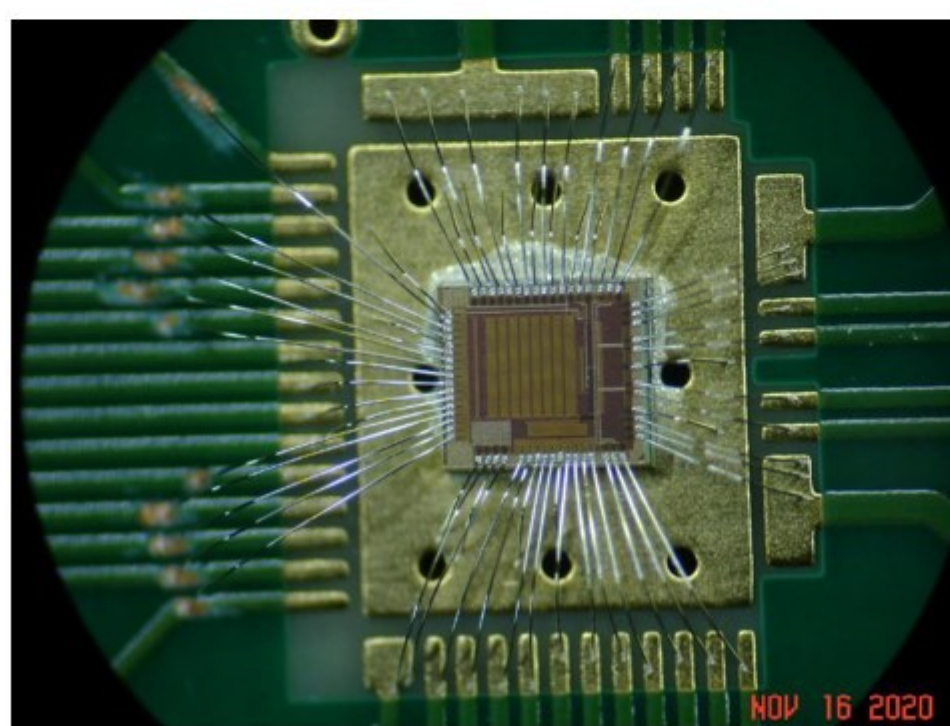
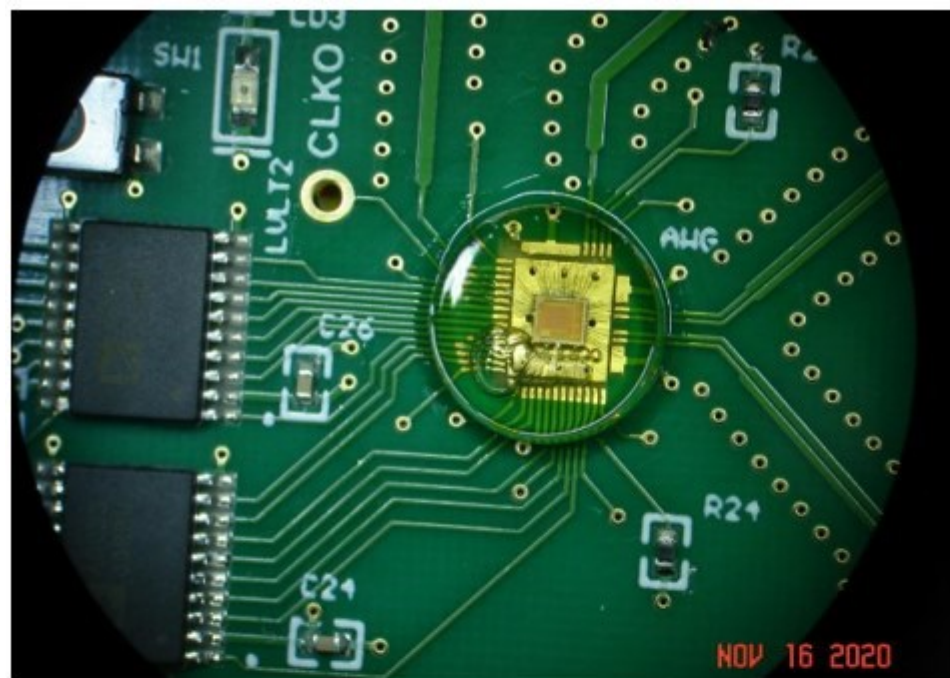
Principal Investigator: Adrian Tang (386); **Co-Investigators:** Emmanuel Decrossas (337), Christine Gebara (355), Mark Haynes (334), Yonggyu Gim (334), Frank Chang (UCLA)

Strategic Focus Area: Micro Instruments for Mars Helicopter and Small Spacecraft Missions | **Strategic Initiative Leader:** Yonggyu Gim

Objectives & Background:

This purpose of this task is to develop an extremely low mass, low power, and wideband ground penetrating radar (GPR) that is compatible with Mars Science Helicopter concept. The GPR is developed with a set of CMOS chips to provide waveform generation and processing (receiver), and synchronization. The radar antenna is a flight-like ultra-light weight deployable structure that stows into a small volume for Mars EDL.

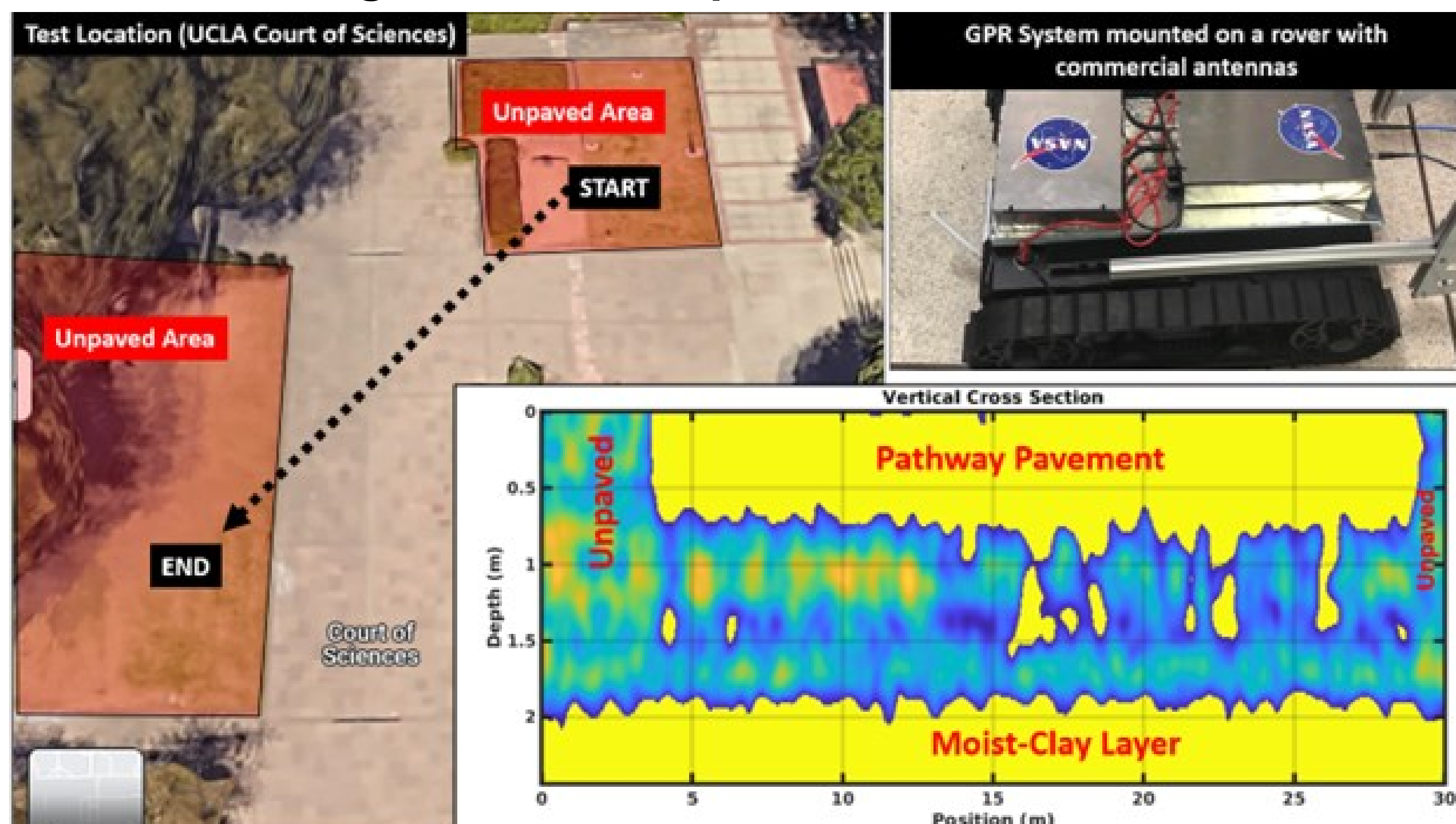
CMOS Wideband GPR System-on-Chip



Flight-Like Deployable Antenna:



Outdoor testing at UCLA Campus



National Aeronautics and Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

www.nasa.gov

Clearance Number: CL#23-4695
Poster Number: RPC#
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Publications:

Adrian Tang, Emmanuel Decrossas, Yonggyu Gim, Rob Beauchamp, Stanislav Culaclii, "A 300-1300 MHz Single Antenna Digital-FMCW Ground Penetrating Radar for the Mars Science Helicopter with Switched-Gain Calibration to Improve Dynamic Range" IEEE International Microwave Symposium 2022.

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