



THE OHIO STATE UNIVERSITY

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Fully Adaptive Atmospheric Sensor on a 6U CubeSat

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OBJECTIVE

- Produce a design specification for a fully adaptive cloud profiling radar (CPR) meeting the 6U CubeSat SWaP constraints

MOTIVATION

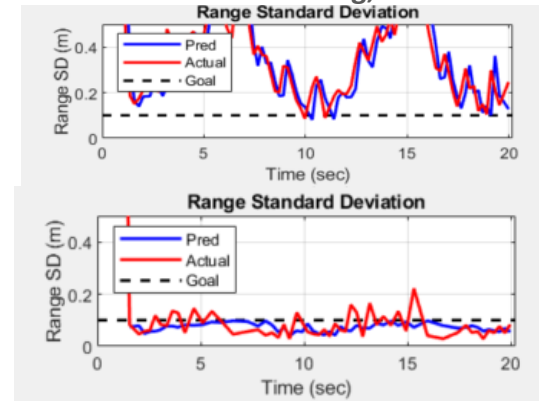
- Fully adaptive radar leads to significant performance gains
 - Tighter error bounds on underlying measurement parameters
 - Autonomous allocation of limited platform resources
- CubeSat standard reduces cost

APPROACH

- Compile relevant constraints
- Instantiate fully adaptive radar (FAR) framework for CPR task
- Use OSU hardware for design refinement

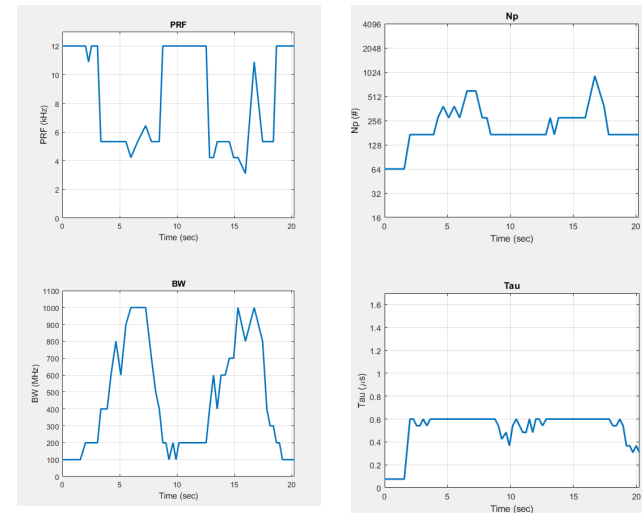
CURRENT PROGRESS

- Gathered short list of CubeSat radio constraints
- Researching modelling of cloud radar return
- Working on development of adaptive remote sensing simulation environment



Left: bottom image contrasts significant improvement in track error against non-adaptive top image

Right: example curves showing the parameter adaptation occurring in real time on the OSU adaptive radar testbed





STARS: A Software Simulation Toolkit for Adaptive Sensing

Jakob DeLong, Andrew O'Brien, Chris Ball, Mohammed Shattal, Joel T. Johnson, Graeme E. Smith

OBJECTIVE

- Develop an extensible open-source framework for simulating adaptive remote sensors
- Provide truly application-independent simulation capability

MOTIVATION

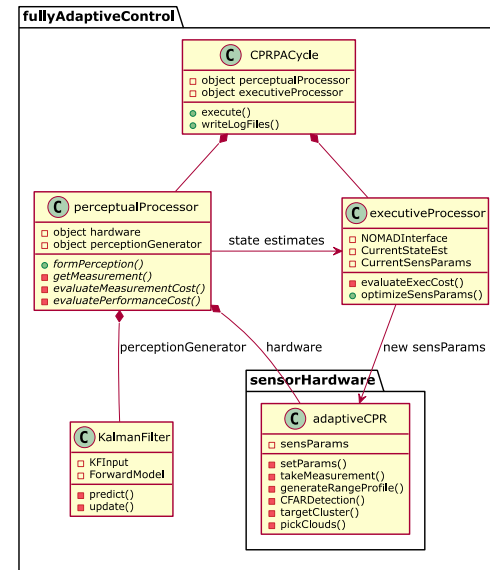
- Future space missions will utilize adaptive remote sensing techniques
- Existing simulators are either tied to particular platforms or non-adaptive

APPROACH

- Expand upon existing fully adaptive radar (FAR) framework to provide task-oriented simulation
- Develop using modular C++ code for enhanced portability, readability, and extensibility

RESULTS

- Produced successful prototype of first Case Study
- Approaching more realistic simulation of cloud returns for Case Study 1



Left: object diagram showing the STARS ADAPT fullyAdaptiveControl structure instantiated for an adaptive cloud profiling radar system

Right: example data input profile for a cloud profiling/precipitation radar simulation

