PAWR Project Office

February 2023

Welcome to the monthly PAWR update. Each month we deliver technical updates on: POWDER, COSMOS, AERPAW, ARA, and Colosseum.

POWDER-RENEW

POWDER concluded a successful Mobile and Wireless Week at the end of January, combining a hands-on workshop for researchers with a day of targeted presentations and demos for industry/government representatives.

The workshop resulted in multiple mini projects completed by student teams. Attendees voted on their favorite projects, with top honors going to:

- 1st prize: ML Based Adaptive Modulation for Massive MIMO, *Rice University team*
- 2nd prize: POWDER Twin, *State University of New York at Buffalo team*
- 3rd prize: Passive Reflective Surface, *Prairie View A&M University team*

Attendees at the session for industry and government representatives were provided with an overview of the POWDER "ecosystem" (the POWDER platform, the POWDER Radio Dynamic Zone (RDZ) and the POWDER Testing Orchestration and Testing Automation framework), a tour of the POWDER facility, and several live demos, including a demonstration of the the OpenAirInterface 5G open source stack operating over the air on the platform.

The POWDER event was covered by Light Reading and Fierce Wireless.

COSMOS

The COSMOS team and collaborators recently received a $1.25M NSF grant from the Spectrum Innovation Initiative: National Radio Dynamic Zones (SII-NRDZ) program, titled "Spectrum Sharing via Consumption Models and Telemetry – Prototyping and Field Testing in an Urban FCC Innovation Zone."

The project will investigate ways to share the electromagnetic (radio-frequency) spectrum using an automatic spectrum management system. The project will prototype a management system for spectrum sharing within and among disparate services such as communications and active and passive scientific uses. The project involves two facilities in West Harlem, New York City: (i) the COSMOS testbed sponsored by the NSF Platforms for Advanced Wireless Research (PAWR) program and (ii) the Cooperative Science Center for Earth System Science and Remote Sensing Technologies sponsored by NOAA (NOAA-CESSRST).

AERPAW

AERPAW is pleased to announce that version 2.0 of the AERPAW Web Portal is now online. Although similar from a user interface perspective, the new version is more closely integrated with the AERPAW Platform Control system, reducing the time it takes for researchers to instantiate a new development session for an AERPAW experiment from days to minutes.

The AERPAW team recently worked with Professor Kamesh Namuduri out of the University of North Texas on an Air Corridor Emulation system using software in the loop (SITL) from ArduPilot (a popular open source autopilot). Air corridors are considered as a promising solution to traffic management of a large number of aircrafts (both manned and unmanned).

The emulation, which was demonstrated on the AERPAW platform, showed several UAVs being instructed to take off and cross through a relatively narrow air corridor where only one UAV could pass through safely at a time. To make things interesting, after the UAVs start to pass through the corridor, the corridor was externally closed (and the UAVs informed), and an alternate corridor was opened. The demo showed how the UAVs were able to re-route autonomously through the new corridor.

The system used for the emulation features visualization based on Google Earth, showing in real time both the air corridor (as a white mesh of allowed space to be traversed), as well as the location of the UAVs. The entire system runs from a docker compose file that sets up a docker container for each UAV, and an additional one for the ground coordinator (which is the entity that communicates the availability or lack thereof for the air corridors).

ARA

ARA continues making progress in UE deployment and integration, with five UE sites recently deployed around the ISU Curtiss Farm and ISU Agronomy Farm to enable research in digital and precision agriculture, and one UE site deployed in a city water systems facility for smart city applications. The deployed UEs will be able to support experiments with Skylark TVWS mMIMO systems, as well as SDR-based open RAN experiments.

Colosseum

The channel sounding code of CaST is now publicly available to Colosseum users; CaST is a toolchain that enables Colosseum users to create, install, and validate Colosseum RF scenarios that can replicate virtually any physical real-world environment.

About CaST: https://dl.acm.org/doi/10.1145/3556564.3558243
GitHub repository: https://github.com/wineslab/cast