

DISCOVER CCRI

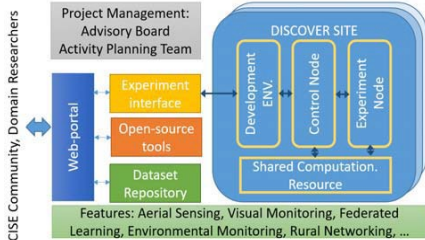
Paul Heinrich, Truong Nghiem, & Morgan Vigil-Hayes
Northern Arizona University

Fatemeh Afghah & Abolfazl Razi
Clemson University

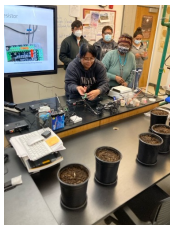
Abhishek RoyChowdhury
Navajo Technical University

Background

- Cyber-infrastructure in rural & remote areas
- Detection & response to environmental disasters
- Distributed computing in sparsely connected network environments
- Last-mile data communications
- Security in distributed and challenged environments
- Multi-agent sensing and actuation tasks
- Collaboration with underserved communities



Outreach



- Navajo Technical University
- Tohono O'odham Community College
- NAU
- Clemson
- Training Workshops
- REUs

This project is funded by NSF CCRI 2120484

Distributed Sensing & Computing Over Sparse Environments



NAU Core Site



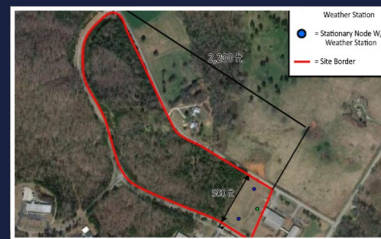
Hat Ranch



NTU Site



Clemson Site



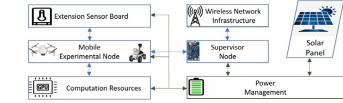
Scan the QR code to visit the DISCOVER Website



Scan the QR code to visit the Experimenter Portal



Sensing & Actuation



Fixed & Stationary Nodes

- Experimental & Supervisory Processors (Raspberry Pi 4)
- GPU Processors (Jetson Nانو)
- SDR, WiFi, & LoRa Communications



Ground Robots

- 4x4 Mobile Leo Rovers
- Raspberry Pi 4 Processor
- 2D RPLidar, Raspicam, and GPS for Sensing
- API for control and sensing

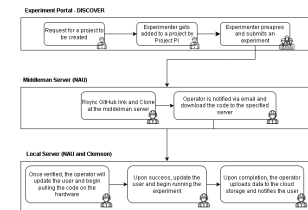


Aerial Drones

- Sentinel drone from Modalai
- VOXL2 Microcontroller
- 6 different cameras, GPS, magnetometer, barometer, & IMUs for sensing.
- Visual inertial odometry (VIO) & GPS fusion for localization.
- PX4 flight stack
- MAVROS and MAVSDK support.
- API for control and sensing.

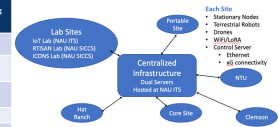


Experimenter Portal



Network Infrastructure

Site	Power Source	Gateway Network Link	Local Area Networking
NAU Core Test	Grid	NAU Net + CBRS	Wi-Fi
NAU Hat Ranch	Solar	Microwave + CBRS	Wi-Fi
NTU	Solar	WiFi bridge to NTU Net	Wi-Fi
Clemson	Grid	TBD	Wi-Fi
NAU Portable	Solar	TBD	Wi-Fi



Acknowledgements

Adrian Nez
Akiel Aries
Andre Koka
Bailey McCauslin
Bryce Hopkins
Cody Beck
Demetrius Tsoukaladakis

Gary Griffin
Julia Boone
Michael Chestnut
Mohammed Algharib
Nhat Linh Nguyen
Sajad Goudarzi