Uncrewed Systems @ CNU

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CHRISTOPHER NEWPORT UNIVERSITY

PCSE @ Christopher Newport

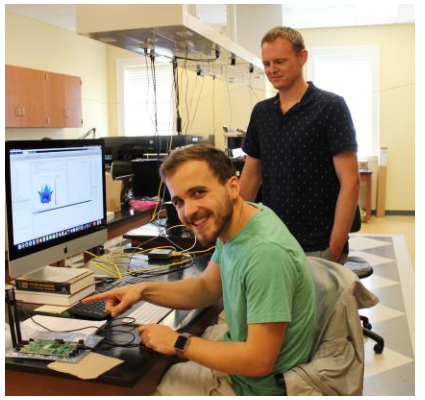
Christopher Newport University

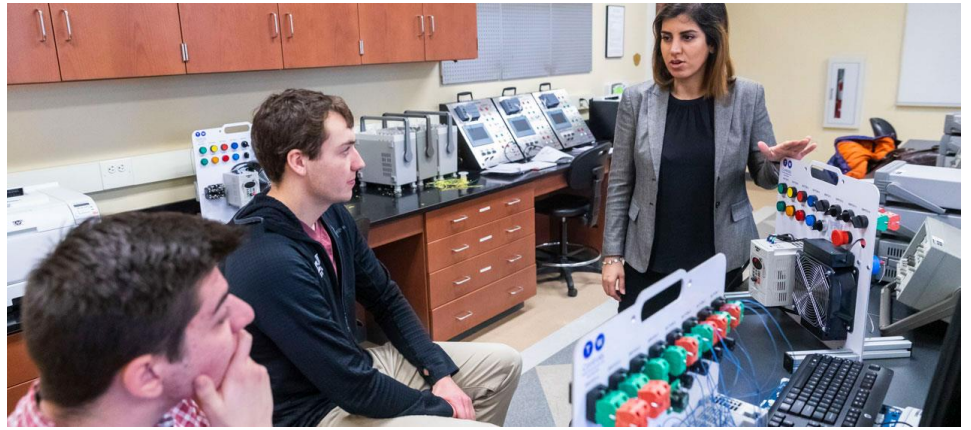
- Public liberal arts & sciences university
- Located 1 mile from here
- Beautiful campus, gorgeous buildings, and wonderful people
- About 5,000 students

PCSE @ CNU

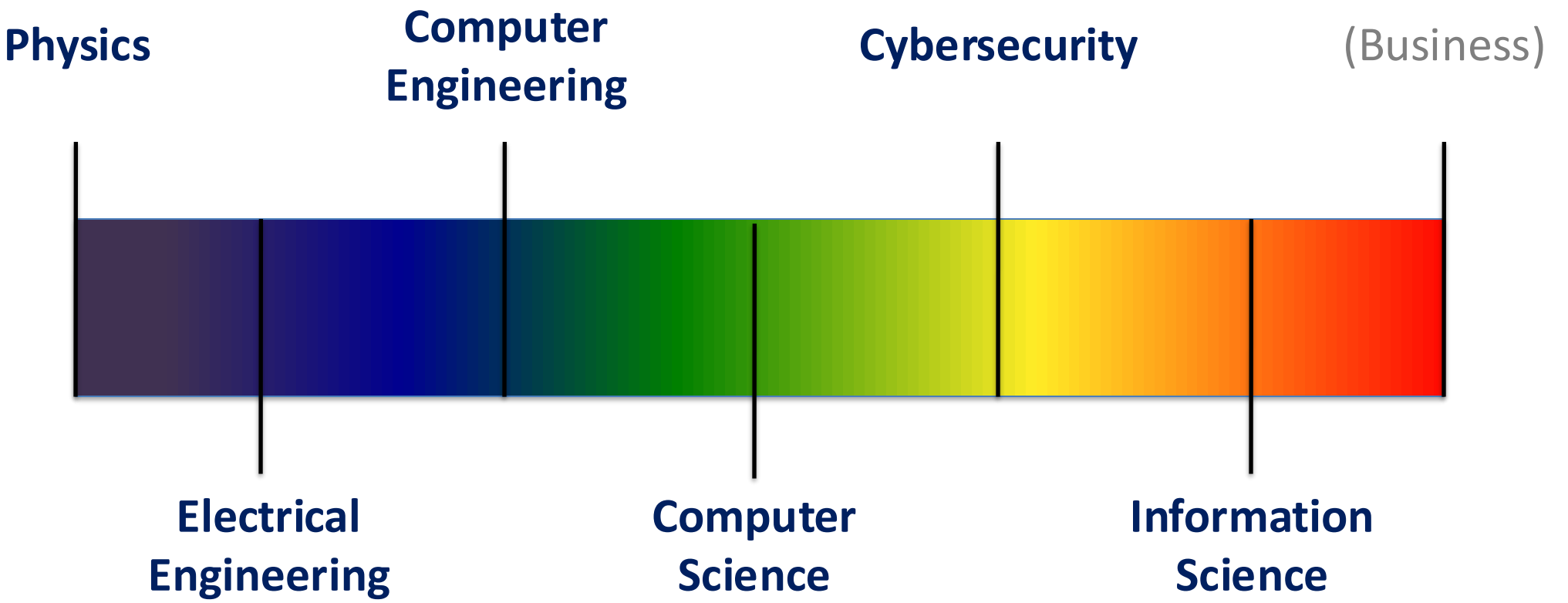
Physics, Computer Science & Engineering

- ~ 550 students
- 27 faculty
- 3 staff members





PCSE Program Spectrum



Minor in Data Science
M.S. in Applied Physics and Computer Science

Faculty Research Areas

- Astrophysics
- Power & Control
- Robotics
- AI & ML
- Nuclear Physics
- Communication & Systems
- Software Engineering
- Cybersecurity
- Big Data, Data Science, Modeling, Simulation, Optimization

Uncrewed Systems @ PCSE

Courses supporting Uncrewed Systems

- Microcontrollers
- Networking
- Communications
- Control & Automation
- Introduction to Robotics
- Mechatronics and Cyber-physical Systems
- Programming in Python, Java, C/C++
- Data Science
- Artificial Intelligence
- Machine Learning

Relevant Faculty Research Areas

Astrophysics

Power & Control

Robotics

AI & ML

Nuclear Physics

Communication & Systems

Software Engineering

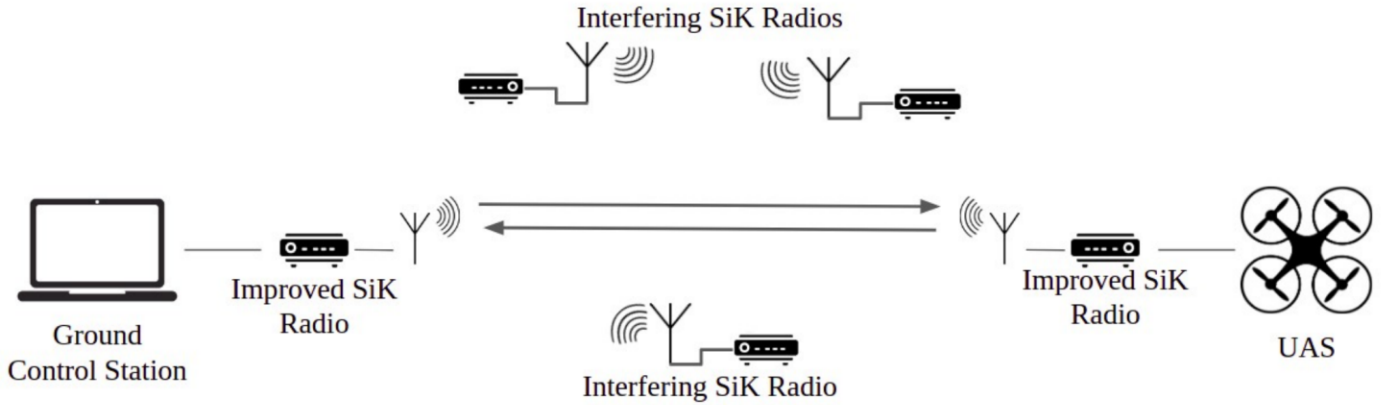
Cybersecurity

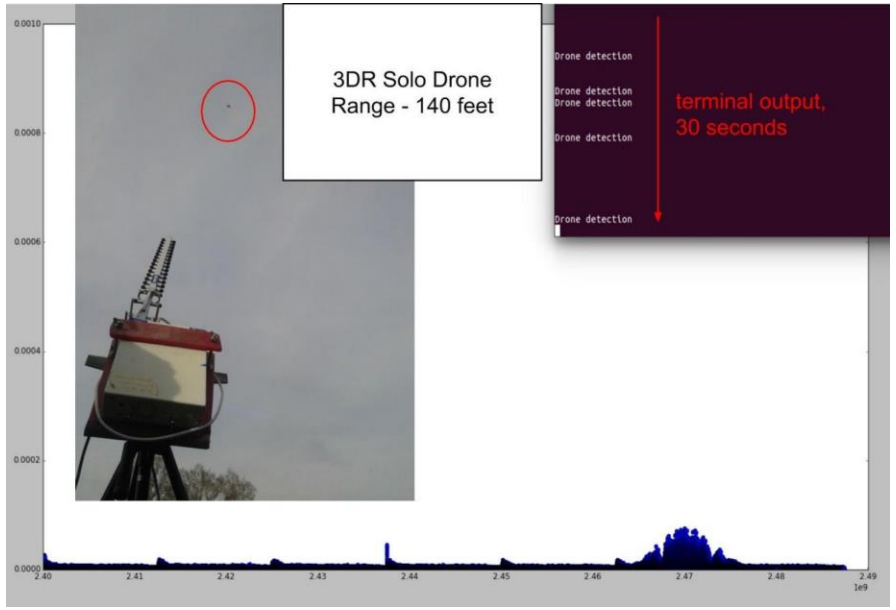
Big Data, Data Science, Modeling, Simulation, Optimization

Sample Student Projects (Capstones & Master Theses)

Wireless & Cybersecurity

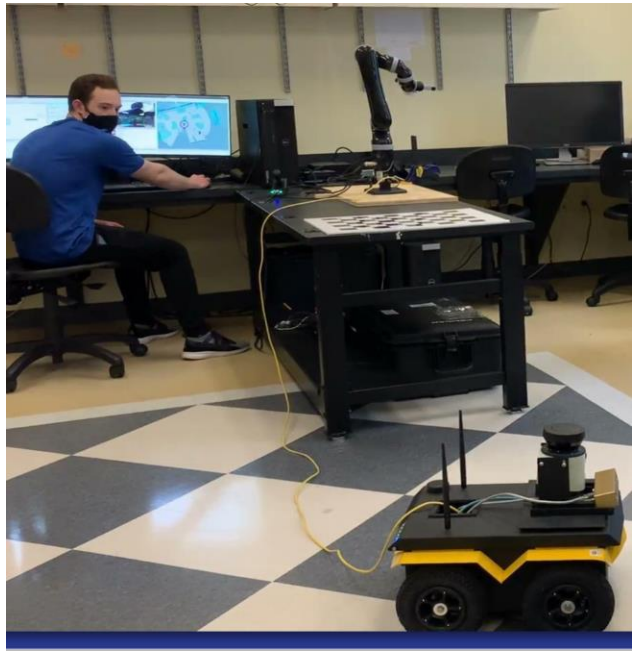
- Pixhawk Exploit Kit – Hijacking a Drone's Telemetry Link
- Facilitating Frame Injection Exploits Through SiK Radio Firmware Modification
- Sik Radio Fingerprinting
- Improved SiK Telemetry Radio
- Drone Detection using Passive Radar

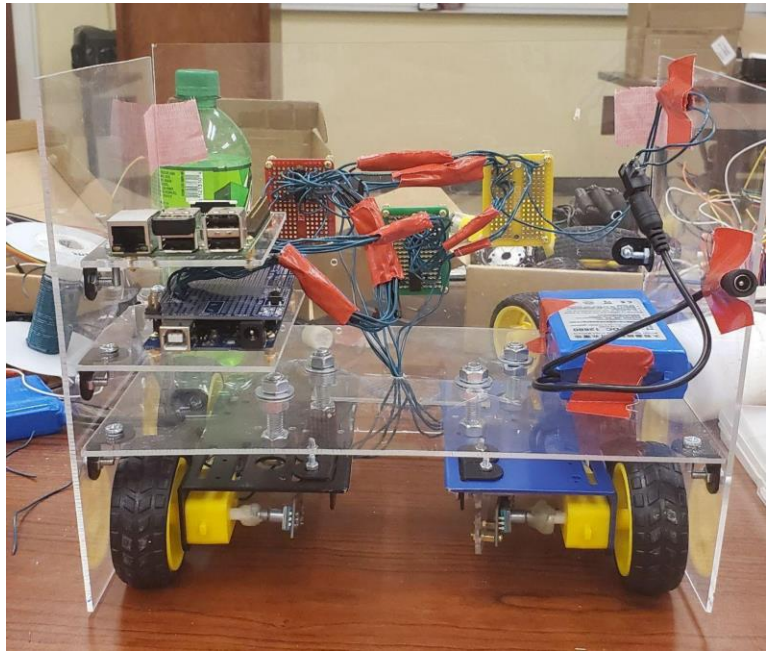


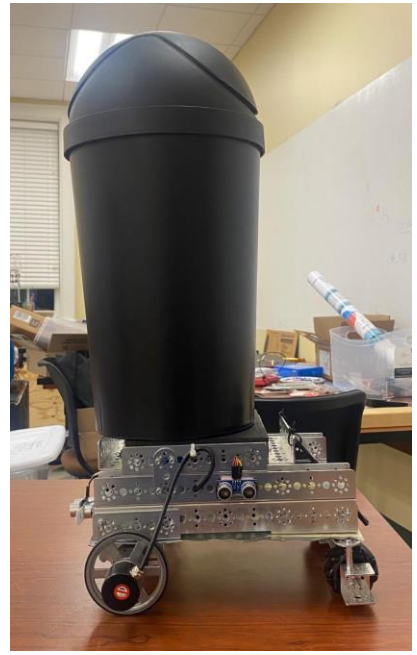


Ground Vehicles

- COVID (Cleaning) Robot
- Dirty Counter Cleaner
- Automated Trash Can







Surface Vehicles

- Autonomous Water Sample Collection System
- *Promoting Electric Propulsion* Competition Boat (supported by American Society of Naval Engineers)

Aerial Vehicles

- Autonomously Expanding Mesh Network
- Uncertainty Propagation with State-estimation and Object Localization for an Autonomous Drone
- HoverRun: The Autonomous Training Partner
- 3d-Printed Solar Power Assisted UAV

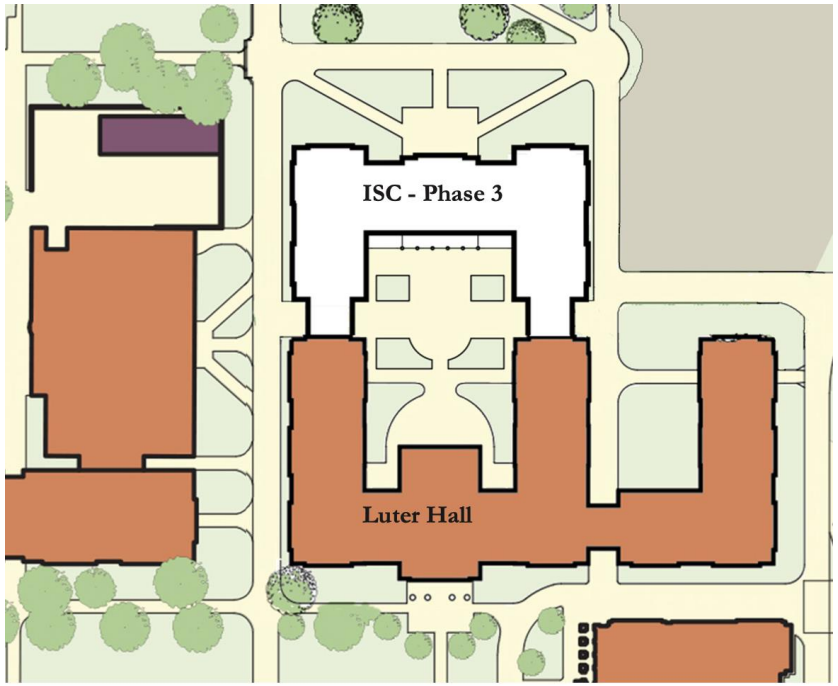
https://youtu.be/w1j4M3awvtY

CNU UAS Team

- UAS Team was founded by Cleveland White in 2013
- Focuses on Unmanned Aerial Systems performing autonomous mission
- Three major components:
  - Technical Journal Paper
  - Flight Readiness Review
  - Mission Demonstration

Outlook & Conclusion

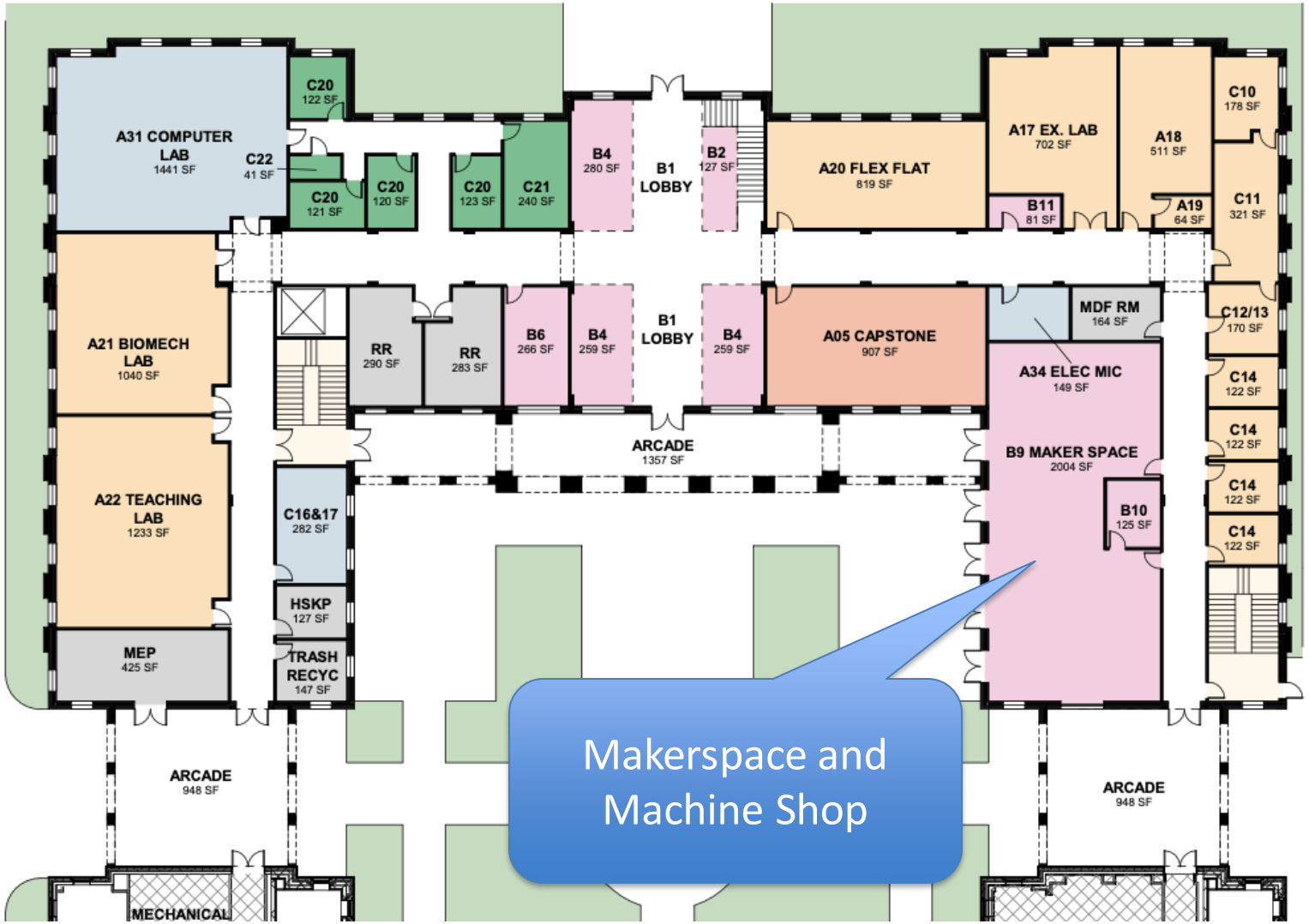
New Building



Integrated Science Center 3

Christopher Newport University

Additional Engineering Spaces



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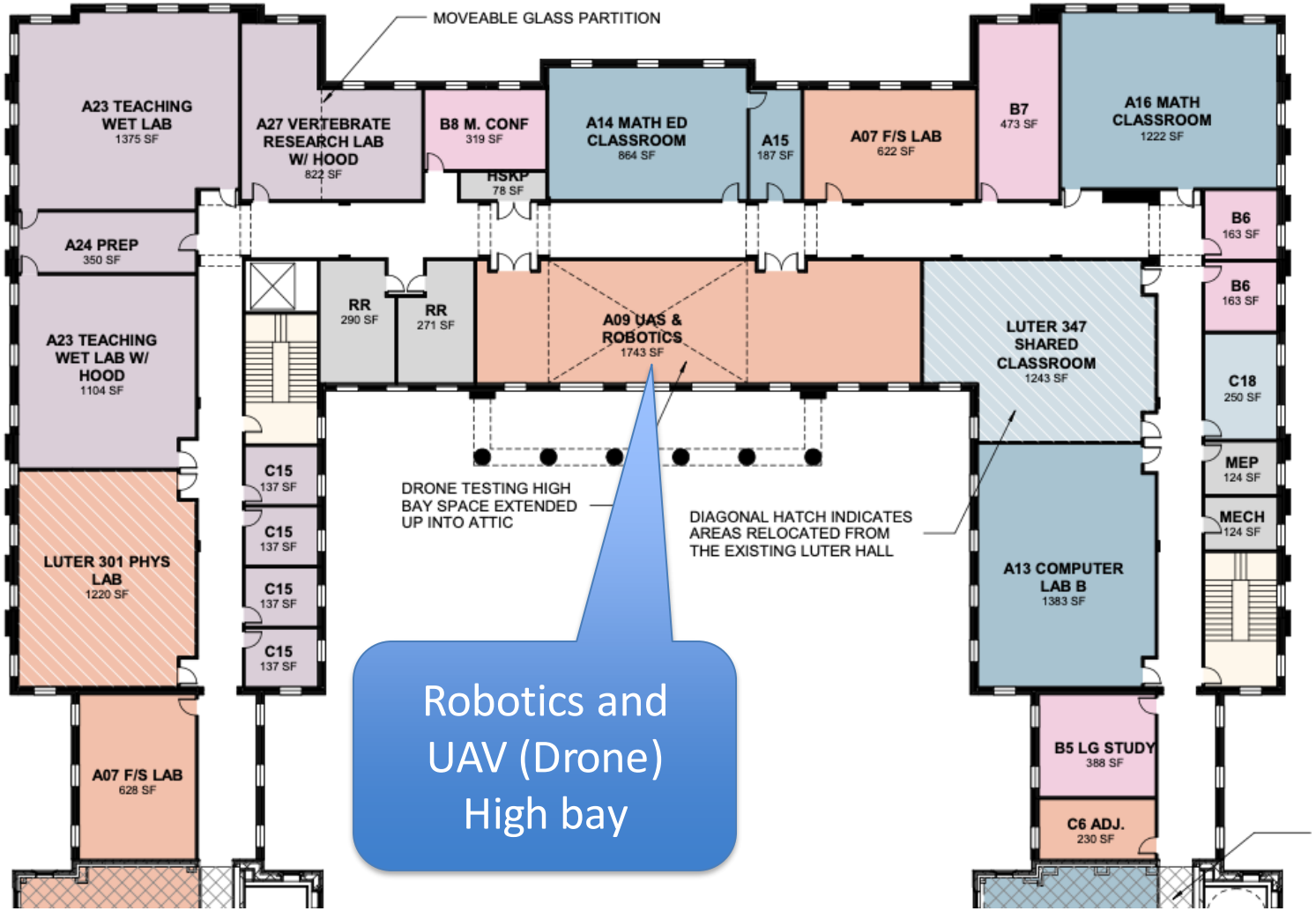

Conclusion

- CNU = Liberal Arts & **Sciences & Technology & Engineering** University
- Great students, graduates, and professors
- Open for partnerships and research collaborations