SWARM-EX Educational Programs in the Development of a Collaborative CubeSat Swarm

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Program Goals

- Persistence and correlation in EIA/ETA features
- Changes in EIA/ETA features that occur over timescales of <90 minutes
- Intercollegiate CubeSat Mentoring Program
- CQ Slack channel
- Efforts to track student engagement/progress
- Formation flying
- Collision avoidance
- Detach & reconnect
- Propulsion
- UHF crosslink
- CDMA downlink
Multi-University Collaboration

- Six institutions: The University of Southern Alabama (USA), Stanford University (SU), The University of Colorado Boulder (CU), Georgia Tech (GT), Olin College, and Western Michigan University (WMU)
- The SWARM-EX mission provides a unique opportunity for STEM education and allows for cross-institutional mentorship between experienced and new CubeSat programs
Our Team
Current Efforts

- Providing cross-institutional mentoring activities
- Development and implementation of a repository for CubeSat knowledge and expertise
- A survey of student participants
- Seminar Series
Cross-Institutional Mentoring

Experienced Programs

New Programs

Georgia Tech

W

CU

USA

S

Olin College of Engineering
Surveys

- Four Surveys
  - Demographic
  - Entry
  - Annual
  - Exit
Survey Purpose

- Identify and track students technical capabilities and CubeSat knowledge levels throughout their time working on the SWARM-EX project.
- The outcome of surveys is to gain a better understanding of what participants bring and take away from the project.
Current CubeSat Resources & The SWARM-EX CubeSat Slack Channel

We make it easy to build CubeSats.

Launching Cubesat Questions
CubeSat Slack Channel

• The CubeSat Questions Slack Channel introduces students and new CubeSat teams to experts and experienced teams
• Subject matter experts from 16+ universities
• Total Members: 98
• Student from Western Michigan University asking questions on GPS telemetry, housekeeping data, and CubeSat deployment

• They received responses from experts with detailed explanations
CubeSat Knowledge Documents

- Academic Material: Lectures and Webinars
- Frequently Asked Questions Document
- Getting Started Document for CubeSat
Seminar Series

- The seminar series is a set of lectures covering various topics put on by members of the SWARM-EX project allowing students’ to participate in discussions on topics which interests them improving their general knowledge in applied STEM

- Upcoming Topic: In-situ measurements and science instruments & SWARM-EX instrumentation  
  Presenter: Dr. Marcin Pilinski

- Previous Topics
  - CU-E3 CubeSat Mission  
    Presenter: Brodie Wallace
  - Academic Journey and Past Research Projects  
    Presenter: Dr. Scott Palo
  - Application of Engineering Principles to Army/MFO Operations in Egypt  
    Presenter: Shane Lowe
Future Work

- Cross-institutional mentoring
- The CQ Slack Channel will continue to be open to additional groups and institutions
- Completing of surveys
- Continuing of seminar series
Questions?
References