Introduction to the 2025-2026 LaACES Program at LSU

UPDATED 22 Apr., 2025

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https://laspace.lsu.edu/laaces/

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What is LaACES?

- **L**ouisian**a** **A**erospace **C**atalyst **E**xperiences for **S**tudents
- A two-semester program where students go through the LSU-designed Student Ballooning Course and build a scientific balloon payload
- Students develop science experiments and fly them to 100,000 feet using a helium-filled latex balloon launched from the NASA Columbia Scientific Balloon Facility (CSBF) in Palestine, Texas.

LaACES Goals

- Allow students without any previous technical background to experience space flight development
- Give students exposure with all areas of payload and mission development
  - Programming
  - Electronics
  - Science
  - Mechanical and Thermal Design
  - Communication
- Have student teams develop a 500g space-flight-ready payload and fly it to 100,000 ft

LaACES Management

Colleen Fava
LaSPACE Director

Doug Granger
LaSPACE Flight Programs

Aaron Ryan
LaSPACE Flight Instructor

Dana Browne
LaSPACE Associate

Sabrina Huezo
LSU P&A Electronics

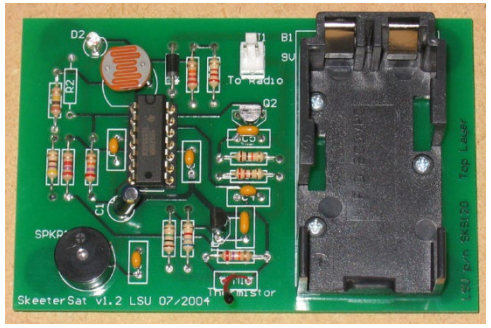
LaACES Program Structure at LSU

- At LSU, LaACES is an extracurricular activity outside of classes
- Students commit to 10-15 hours per week
  - Includes both “class time” and self-guided work time
- **Participating students paid as student workers**
- Fall semester consists of bi-weekly 2-hour instructor-led sessions
  - Typically, Tuesday and Thursday from 6-8 pm
  - Additional lab work time will be required to complete assignments
- Spring semester devoted to designing, developing, testing, and documenting a balloon payload
  - Student led structure with specific deliverable milestones to hit
  - Will group into student-managed teams of 3-5

Fall Semester

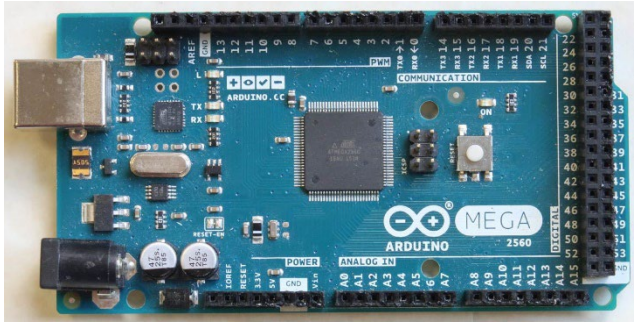
- First Semester is focused on basic skill building
- Introduce students to:
  - Technical writing and data analysis
  - Basic Electronic Circuits and Soldering
  - Programming in C++ using Arduino IDE
  - Digital communication techniques ie UART, I2C, SPI, ADCs
- Two Major Reports in the Fall
  - SkeeterSat Report
  - Capstone Sensor Report

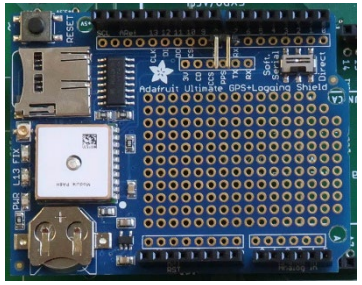
LaACE Hardware Fall 2024



SkeeterSat – a simple introductory sensing circuit that students will build. Then you calibrate it, test it, and document the performance in a written report.

Arduino Mega2560 is a powerful microcontroller we will use for learning programming and digital communication techniques.



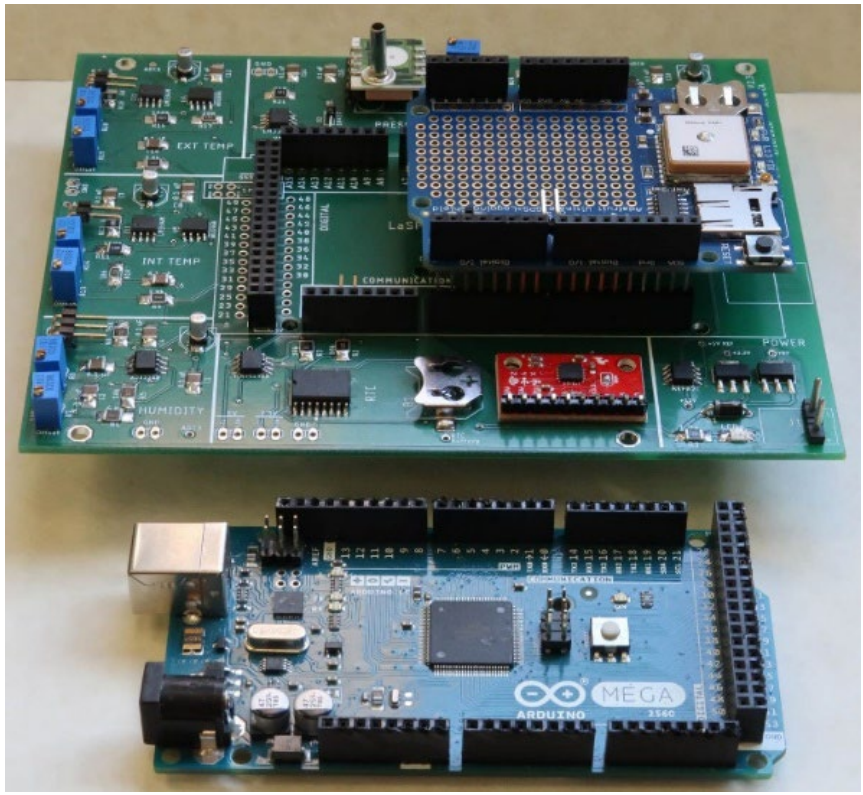


Adafruit Ultimate GPS Logger provides a GPS signal and on-board data storage via a SD Card.

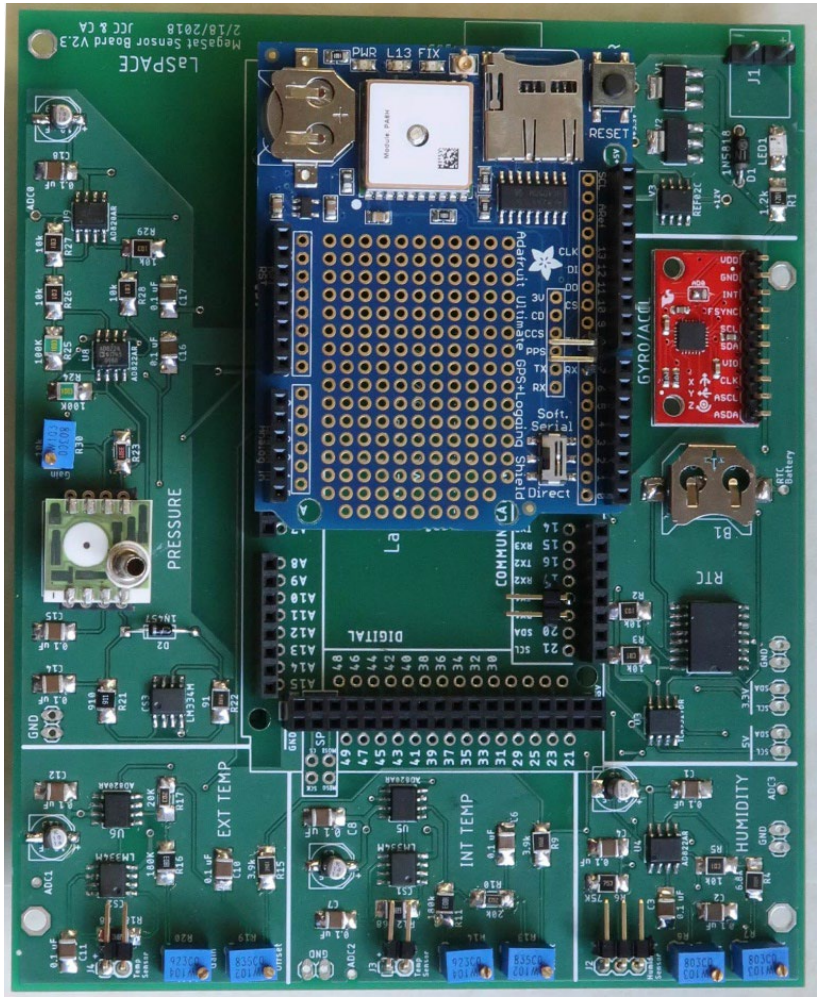
At end of semester combine the all components to build a simple benchtop datalogger in the **Capstone Project**

Spring Semester

- Will form teams of 3-5 students
- Teams will design, build, test, and then fly their payload
- Teams are provided a base flight computer and sensor package called the MegaSat
  - Develop your software
  - Design your sensor circuits
  - Use its interfaces to add additional sensors or capabilities as needed to meet your goals
  - Build a payload housing that can survive the extreme environment
- Document your payload status through Design Review documents and presentations



SBC Hardware Components: The MegaSat



MegaSat Shield is a baseline sensor package and flight computer to base your payload:

- Teams will build this board over the course of the semester
- Provides a baseline set of capabilities to allow teams to develop a complete payload in a short amount of time
- Hardware has been flown previously so can be used as a comparison or to support for any new sensors teams may choose to develop

Design Cycle

- We don't just want to hand you a sensor and say fly this and get some data
- Instead, follow a design and development cycle based on NASA mission development
  1. Start with a scientific hypothesis or question
  2. Determine what kind of measurements you need to make to answer that question (requirements)
  3. Design an instrument that can make those measurements
  4. Prove that the built payload is capable of actually making those measurements
  5. Fly the instrument and analyze those results

Project Management Skills Learned

- How to break down a project into individual achievable tasks
- How to estimate a schedule
- How to develop a budget
- How do you identify and assess the risks that can impact a project

LaACES Launch Week
May 17-22, 2026

- Sunday - Travel
- Monday
  - AM : FRR Defense Presentations
  - PM : Final Certification and Flight String Assembly
- Tuesday - Flight
  - Flight and Recovery Operations
- Wednesday
  - Analysis and Science Presentation Prep
- Thursday
  - AM : Science Presentations
  - PM : Return Travel
- Friday
  - Contingency Day

Launch Day

- Teams will meet in the morning at the launch site (as early as 5:00 am)
- Take 2 hours to prepare the flight string
- Launch the balloon(s)
- After ~1 hour and 30 minutes the balloon reaches 100,000 ft (~ 30km)
- Balloon is cut free from the string
- String fall on a parachute for ~30 minutes
- We locate the payloads via radio and recover

Tentative LaACES 2024 Schedule

- Applications are **Currently Open**

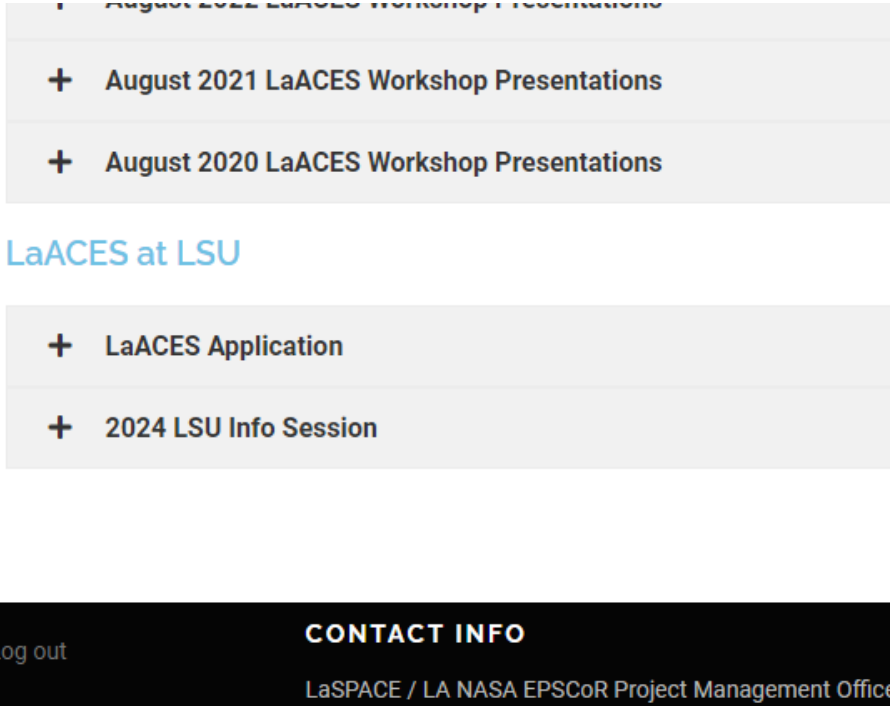
- Applications are considered as they are submitted with a limited number of seats available

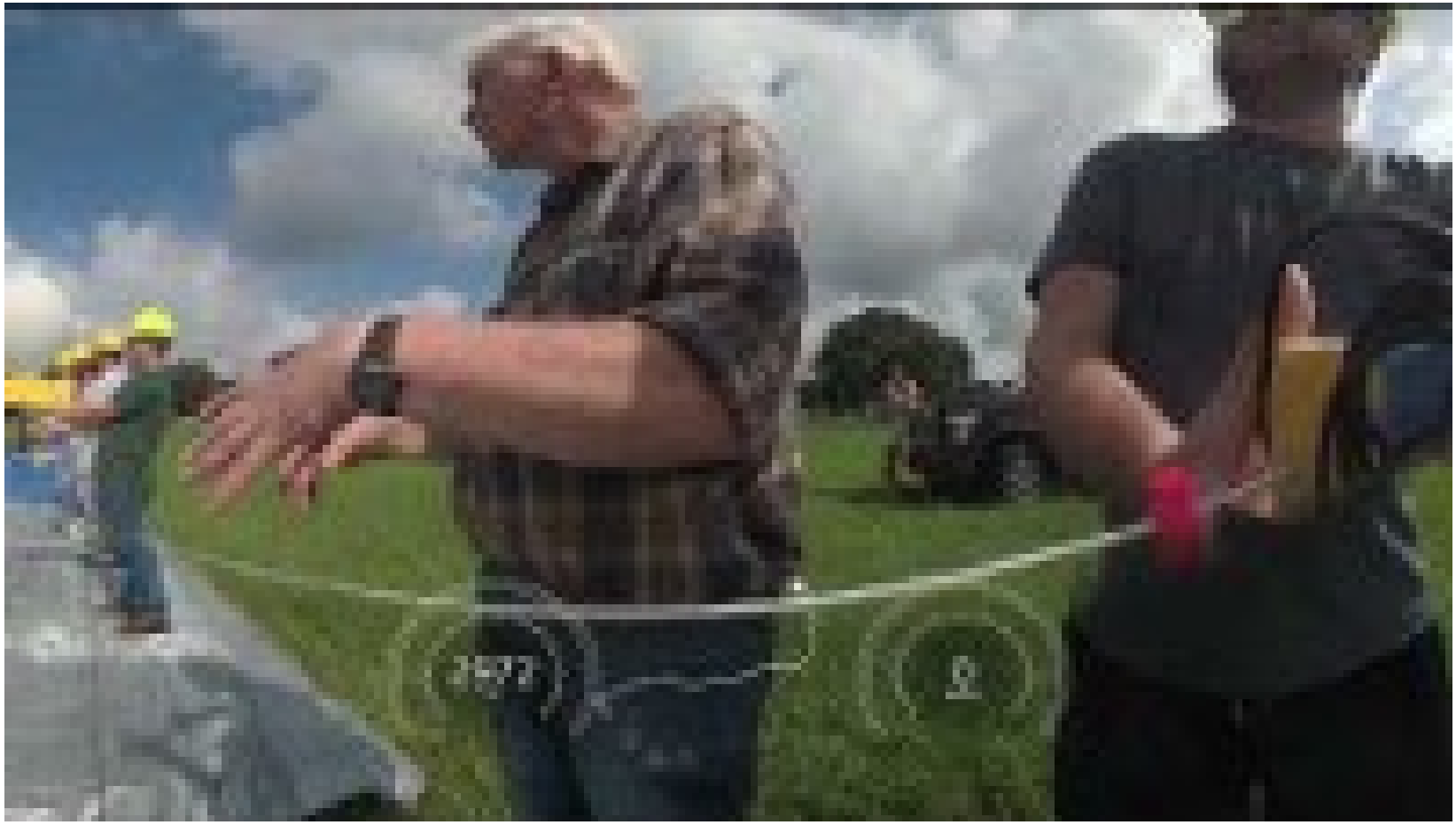
- First Session **Tuesday, September 9, 2025**
- Capstone Report December 1, 2025

- Spring Semester Starts January 12, 2026
- Flight operations trip May 17-22, 2026

SAFE Application

- Application can be accessed on the LaACES website via
  - https://laspace.lsu.edu/laaces/safe-laaces/
- Be sure to follow instructions and fully answer all questions
- Submit application via online form
- Application and recording of this info session can be accessed from the LaACES Document Center under the **LaACES at LSU** section

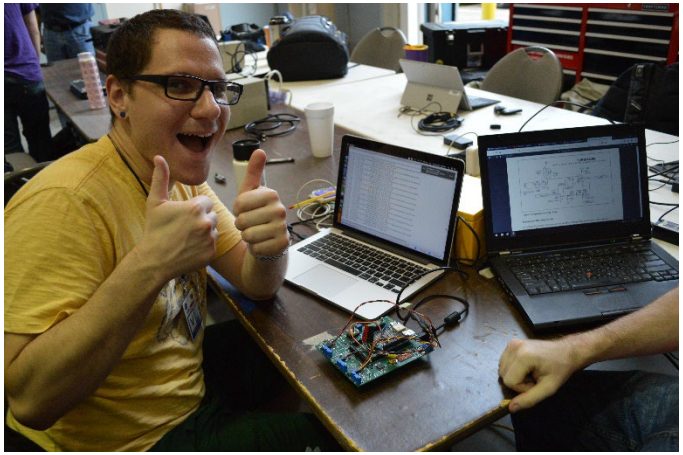




Flight Video

- https://www.youtube.com/watch?v=CF_U6wluJE&list=PL3alra5OKvYtLPy3uZqv98aEztPdzfJBS&index=2

LaACES is always fun plus students end up learning something



Questions

- Application Link

https://laspace.lsu.edu/laaces/safe-laaces/

- Course Materials

https://laspace.lsu.edu/laaces/student-balloon-course/