

# Master's In Instrumentation and Applied Physics

## The Ask

We are seeking

- ideas for projects of appropriate complexity that might be of benefit to your own enterprise;
- occasional conversations between members of a project group and an industry staffer who serves as a liaison;
- the presence of a recruiter at the Grainger College of Engineering's spring job fair, and a visit by that recruiter to the project class;
- discussions about a possible hiring pipeline linking our program to the industry affiliate.

If you'd like to support one or more of our students, and/or use tuition support as an incentive in your own recruiting, so much the better!

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## The Program

The Illinois professional master's in Instrumentation and Applied Physics is a two-semester project-based program.

Through a mix of laboratory, classroom, and field work, we will teach our students to take a collaborative project from conception and design through planning, prototyping, calibration, analysis, and documentation.

## The Projects

A typical project will comprise a suite of sensors managed by a microcontroller that transmits data over a radio link to a base station. Supervised by UIUC faculty, students will design and build their device's circuit and printed circuit board. They will write data acquisition, calibration, and offline analysis code. Students will fabricate parts as necessary on 3D printers. Oral presentations—at mid-year, then at project completion—will be complemented by a detailed technical report upon conclusion of the project.

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Physics  
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# INSTRUMENTATION and APPLIED PHYSICS

IN THE MASTER OF ENGINEERING IN ENGINEERING DEGREE

More information:

<https://physics.illinois.edu/academics/masters>



# About those projects...

## Nature of the projects

The expected level of sophistication of the projects our students will undertake is informed by our experiences teaching a project-based senior design course. In that course, students design embedded systems in which microcontrollers manage suites of sensors, store data to removable media, and sometimes use radio links to move data between widely separated devices.

## Our capabilities

- Record 12-bit audio at 70 kHz
- Synchronize devices to 1  $\mu$ sec
- GPS position updates at 1 Hz
- $\pm 0.2$  Pa barometric pressure
- Methane, VOC detection
- acceleration/vibration at 500 Hz
- 10-channel visible light spectrometer
- Mavic 2 PRO drone, >300 gram payload
- LoRa 915 MHz radio communications
- visible and near-IR imaging
- airborne particulates sensing
- ...lots more

## Our tools

- Four Ultimaker 3D printers
- Soldering/desoldering stations
- Table, miter, band saws; hand tools
- Multimeters, oscilloscopes (of course!)
- EAGLE schematic capture and PCB layout
- TinkerCad and Cura design software
- 8-day PCB fabrication turnaround
- thousands of sensor breakout boards, microcontrollers, discrete components, solar power managers, non-contact IR thermometers, electret microphones, FRAM memories, proximity sensors, prototyping tools, etc. etc. etc.

## Past (senior design) projects

- Position and frequency dependence of a symphonic hall's acoustic response
- Measuring/mapping track irregularities on the AMTRAK Illinois Central line
- Bovine methanogenesis
- Monitoring oxygen delivery to intubated patients sharing a respirator
- ...lots more

