ENGINEERING EXCELLENCE FUND

Engineering Excellence Fund
UNIVERSITY OF COLORADO **BOULDER**

MINI PROPOSAL
Spring
2021

# Sensors and Data Acquisition Equipment For Student Checkout

Submitted to the Engineering Excellence Fund Committee
University of Colorado Boulder

17 Feb 2021


**Primary Contact**

Anne Barlas
Integrated Teaching and Learning Program
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920-493-2595

**Faculty Sponsor**

<<Faculty Sponsor Name>>
<<Department>>
<<e-mail>>
<<telephone #>>


## Supporting Authors

| Name | Department | E-mail |
|---|---|---|

## Affiliation

Check the box(es) that best describe your group

| | | |
|---|---|---|
| ☐ Student Organization / Club | ☐ Undergraduate Course | ☐ Sr. Design Group |
| ☑ College Center / Program | ☐ Graduate Course | ☐ Individual |
| ☐ Other: | | ☐ Research Lab |

Always have a title that explains what will be funded or at least the organizations name

Every proposal needs a faculty sponsor! Please be sure to have everyone's information written correctly as we will be reaching out with questions.
And if any of the information changes please notify the EEF as soon as possible so we can keep our data up to date.

These are the types of programs that we usually fund but if you do fall in the other category please describe your affiliation here as well and more into your proposal.

Tip: Before starting your proposal look through our RFP (Request for Proposal) as it is breaks down how we think about a proposal ( and feel free to email us with any questions during the proposal process we are more than happy to help)

# II. Project Description

## Project Overview

The Integrated Teaching and Learning Program (ITLP) requests $3,000 in funding to purchase sensors to support test and measurement, especially in Senior Design courses. As a required capstone course for eight CEAS majors, Senior Design brings together skills learned during the undergraduate education in a final project that solves a real-world problem. Student teams are paired with industry partners to research, design, and prototype a functional project that is often put into use as is or is modified for use by the company. Design testing is an integral stage of project development, the results of which are presented to industry partners as validation of the design feasibility and functionality.

Through ITLP's robust inventory of sensors and data acquisition (DAQ) equipment, students develop their testing skills as they validate their designs. By growing the inventory of the most-used sensors and updating obsolete sensors, as well as providing sensors with capabilities and ranges not offered before, students will have increased access to high-quality equipment.

Senior Design courses continue to develop in complexity as industry partners recognize the value of UCB engineering students to engineer practical solutions to real-world problems. Projects span many different industries and often include complex digital or electro-mechanical aspects. For some engineering students, Senior Design is their first industry interaction, involving critical connections within the vast engineering network. By supporting students in their capstone course, there is also opportunity to help them expand their job search with potential employers -- bridging their education with their long-awaited career.

The proposed sensors and DAQ equipment are organized in the budget table by sensor category and include new sensors to expand ITLP's availability inventory, updated sensors to replace those that are obsolete, and most checked-out sensors and DAQ equipment to reduce wait times.

We love hearing the impacts of the projects and the technical aspects of the project

## Student Impact

The ITLP purchases and manages equipment for use by all engineering students in CEAS courses or ITLP workshops. Following this protocol, the proposed sensor and DAQ equipment will also be available to all students and faculty. While the proposed equipment is specifically needed for use in Senior Design capstone courses, students in other courses will be able to use the equipment as well. The ITLP-supported GEEN 1400, 2400 and 3400 projects courses had an annual enrollment of nearly 600 students and are excellent candidates for use of this equipment to validate project designs.

There are eight majors within the college that host a Senior Design course, and most utilize the inventory at the ITLP for sensors and DAQ equipment checkout. ME Senior Design alone has 34 teams of 4-5 students each enrolled this year. Over an expected lifetime of 5 years, over 800 ME Senior Design students are expected to be served, and 3000 from project courses.

Please do not exaggerate your impact.
EEF is not more likely to fund a proposal with a larger student impact. Instead we look at the project as a whole

Estimate the number of CU students that will impacted by the funding of this work: 3800

Which communities will be most impacted by the funding of this work? (check all that apply)

- [x] Undergraduates
- [x] Engineering Students
- [ ] A Research Group
- [ ] Grad Students
- [ ] Non-Engineering Students
- [ ] A Student Org./Club
- [ ] <<Other communities/group/organizations>>
- [ ] An Individual

## Justification of Costs and Economic Sensibility

The requested equipment includes accelerometers, load cells, flow, pressure, temperature sensors, and DAQ equipment. The sensors selected are all professional grade, allowing students to learn with equipment found in industry --skills that give them a crucial jumpstart in their careers. The sensors selected either replace or complement the existing ITLP inventory, creating resources applicable to most student projects in a variety of courses. Although the costs of sensors vary considerably depending on the type, it is important to maintain standards that provide students with the best data possible. Many Senior Design teams submit their test plan and data to their industry clients, so high-quality data is essential, as it can be representative of the quality of their project. The proposed sensor selection also includes the most frequently used sensors and DAQ equipment currently available for ITLP checkout, which will reduce wait time and help keep projects on track.

## Qualifications of the Proposal Team

As an engineering education team, the ITL Program strives to support students as they learn through doing. Anne Barlas, ITLP Engineering Project Consultant, will purchase the proposed materials, complete work to update the published sensor resources and assist students with the use of the equipment. Barlas has experience supporting the existing sensors and DAQ equipment in the ITL Laboratory through leading a DAQ Workshop and numerous Senior Design consultations. Further support of the implementation and management of the equipment will include ITLP engineering staff, ITLP engineering support student staff, and Kai Amey, Assistant Director of the ITLP.



You are encouraged to follow this format as we look in for these in every proposal

- Student Impact
- Goals
- Qualifications
- Justification of cost and specific items
- Clear list plan of how the budget will be used
- about the team/ the kind of organization you are

# III. Project Budget

Section 1 should include a comprehensive project budget. Section 2 should distinguish between items funded by EEF and by outside sources.

## 1. SOURCES OF FUNDING

| Funding Source Name | Confirmed? | $ Amount |
|---|---|---|
| **Engineering Excellence Fund, This Proposal** | ☐ No | **$ 3,000.00** |
| Engineering Excellence Fund, Past Proposal(s) | ☐ No | |
| Department Contribution | ☑ Yes | $ 3,813.52 |
| College Contribution | ☐ No | |
| Donations in-kind | ☐ No | |
| Unfunded | | |
| <<Insert additional source name here>> | ☐ No | |
| <<Insert additional source name here>> | ☐ No | |
| <<Insert additional source name here>> | ☐ No | |
| <<Insert additional source name here>> | ☐ No | |
| **TOTAL PROJECT BUDGET** | | **$ 6,813.52** |

## 2. BUDGET DETAIL

| | Item Name/Description | Donated? | EEF Funded? | $/Unit | x # Units | = $ Amount |
|---|---|---|---|---|---|---|
| 1 | PCB Shock Accelerometer (350C24) | ☐ | ☐ | $ 807.00 | 1.00 | $ 807.00 |
| 2 | PCB Single Axis Accelerometer (3711E1110G) | ☐ | ☐ | $ 745.00 | 1.00 | $ 745.00 |
| 3 | PCB Impulse Hammer 0 to 500 lbf (086C03) | ☐ | ☐ | $ 785.00 | 1.00 | $ 785.00 |
| 4 | Measurement Special. 340deg Pot.(6009-1002-030) | ☐ | ☐ | $ 260.62 | 1.00 | $ 260.62 |
| 5 | LIDAR-Lite v3 (SEN-14032) | ☐ | ☐ | $ 129.99 | 1.00 | $ 129.99 |
| 6 | Terabee Distance Sensor (TR-EVO-SWP) | ☐ | ☐ | $ 72.00 | 1.00 | $ 72.00 |
| 7 | Measurement Special. 100lbf (FC2211-0100-L) | ☐ | ☐ | $ 60.00 | 1.00 | $ 60.00 |
| 8 | Transducer Techniques, 0-5k lb (LBO-5K) | ☐ | ☐ | $ 405.00 | 1.00 | $ 405.00 |
| 9 | Dwyer Telescoping Pitot Tube (166T) | ☐ | ☐ | $ 213.00 | 1.00 | $ 213.00 |
| 10. | Dwyer S Type Stainless Steel Pitot Tube (160S-18) | ☐ | ☐ | $ 200.00 | 1.00 | $ 200.00 |
| 11. | PCB High Res ICP Press Sensor, 100psi (102A05) | ☐ | ☐ | $ 796.50 | 1.00 | $ 796.50 |
| 12. | Omega RTD Immer. Probe (PRTF-11-2-100-1/4-E) | ☐ | ☐ | $ 59.53 | 1.00 | $ 59.53 |
| 13. | ½" Digital Torque Adapter, 25-250f (ARM602-4A) | ☐ | ☐ | $ 59.99 | 1.00 | $ 59.99 |
| 14. | 3/8" Digital Torque Adapter, 5.9-59f (ARM602-3) | ☐ | ☐ | $ 49.99 | 1.00 | $ 49.99 |
| 15. | NI-9234 | ☐ | ☐ | $ 2,169.90 | 1.00 | $ 2,169.90 |
| 16. | | ☐ | ☐ | | | |
| 17. | | ☐ | ☐ | | | |
| 18. | | ☐ | ☐ | | | |
| 19. | | ☐ | ☐ | | | |
| 20. | | ☐ | ☐ | | | |
| 21. | | ☐ | ☐ | | | |
| 22. | | ☐ | ☐ | | | |
| 23. | | ☐ | ☐ | | | |
| 24. | | ☐ | ☐ | | | |
| 25. | | ☐ | ☐ | | | |
| 26. | | ☐ | ☐ | | | |
| 27. | | ☐ | ☐ | | | |
| 28. | | ☐ | ☐ | | | |
| 29. | | ☐ | ☐ | | | |
| 30. | | ☐ | ☐ | | | |
| | **TOTAL PROJECT BUDGET** | | | | | $ 6,813.52 |

Form error: sum of BUDGET DETAIL does not equal sum of SOURCES OF FUNDING. Verify that budgets in both sections agree.



Though we do not have a cap to how much you can request do keep your requested amount precise.

We would prefer that you select which items that the EEF is funding. Also the EEF does not fund consumables.

The proposal can be longer than this but please make sure that it is under 7 pages and you are always more than welcome to include an appendix for more details that you were not able to fit in. We love pictures! And also note that when we do give funding we expect to hear back in a year about what was accomplished with the funding and we expected attendance for our annual symposium that occurs every spring.

# IV. Approvals

This page must be completed for proposals to be considered

Sensors and Data Acquisition Equipment For Student Checkout
Spring 2021

## 1. Finance Approval

Ruth Rindin

ITLP

ruth.rindin@colorado.edu

Existing SpeedType: [redacted]

Or, new SpeedType is needed: ☐

Propsals must be signed to be considered for funding

Ruth E Rindin
(Finance Manager Signature)

February 15, 2021
(Date)

## 2. Sponsor Approval

Signature indicates the proposal has been jointly reviewed by student(s) and faculty and approved by the faculty sponsor. (If you are a faculty or staff member applying for a mini grant you do not need to sign.)

<<Faculty Sponsor Name>>

(Faculty Sponsor Signature)

(Date)



Important:
If any of the funding that was requested was not used in its entirety you must return it back to the EEF