

CALIFORNIA STATE UNIVERSITY, FULLERTON



**Center for Collaborative Research and Prototype Development
Campus Centers and Institutes Self-Study**

Center Information:

COLLEGE OF ENGINEERING AND COMPUTER SCIENCE
ENGINEERING NE-043
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1 Mission and Goals

The mission of the Center for Collaborative Research and Prototype Development (CCRPD) is to provide a portal for directed engineering research and prototype design to regional industry partners. Its purpose is to create a mutually beneficial platform between the College of Engineering and Computer Science (ECS) and local industry, where students gain hands-on experience directly related to an industry partner's field. In exchange, the supporting industry sponsor receives a customer-driven design and prototype (*e.g.*, physical mechanism, computational tool, *etc.*), as well as recruitment access to students that are already familiar with their organization. The center achieves this by leveraging the interdisciplinary knowledge base of the students and faculty in ECS, in addition to accessing ECS's broad manufacturing capabilities such as CNC machining and 3D printing. Additionally, the Center will conduct pedagogical research into the impact of project-based learning opportunities in engineering education.

By providing senior ECS students with direct experience in working with local industries, the mission of the CCRPD directly aligns with the University's Strategic Goal No. 01: *to provide a transformative educational experience and environment for all students*. Moreover, CCRPD's involvement in the ECS *Corporate Partners Program* has contributed to ECS's ability to raise fund from external sources. This activity strongly aligns with University's Strategic Goal No. 04: *to expand and strengthen the financial and physical capacity of the University*, as well as with ECS's Goal No. 03: *to cultivate and nurture mutually beneficial relationships with community, industry, and alumni*.

2 Activities

In its first three years, CCRPD has participated and promoted the following activities:

- Collaborated with local industry partners through the ECS Corporate Partners Program
- Implemented the ECS Student Projects Showcase and Awards Event
- Submitted proposals to industry partners to fund faculty research and education activities
- Attended a professional development conference
- Serve as co-advisors on industry-sponsored projects

The following subsections further detail these activities and discuss how they meet the Center's mission and goals.

2.1 ECS Corporate Partners Program

ECS Corporate Partners Program seeks industry support of student capstone projects and faculty research. The program requires that the Co-Directors (in collaboration with ECS's Senior Director of Development *Mike Karg* and Associate Director of Corporate and Foundation Relations *Nicole Bailey*) visit several local companies to solicit potential design projects for the ECS's capstone design courses. Companies who sponsor projects are categorized as *Corporate Partners* and also co-advise the project with a faculty member. Moreover, Corporate Partners participate in the ECS Student Projects Showcase and Awards event, where they can promote their companies and recruit graduating ECS students.

2.2 ECS Student Projects Showcase and Awards Event

The ECS Student Projects Showcase and Awards Event is an annual event and design competition for undergraduate ECS students. Projects from across all five of ECS's departments participate. Corporate Partners and industry representatives are heavily involved in this event. Before the ECS Student Projects Showcase and Awards, each student team is invited to submit an abstract to a panel of reviewers who collectively represent a diverse set of industry disciplines. Several of the student teams are then invited to present their work to a joint industry and faculty panel, which convenes after the presentations to make the award selection.

2.3 Proposal Submissions

The Center has submitted two proposals to support research and educational activities. One proposal was submitted to the HAAS Foundation which requested funding to develop a 6-week summer program focusing on integrating advanced design and manufacturing processes. The summer program targeted both high-school and community college students throughout the Los Angeles/Orange County region. The goal of the project was to reduce the skills gap and create a skilled workforce in advanced manufacturing by addressing the current disconnect between manufacturing technicians and design engineers. Unfortunately, this proposal was not funded. However, the Co-Directors plan to revise the proposal, based on reviewer feedback, and to resubmit in future calls.

The second proposal was submitted to Sony to support Hearing Aid research. The overarching research goal of the proposal is on improving speech intelligibility and to enhance spatial hearing of hearing aids. To achieve this, it is proposed to create a mobile app which will use current smartphone technology to reduce the influence of background sound sources and to localize and spatialize target speaker(s) prior to delivering the audio stream to a hearing-aid user. If funded, this proposal will increase research and educational opportunities for undergraduate students in ECS as CSUF.

2.4 Professional Development

The Co-Directors attended the 2018 Makerspaces for Innovation and Research in Academics (MIRA) conference at the University of La Verne. The purpose of this conference was to learn about how educators are using makerspaces, at their respective institutions, for educational and research purposes. The Co-Directors learned about the makerspace, located in the CSUF library, and will look into potential collaborative projects with the makerspace directors.

2.5 Industry Sponsored Project Co-Advisors

The Co-Directors served as co-advisors to several of the industry-sponsored projects under the Corporate Partners program. These projects are typically advised by the faculty mentoring ECS senior capstone projects. However, some of the projects required additional faculty mentorship and, hence, was fulfilled by the Co-Directors. The projects co-advised by the Center Co-Directors were projects sponsored by CalAmp and Prodex.

3 Organizational Structure and Governance

The Dean of ECS, in consultation with ECS Department Chairs, appoint the Co-Directors. The Dean approves all faculty and researchers working on behalf of CCRPD. The center welcomes all faculty interested in contributing to its mission statement and goals. The administrative structure is currently comprised

of the Center Co-Directors, Assistant Director of Research and Grants (ADRG), and a Corporate Partners board. The Co-Directors are responsible for proposing Center activities, overseeing corporate-funded projects, the delegation of Center activities, overseeing research and grants acquisition, outreach activities of the Center, maintaining regular contact with the Corporate Partners, and approving membership. Currently, the Center does not have an appointed ADRG, and the ECS's Associate Director of Corporate and Foundation Relations (*Nicole Bailey*) is currently fulfilling this role. Once an ADRG is appointed, he or she will be charged with the following duties:

- Advancing the research goals of the Center as well as spearheading the process of preparing grant proposals for funding the Center activities.
- Jointly with the Co-Directors will have the responsibility of vetting the prospective members interested in joining the Center for the purpose of conducting research or developing proposals.
- Jointly with the Co-Director will have the responsibility in seeking out and working on grant applications necessary to procure funds for supporting the Center.

The Corporate Partners board will consist of all the Corporate Partners from industry, government, and other academic institutions. The Co-Directors and ADRG meet periodically with members of the Corporate Partners program to get feedback on the Center curriculum development, research, and outreach activities. The meetings occur either on an individual or group setting at the convenience of the Corporate Partner.

4 Resources and Sustainability

Over the past 3 years, the Center has produced a total revenue of \$167,347.05 through its Corporate Partners program. Additionally, the Center has a pending proposal from Sony that, if funded, would bring in approximately \$25,000 through indirect cost for the College. The Co-Directors have each been given one-course release per academic year from the Dean of ECS for the leadership of the Center. All of the faculty mentoring ECS senior capstone projects are affiliated with the Center, however, they are not directly compensated for their affiliation. No administrative staff is assigned to the Center. The Center is housed in Engineering NE-43 which acts as a physical and virtual meeting space for students, faculty, and collaborators. To serve this function, the room consists of a teleconferencing and video conferencing equipment.

As mentioned earlier, the Center does not have a permanent ADRG. Furthermore, the Co-Directors believe that the Center could benefit from an Assistant Director of Corporate Relations (ADCR) whose role and responsibilities are summarized as:

- Advance the Center's corporate relations through corporate outreach, maintaining regular contact with Corporate Partners, and identifying new potential Corporate Partners. During all meetings, the ADCR will take meeting minutes and submit them to the Director.
- The ADCR will meet regularly with the Center Director to report the status of the ongoing corporate related activities and receive Director's approval for prior to new corporate-related activities.
- Foster collaborative opportunities with the CSUF Startup Incubator.
- At the conclusion of each semester, the ADCR will prepare a report documenting all Center corporate related activities undertaken by the Center that semester and related activities planned for the upcoming semester.

- The ADCR will keep the corporate-related activities portion of the Center website up to date with the latest information regarding the Center’s activities and accomplishments.

Initially, one of the Co-Directors will also assume the role of ADCR and ECS’s Associate Director of Corporate and Foundation Relations (*Nicole Bailey*) will remain as the acting ADRG. However, if the Center’s revenue can be increased such that two 1 semester course release can be sustained for 3 years, then the Dean and Co-Directors will identify 2 ECS faculty members to fill these roles for a 3-year appointment at a time.

5 Highlights and Accomplishments

The Center has several accomplishments and highlights over the last 3 years stemming from the activities listed above. The Center was able to increase support coming from the Corporate Partners program from \$12,500 during the 2016-2017 fiscal year to \$85,097.05 during the 2017-2018 fiscal year. This was an increase in revenue from the Corporate Partners program of 681% and is, hence, increasing support for student projects and College needs, aligning with the University’s Strategic Goal No. 4. The amount the Center brought in during the current fiscal year (2018-2019) is \$69,750.

The Center was critical in the development and implementation of the ECS Student Projects Showcase and Awards event. This event allowed current and potential Corporate Partners to observe ECS research and senior capstone projects. Furthermore, industry representatives were able to directly interact with ECS students allowing them to introduce their companies to our talented students for project and recruitment purposes. This event directly aligns with the University’s Strategic Goal No. 1 (*providing a transformative educational experience and environment for all students*) and Goal No. 4 (*potential increase in revenue from any new Corporate Partners*), and the College’s Strategic Goal No. 3 (*cultivating and nurturing a mutually beneficial relationships with community, industry, and alumni*).

As mentioned in the activities section above, the Center has submitted 2 proposals to support research and educational activities. If funded, this will increase revenue, aligning with the University’s Strategic Goal No. 4, and increase educational and research activities that involve Corporate Partners, aligning with the University’s Strategic Goal No. 1 and the College’s Strategic Goal No. 3.

The Co-Directors attended a makerspace conference in July 2018. During this conference, the Co-Directors learned about the makerspace, located in the CSUF library, and discussed collaborative opportunities with the makerspace directors. Working with them would create mutually beneficial relationships between the Center and the CSUF makerspace, directly aligning with the Colleges Strategic Goal No. 3.

6 Planning and Strategic Outlook

To meet the Center’s mission and goals, the Center will foster an environment that emphasizes the need for theoretical engineering research supported by proof-of-concept simulations and prototypes. The future of the Center is ripe with opportunities to partner across the College and University. Already, the Center has involved 3 of the 7 departments in ECS. There will be future opportunities to partner across the University, specifically with the Mihaylo College of Business and Economics as our research expands and practical applications are created. To connect theory, research, and instruction, the Center has the following goals.

6.1 Increase Revenue through the Corporate Partners Program and Proposals

Building on ECS’s existing partnerships with engineering industry leaders, the Co-Directors, the ADRG, and the ADCR will reach out to potential Corporate Partners. Furthermore, the Center will submit

proposals to industry and government agencies, such as NSF, NASA, AFSOR, NIH, Sony, *etc.*, to support research and educational activities.

6.2 NSF Industry-University Cooperative Research Centers Program (IUCRC)

The NSF Industry-University Cooperative Research Centers (IUCRC) program develops long-term partnerships among industry, academe, and government. The Centers are catalyzed by an investment from the National Science Foundation (NSF) and are primarily supported by industry Center members, with NSF taking a supporting role in the development and evolution of the Center. Each Center will conduct research that is of interest to both the industry members and the Center faculty. An IUCRC contributes to the nation's research infrastructure base and enhances the intellectual capacity of the engineering and science workforce through the integration of research and education. As appropriate, an IUCRC uses international collaborations to advance these goals within the global context.

6.3 Expand the ECS Student Projects Showcase and Awards Event

The Center will build on the success of the annual ECS Student Projects Showcase and Awards event by expanding the two-hour event into an all day "Engineering Exposition." This is a formal event that is held in the Titan Student Union (TSU), and it is promoted to industry partners, as well as all CSUF students and faculty. In addition, it is planned to expand this and to start promoting to regional academic partners (*e.g.*, UC Irvine, CSU Long Beach, Cal Poly Pomona, *etc.*).

6.4 Collaborate with the CSUF Startup Incubator

The CCPRD will formalize a partnership with the Center for Entrepreneurship within the Mihaylo College of Business and Economics. Specifically, we'll identify collaborative opportunities with the CSUF Startup Incubator to encourage entrepreneurial thinking throughout the applied research process, which will promote entrepreneurship as a future professional goal.

6.5 Establish ECS Seminar Series

The Center will organize a formal engineering seminar series within ECS, which will be held 2-3 times per semester. Guest speakers will be recruited from the Center's pool of collaborators and academic partners, and the topics will align with the goals of the Center. The Seminars will be required for students that are involved with corporate-sponsored projects.

6.6 Partnerships with Other Manufacturing Centers in the Region

The CCPRD will take efforts to enter into fruitful partnerships with other manufacturing centers and institutes in the Southern California region who share similar goals. The three major manufacturing centers in the region include 1) University of Southern California Advanced Manufacturing Partnership for Southern California (AMP SoCal) and 2) Clean Energy Smart Manufacturing Innovation Institute (CESMII), and 3) California Manufacturing Technology Consulting (CMTTC). Through these collaborations and partnerships, the CCPRD will use combined resources to create quality college education programs and foster innovations that are linked to the regional economic development and labor requirements benefitting the diverse population of our students, community, and beyond.