

Proposal to Create the
CALIFORNIA MECHATRONICS CENTER

Prepared by: Nick Repanich
Adjunct Research Professor
Department of Mechanical and Mechatronic
Engineering & Sustainable Manufacturing
California State University, Chico
Chico, CA 95929-0789
(530) 520-2548

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1. NAME OF NEW CENTER

The proposed name of this new center is the *California Mechatronics Center*.

2. NAMES

a. Overseeing Unit

The College of Engineering, Computer Science, and Construction Management, together with the Board of Directors, will oversee the center.

b. Responsible Individual

The individual primarily responsible for drafting this proposal is Nick Repanich, an Adjunct Research Professor in the Department of Mechanical and Mechatronic Engineering & Sustainable Manufacturing (MMEM).

3. DESCRIPTION OF THE CENTER

a. Center Contact

The Contact Person responsible for this Center is:

Nick Repanich
Adjunct Research Professor
Department of MMEM
898-5660 or cell 520-2548
nrepanich@csuchico.edu
www.csuchico.edu/cmc

b. Goals and Purpose of the Center

Formation of a formalized center is really just the final coalescing of three areas of talent and expertise:

For many years, CSU Chico has had a very unique Mechatronic Engineering (MECA) degree. It is the only ABET-accredited degree of its type in California and one of very few programs offered nationwide. The MECA engineer takes many more electrical, computer and controls classes than a mechanical engineer, and more mechanical classes than an electrical engineer. So we always have students that are very interested in automated machines and robotics. *The proposed California Mechatronics Center (CMC) does not affect this curriculum, but rather*

enhances opportunities for those students. Finding projects and then employment for these students has always been a challenge, as many manufacturers are in the Bay Area, and coming to Chico for their future talent is not necessarily part of their normal consideration, especially given Chico's periodic bouts of negative press.

Since about 2003, we have had a continual string of research projects mostly sponsored by Lawrence Livermore National Laboratories (LLNL), but also nuclear energy producers looking to make green energy in a safer way. The LLNL projects have had a consistent theme, that of creating innovative and inexpensive solutions to hazardous or battlefield problems. A continual problem has been one of advanced scouting before ground troops arrive on a scene. We have successfully developed these scouting platforms in various sizes and form factors. That scouting is now being used by the nuclear industry to venture into environments in the reactors that may have potential radiation exposure. Dr. Mike Ward directed these projects for the first few years, and since 2007, Nick Repanich has been Project Director. We have also had a consistent supporter and occasional staff senior researcher, CSU, Chico graduate Dr. Bill Wattenberg, who is the genesis of many of the ideas we have explored. Without Dr. Wattenberg's participation, we would not have had the success in attracting these projects.

CSU, Chico has a unique resource in Nick Repanich. Mr. Repanich brings a different type of expertise to the university environment. He spent 20 years in industry as a machine automation engineer and entrepreneur. He and his wife sold their business in the Pacific Northwest and moved home to Chico in 1999. His technical expertise is in mechatronics in machines, a perfect fit for the university and CMC. He also brings a level of business, sales and marketing, and technical training expertise not usually found in the university engineering departments, as well as deep industry contacts. He has been responsible for well over \$400,000 in equipment donations from industry to the MEM Department, populating two different labs with state-of-the-art equipment, and elevating the educational experience of the MECA graduates. He has operated all of his projects from within the Foundation, and has helped many of our local manufacturers such as FAFCO, Sierra Stream & Mountain, Lares Research, Voorwood, AVL Looms, Advanced Equipment Systems, and Johns Manville develop automated machines that help their productivity or protect workers from unsafe jobs.

He has also been responsible for bringing potential employers from the machine automation industry to campus to hire our students. One of his other ongoing projects is to provide technical interviewing services to employers across the country, as well as developing the industry's primary post-graduation training program as well as training the trainers, a program used by hundreds of graduating engineers and hundreds of small consulting business that hire those graduates.

The California Mechatronics Center provides a place for all of these local talents to work together for the benefit of our students local businesses and our nation.

c. Need for the Center and Relationship to the University

By formalizing the activities we have been doing the past several years into an official “center”, it gives us more standing to attract more fine projects for our students and staff. We can market ourselves more widely, and perhaps have better choice of projects as we go forward.

We also have developed a few products that have resulted from our research projects. One of our sponsors (LLNL) has encouraged us to market these beyond the original project. A named center allows for more market recognition. A specific example is the small Scout remote control vehicle that was in the news a few years ago. We now have prospective customers from the nuclear industry, the chemical industry, and the law enforcement community (bomb detection). As a customer, it is always more reassuring to buy a product from an entity that sounds like someone that will be around after they buy it, not just a bunch of students that will graduate and leave the purchaser with no technical support.

A more recent product is the D2T3 robot that is used in the National Ignition Facility. Our control platforms have become stable enough that our vehicle is currently the only ground robot to be used in that LLNL facility.

Another rather positive affect may be the positive stories our activities tend to generate. Many times our University is in need of positive stories to counteract the negative ones we also seem to foster. The projects we have finished in the past have attracted press from beyond just the local Chico market. We have been featured in television news stories carried in hundreds of markets, on primary networks such as CBS and Fox.

A newer offering we are currently rolling out may bring even more national recognition to the Center and Chico State. We are beginning to offer an online-chat service to help people develop mechatronics in their projects. It is a pay service with multiple levels of contact beyond just chat, and may end up using most of our MECA majors to fill the potential need. We have tested this with a sampling of students and industry, and had encouraging results.

Our most important resources are our full-time and student employees. Each of the engineers that come to work on our projects has options as to where they can work. Though we hire students to do much of the work on these projects, retaining our core engineering talent is essential to continued progress. The more comfortable they feel about the future prospects of their local employer, the less they may be attracted to other offers. Operating our projects under the “center” title does not necessarily guarantee any sort of future employment, but it does make it easier to attract projects. It also gives a sense of pride to say you are with the “California Mechatronics Center”, rather than always trying to explain how you do robotic research projects for a sponsor within the Research Foundation.

Forming this new Center is a proactive way to keep Chico State Engineering recognized as a prestigious learning environment and as a supplier of well-prepared students to the workforce.

d. Governing Structure

The administrative governance of the Center is provided by a Board of Directors that is comprised of members from industry, Chico State's College of Engineering, Computer Science, and Construction Management (ECC), and the CSUC Research Foundation. The Board of Directors will provide oversight related to the Center's operation.

The Board of Directors consists of six members:

- The Dean of the CSUC College of ECC, or designee from the Dean's Office in consultation with the Director of the Center
- The Executive Director of the CSUC Research Foundation, or designee in consultation with the Director of the Center
- The Director of the California Mechatronics Center
- A CSUC student majoring in Mechatronic Engineering, appointed by the CSUC student chapter of the American Institute of Mechatronics Engineers (one year term, nonrenewable)
- A CSUC at-large representative (non-prescribed, one year term, renewable)
- An industry or CSUC at-large representative (non-prescribed, one year term, renewable)

The two non-prescribed members will initially be chosen by the Director of the Center, in consultation with the four prescribed members of the Board. The Chairman of the Board will be appointed by the Board at the Board's first meeting. Until that meeting the Director of the Center will assume that role. At the resignation of a non-prescribed member, a replacement will be elected by a consensus of the remaining Board members. At least one annual meeting will be held, but the Director may call meetings more often as needed.

The Board's governance of the CMC will adhere to all CSUC requirements for Centers established within the CSU system.

The Director will have the authority to hire and manage any/all employees of the Center. If the Director cannot serve for any reason, the Dean's Office representative will assume the role of Director until a successor is appointed by the Board.

4. EXPECTED IMPACT ON CURRICULUM

In general, there will be beneficial impact on a couple degree program curricula. From time to time various projects we produce can be of great interest to students in Mechatronic and/or Mechanical Engineering. Our demos may help some instructors to enhance the students' understanding of the class material. We intend to make our projects available in that fashion when requested.

For the last 5 years, we have also sponsored at least one group of 4-5 students in the MECA440 "Senior Capstone Design" class every year. This involves seeding the group/class with \$5000, and supervising their two-semester design/build/test project.

5. PLACE IN STRATEGIC PLAN

Goal number one of the Academic Plan approved in 2008 is to “Enhance student learning-both inside and outside the classroom.” Goal number five of the Academic Plan approved in 2008 is to “Strategically manage resources in support of mission, shared values and vision.” The California Mechatronics Center supports both stated goals. For one, the Center provides real-world design experience and internships that supplement the classroom experience of students who participate in the center. In addition, the California Mechatronics Center is able to attract grants, contracts, and significant in-kind donations of equipment that are used in the Mechatronic Engineering classes, as well as by the center.

The Mechatronic Engineering Program Mission Statement includes the following statements that are relevant to the creation of the Center:

The Mechatronic Engineering Program has the primary mission of providing a high-quality undergraduate engineering education with

- 5. Project experiences that build on fundamentals and develop team skills*
- 6. Facilities and equipment that are readily accessible*

Students engaged in the California Mechatronic Center benefit from project experiences that extend well beyond the curriculum and better prepare them for professional work. In addition, the equipment obtained by the Center contributes significantly to the breadth and depth of experiences that all Mechatronic Engineering students experience in the laboratory.

6. FUNDING

a. Funding Necessary

Currently the Director position is not a full-time position, and is funded through each project as needed. Depending on funds available, the CMC may fully employ the Director, additional engineers and students. Currently we have one full-time benefitted engineer and three part-time student engineers. These staffing levels can increase and decrease with available project funding. Every attempt will be made to allow full-time employees as much advance notice of funding timing as possible.

Currently we have \$150,000 of contracts in place, which will take current staffing levels through most of the rest of the 2015 calendar year. Our contracts are typically one-year or less, though that may change (longer). Our funding history is strong, as we have had projects and funds for between 2 and 3 full-time engineers, as well as 2-5 students since 2002. The annual budget has ranged between \$150,000 and \$450,000 depending on the complexity of the projects. We expect to have future revenues from projects that follow on to our current projects, as well as sales of developed products such as remote scouting vehicles that

supplement any project lapses. The general emphasis of our nation's needs in the fields of energy development and machine automation align nicely with our strengths, so we see a bright future ahead.

b. How funding is obtained

The Director will be responsible for obtaining funding required to maintain the Center to the extent possible. There may be periods of time when no funding is available, and there may be times when we simply have too much to do. Every attempt will be made with project sponsors Foundation analysts and staff, and the Director to have work project schedules organized in such a way to allow for a continuous source of funding that will support at least one full-time engineer.

c. How Funding is Used

The financial decisions for the CMC research and fund raising activities will be made by the Director of the Center, under the direction of the ECC Dean and the CMC Center's Board of Directors in accordance with the Chico Research Foundation requirements. We typically do not use any State funding, and each contract contains funds to buy the equipment needed for the project, minimizing use of State equipment. If Faculty work for the Center, they are paid through the project funds.

i. Equipment & Facilities

While the Center intends to make most Mechatronic-type components (those needed in projects) a part of the project budget, we will also make use of lab and shop equipment in facilities that are overseen by the MMEM Department. The Dean of ECC sees multiple benefits to having the CMC in close proximity to students and academic programs, and provided use of OCNL 347 as offices for our engineers and employed students. We may use OCNL 431 for testing and light fabrication of medium-sized projects subject to the ongoing approval of the assigned lab overseer. We will use OCNL 432, a design workshop with lightweight wood and metal removal equipment. We will use a section of building just south of the University Farm office for some larger projects, as well as access to heavier metal working, again with the ongoing approval of that assigned facility's overseer. Finally, we may periodically use the special tools and expertise of the ECC Tech Shop, again with safety training and approval of the ECC Lead Technician. CMC employees will only be allowed use of any of these facilities after proper safety training has been completed, provided by the overseer of that space.

ii. Supplies

We intend to provide our own office supplies through project budgeting, and any consumables used in any of the above labs will be either replaced directly or reimbursed, at the lab overseer's discretion.

iii. Staff

We will use the MMEM department office's mailbox system, but will not add any workload to any MMEM department staff.

iv. Library Needs

We do not intend to use the library in any normal way, except for one special need. The library has an antenna tower on the roof with some well-used antennas, and some no longer used. We may work with the staff in the Library and/or Facilities Management and Services that oversees that facility to allow us to add special antennas that our research may require.

7. OTHER UNIVERSITY ENTITIES AFFECTED

None.

8. MEETING THE DEFINITION OF A CENTER

EO 729 defines "Centers, institutes, and similar organizations" as "entities affiliated with California State University campuses ... to offer services beyond the campus community, to public or private agencies or individuals." The EO states that campuses may create such entities "to facilitate the conduct and dissemination of research..." In that context, the California Mechatronics Center falls within the definition of a center provided by EO 729.