

Alcon

ALCON Capstone

Engineering tends to be a “contact sport.” You learn more as you do more. The College of Engineering at UC Santa Barbara helps students become engineering professionals by pairing them with experts from industry and academia. Together, they engineer solutions for real and meaningful problems. Capstone courses are the cornerstone of these hands-on experiences. These courses provide student teams (3-5 students/project) with an opportunity to use the skills they have accumulated from their coursework, as well as their teamwork, applied to a practical project. Each team starts by developing a project concept, with the objective of creating a functional prototype that can be tested. Students must be able to describe the project exploration, design, implementation, and de-bugging processes to a knowledgeable and curious audience. There are currently four formal capstone programs at UCSB: computer science, mechanical, electrical, and computer engineering.



Burton Tripathi,
PhD, Head of
Visualization

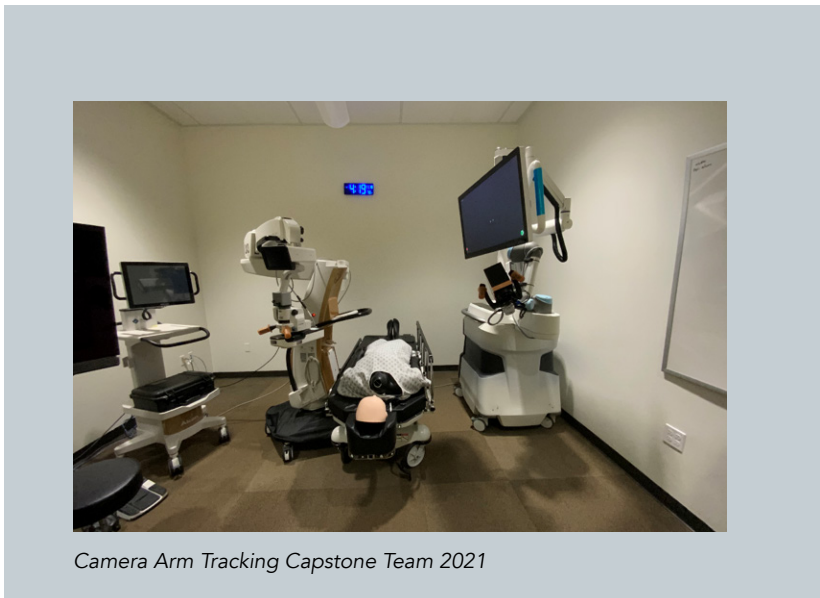
Burton Tripathi, PhD, the Head of Visualization for Alcon, R&D in Goleta, and members of his team have enjoyed being mentors for both the UCSB Computer Science and Computer Engineering capstone courses for several years. Alcon is the global leader in eye care with a 70-plus-year heritage and complementary businesses in Surgical and Vision Care. In fact, their student team, Alpro, won first place in the 2020-21 Computer Science final competition. The division of Alcon

that is based in Goleta develops digital surgical microscopes to aid ophthalmologists performing eye surgeries. The goal of the Alpro capstone project was to automate robotic control of the ophthalmological surgical camera and to focus the stereoscopic view on a single patient eye by developing a powerful, yet safe, machine-vision-guided algorithm. The Alpro student team proposed something even more complex; creating an algorithm using the Alcon robotics camera, some novel software, and a database of patient eyes, to ensure that surgery would be conducted on the correct patient and the correct eye.

“The benefits from a ‘fresh pair of eyes’ looking at a problem are fantastic,” said Tripathi. “And, compared to an internship, you get to observe the team’s dynamics as the project progresses and see the natural leaders and self-starters emerge. With a capstone project you have the opportunity to work at ‘arm’s length’, with the students. During this extended partnership with the students, you can evaluate which of the team members would fit best into your company culture.” But, as Tripathi continues, “One of the most important commitments by the company is the time allocation of staff domain experts.” Alcon had two engineers who supported different aspects of the Alpro project and were available to the students on a weekly basis. Tripathi recommends weekly check-ins to keep the projects on track and communication channels open.

Industry partners are actively sought. Industry-student partnered projects are generally established as follows: In the summer, industry partners come up with ideas for interesting engineering projects and work with the relevant UCSB Capstone staff to fully define each project for the students. Potential project sponsors then provide brief project descriptions/problem statements, all of which are circulated to the students prior to the start of the academic year. During the first week of fall quarter (late September), project sponsors are invited to our Engineering Projects Fair to pitch their projects to the students, after which students form teams and select projects.

Not all projects are selected each year. For the projects that are selected, teams are assigned an internal UCSB faculty or staff advisor, and kick-off meetings are held with the sponsors shortly after. Students then proceed to work on the project throughout the academic year. Each team holds an initial design review with their sponsors at the end of fall quarter (early December), a mid-project design review in the middle of winter quarter (late February), and a final presentation at the end of spring quarter (late May).



Camera Arm Tracking Capstone Team 2021

At the conclusion, students present their projects at our Engineering Design Expo, a large event open to the public. Upon completion of the project, the sponsoring company can elect to keep the final product and is provided with a final design report and all other supporting documentation.

In addition to creative solutions and interesting designs, the company also has the opportunity to actively recruit from the pool of Capstone students. "Having six months of live interactions, watching the students solve problems and deliver results is dramatically more insightful than even the most stringent interview process," said Tripathi. "We have hired many talented engineers from these projects. I highly recommend other firms get involved!"



Alcon Capstone Team 2020