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## Cal Poly Students Headed to Malta and Sicily for Underwater Archeology Expedition

SAN LUIS OBISPO – Eight Cal Poly students are heading to Malta and Sicily in March to launch their underwater robots and explore ancient water systems and marine caves.

Organized through this year’s International Computing Engineering Exchange (ICEX) program, the students will collaborate with marine archaeologists and biologists from the University of Malta to investigate previously unexplored underwater sites, including marine caves and ancient water cisterns -- underground water storage systems located beneath fortresses, private homes and churches.

The students, who will be gone March 3 to 30, will be joined by Zoë Wood, Cal Poly computer science associate professor, and Jane Lehr, associate professor of ethnic studies and women's and gender studies, along with a team of four Harvey Mudd College students and associate professor of engineering Christopher Clark. Clark is a former Cal Poly faculty member.

The student teams will map the underwater environments using a Simultaneous Localization and Mapping (SLAM) based algorithm. The Cal Poly students are working on a number of projects including: creating computer graphics applications to construct and visualize geometric models of the underwater sonar data; integrating stereo data with sonar data to refine the geometric models of the underwater sites; measuring and visualizing underwater science data, such as temperature and salinity; comparing research on robotics education outreach efforts to elementary school children in the U.S. and Malta; and creating an online database to support communication and outreach efforts that will showcase new curricular modules and interactive simulations designed to support the exploration of the relationships between water and society, using Malta and Sicily as a case study.

The research has a range of potential broader impacts. By surveying cisterns, investigators are better able to understand the development of Malta's ancient water storage systems and subsequently inform current water management strategy and policy. The robotics and visualization technology developed will also be relevant to applications in oceanography, biology, homeland security and defense.

Additionally the research on robotics education will inform the design of future hands-on and online outreach efforts by ICEX and other Cal Poly programs, including the Learn by Doing Lab and the MOST (Mentors in Out of School Time) projects in Cal Poly’s Center for Excellence in Science and Mathematics Education (CESaME).

The Cal Poly students prepared for the trip by conducting independent historical and cultural research on Malta as part of a new ethnic studies and women’s and gender studies course, Global Engineering – Gender, Race, Class Nation. The course examines the historical and contemporary engineering institutions in different national contexts.

The Cal Poly students are also introducing young people to the fields of robotics and computer science via class visits to elementary schools in San Luis Obispo and Malta. In San Luis Obispo, the students explored the processes of design, engineering and robot construction and computer programming and testing with second graders at Pacheco Elementary School.

The 2013 Cal Poly Student ICEX team members are Cecilia Cadenas, a computer engineering senior; Andrew Carrillo, an electrical engineering master’s student; Ian Dunn, software engineering junior; Amanda Erb, graphic communication junior; Vanessa Forney, computer science junior; Jeff Forrester, computer science senior; Erik Nelson, materials engineering senior; and Spencer Woodworth, computer science senior.

Funding for the trip was provided by Cal Poly’s Instructionally Related Activity program, which supports out-of-class experiences that provide enrichment to students and project partners, with additional support coming from the university’s Provost’s Office, Louis Stokes Alliance for Minority Participation, and faculty Professional Development funds.

The National Science Foundation’s International Research Experiences for Students program, the Collaborative Research Experience for Undergraduates program, which is jointly coordinated by the Computing Research Association's Committee on the Status of Women in Computing Research, and the Coalition to Diversify Computing, also provided funding.

Additional support for individual students and faculty has been provided Lockheed Martin Foundation also provided support.

Follow the students at the ICEX 2013 blog:

<http://icex2013-maltasicily.blogspot.com/>

Additional information on the Malta Cistern Mapping Project can be found at:

<http://users.csc.calpoly.edu/~zwood/MaltaMapping/index.html>

Three-dimensional interactive models of prior cisterns can be seen at:

<http://users.csc.calpoly.edu/~zwood/ICEX/Cistern/shading.html>

### About ICEX

ICEX is a hands-on opportunity for students to develop and apply technical knowledge in international contexts. The ICEX program provides students with an experience in which they: 1) gain experience working in a foreign country, 2) understand how sociocultural and national differences can affect how work is conducted, 3) apply knowledge gained in computer science/engineering coursework to new applications, 4) enhance teamwork skills necessary for graduate studies and international careers, and 5) engage in an interdisciplinary project. It is a collaborative effort involving Cal Poly's Computer Science and Computer Engineering programs and various international partners.

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