

OF ROBOTS AND THE

CHRISTOPHER CLARK EXPLORES THE SECRETS OF MALTA



BY MATT LAZIER

SECRETS FROM WHEN CAESARS ruled the world are still abundant. But a few may be given up thanks to the efforts of one Cal Poly computer science professor.

Scientists are getting the first looks in as many as 2,000 years inside large water cisterns under historic buildings on the island nation of Malta, just south of Sicily. And software written by Professor Christopher Clark is playing a major role in the archaeological expedition.

Clark and three other scientists are sending remotely operated, underwater robots into the water cisterns on the island in the Mediterranean Sea. Clark's programming is even allowing the team to use sonar on the robots to map the insides of the cisterns.

The project combines many of Clark's academic passions and personal interests – autonomous robots, history, and travel and foreign cultures.

And through his continuing involvement in the project, Clark is giving five Cal Poly students the chance to share in the experience.

Clark became involved in the project in late 2006, when he attended a conference put on by Video Ray, a company that makes underwater, remotely operated vehicles. There, marine technologist Chris Olstad gave a talk on how he and two other

researchers had sent ROVs into the cisterns Malta's residents used to store water and possibly other goods when they were under siege.

The researchers at that point had only used ROVs to transmit back images.

"They were fascinating images," Clark said. "But I told them 'I think you could do more.'"

He spoke with Olstad and then with Timmy Gambin, the archaeologist who initiated the project (which is supported by the Aurora Trust and Marine Resources Development Foundation), proposing to map the inside of the ancient chambers. Clark wrote computer software to enhance the ROVs – allowing them to use sonar to map the cisterns and to be pre-programmed to move autonomously throughout the chambers.

Clark visited Malta in 2008 for the group's second expedition, during which his enhancements to the ROVs allowed the researchers to completely map six cisterns.

"He has brought a totally new dimension to the project," Gambin said. "His software is not only innovative but also essential for the creation of maps that would otherwise have been impossible."

Gambin said the project is shedding light on how the water

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system was constructed and could help in managing and protecting Malta's historic resources and improving water supplies to its buildings.

The uncommon pairing of computer science and archaeology was one of the main things that drew Clark to the project.

"That was really the neat side of the project, this archaeology and exploration," he said. "We were putting these robots into cisterns that no one had been in for 2,000 years. Everyone was glued to the video screen, wondering 'What will we find?'"

The Malta team spent the early part of 2009 preparing for a third expedition, over spring break. They planned to explore several new sites, including a medieval monastery.

For this trip, Clark recruited five Cal Poly computer engineering students to join in.

It's part of a program Clark has launched with his wife, Christine Victorino, a veteran in the field of international programs and a lecturer in Cal Poly's Center for Teaching and Learning. Called the International Computer Engineering Experience, or ICEX, the program aims to give students a chance to practice their craft while being exposed to different cultures abroad.

Clark and Victorino chose the participants in the fall and spent winter quarter training them on the cistern project and Malta's culture.

"We wanted students who had definite reasons for wanting to go and who would experience personal growth and gain technological experience," Clark said. "We have one whose hobby is creating 3-D architectural images on the computer. Another student is very interested in Malta's history and architecture, because they had a relative who was there in World War II."

ICEX plans to lead small student groups on international projects each year.

Meanwhile, Clark also is preparing to translate his ROV programming techniques to a second project. He and Cal Poly biology Professor Pat Fidopiastis will use the ROVs to research the bioluminescence of squids off the beaches of Hawaii this summer.

Fidopiastis said Clark's work with the ROVs will allow the squid research to break new ground.

"Unlike previous studies that took place in laboratories," he said, "researchers in this project will be able to correlate squid bioluminescence and behavior to variables associated with the squids' habitat."

It shows, Clark said, how technology developed for one use can be translated to others.

"This kind of tracking and mapping can be used for research, defense and homeland security, pipeline inspection," Clark said. "It's an example of technologies building on one another." □

For more on Prof. Clark, including links to his Web sites on ICEX and the Malta cistern project, visit <http://users.csc.calpoly.edu/~cmclark/>.

