

ENGINEERING STUDENTS BUILD EOD ROBOT

In 2012, a group of Villanova students and faculty traveling to Cambodia for a service project met Len Austin, chief of explosive ordnance disposal (EOD) for Golden West Humanitarian Foundation. That fortuitous encounter resulted in a partnership with the Foundation's regional office in Cambodia that has led to the development of a low-cost humanitarian EOD robot.

Based in the United States, but with offices all over the world, Golden West is a non-profit "dedicated to the development of innovative, appropriate technologies to overcome the operational limitations encountered by the humanitarian mine action community." One of the greatest challenges for countries like Cambodia, which is contaminated by landmines and unexploded ordnances, is the expense of high tech solutions for the disposal of these devices. While robots frequently are used by the military and other organizations, the cost—starting at \$50,000—puts them out of reach for developing countries. Additionally, these robots cannot be serviced or repaired locally, another disadvantage.



Golden West Detection Technologies Manager Sambo Heang; James Convery '16 ME; Associate Professor of Mechanical Engineering Garrett Clayton, PhD; and Michael Benson '16 ME examine the interior components of the EOD robot.

Working together with Golden West Design Lab in Phnom Penh, Cambodia, Associate Professor of Mechanical Engineering Garrett Clayton, PhD, and teams of Mechanical Engineering students have dedicated themselves to the development of an effective EOD response robot with a price tag under \$10,000 (USD). Students are challenged with the realities of product design, sustainability, infrastructure and economics in a developing country. Those who have traveled to Cambodia have had the opportunity to speak with local residents who live with the problem, as well as EOD specialists who are working to solve it, including Director of the Cambodia program and Design Lab, Allen Tan, a former U.S. Army EOD team leader. "It's so important to have that firsthand knowledge," says Villanova team member Michael Benson '15 ME, "Otherwise you can't understand the problem fully and what's needed to fix it."

Throughout the past three years, 15 students have worked on the robot as their senior capstone project, each improving upon the last team's design. In January 2015, after conducting field trials of the latest prototype at Golden West's Applied Technology and Training Center, everyone agreed that the robotic platform is ready to undergo redesign for production. Dr. Clayton lists the objectives that have been met: "This model is made from low cost computer hardware, can be assembled in-country and repaired locally. It also fits into a suitcase so that it can be taken on a plane and deployed to different locations. The robot control interface has been designed for intuitive operation to enable users with a limited educational background." A Kickstarter campaign is expected to launch later this year to help bring the robot to commercial production. The goal is for the robot to be available for purchase by mid-year 2016. ■

"While this project has involved only Mechanical Engineering students to this point, I anticipate that Electrical and Computer Engineering students also will be brought on board. Interestingly, we have a student from our Master's in Sustainable Engineering program studying Golden West's explosive recycling program. It's great seeing multidisciplinary opportunities emerging from this relationship."

—Jordan Ermilio '98 ME, '06 MSWRE, director of Villanova Engineering Service Learning