

# Path to Palau

## Students use UROV in search for America's missing airmen in the Western Pacific Ocean



It all started with a small town newspaper article and a phone call. It led to a 17-day expedition in the Western Pacific for eight high school robotics students from the small rural community of Stockbridge, Michigan. Located two hours west of Detroit, and surrounded by cornfields, landlocked Stockbridge is not a place you would normally expect to find underwater robotics. Still, this school without a swimming pool has developed a unique program for its students.

Flip Colmer a member of the BentProp Project contacted the school in May of 2011. As noted at Wikipedia.com, The BentProp Project is made up of "volunteers whose common goal is gathering information that can lead to the location, identification and repatriation of remains of U.S. service members who were killed in action in the Republic of Palau (in the western Pacific) during WWII." Colmer learned of the Stockbridge Robotics program after reading an article about the team in the local paper, as the team prepared to travel to the MATE International UROV Competition. He contacted the school asking if the team would be interested in a real world mission.

Each year for the past thirteen years, the members of the BentProp project, have traveled to Republic of Palau to search for missing World War II aviators. Led by Dr. Pat Scannon, this group of volunteers searches the waters and jungles of the Western Pacific for clues that may lead to the location and iden-

The Stockbridge Advanced Underwater Robotics Team at Camp Katuu in Palau, home to a US Navy Seabee detachment.



tification of wreck sites and remains of men who gave their lives in defense of America.

After doing some quick research we returned Flip's call and then met in person. Flip explained, "all of the easy stuff has been found." Their new searches were leading them into deeper water within the barrier reef. The BentProp team had several side scan sonar contacts in the 125 foot (depth) range, which is at the limit for recreational scuba divers. They needed a way to make diving safer. So Flip asked if we could build an

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Underwater Remotely Operated Vehicle or UROV capable of diving to a depth of 125 feet in saltwater and recording images of downed aircraft in Palau from World War II. We explained to Flip that building such an UROV was well within our capabilities. The real challenge would be in raising the funds needed to build the UROV and then travel to Palau.

### GRANT PROPOSAL

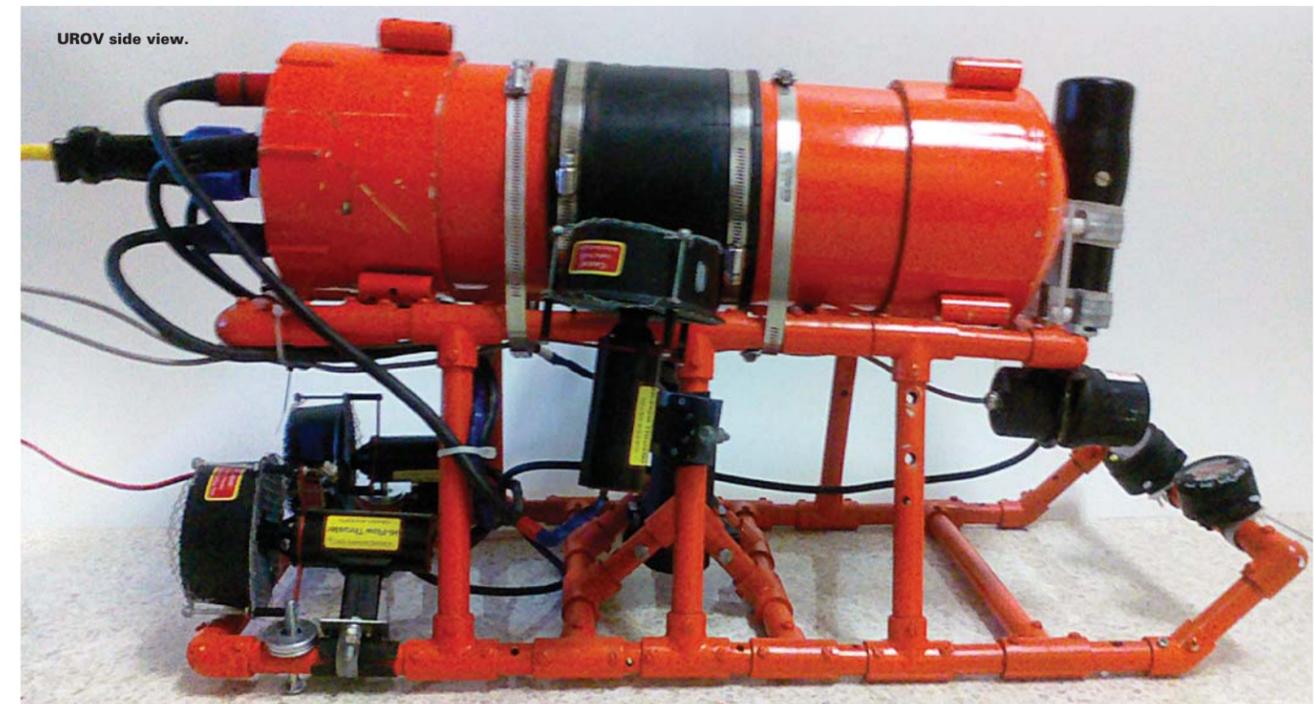
A grant proposal was quickly assembled and sent out to numerous organizations. The Square One Education Network agreed to fund the building of the UROV and provided Stockbridge High School with a grant for \$8,600 to purchase the needed parts. All the parts were ordered and received by the school by the start of the school year and the project began. The eight students were divided into a marketing team, responsible for fundraising and public relations, and an Engineering team responsible for building the UROV. All students would get a chance to operate the UROV and work on the deployment. The students used the time between September and March to design, build, test and refine the UROV and raise over \$40,000 for the expedition to Palau.

On March 22, 2012 the day for our trip finally arrived and eight high school students, two teachers and four chaperones departed the small rural Michigan community of Stockbridge for their 20-hour trip from Detroit through Narita Japan and onto Koror, Palau, a distance of over 8,200 miles!

### CORSAIR DISCOVERED

Once in Palau the team set up their UROV and prepared for their mission: search for a B-24 bomber downed somewhere off of the Palau Islands in August of 1944. Shortly before the teams arrival in Palau some local spear fishermen found the remains of an unknown aircraft about seven miles off the coast. The fishermen contacted Neco Marine and the BentProp Team. The high school UROV team was sent out with the BentProp Team to image the aircraft, a Marine Corps Corsair. The plane was lying in about 45 feet of water and was partially covered with coral. It had settled into a slight depression on the ocean floor, which had helped it to remain hidden since the war.

The students and BentProp divers were able to shoot photos and video of the aircraft and of its data plate. High school team members





Team member Barb Lance explains the UROV to State Representative Mike Shirkey at the house energy and technology committee meeting.

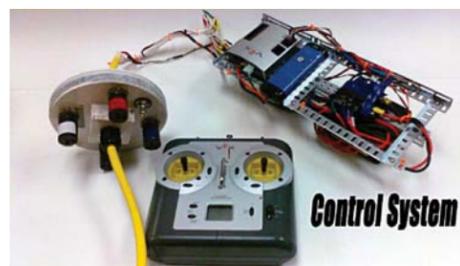
used Photoshop to maximize the “readability” of the Photos. This work uncovered the aircraft’s serial number. The serial number was used to search military records. Those records showed Carroll McCullah then a Captain in the Marine Corps assigned to VMF 121 on Peleliu piloted the aircraft.

### Stockbridge UROV Specs

- (4) Castle Creations Hydra 120 Brushless Electronic Speed Controllers (ESC) rated at 25 Volts
- (4) CrustCrawler Hi-flow thrusters (400HFS-L) each with 15lbs of thrust at 24 volts
- (2) SeaView Seamaster super-mini underwater video cameras
- (1) Tritech ST 525 Imaging sonar
- (1) VEX Micro Controller
- (1) VEX Remote Control
- Video Ray Tether: 145ft. with 105ft. extension
- Weight:** 40 lb.
- Dimensions:** 26 x 12 x 10in.
- Power System:** 48 Volts for sonar system
- 24 Volts for UROV
- 12 Volts for camera system

### CRASH REPORT

The crash report indicated that McCullah was on a mission to bomb and strafe an enemy ammunition dump. Shrapnel from the exploding ammunition



VEX Robotics control system used on the UROV.



Robert Richards and the Stockbridge Advanced Underwater Robotics Team.

hit the oil cooler in the Corsair causing enough damage to force him to ditch the aircraft near the barrier reef and await the search and rescue flying boat. Captain McCullah spent about 30 minutes in the water before being rescued and returned to his unit on Peleliu. He ended up flying combat missions the next day and later in the Korean War as well. We later found out that he is alive and well at the age of 91.

While working on the Corsair mission the students made many adjustments and minor repairs to their UROV. They later moved on to a Japanese Seaplane called a “JAKE.” After diving on the “JAKE” the team moved off into deeper water in search of the B-24. They made three dives of over 125 feet but were unable to locate the B-24. Perhaps Stockbridge student Barb Lance summed it up best, “We may not have found the B-24, but at least we know where it isn’t, freeing searchers up to look at other side scan sonar contacts in the future.”

While in Palau the Stockbridge high school team was also able to meet with the United States Ambassador to Palau Mrs. Helen Reed-Rowe as well as Palauan President Johnson Toribiong. Other excursions included a snorkeling trip through the Rock Islands and Jelly Fish Lake, A visit to Peleliu Island where students were able

## UROV Power

### A Closer look at CrustCrawler 400HFS-L Thrusters

At the heart of every underwater remotely operated vehicle (UROV) design is its thrusters. Without reliable, powerful and efficient thrusters, a UROV will have severe limitations in navigating different types of water conditions. Stockbridge High School selected Crustcrawler’s 400HFS-L thrusters for their UROV mission. A closer look at the 400HFS-L thruster reveals:

- A hard anodized finish for fresh and salt water corrosion resistance
- All brass, 60mm 4-blade propellers
- A 2-stage seal consisting of a Spring Jacket Lip Seal followed by a grease gallery
- Waterproof, insulated, 400W brushless motor with a 4.28:1 gear ratio for low power consumption (Less than 6 amps at 15 pounds of thrust)
- Optional thruster mounting bracket
- Programmable, brushless motor controllers allowing the user to set different operating parameters for each thruster depending on water conditions

To learn more about Crustcrawler’s 400HFS-L and other UROV products, visit their website at [www.Crustcrawler.com](http://www.Crustcrawler.com)



SeaView Systems control station.

to walk the battlefield from the invasion beaches across the airfield and up to Bloody Nose Ridge along with smaller side trips to local museums and the aquarium. The students spent one day attending high school in Koror where they were able to meet kids their own age and share their experiences.

### RECOGNITION BEFORE THE MICHIGAN HOUSE

The team returned to Michigan on April 7th and was called to speak before the Michigan House of Representatives, Energy and Technology Committee on April 24th. At the committee meeting students took turns explaining their project in front of committee members. “The committee was extremely impressed with the students’ presentation, and their demonstrated expertise in the field of robotics,” said State Representative Mike Shirkey, R-Clark Lake. “Emerging technologies such as robotics will help power our economy, and the Stockbridge underwater robotics team is on the cutting edge. They are doing an outstanding job in preparing students for the jobs of the 21st century.”

### NEXT YEAR’S MISSION

As the school year wrapped up, team members were already planning for next year’s mission. The UROV has been redesigned to include upgraded connectors and improved control systems. Engineering Team leader Michael “Buck” Poszywak is already looking to reconfigure the UROV for Vectored Thrusters and additional cameras. After receiving school board approval, the team will begin fundraising for a return expedition March 25 to April 6, 2013. The team’s fundraising goal is to raise \$60,000. \$45,000 is required to fund travel and expenses while in Palau. The rest will be used to upgrade the UROV and conduct two practice dives in the Great Lakes this fall.

For more information on the Stockbridge Advanced Underwater Robotics Team please visit our facebook page noted in the links below. ©

### Links

- Ashtead Technology (Tritech International sonar), <http://ashtead-technology.com/manufacture/offshore/tritech>, (281) 398-9533
- Castle Creations, [www.castlecreations.com](http://www.castlecreations.com), (785) 883-4519
- CrustCrawler, [www.crustcrawler.com](http://www.crustcrawler.com), (480) 577-5557
- SeaView Underwater Cameras, [www.seaview.com](http://www.seaview.com), (727) 498-4862
- Seaview Systems, <http://www.seaviewsystems.com>, (734) 426-8978
- Stockbridge Advanced Underwater Robotics Team on Facebook, [www.facebook.com/mobileprotection#!/pages/Stockbridge-Advanced-Underwater-Robotics/148465301909424](http://www.facebook.com/mobileprotection#!/pages/Stockbridge-Advanced-Underwater-Robotics/148465301909424)
- The Bent Prop Project, [www.bentprop.org](http://www.bentprop.org)
- VEX Robotics Design System, [www.vexrobotics.com](http://www.vexrobotics.com), (903) 453-0800
- Video Ray, [www.videoray.com](http://www.videoray.com), (610) 458-3000

For more information, please see our source guide on page 80.