

Bumblebee Swims and Sails Autonomously - Wins 4th Place at Maritime RobotX Challenge



Bumblebee Autonomous Surface Vessel

Proving that they can overcome all challenges in and on the waters, the Bumblebee team emerged victorious at the recently concluded 2016 Maritime RobotX Challenge in Hawaii. Placed 4th, the team was the only finalist who had less than 4 months to work on their Autonomous Surface Vessel (ASV) and also the only one featuring a fully undergraduate team. Leveraging on previous experiences in the Autonomous Underwater Vehicles (AUV) competitions they have succeeded in, the team sent over 2 crates of spares and flew in one week early to prepare. The readiness enabled the team to cope with many of the issues faced on site.

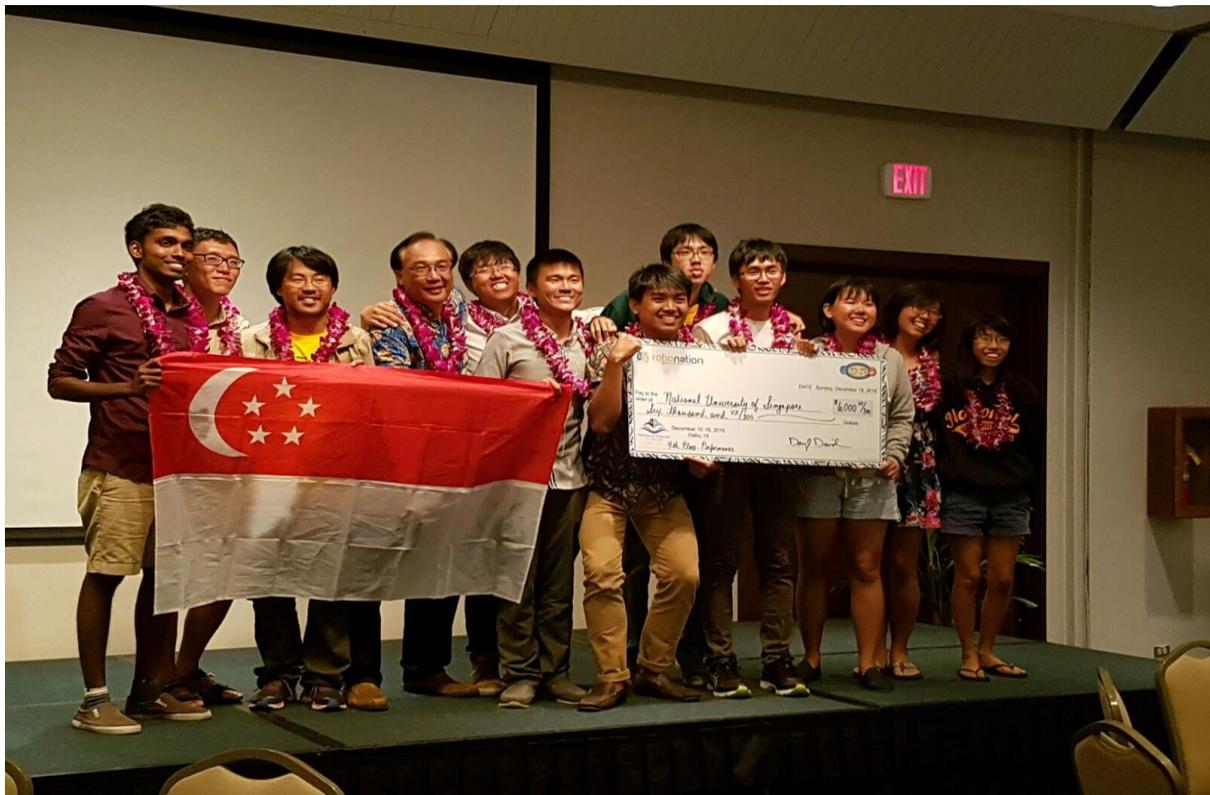
The team started fighting against the odds from Day 1. Winds and currents in Hawaii were almost double of what the thrusters could provide to steer the vehicle. The unknown rocky conditions destroyed 4 of the team's thrusters and propellers. Out of desperation, the students consolidate all units available to debug, including a damaged customer returned unit from a local Hawaiian supplier. It was a relief that they were successful in their "surgeries" transplanting various components, and salvaged two sets to last the team through to the finals. The breakdown of one manipulator one day before the semi-finals then caused an overcurrent into the main system, resulting in the main electrical hull having to be swapped out for a full set of spares overnight. The antennas and kill switches were also damaged but swapped out for new units.

Overcoming hardware problems was just the beginning. Having insufficient time to tune and test our controls and movements of the USV back in Singapore meant intense pressure for the software team to deliver on-site, in a matter of days. This is to be done despite the sensors such as the LIDAR and GPS giving inaccurate data. The students all had very little sleep, with less than 4 hours every night.

The challenge course was extremely difficult, and no teams completed the full course. The Bumblebee team relied heavily on their stronghold of acoustic localisation to complete some tasks, concluding our long journey in preparation of ROBOTX.

Steven Harta Prawira, 2016 RobotX Team Captain highlighted, "The results make it easy to forget all the challenges we have overcome to reach where we are today, but the team and all of our supporting crew and organisations back home has worked tirelessly and made countless sacrifices to deliver this. I'm immensely humbled by this achievement by our team under such tough circumstances, and am sure we will seek to do better than before in 2018." The team will be seeking new funding to continue engineering autonomous systems, and the goal is to complete an upgrade to the AUV, a complete redesign of the ASV based on lessons learnt, and deliver the integration of a fully automated Launch and Recovery system for the AUV from the ASV by RobotX 2018.

About the Team - The Bumblebee team has been flying the NUS flag high at autonomous underwater vehicle competitions since 2013, namely Robosub and Singapore AUV Challenge.



Team Bumblebee at Maritime RobotX Challenge 2016, Hawaii