



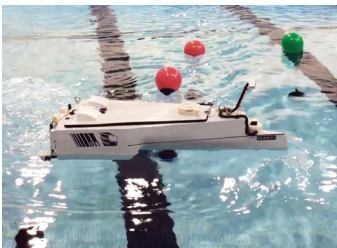
# A Self-Navigating Boat Leads To New Career

## OLD DOMINION UNIVERSITY USES 3D PRINTING TO COMPETE AT NATIONAL COMPETITION

*“Other teams have to look around to all these different suppliers for off-the-shelf-parts that do sort of what they want. Not us. We can custom build things for our exact need.”*

*– Daniel Failach, Senior at Old Dominion University, and Team Lead, ODU Autonomous Surface Vehicle Team*

### CASE STUDY



Old Dominion University's completed autonomous surface vehicle in operation.

For students at Old Dominion University, asking the right questions at the right place and time has made all the difference. Each year, one of the senior engineering teams competes in Robonation, a national robotics competition in Daytona Beach, Florida. More than twenty teams from around the country compete to build an autonomous surface vehicle that can navigate an in-water obstacle course—without direct human intervention. Last year the public university, located in Norfolk, Virginia, was up against stiff competition. But according to this year's team leader, Daniel Hoyos Failach, the University has a distinct edge because of 3D printing.

## A Competitive Edge

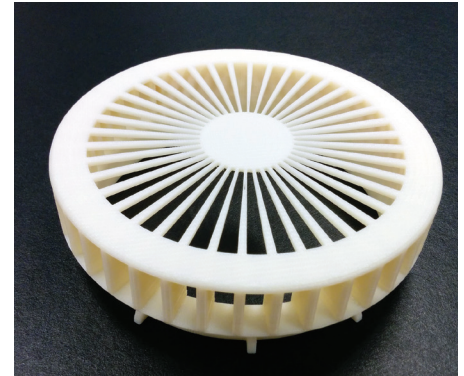
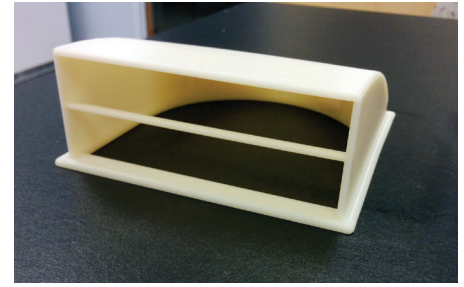
After studying last year's design as well as learning from competitors including Georgia Tech and Florida Atlantic University, Failach quickly realized he needed a way to compete with teams that had more resources than he did. After discussing with his advisor, Dr. Rafael Landaeta, the team was given full access to two uPrint™ 3D Printers. The team, which consists of a core group of five mechanical engineers, one computer science volunteer and one electrical grad student volunteer, began by downloading GrabCAD Print™ software. This allows each student to print directly from his or her own computer. It also lets the students, who are on a strict budget for the project, see exactly how much filament each print requires, ensuring they don't go over budget or waste material.

To save on time and money, the team is 3D printing as many components for their vessel as possible. "Every single piece of electronics attached to the boat has a bracket that's custom printed," Failach says. They're also printing the vents, cable conduit, casings for ultrasonic sensors, and mounts for the webcam. By the time the vessel is ready for competition, Failach predicts it will include more than fifty custom 3D printed pieces. By contrast, last year's boat only included two 3D printed vents and four ultrasound cases. The ability to custom print so many pieces is likely to give them an edge, according to Dr. Landaeta. "Of course we're excited they're going to be highly competitive," he says.

Learning from the previous year's team, who didn't use 3D printing at all, has cut the prototyping and building time for this year's vessel in half. But it wasn't just the printers that helped. The GrabCAD Print application allowed team members to print their design files directly, significantly expediting print job completion. Previously, the design-to-print process required intervention by a staff member who handled print jobs for the entire school, an operation that could take up to two weeks. "A bottleneck defeats the purpose of rapid prototyping," Failach says. "Can you really call it rapid if you have to wait a week or more to receive the printed piece?"

## Real-World Application

But learning how to use GrabCAD Print software and 3D printers isn't just giving Failach an edge in Robonation. It has already given him an edge in the job market. The senior recently attended the Society of Professional Hispanic Engineers annual conference where interviews for engineering jobs take place. "I took a 10 percent 3D printed model of the vessel and some videos with me. Every time I talked to anyone, I showed them the model and videos. Everyone else had papers and just talked about their resumes. No one gave them a physical representation of what they did. Now I have a career lined up when I finish school in May." Failach was offered a position in Huntington Ingalls Newport News Shipyard propulsion department. Upon graduation, Failach is excited to begin a career as a mechanical engineer. That is, after his vessel competes in Robonation, of course.



Examples of 3D printed parts used by the team include two different styles of vents.



The Robonation competition team from Old Dominion University.

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