

Falcon robotics team makes inaugural trip to international competition

July 30, 2018 - On a breezy Thursday evening on the campus of the University of Wisconsin-River Falls four students hunkered over a large white table. They moved quickly, scuttling back and forth between the white table and another smaller table covered in Lego pieces and small tools. The four were troubleshooting as part of a team, discussing various packing materials and debating whether corrugated cardboard would help their cause or not.

The students were four out of the five students who make up the newly-formed Falcon Robotics Team and the problem at hand was the distance that the crane arm on their robot could swing. The team had gathered for one of their final meetings before their first international competition and the students were putting the finishing touches on their competition robot.

The robot is the team's first-ever entry in the American Society of Agricultural and Biological Engineers (ASABE) Robotics Student Design Competition set for Tuesday, July 31, in Detroit at the ASABE International Meeting. The Falcon Robotics Team, which formed in January, will be competing against 12 other schools hailing from across the United States and China. UWRF will compete in the beginner's category.

Cody Hawkins, a sophomore agricultural engineering major from Chippewa Falls, helped kickstart the team earlier this year at the urging of Matthew Digman, assistant professor of agricultural engineering at UWRF.

"We started this in January. Nick [Hovel] and I were both in an Intro to Engineering class and we had a robotics competition at the end using these robots. Dr. Digman asked if I wanted to start a team for this competition, so we did," explained Hawkins.

The annual competition, which began in 2006, "allows undergraduate and graduate students to develop skills in robotic systems, electronics, and sensing technologies by simulating a fully autonomous robotics solution to a common agricultural process," according to the ASABE.

This year's challenge focuses on apple picking. Team's robots, which must measure less than 12" x 12" x 12," navigate an 8' x 8' competition board while harvesting "apples." Ping pong balls represent the apples and the robots must distinguish between three colors of apples: red (ready to harvest), green (immature and should not be harvested) and blue (rotten or diseased and must be removed from the tree and dropped to the ground).

The five team members have met weekly since January to build the robot from the ground up. The robot consists of a Lego base, sensors and motors. One sensor identifies the colors of the "apples," while others help to recognize the distance between the robot and surrounding items. Crane arms act as the picker, reaching out to identify and either grasp or ignore the apple. The team has programmed the robot to identify the colors of the ping pong balls and perform the corresponding task, all while following a black marked line around the board.

"We started with the big problem first," said team member Nick Hovel, a sophomore agricultural engineering major from Prescott. "It [the robot] needs to follow a line so we focused on that for a while. Then once it's following a line very jerkily, then we can make incremental improvements to the program and it can get better and better as you go."

Working through those incremental improvements – like the one they were troubleshooting Thursday evening – provides valuable skills to the team members. The students are forced to think outside the box, relying on creative and innovative ways to make their robot work, all while staying within the competition guidelines.

For team member Virginia Lee, a junior from Mequon, the experience she's gaining from the process is something she hopes will serve her well down the road.

"I think that programming in general is really important, especially in today's age when things are automated. It's good to have contact with this, even though it's not necessarily a program that we'd use in the real world," she explained. "But getting familiar with troubleshooting, pinpointing problems, that is something that we will use."

"I also think being involved outside of class is really important for getting those skills down," she continued. "You might do something once when taking a class and then not use it so this kind of helps build those skills. It reinforces what we're doing in the classroom and it helps you learn different things as well."

Fellow team member and agricultural engineering major Lindsey Murry agreed with Lee.

"Like Virginia said, the programming – while it isn't necessarily something we'll be doing exactly – using programming languages and learning about them and getting comfortable with them, I think that will help out in the future wherever we end up," said Murry, a senior from Mosinee. "I think going to the international meeting for the competition is also a really good learning experience."

According to the team, the outside of the classroom learning experience that the competition provides is something that UWRF has fully supported.

“The university has encouraged and supported us quite a bit,” said Hawkins. “We get to use the Ag Engineering Annex as space for all our stuff. We had a seminar class build our table for us. We were able to get money from CAFES [College of Agriculture, Food and Environmental Science] for travel. The Ag Engineering Department has bought a couple sensors for us.”

“They let us use the 3D printers, too, and all the computer labs,” added Hovel. “It’s really let us jump in and commit to this project. They’re pretty supportive and behind us.”

The cooperative spirit between the robotics team and the university isn’t just beneficial for the team, said Hawkins. He explained that Digman plans to use the most recent year’s board and competition guidelines to work with future Intro to Engineering classes.

“This is something that will be useful for future students,” he said.

Now, with the competition looming, Hawkins and his fellow team members are excited to see their robot in action – and complete a goal that once seemed insurmountable.

“We’re pretty excited about taking it now that we’ve got something that can actually compete,” said Hawkins. “For a while it seemed like the task we had to accomplish was so large that it was never going to be able to get it done and we wouldn’t be able to compete or do well.”

The team says this competition is just the beginning for them, though, as they fully plan to expand down the road.

“The ultimate goal would be to have a competitive team in the next few years that could go and compete in the advanced division and potentially win,” said Hawkins. “Our goal is to just get robotics as a thing that River Falls is known for.”

To learn more about the ASABE Robotics Student Design Competition, visit <https://www.asabe.org/Awards-Competitions/Student-Awards-Competitions-Scholarships/Robotics-Student-Design-Competition>. The Falcon Robotics Team will be livestreaming Tuesday’s competition. For more information and to view the livestream, visit <https://www.facebook.com/UWRF-Falcon-Robotics-2137630433118172/>.

To learn more about CAFES, including the UW-River Falls agricultural engineering program, visit <https://www.uwrf.edu/CAFES/Index.cfm>.

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Photo: UW-River Falls agricultural engineering major Virginia Lee, a junior from Mequon, works with a robot the Falcon Robotics team has built for the ASABE Robotics

Student Design Competition to be held July 31. The robot is designed to pick "apples" on an 8' x 8' course using color-detecting sensors. Photo by Kelsea Wissing/UWRF Communications staff.