

Mechatronics and Instrumentation

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MECHATRONICS AND INSTRUMENTATION

What better way to teach engineering majors about mechatronics—the study of how mechanical and electrical systems interface—than by building robots?

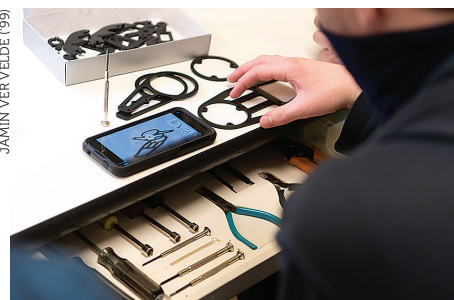
Engineering Professor Dr. Jason Wyenberg ('07) thinks having students work on robotics projects is a natural fit for his Mechatronic and Instrumentation course.

"Robots have sensors and actuators, which interface between the mechanical devices and a microcontroller (the brains of the robot). Applying concepts learned in class to robots they can see and touch makes the content more tangible and exciting," he says.

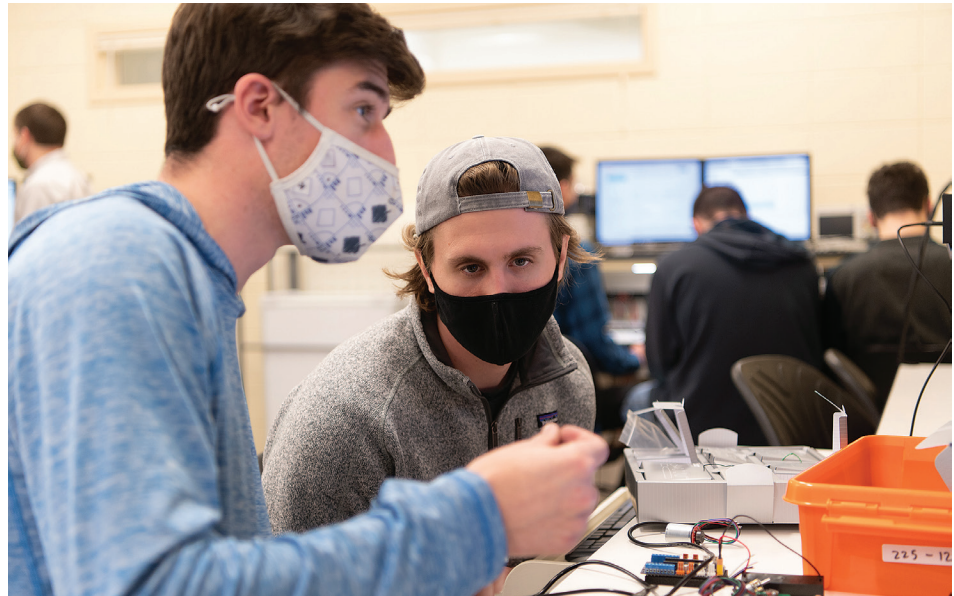
Students participate in three projects in the class: a robot that can draw on a whiteboard, a self-balancing motorcycle, and a small forklift. "The self-balancing motorcycle will utilize a flywheel to balance a small toy motorcycle standing still," explains Wyenberg. "The small forklift will perform simple tasks such as moving small objects to different locations."

Wyenberg's class includes both mechanical and electrical engineering students who are paired up so as to take advantage of each other's areas of expertise when constructing the robots. Shane Tinklenberg, a senior electrical engineer, has enjoyed the interdisciplinary nature of the class and especially enjoyed working on the whiteboard drawing robot.

"One of the things I feel Dordt has done



A student assembles the mechanical structure of the whiteboard drawing robot.



"I am happy to see Dordt's engineering department grow and adapt their course offerings to best equip students for their professional careers," says Shane Tinklenberg.

well in my time here is to provide every engineering student with some amount of interdisciplinary experience. As many professors have emphasized, developing the ability to work with individuals from a variety of engineering disciplines is an incredibly important skill to have before entering our own professional careers," he says.

Hands-on labs like this one help students learn important engineering concepts, says Eden Winslow, a junior biomedical engineering major.

"Often, our classes are so technical and theoretical that it can be hard to put them in the context of practical engineering work. Being able to program robots to do fun things in the real world puts our learning in a fresh setting, where we can experiment more with our ideas and look for different situations in which those ideas can be applied," she says.

"The interaction of instrumentation and sensors, actuators, electrical analog and digital systems, mechanical control systems, and signal conditioning techniques can become overwhelming

on paper," adds Wyenberg. "Studying manuals and doing computer modeling, graphing, and calculations all have their place in engineering, but sometimes you have to get your hands on the material and start playing with it to open up your imagination."

Knowing that they'll learn concepts as they build robots, students have flocked to Mechatronics and Instrumentation; 53 engineering majors are split between four separate sections of the class. Wyenberg says he feels continually blessed by teaching students who are passionate about learning and growing in a challenging course.

"I enjoy building relationships with my students so that I can motivate them, challenge them, and understand their own challenges as I help prepare them to serve in Christ's kingdom. Project-based work gives me the chance to directly interact with individuals and teams as they run into problems, develop new insights, and have a lot of fun along the way," he says.

SARAH MOSS ('10)