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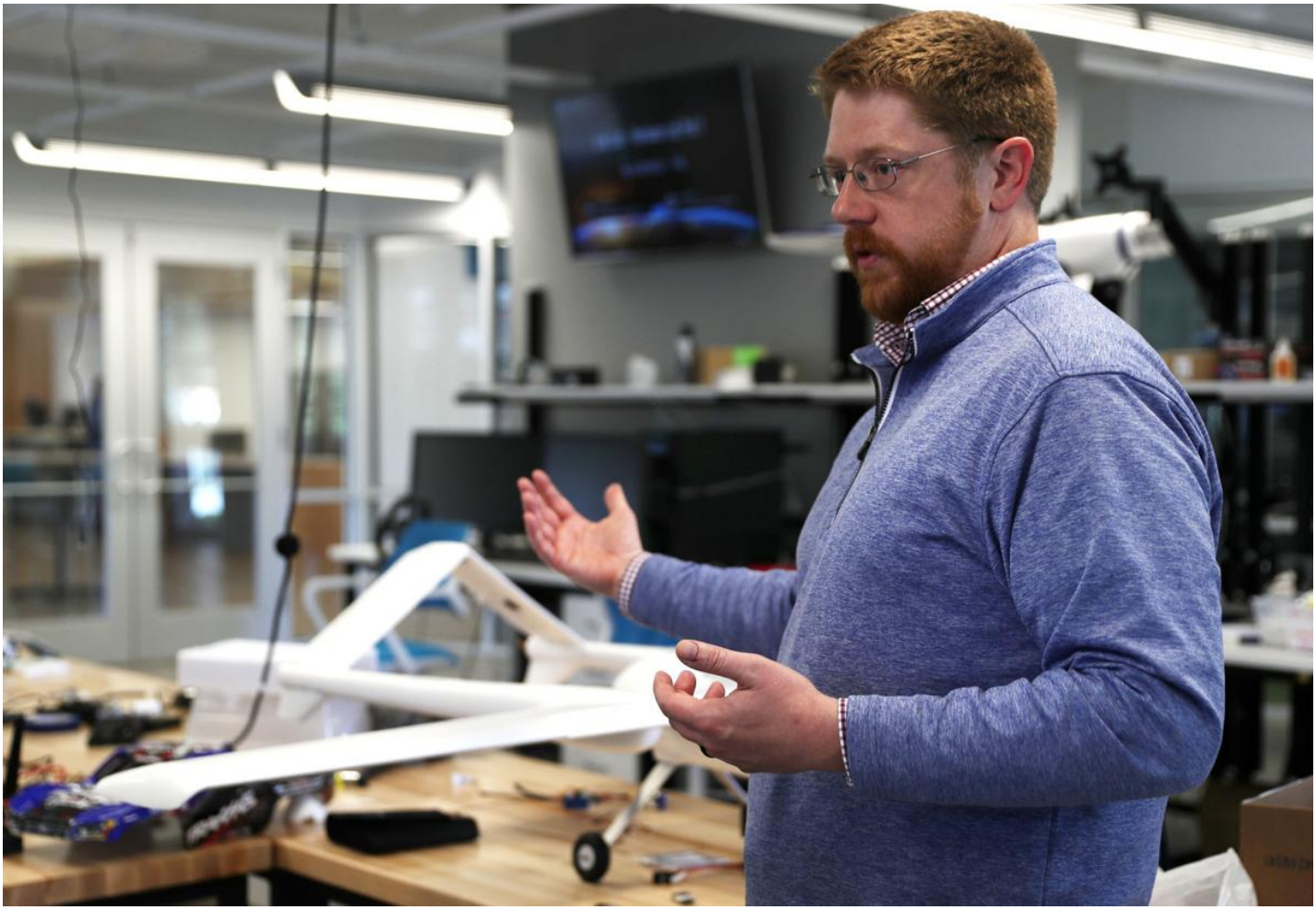
UVa Link Lab focuses on tech that connects cyber, physical worlds

BY RUTH SERVEN Apr 7, 2018



Travis Hite, program director of the Link Lab at the University of Virginia, explains Friday the various projects in progress there. The space in Olsson Hall incorporates a group of multidisciplinary doctoral students to work on projects relating to technology in society.

ZACK WAJSGRAS/THE DAILY PROGRESS

Midway through a project on autonomous cruise control, Gabriella Greiner walked through the doors of the University of Virginia's Link Lab for the first time.

Greiner had been working on the project during the fall semester for her civil engineering capstone, but had stayed on the project with a few other students. Her professor, Brian Park, studies safety and smart transportation, and is one of the researchers who recently moved to the Link Lab. The lab, part of the School of Engineering & Applied Science, opened in January and holds offices, desks, an autonomous car test track and work tables littered with parts for drones, computers and sensors.

The lab is a high-priority $4.8 million project to bring together researchers across the engineering school to collaborate on a variety of technologies and develop systems for the future.

“The work is definitely easier to do in the Link Lab,” said Greiner, a fourth-year student who will work for a Washington, D.C., construction company after graduation. “Over the past year, with this paper, it’s been pretty unique to work with so many people and see all of the possibilities open in this field.”

For Greiner’s capstone project and a paper co-written with several students and faculty members, human drivers were asked to participate in a simulator that placed a human driver in the middle of a group of autonomous cars traveling at one speed. The study measured how different spacings between the autonomous cars affected the human driver’s comfort levels, and found that the participants were more comfortable and drove more safely when the cars were spaced farther apart.

One of the Link Lab’s main goals is to give undergraduate and graduate students hands-on experience before they leave Grounds, said Jonathan Goodall, assistant director of the lab.

“I think we’ll consider the Link Lab successful if we train students to be leaders in their field, to have a true depth and breadth,” Goodall said.

The lab focuses on technology that connects cyber and physical worlds, with specific concentrations around smart health care, intelligent homes and autonomous vehicles. As technology becomes more complicated and interconnected, it’s necessary to have researchers who can work across disciplines and push technological boundaries, said the lab’s program director, Travis Hite.

“The university had a lot of foresight in creating a group that reflects the complexity of research in the real world,” Hite said.

While many of the researchers work on specific technology, others look ahead to a future when, if it is implemented, will require big changes in human behavior and policy.

“So far, most of my work has been simulations, and what the Link Lab will allow in the future is to bring this to the test bed level,” said Donna Chen, who has been running models on the concentrations and usage of electric and autonomous vehicles.

Though intuitive, Chen’s findings pinpoint the tipping point for demand for autonomous cars in various scenarios.

If a car could be summoned for a commute, one car, “basically an autonomous Uber,” could replace as many as seven gas vehicles. They could also be configured for carpooling.

However, just as one employee doesn’t want to zigzag across the city picking up coworkers, Chen found that autonomous ride-sharing is most effective for two passengers.

“It’s really great to have carpooling, but these [autonomous cars] will not replace mass transit as we have it today,” she said.

But, mass transit, while immensely effective in big cities at moving lots of people at peak times, still has one glaring drawback: parking. If commuters could carpool in an autonomous vehicle to and from subway or bus stops, Chen said, the system becomes more efficient and no one would have to subsidize parking in prime locations.

“Even if you think about Charlottesville, there’s all that prime parking by the Amtrak station, or by the airport,” Chen said. “There are probably much better things that people and developers would love to put right there, if we had a way to transport people to the station.”

Hite said he hopes to continue collaborations between researchers like Chen and those like Madhur Behl, who is taking a team to race autonomous cars in Porto, Portugal, this week. Most of the lab’s funding is currently provided by the Strategic Investment Fund and by faculty grants, but Hite is working on lab-wide grants and partnerships with industry and government agencies.

“Technology is not always this huge leap; often, it’s little iterative improvements, like ironing something out,” Hite said. “Leaps in technology are made up of minor differences and little things people never see.”

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