

# ME's Blumenschein Selected for MIT Technology Review's Innovators Under 35 List

Laura Blumenschein, assistant professor of mechanical engineering, was selected for MIT Technology Review’s Innovators Under 35 list in the category of AI and robots in June.

Every year, MIT Technology Review publishes a list of 35 innovators under 35 years old in the fields of climate change, biotech, AI and robots, computing and materials science. The list highlights promising researchers whose projects reflect where technology is headed.

Blumenschein was chosen for her work on the Vine robot project, a growing robot inspired by the growth and adaptability of plants. Her contribution to the field of soft robotics expands upon the potential uses for autonomous robotic systems to interact in the human world.

“It’s very exciting to see my work spread out to the wider research community and community of people interested in science and technology,” Blumenschein said. “I feel very honored.”

Blumenschein was first introduced to the idea of a growing robot by Elliot Hawkes, associate professor of mechanical engineering at the UC Santa Barbara, during her doctoral work at Stanford University in 2017. She is co-inventor of the Vine robot alongside Hawkes, Allison Okamura, professor of mechanical engineering at Stanford University and Joey Greer, research scientist at Facebook Reality Labs.

“We had a real curiosity about this growing tube that didn't seem to work like anything else,” Blumenschein said. “We said, 'What can we do with this? What are the limits of what we could achieve?' ”

In 2017, Blumenschein and her co-inventors patented the Vine robot. Since joining Purdue in 2020, Blumenschein and her undergraduate and graduate students have worked to make the Vine robot a reality.



Laura Blumenschein, assistant professor of mechanical engineering

## Inspired by plants for human world

Blumenschein works at the Robust And Adaptive Design (RAAD) Lab with a team of students who help translate her ideas into projects that work.

“The direction we're working on right now in the RAAD lab is how do we use the structure of a growing robot to do interesting things? How can we use the structure of the growing robot to sense the environment?” she said. Answering those questions begins by looking at plants.

A tree root does not have a brain, yet it can curve around a rock in its path. Its natural adaptabilities inspired Blumenschein to develop a robot that can sense where things are in space and gently move around them.

“If you think about a blade of grass trying to stick up through the sidewalk, it's not very strong; it's compliant, meaning soft and flexible, but it's still able to navigate its way through. The reason why that works is that plants mostly add new material at the end of whatever structure they're growing,” Blumenschein said.

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The Vine robot is a soft, plastic tube made from low-density polyethylene, called LDPE. The tube is inverted, i.e., pushed inside of itself. When the robot is ready to deploy, air pressure is added and pushes the tube forward, in a process Blumenschein calls everting; the robot appears to be growing from the tip. “Then, we add on actuation, which is the ability to steer it, and we add a sensing ability,” Blumenschein said.

## Soft robotics offers new possibilities for robots

Unlike traditional robots, the Vine robot doesn’t need a flat surface to move along because it grows upward from the top of the structure. This growing feature creates new opportunities for robotics to move into space, through pipes or even the human body. This blossoming field of technology is called soft robotics, where pliable materials give robots increased flexibility and adaptability.

While a traditional, rigid robot can get to its destination precisely, it might knock over an obstacle — like a human — in the process. A soft robot, however, will “sense” the human and may softly deflect around it, but it might not get to its destination because it didn’t know the obstacle was going to be there, Blumenschein explained. “It doesn’t hurt anything, but that’s the trade-off that we’re working with, and that makes it a different problem space,” she said.

The ability to adapt to challenging environments means the robot could be used in search and rescue missions to deliver supplies or locate victims in rubble during the aftermath of a disaster like a hurricane or an earthquake. Growing robots could also do work that is highly toxic to humans, such as inspecting the inside of an oil drum, or jobs that aren’t done enough, like examining the inside of airplane wings, Blumenschein said.

“If we have a system that can do those tasks, we can increase safety both for people at the individual level and for consumers who are using the technology that is getting inspected,” she said.

Blumenschein works with industrial engineers at Purdue and other universities to further explore how soft robotics can interact with the human world.

“Part of my hope as I go forward a few years is to bring more industrial collaborators in as well because I think that's where you start to see the real transition from cool research to practical research,” Blumenschein said.

Being recognized for such an award as MIT Technology Review’s Innovators Under 35 opens the door to possibilities for future work. “It’s always nice when someone says this is a technology to watch out for because it feeds back into the enthusiasm we have as a group,” she said. “An award like this means we have more liberty to say we’re going to take this growing robot into space or we’re going to explore archaeological ruins with it. We’re going to push the technology forward.”

In addition to the Innovators Under 35 award, Blumenschein’s contribution to the paper “Vine Robots: Design, Teleoperation and Deployment for Navigation and Exploration” received the IEEE Robotics and Automation Magazine Best Paper Award in 2021.

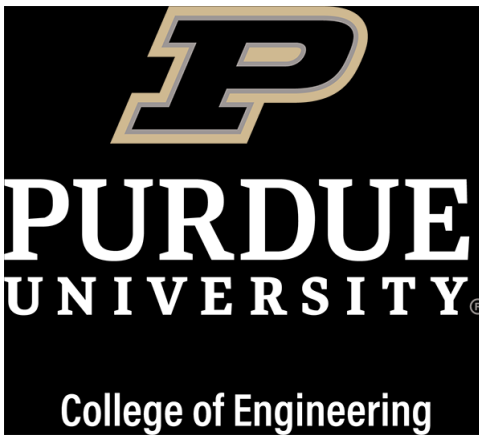
Blumenschein and the 34 other winners of MIT Technology Review’s Innovators Under 35 will be recognized at the EmTech MIT conference in November.

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