KEYSIGHT TECHNOLOGIES

IoT INNOVATION CHALLENGE

2019 SMART LAND FINALIST

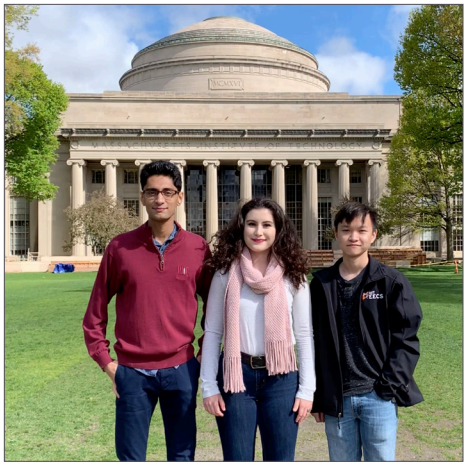
berrySmart

The MIT team is on a mission to make farming more efficient and minimize water consumption

Farming accounts for 70% of the world's water consumption, but farmers often lack a good understanding of what individual plants require, wasting water, fertilizer and pesticides on crops. Meanwhile, one-fifth of the world's population lacks safe drinking water.

Startling data points like these are what inspired Massachusetts Institute of Technology students Nikhil Murthy, Gabriella Garcia, Sunny Tran and Irin Ghosh to collaborate on a project called berrySmart, a sensor network concept designed to make farming more efficient. The concept was selected as the U.S./Canada finalist for the Smart Land Challenge of the Keysight IoT Innovation Challenge.

The MIT students first met in a course called 6.08 Introduction to EECS via IoT, but really connected over their shared interest in helping the environment. Although they come from different backgrounds, the problem of inefficient farming touches them all close to home. Nikhil and Irin originally come from India and have close family members that farm. The high variability of weather makes farming in rural India very risky, as a small decrease in rainfall can ruin an entire year's worth of crops. Current "smart" solutions are just too expensive and complicated. Gaby is from Colombia and sees firsthand the effects of unsustainable agriculture and climate change on Colombia's environment. Clearing forests to create pasture land is a leading driver of



berrySmart
Pictured from left to right: Nikhil Murthy, Gabriella Garcia and Sunny Tran, from the Massachusetts Institute of Technology, are the U.S./Canada finalists for the Smart Land challenge. Irin Ghosh, not pictured, is also on the team. Their concept is berrySmart.

deforestation in the Amazon rainforest. Smart sustainable agriculture that minimizes land use is essential to preventing environmental destruction.

Professor Joe Steinmeyer, who taught the Introduction to EECS via IoT course, inspired his students to apply what they were learning in class—everything from signal processing and database management to IoT sensors and systems—to solve real and meaningful problems. That's when Nikhil, Gaby, Sunny and Irin came to him with their idea for berrySmart, a system that allows farmers to more precisely understand their farm. The concept works by placing sensors that track soil moisture, temperature, light and humidity across a farm. This novel sensor mesh network, in which each sensor communicates with adjacent sensors, allows for a decentralized, scalable and effective solution to gathering plant-level data. It's a welcome alternative to current systems that rely on a WiFi network that extends over the entire farm, which is expensive and impractical for most farmers around the world.

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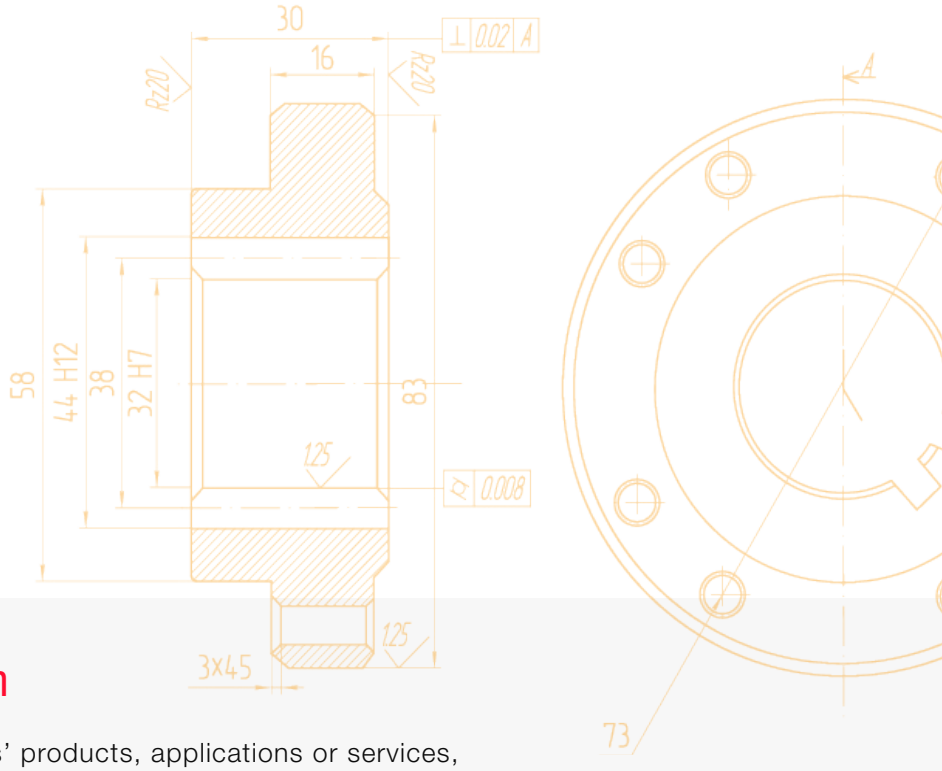
"We believe we are the only precision farming system that is fully open source with respect to our hardware and sensor software," Nikhil Murthy said. "This allows farmers to cheaply build their systems and customize it to their farm."

Thanks to professor Steinmeyer encouraging the team to enter the Keysight IoT Innovation Challenge, the students will present their idea before a panel of judges during the final competition in New York City this September.

"We're at the cusp of a digital revolution and **it's time that we enlist the help of our technologies to help small farmers internationally and in turn, help our planet**," Murthy said. "Smart farming is the best way to address issues such as population growth, climate change, reduction and mismanagement of resources, through the input of technology."

Since berrySmart's hardware and sensor software are completely open source, the innovation can easily scale to large markets. However, there are a few hurdles that the team hopes to tackle in the near future. "Firstly, we will have to talk to even more farmers about their data and analytics requirements," Murthy said. He explained that blueberry farming, for example, requires acidic soil (4.8 to 5.2), which must be closely monitored. Additionally, different farmers may require different types of analytics, depending on the crop, geography and climate. As the team collects more data and gains users, they plan to employ more sophisticated and personalized algorithms.

"Overall, we believe our work thus far is just a starting point for where berrySmart can grow, and we are extremely excited to see how we can make an impact on farming worldwide," Murthy said.



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