

Extra Credit

A company founded by Caltech alum Aadith Moorthy (BS '18) uses

The emergence of agriculture changed the course of human history roughly 10,000 years ago. Now, Boomitra, a company founded by Caltech alum Aadith Moorthy (BS '18) in 2016, is using artificial intelligence and remote-sensing technology to help farmers once again shape humanity's future.

Boomitra partners with farmers around the world to help them implement agricultural practices that take carbon out of the air and store it in soil; practices for

which the farmers get rewarded. Boomitra's proprietary AI software analyzes satellite observations made by agencies such as NASA and the European Space Agency to accurately determine how much carbon the farmers have sequestered

in their soil. For every ton of carbon the farmers store, Boomitra can sell one carbon-removal credit through its marketplace to companies looking to offset their own greenhouse gas emissions.

Boomitra, which means "friend of the earth" in Sanskrit, takes a small cut of each transaction, and the rest of the money is passed on to the farmers. "We get farmers paid for removing carbon dioxide from the atmosphere," Moorthy explains. And, because the amount farmers get paid is tied directly to the amount of carbon in their soil, they are incentivized to store as much as they can.

Thanks to this innovative AI software and carbon-credit marketplace that connects farmers with industrial businesses, Boomitra won the 2023 Earthshot Prize in the "Fix Our Climate" category, which came with an award of £1 million (around \$1.24 million today). The contest was

launched by William, Prince of Wales, in 2020. "All our finalists remind us that, no matter where you are on our planet, the spirit of ingenuity, and the ability to inspire change, surrounds us all," said Prince William in a press release.

Boomitra sells carbon credits to organizations through the voluntary carbon market, with plans to operate within compliance markets (which are driven by government emissions mandates). In the voluntary carbon market, organizations can choose to offset their carbon emissions through the purchase of premium removal credits. Through Boomitra, these offsets are enabled by farmers and ranchers across the world, who receive additional income to adopt regenerative practices, restore soil health, and sequester atmospheric carbon.

To date, Boomitra has received roughly \$6 million in venture capital funding to scale its efforts. "Something holding back the carbon markets in agriculture is how expensive and laborious it is to certify credits in a field," said Erkki Aaltonen, managing director of Norway's Yara Growth Ventures, which invested \$4 million in Boomitra in 2021. "Boomitra's remote technology and marketplace have the opportunity to categorically change the way agri-carbon credits are monitored, packaged, and sold. All while enabling small-holder farmers with as few as 2 hectares to make money while sequestering carbon."

Boomitra monitors the farms through satellite data collected via remote-sensing technology because testing soil from every individual farm would be far too costly and inefficient, Moorthy says. Tracking soil carbon capture from space decreases costs by more than 90 percent, he adds, making it possible to monitor far more land than through physical soil sampling alone.

Boomitra, whose continent-spanning team of 56 employees is headquartered in San Mateo, California, also helps farmers learn how to store carbon in the ground by connecting them with nongovernmental organizations such as the United Nations' World Food Programme, as well as with governments, farming organizations, and

artificial intelligence to help farmers get paid for storing carbon in their soil.

By Elise Cutts (BS '19)

large agribusinesses that offer this type of educational outreach. In addition to generating carbon credits, storing carbon in soil also helps farmland to resist erosion and hold onto water and nutrients more effectively. "It's a win for the farmers; it's a win for the planet," Moorthy says.

Idea Germination

The idea that eventually grew into Boomitra struck Moorthy when he took a trip to southern India as an undergraduate at Caltech and encountered the funeral

help farmers keep better tabs on the moisture in their soil. He built a smartphone app that allowed farmers to pay for satellite data that could help them measure soil moisture more accurately as a means to improving soil quality. While a few thousand farmers began to use the app, Moorthy felt that the company was not scaling up well enough to make the difference he wanted.

Before leaving Caltech, Moorthy realized that the answer might be to shift the focus from soil moisture to soil



procession of a farmer who had ended his own life. The monsoon rains had not come, and the farmer's crops failed. "That got me thinking about why the farmer struggled so much in the face of changing weather patterns, in particular now with climate change," Moorthy recalls. "I wondered if there was anything that I could do with my skills to make some change there."

Moorthy received his bachelor's degree from Caltech in computer science and materials science with a concentration in computer vision and AI. After graduation, he joined the inaugural class of Knight-Hennessy Scholars, a graduate-level scholarship program at Stanford University that prepares students to become leaders in the development of creative solutions to complex global issues.

"At Caltech, I was mostly looking into sustainability," Moorthy says. "From the materials science side, I was doing research on hydrogen fuels and storing hydrogen." But when he returned to Caltech after his trip to India, Moorthy explored whether a satellite's-eye view could

carbon—and to flip his business upside down: Instead of asking farmers to pay for insights that would help them improve their soil, he would provide the insights for free. Revenue would instead flow from industrial polluters looking to buy carbon credits. The pivot worked. Boomitra now partners with hundreds of thousands of farmers who capture carbon and track their storage levels through Boomitra's smartphone app.

"I'm very proud of the fact that we won the Earthshot Prize; it's a huge validation of all the things that we are doing on a global scale," Moorthy says, noting the company's farmer partners have removed 10 million tons of carbon from the atmosphere so far, storing it on more than 5 million acres of land. "But to truly move the needle on climate change, we need to add two zeros to the end of each of those numbers. By the end of the decade, Boomitra aims to capture one gigaton of carbon in soil—3 percent of the total amount of carbon humans currently pump into the atmosphere every year." 🌱



Above: Moorthy, center, with farmers in Kenya in 2023.