

# How to



PHOTOS JOHN RUSSELL/VANDERBILT

## ...build a tiny home

**Sean Ticknor, BE '99**, founded Big Skills Tiny Homes to teach high school graduates the construction trades by building a tiny home. Each May, he recruits high school seniors in Marin County, California, who are interested in learning how to build. "Everybody is looking for good workers, but there is no clear path from high school into the skilled trades," said Ticknor.



After completing the nine-month program, students receive a \$3,000 scholarship and Ticknor's help securing a job. He sold his first team's home for \$50,000 to fund the next year's project.

Ticknor, a civil engineering major, worked as an engineer and structural designer for 18 years and has some tips for potential tiny home builders or buyers. First, decide whether to build on a foundation or trailer. Check land use and zoning regulations for the site. Make every inch count, but plan for the absolute musts—electrical, water and sewer connections; a small countertop, stove, refrigerator and sink in the kitchen; a toilet, shower and sink in the bathroom; and a bed—before

8 committing to more. Design in as much storage as possible. Never skimp on ventilation for the kitchen and bathroom.

A simpler option is to buy one. "You can just order one and have it delivered to right where you want it," he said.



PHOTOS COURTESY OF BIG SKILLS TINY HOMES

## ...be a hydroponic farmer

HydroHouse Farms in Mount Juliet, Tennessee, supplies leafy greens to many restaurants and businesses in Nashville—including Vanderbilt Campus Dining. Before launching the hydroponic venture, owner **Hassan Sharaff, BE '07**, researched planting mediums, nutrients, environment, and water. He studied the nutrient film technique hydroponics system, which pumps a nutrient and water solution through grow trays. The rest was trial and error—adjusting temperature, humidity, water solution pH, and other inputs—and watching how plants responded. "Get some seeds, choose a medium and dive into it," he said.

Engineering undergraduates have helped Hassan troubleshoot, too. HydroHouse has partnered with "How to Make (Almost) Anything and Make it Matter," the immersion course taught by Research Assistant Professor of Mechanical Engineering Kevin Galloway, for two years. Using design thinking, student teams devise, test and modify solutions to answer a client need. One team created a more efficient cart to use while harvesting greens such as lettuce, arugula, basil and kale at night, fashioned from clear and white PVC parts and tricked out with remote-controlled LED lights.

Hassan, who majored in mechanical engineering, said his engineering background prepared him to work hands-on and to break problems into smaller components and attack them one by one "instead of feeling overwhelmed."



## ...foster innovation

Together, siblings Charleson Bell and Charreau Bell have seven Vanderbilt engineering degrees and launched multiple companies.

**Charleson, BE '07, MS '09, PhD '15**, began his career as an entrepreneur while working on his Ph.D. in biomedical engineering and was the first Vanderbilt graduate student to receive venture capital funding for his startup. He is research assistant professor of biomedical engineering and National Science Foundation I-Corps consultant at the Wond'ry, Vanderbilt's Innovation Center.

**Charreau, BE '09, MS '14, MS '16, PhD '18**, is senior data scientist at the Data Science Institute. After she joined BioNanovations, her brother's venture, they and two other team members completed the I-Corps program. With a Department of Defense grant, the team is refining a way to deliver rapid blood tests at the point of care, using smartphone-compatible QR codes printed on paper.

The Bells emphasize that strong, inclusive networks foster innovation. "That's something I really love about the Wond'ry," Charleson said. "It's a place that brings people together from different backgrounds to share good ideas, and it's that inclusion of all perspectives and experiences that turns them into great ideas."

Charreau agrees. "It's critical to have inclusive networks and mentors of color," she said. "That's one of the reasons I think my role at the Data Science Institute is so important, and I am always eager to serve as a mentor to others."

