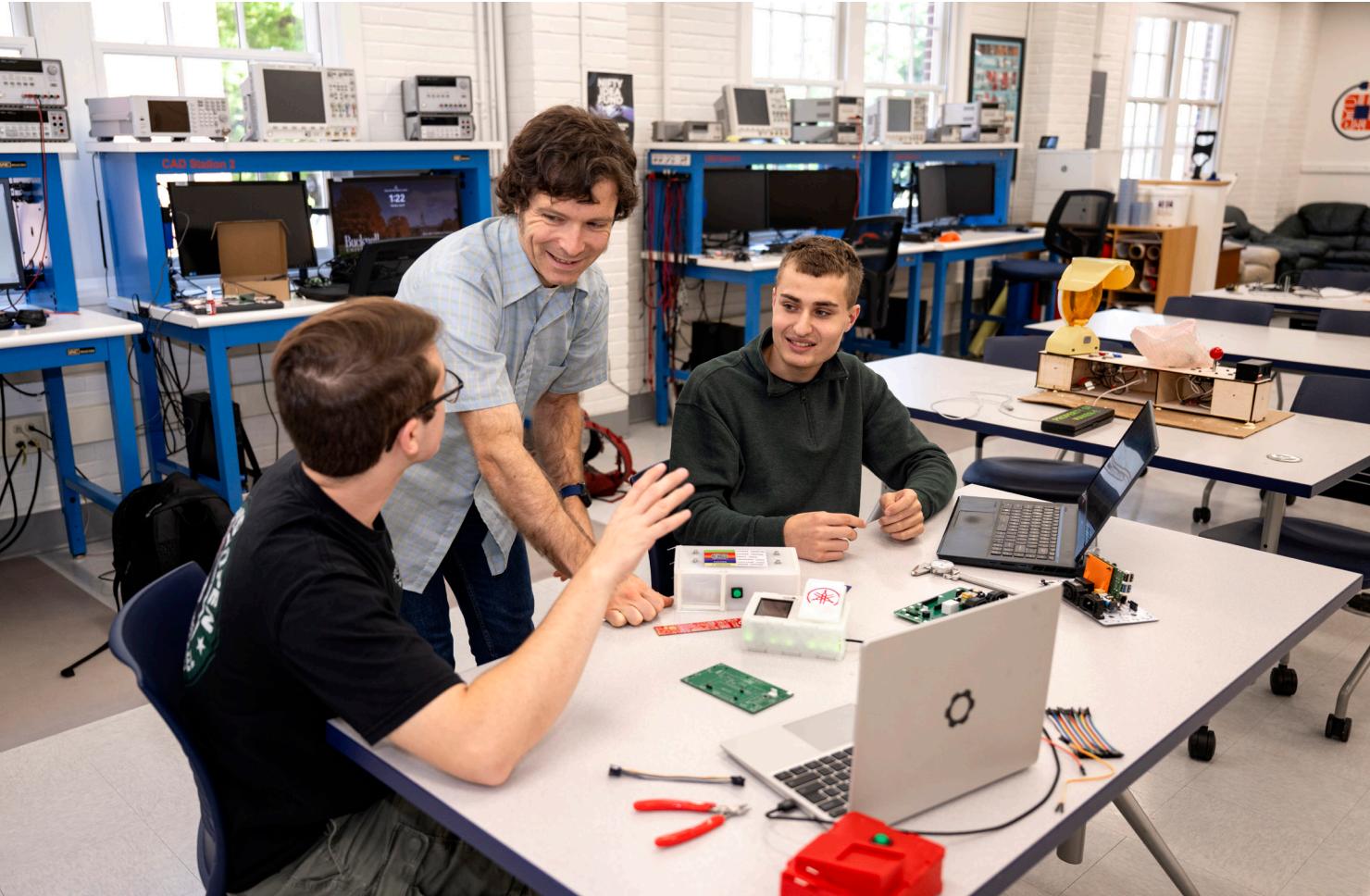


Eli Foster '27, Matt Lamparter '06 and Aiden Cherniske '27 (L to R) collaborated to develop the fifth evolution of the Portal Box.



Plug Into Possibility

A student-built system has transformed how Bucknell's makerspaces manage access — and now it's ready to share with the world

by KATE WILLIARD
photography by EMILY PAINÉ

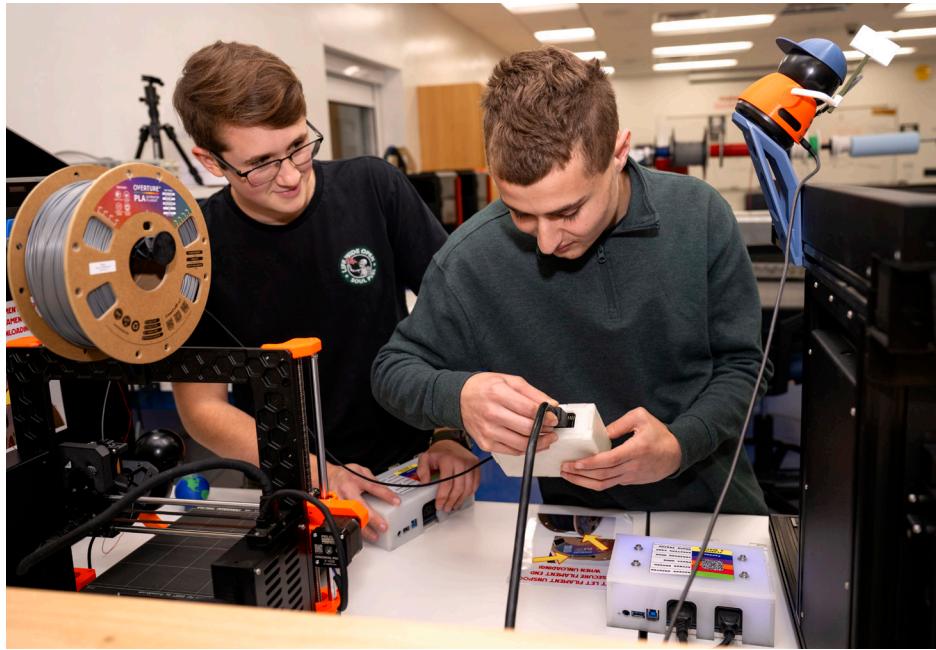
Bucknell's makerspaces operate under a guiding philosophy of open access, empowered creativity and smart accountability. That approach is most clearly embodied in the Portal Box — a student-built access system that has evolved through multiple generations of makers and engineers.

It started in 2015 as a Senior Design project mentored by Professor Margot Vigeant, chemical engineering. Her vision was simple: create a device that

could grant or restrict access to equipment based on the training the user had completed. The team succeeded, and the first Portal Box was born.

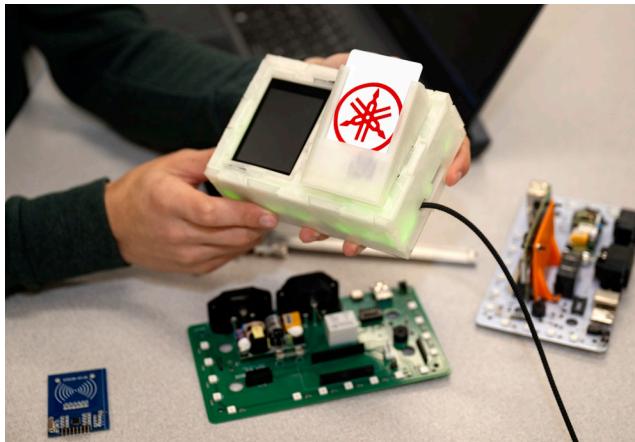
A decade later, that prototype has become a fully integrated access platform used in several of Bucknell's makerspaces, including the Maker-E and Mooney Innovative Design Laboratory, as well as in the chemistry department's electron microscopy suite.

In summer 2025, **Aiden Cherniske '27**, a computer engineering major, and **Eli Foster '27**, an electrical



BUILD A PORTAL BOX, SHARE YOUR WORK

Hardware designs, software and documentation for the Portal Box project are freely available under Creative Commons and Apache 2.0 licenses. Explore the project at portalbox.blogs.bucknell.edu



Eli Foster '27 (left) and Aiden Cherniske '27 fine-tune version five of the Portal Box, the smallest and most modular iteration yet.

The Portal Box lights up green when a student with verified training taps their RFID card.

engineering major, led the development of its fifth and most recent evolution — one focused on accessibility, efficiency and wider deployment.

How It Works

The Portal Box system controls access to equipment that requires verified training. It includes a physical access point (glowing acrylic boxes), embedded software that manages user interactions, and a database and web portal that tracks training and usage. Users insert radio frequency identification (RFID) cards into the box to activate equipment. If

training is complete, the box glows green and grants access.

Maker-E staff and managers oversee the system online, adding users, updating access and tracking usage.

As it has evolved, the project has embraced the collaborative spirit of the maker community — it is open source, free and available to any lab in need of a smart access solution.

"The Portal Box is effective and inexpensive," says **Matt Lamparter '06**, director of electrical & computer engineering laboratories and current leader of the Portal

Box project. "We know the broader maker community could benefit from our design."

New Developments

In spring 2025, Lamparter guided Senior Design students in adding a touch-screen display for user feedback and multi-factor authentication.

Cherniske and Foster developed version five of the system, upgrading the microcontroller, installing the display and reducing component costs. By remapping the circuit board and redesigning the box, they created the smallest, most modular version yet,

with interchangeable parts that allow users to swap out components and customize the setup.

"If another university or makerspace wants to implement something that will serve them better, they can design new pieces for the sides of the case," says Foster. "Then they can share it to keep expanding the project."

Lamparter presented the latest iteration of the tool at the International Symposium on Academic Makerspaces in August. He found that all makerspaces face the same problem — balancing access against accountability. "There are a lot of similarities in how we operate," he says. "I'm excited to explore ways to collaborate."

"Our work feels like continuing a legacy of everyone who has ever worked on this box," said Cherniske. "It just keeps getting better and better."