

CASE STUDY

University of Houston Enhances eLearning with Real-World Labs

Ain't nothing like the real thing — especially when you've gone virtual. Marvin Gaye said it. So did Aretha Franklin, the Supremes, Donny & Marie, and even Vince Gill. It applies to pictures versus people, movies versus real life — and, in this case, to students taking classes and labs online rather than in person.

The professors are real, but they aren't in the room to give pointers. The device under test is real, but it's just an image on a screen for students. And for many schools, because of cost, availability, and other factors, the remote test equipment is real, but industry doesn't use it, and it offers limited functionality and features.

So how did the Cullen College of Engineering at the University of Houston find a teaching solution that provided engineering students with industry-ready test skills, using "real" oscilloscopes, power supplies, data acquisition units, and waveform generators? By turning to Keysight for a solution using "real" benchtop instruments controlled by a powerful tool called PathWave BenchVue.



Organization

The University of Houston Cullen College of Engineering

Challenges

- Take-home kits have limited functionality.
- Online learning may outlast the pandemic.
- Time was short.
- Costs had to stay in check.

Solution

- Keysight PathWave BenchVue
- Keysight Remote Access Lab

Results

- Students get hands-on lab experience from home.



Challenges: Fast, Affordable, Hands-On Lab Experience

COVID-19 prevention efforts meant many classes would have to move online, and professors had a lot of concerns: Would an inexpensive take-home lab kit do the trick, at least for now? What can my students afford? What can my department afford? How long will this last? If I can “get them by” during quarantine, can I improve their in-classroom learning later to make up for the lack of solid lab experience during quarantine? Will my students’ test and simulation lab skills translate well in their first jobs?

The preferred curricula would keep students engaged and learning the skills needed in the workforce, assuring both students and parents that the University of Houston is still the right place to get the best engineering education. The Keysight solution would address these concerns while enhancing the department’s existing syllabus and lab instruments.

The university’s challenges were fourfold:

- Inexpensive take-home kits don’t give students real-world test skills because they have limited functionality and features, and they often break or malfunction.
- Even for hybrid learning models, some classes and labs needed to be online or at least have a contingency model for online learning. The World Economic Forum COVID Action Platform suggests that “online learning has been shown to increase retention of information, and take less time, meaning the changes coronavirus have caused might be here to stay.”¹
- The 2020–21 school year was fast-approaching. Any remote solution needed to be set up quickly and be easy to maintain.
- Cost was a big consideration. There was not enough budget to invest heavily in either new lab equipment or remote learning solutions, yet the university likely will need both now and in the future.

Solution: Keysight Remote Access Lab and PathWave BenchVue

The Keysight solution uses industry-standard bench instruments that students access remotely. With PathWave BenchVue, users have all the control and features they would have if they were operating the instruments in-person. In addition, students learn to use data acquisition equipment, a key skill employers look for and one that schools don’t typically teach. Take-home kits don’t provide that ability.

¹ “The COVID-19 Pandemic Has Changed Education Forever. This Is How.” World Economic Forum. Accessed October 9, 2020. <https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning/>.

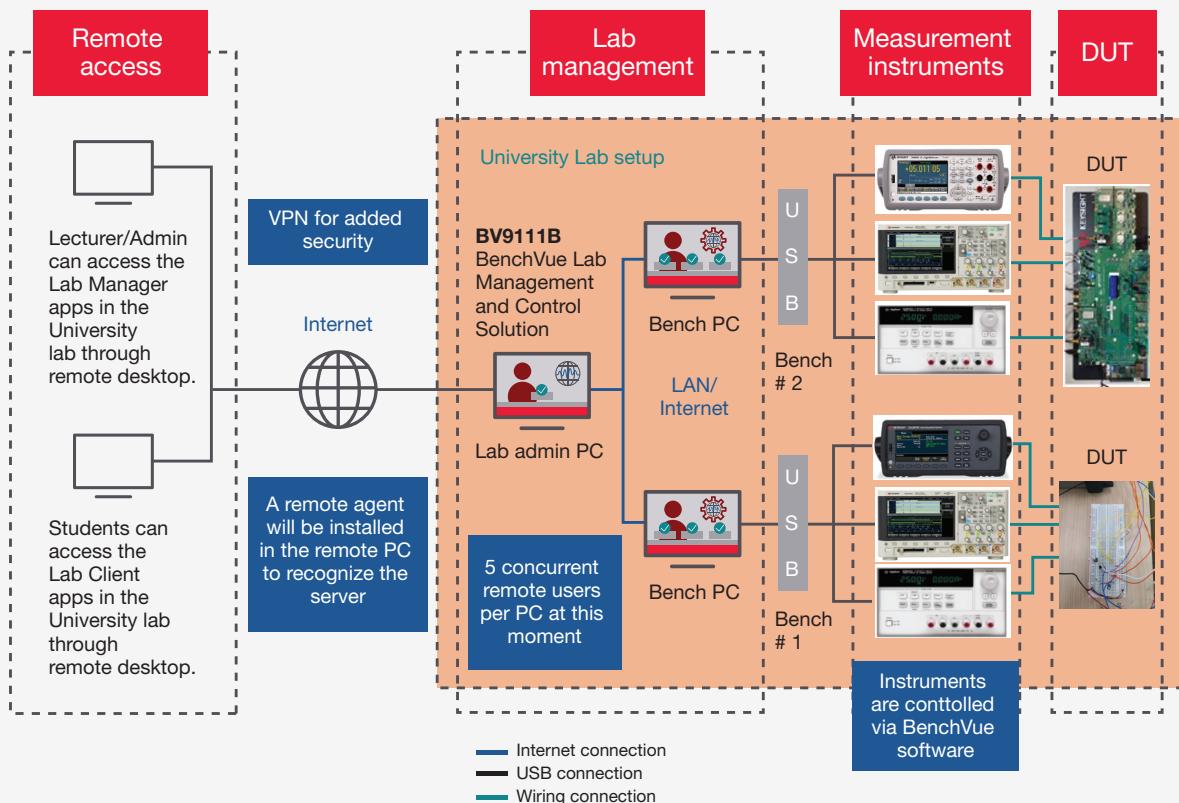


Figure 1. Students access on-campus labs with a software interface

Because Keysight's solution leaves on-campus equipment in place, remote versus in-class learning is quickly interchangeable as the need arises. PathWave BenchVue allows multiple users to conduct labs together, giving students the ability to collaborate and share learnings as they would in the classroom.

The university implemented the PathWave BenchVue solution quickly. Once the overall lab configuration is determined, setting up additional benches takes less than an hour. When professors alternate subjects, only one person needs to access the physical lab to modify equipment for the next lesson set (for instance, switching between an antenna lab one week and a circuits lab the following week).

Cost is an ever-present concern. A Keysight Remote Access Lab setup costs about half as much per student as a take-home kit. While students are unlikely to need the take-home kits after graduation, schools can reuse the Keysight solution with new students in subsequent semesters.

Results: Students Get the Career Skills They Need

Whether a university plans to continue in-classroom learning, go 100% virtual, or do something in between, it's clear that every school must adopt a solution that allows for flexibility while maintaining a high caliber of instruction.

A Keysight Remote Access Lab solution addresses several key pain points, including cost, flexibility, and ease of use, while affording students critical skills they'll need post-graduation as industry engineers. Schools can make a one-time investment to upgrade both on-campus and remote instruction with hardware and software that they can use for years to come. Having the latest industry-used instruments and tools can accelerate the accreditation process and help attract new students. Finally, students can bolster their résumés by citing industry-ready skills they've learned on real-world test equipment.

"With the increasing importance of remote learning in higher education, Keysight's Remote Access Lab solves the difficult problem of doing laboratory work from home," said Dr. Len Trombetta, director of undergraduate studies at the University of Houston. "We can now give our students a meaningful laboratory experience, using the same equipment they will encounter in their jobs."



"We want our engineering students to be ready to go into industry when they graduate, ready to be successful in their careers. . . . Teaching them on industry-grade equipment is the only way to make that happen. Keysight's Remote Access Lab is the clear path to do that in a remote environment."

— Dr. Len Trombetta,
University of Houston

Resources

Turn to Keysight for remote teaching solutions like the one that's helping the University of Houston groom its engineering students to become tomorrow's skilled engineering professionals. For more information, visit Keysight's [education](#) resources web page, or search "BV9111EDU" on Keysight.com.

To find out more about the University of Houston's Cullen College of Engineering, visit <https://www.egr.uh.edu/>.

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