

XR Development Studio

Where Southern University builds, tests and deploys the VR lessons and research tools that power the whole pathway.

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At a glance

What it is	Southern University's studio for building, testing and running virtual reality lessons and research tools.
Headsets	a fleet of Meta Quest and ClassVR headsets for lessons, research and events, with ClassVR carts that charge and carry a full class set.
Build tools	Unity (build engine), OpenXR (headset standard), Unity XR Interaction Toolkit, Unity Universal Render Pipeline and Unity Version Control; Meta Quest 3 for one research app.
People	staff who install and test VR apps on the headsets, and the XR JAGS student team.
Services the center lists	XR app development, 3D printing and rapid prototyping, reality capture and workforce training.
Programs the center lists	SURADD, ICLERT, the Louisiana Office of Public Health VR Project, and Enhancing Additive Manufacturing Education with Cybersecurity and VR.
Access	outside groups can ask for a demo by appointment.

What it is

The XR Development Studio is the workshop behind every virtual experience on the pathway. When a learner names the parts of a 3D printer in a headset, runs a simulated print job in the Mobile CAVE, or a teacher candidate leads a VR science lesson, the lesson came from a studio like this one. "XR" stands for extended reality, the umbrella term for virtual, augmented and mixed reality.

The studio has four parts. First, a fleet of VR headsets: Meta Quest headsets and ClassVR headsets, stored and charged in rolling carts so a full class set can move to a classroom or event. Second, build workstations: computers for building and testing VR apps. Third, staff who install and test the apps on the headsets so they work when a class or visitor puts them on. Fourth, readiness to deploy: apps go out to lectures, research, classrooms and community events.

The studio also captures the real world. A 3D scanner on a tripod and a build workstation support reality capture, turning real rooms and objects into 3D models that can be used inside VR lessons. That lets the studio build lessons around the actual equipment and places learners will work with.

The XR JAGS student team works alongside the studio, testing headsets and running demonstrations. Students are not only users of the technology here; they are part of building and delivering it.

How it works

01 · Start with a need

Faculty and researchers can ask for VR apps made for their own teaching or research. A request might be a lesson on a piece of equipment, a scenario for a research study or a training exercise for a workforce program.

02 · Capture and model

The studio models the objects and spaces the lesson needs. Reality capture with a 3D scanner turns a real room or object into a 3D model. The AM Lab prototype used Blender for 3D modeling, Unity 2022 for the application, XR interaction tools and OpenXR.

03 · Build in Unity with an open standard

Lessons are built in Unity, with the Unity XR Interaction Toolkit for hand and controller interaction and the Universal Render Pipeline for graphics. OpenXR, an open, royalty-free standard released by the Khronos Group in 2019, lets one application run across many VR and AR devices through a common interface. That is why the AM Lab printer modules run both on Meta Quest headsets and in a CAVE-style environment.

04 · Test on real headsets

Staff install the apps on the headsets and test them. Unity Version Control keeps track of every version so changes can be tested and rolled back safely.

05 · Deploy where learners are

Finished apps go out to lectures, research studies, K-12 classrooms through the ClassVR carts, community events, and the stationary and Mobile CAVE rooms. Rugged travel cases carry studio gear to events and visits.

06 · Learn and improve

Research studies, such as Southern University's computational thinking work in the CAVE, use the studio's tools and feed findings back into how lessons are designed.

Social impact

Training that would otherwise be out of reach

Many kinds of training are expensive, dangerous or impossible to repeat in real life: running industrial equipment, responding to a crisis, practicing a medical procedure. A 2021 meta-analysis in *Human Factors* found that VR, AR and mixed reality training performs about as well as traditional training, and that its main value is where traditional training is impractical because of danger or cost. The studio builds exactly those experiences.

Closing the digital divide

Through SURADD (Southern University Reaching Across the Digital Divide), the university received \$6.2 million from the U.S. Department of Commerce's Connecting Minority Communities program in 2023 for VR equipment

and connectivity. SURADD builds a K-12 workforce pipeline by engaging middle school teacher candidates, clinical educators, and university faculty and students with interactive VR spaces for instruction and workforce training. The studio's headsets and lessons are what make that possible in practice.

Public health and emergency response

The center lists ICLERT (Immersive Crisis Leadership and Emergency Response Training) and the Louisiana Office of Public Health VR Project among its programs. VR lets responders and health workers rehearse scenarios that cannot be staged safely or often in real life.

Students who build technology

The XR JAGS team gives students hands-on experience building and delivering immersive technology, a skill set that applies across games, simulation, engineering, healthcare and training industries. An HBCU studio where students build the tools widens who enters that field.

Technology impact

Building once, delivering everywhere

Because the studio builds on Unity and OpenXR, a lesson built once can run on headsets in a classroom and in the CAVE rooms. That makes each lesson more valuable: the same work serves a K-12 class, a university course and a Mobile CAVE visit to a plant.

Training that pays off at scale

PwC's study of VR training found learners finished up to four times faster than classroom learners and were up to 275% more confident applying what they learned. PwC also found that VR content can cost up to 48% more to build at first, but reaches cost parity with classroom training at 375 learners and becomes 52% more cost-effective at 3,000 learners. A studio that builds content for many programs and many audiences is how those learner numbers are reached.

Reality capture

3D scanning turns real equipment and spaces into accurate models. For training, that means lessons built around the machines and rooms learners will actually use, not generic stand-ins.

Immersive research

VR supports studies of decisions, learning and how people respond in a scenario. Southern University's published CAVE research with 301 engineering students validated a computational thinking survey for HBCU students and recorded high engagement, motivation and collaboration in the CAVE, while also noting student reports of eye strain and dizziness. Honest measurement like that guides better design.

Security built into the curriculum

The center lists "Enhancing Additive Manufacturing Education with Cybersecurity and VR," the NSF-funded project (award DUE 1915520, \$1.65 million) that uses VR to show students how cyberattacks on 3D printer files can change printed parts. The studio is where that kind of lesson is built.

Why Southern University

Funded programs already running through VR

SURADD, ICLERT, the Office of Public Health VR Project and the additive manufacturing project are all listed programs. Several are also Mobile CAVE sub-projects. The studio serves a real, funded program portfolio, not a hypothetical one.

A research base

Southern University faculty have published immersive learning research at the American Society for Engineering Education, including a 2024 study of knowledge acquisition in a CAVE with first-year engineering students. The studio's work is grounded in that research.

A student-built culture

The Mobile CAVE is described on its banner as the world's first student-conceived advanced visualization research and training environment. The XR JAGS team continues that tradition in the studio.

The center of the pathway

The studio connects every other piece: it builds the AM Lab printer modules, the lessons for the CAVE rooms, the classroom VR content and the scenarios for research. Investment here multiplies across all of them.

Who it serves

Faculty and researchers

Anyone at the university who needs a custom VR app for teaching or research.

Students

Students who learn through VR lessons, and XR JAGS team members who build and deliver them.

K-12 teachers and students

Teacher candidates and classroom teachers who use ClassVR headsets and lessons, through SURADD and the classroom VR program.

Workforce and industry partners

Programs and employers that need simulations of job steps, work settings and technical skills, delivered on headsets or in the Mobile CAVE.

Public agencies

Public health and emergency response partners using VR scenarios through programs like ICLERT and the OPH VR Project.

Community groups

Organizations that request a demo or host the studio's headsets at outreach events.

Why fund it now

Every new lesson starts here. The AM Lab has two VR modules today, Printer Components and Print Job Operations, out of an eight-module track. Building the remaining simulations, print preparation, safety and quality control, requires studio time, developers and testing.

The Mobile CAVE is getting ready to open. Each of its eight fields needs content. The studio is the place that content is built and maintained, and support now determines how much is ready as visits begin.

Headsets need care. A fleet of Meta Quest and ClassVR headsets needs staff to install, update, test and repair them, and to keep carts charged and ready. Without that support, equipment sits unused.

Funding multiplies. Because the studio builds on open standards and serves many programs, each funded lesson reaches more learners across classrooms, campus CAVE rooms and the Mobile CAVE, which is how VR training becomes more cost-effective than classroom training over time.

How it connects

The studio builds the content the rest of the pathway runs on. It created the **AM Lab** printer modules used in the **Polymer 3D printing lab** track, and its lessons play in the **Stationary CAVE** and the Mobile CAVE. Its ClassVR carts power **Classroom VR and teacher training**, and its tools support **Computational thinking research** and the **CAVE demo: chemistry molecules**. On the road, it supplies the Mobile CAVE sub-projects, including **Manufacturing technologies and cyber-additive XR** and **Student-led Mobile CAVE systems integration**. The **Vision** document shows how the studio anchors the full pathway.

Questions funders ask

What does the studio actually produce?

Custom VR apps for teaching and research, deployed to headsets, classrooms, community events and CAVE rooms. The AM Lab printer modules are one example.

Why build on Unity and OpenXR?

OpenXR is an open, royalty-free standard that lets one application run on many devices. Building on it means a lesson works on headsets and in the CAVE, and is not locked to one vendor.

Who can request a lesson?

Faculty and researchers can ask for VR apps for their teaching or research, and outside groups can request a demo by appointment.

How do you know VR training works?

A 2021 meta-analysis found immersive training performs about as well as traditional training and is most valuable where real practice is dangerous or costly. PwC found VR learners trained up to four times faster than classroom learners. Southern University measures its own results through published research.

What role do students play?

The XR JAGS student team tests headsets, runs demonstrations and works with the studio, building skills in immersive technology development.

What would new funding pay for?

Developer and staff time to build the remaining AM Lab modules and Mobile CAVE content, headset upkeep and replacement, reality-capture work, and support for research studies.

Sources

- [Khronos releases OpenXR 1.0 specification](#) (Khronos Group, July 29, 2019)
- [Kaplan et al., The Effects of Virtual Reality, Augmented Reality, and Mixed Reality as Training Enhancement Methods: A Meta-Analysis](#) (Human Factors, 2021)
- [PwC: VR training hits the ground running](#) (2020)
- [PwC: Upskilling and VR training cost analysis](#)
- [Southern University to boost VR teacher training, broadband access](#) (GovTech, January 3, 2023)
- [NTIA: Southern University Reaching Across the Digital Divide](#) (SURADD)
- [Immersive Engineering Learning and Workforce Development: Pushing the Boundaries of Knowledge Acquisition in a CAVE](#) (ASEE 2024)
- [Southern receives \\$1.65M NSF grant to study cybersecurity for 3D printing](#) (Southern University, 2019)
- [Southern University CSAM project page](#) (NSF award 1915520)

Related deep dives

- Vision · The vision: one pathway from the virtual room to the real machine — <https://am-lab-3d-printing.vercel.app/deep-dive/00-vision.html>
- Lab 02 · Polymer 3D printing lab — <https://am-lab-3d-printing.vercel.app/deep-dive/L2-polymer.html>
- Lab 04 · Stationary CAVE — <https://am-lab-3d-printing.vercel.app/deep-dive/L4-stationary-cave.html>
- Lab 05 · Classroom VR and teacher training — <https://am-lab-3d-printing.vercel.app/deep-dive/L5-classroom-vr.html>

- Lab 06 · Computational thinking research — <https://am-lab-3d-printing.vercel.app/deep-dive/L6-ct-research.html>
- SP-05 · Manufacturing technologies and cyber-additive XR — <https://am-lab-3d-printing.vercel.app/deep-dive/SP05-manufacturing.html>
- SP-07 · Student-led Mobile CAVE systems integration — <https://am-lab-3d-printing.vercel.app/deep-dive/SP07-cave-ops.html>