



BALL STATE UNIVERSITY

## INSTITUTE FOR DIGITAL INTERMEDIA ARTS

COLLEGE OF ARCHITECTURE AND PLANNING

2020.3

### UPCOMING

IDIA is currently creating a contract with the Academy of Dietetics and Nutrition for an upcoming training simulation. The project will deal with the topic of nutrition and diabetes and including an interprofessional communication methodology called TeamSteps.

We are designing new lunar habitat construction prototypes for a presentation by Henk Rogers, Founder International Moonbase Alliance. Rogers will be presenting the concepts to the AIAA American Institute of Aeronautics and Astronautics in an upcoming conference.

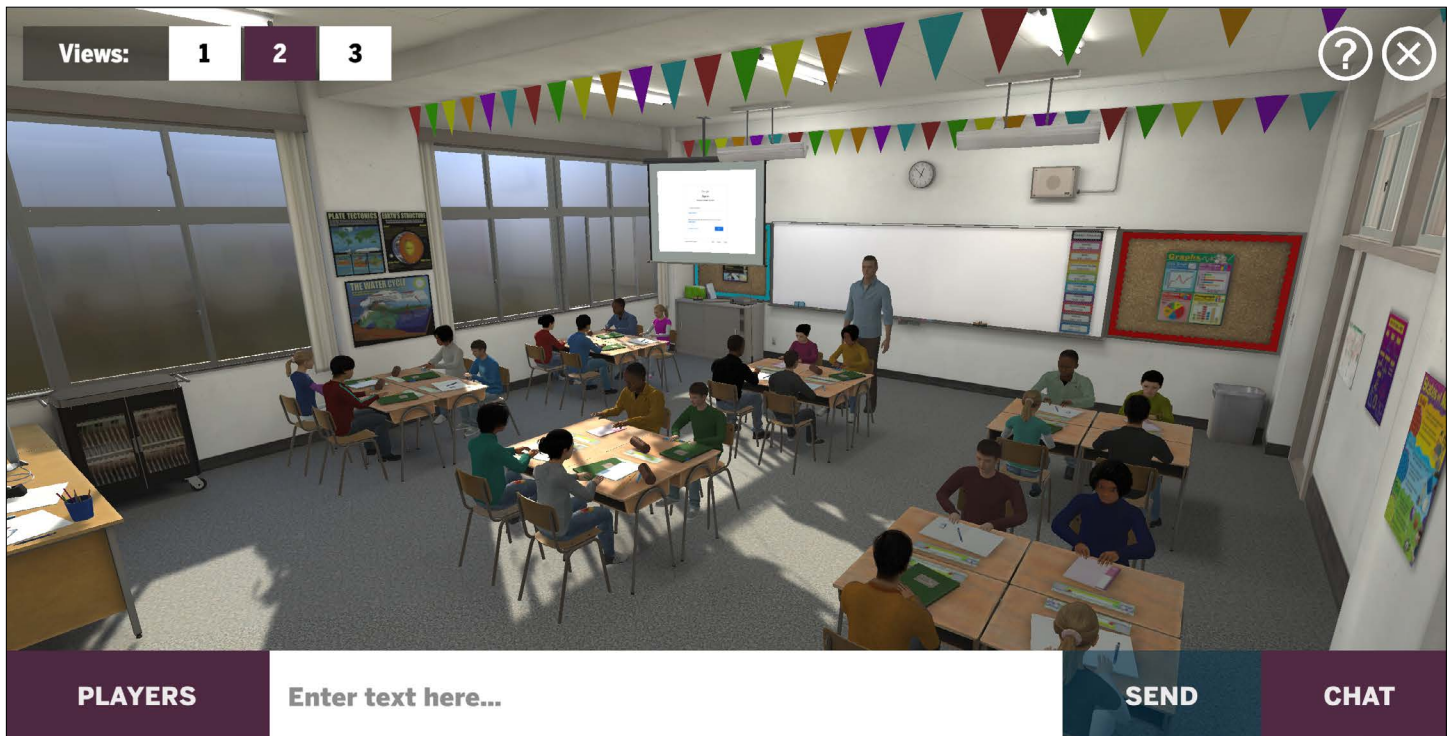
IDIA Lab is drafting a proposal with Professors Diana Saiki and Valery Birk, BSU for an National Endowment for the Humanities Startup Grant for their 3D Photogrammetry Clothing Digitization and Archive project.

College of Architecture and Planning's IDIA Lab creates technological innovation in the arts, sciences, and humanities. The Lab engages students, staff, scholars and clients in collaborative projects including 3D, virtual reality and mobile applications. This newsletter includes updates on current IDIA Lab projects including an augmented reality visitor experience application for Mesa Verde National Park, a publication on our Roman archeology celestial alignment research, a multiuser simulation for understand aspects of wellness in Amazon's Lumberyard game engine, and a \$3 million dollar NSF grant in which IDIA Lab was selected by Massachusetts Institute of Technology, Educational Testing Services and Indiana University to create simulations for elementary math and science classrooms.



While the COVID-19 pandemic has had a major effect on PK-12 classrooms, it has also affected opportunities for preservice teachers to gain practical teaching experience. Responding to this problem, School of Education faculty Meredith Park Rogers and Adam Maltese, along with Dionne Cross Francis of the University of North Carolina at Chapel Hill, an affiliate faculty member of IU, have begun work on a project with collaborators from ETS, Towson University and Massachusetts Institute of Technology, where they will design and study an on-line suite of practice-based teaching activities intended to support mathematics and science preservice teachers in honing their skills for facilitating argumentation-focused discussions.

This project, funded by a grant for over \$3 million from the National Science Foundation (Grant 2037983), will run from 2020-2023. ETS serves as the lead organization for the project, titled Online Practice Suite (OPS): Practice



Spaces, Simulations and Virtual Reality Environments for Preservice Teachers to Learn to Facilitate Argumentation Discussions in Mathematics and Science.

The OPS consists of a coordinated set of online practice-based teaching activities that include game-based practice spaces, small-group avatar-based simulations, and a virtual reality classroom. The activities are designed to be complemented with targeted feedback and support from teacher educators.

With the COVID-19 pandemic increasingly pushing K-12 schools and universities across the nation to adopt online approaches, there is an immediate need for finding effective methods for preservice teachers to practice teaching even if traditional school-based teaching experiences are less available.

Even without pandemic-related restrictions, learning how to teach effectively demands that preservice teachers have robust, authentic and consistent opportunities to engage in the work of teaching—ideally across different contexts with diverse student populations and for varied purposes.

Over the next three years, the OPS research team will work with mathematics and science teacher educators to design, test, and refine the full suite of online practice-based teaching activities. Findings will be used to understand the mechanisms that support preservice teachers' learning within and across the OPS activities and to document an emergent set of best practices for supporting preservice teachers' improvement in this ambitious teaching practice over time. The OPS will be accompanied by support materials to help teacher educators use and integrate the activities into teacher education courses, including online and face-to-face learning contexts. Both elementary and middle/secondary school mathematics and science scenarios will be developed for the OPS.

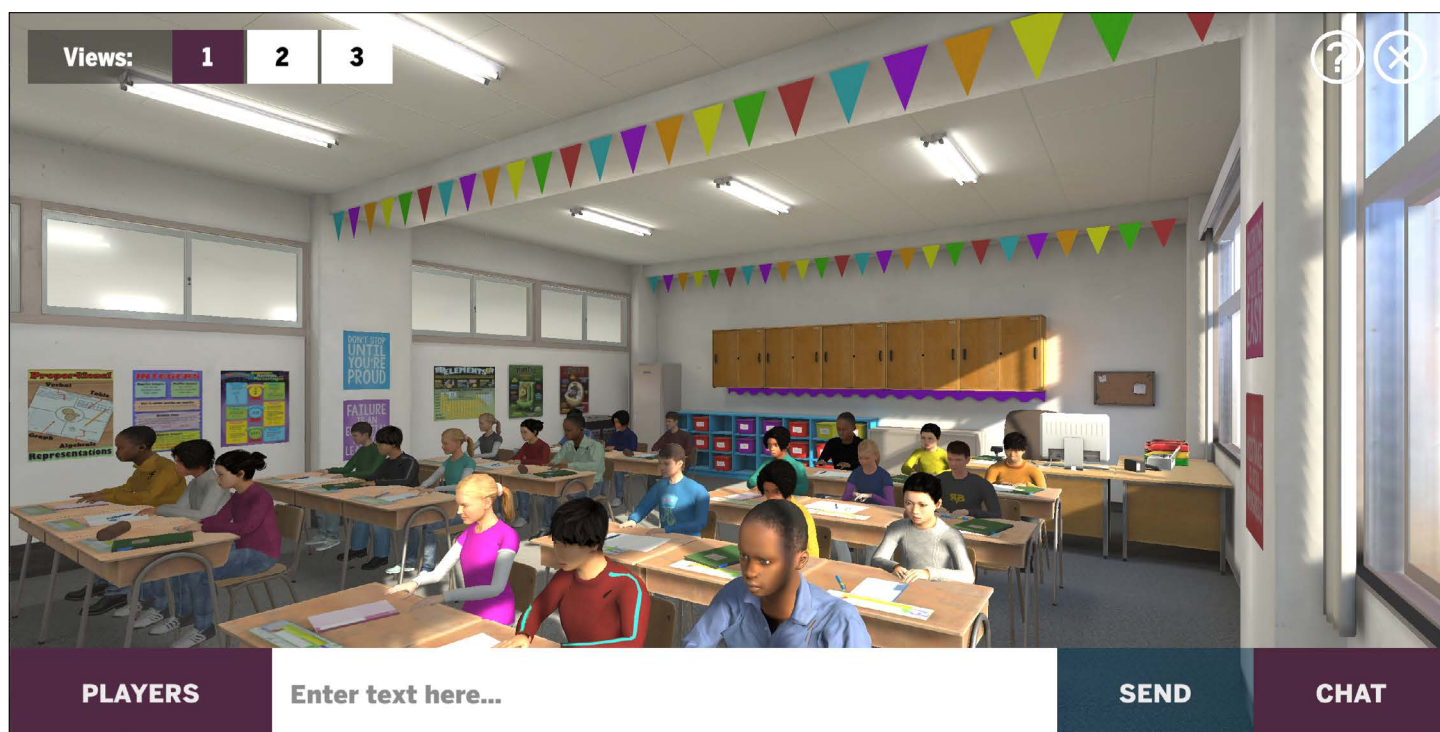
The IU faculty will work with the Institute for Digital Intermedia Arts (IDIA Lab) at Ball State University to develop an immersive virtual reality environment that will situate teachers in learning to navigate a whole-class discussion with students. This aspect of the OPS is referred to as the Virtual Teacher Simulator (VTS). In these simulations, preservice teachers will move beyond the one-on-one and small-group interactions of the other two OPS activities and begin to put their skills together to teach a full classroom of virtual student avatars. Each preservice teacher will have the opportunity to move around the classroom and engage with the virtual student avatars just as though they were in a real classroom. Additionally, they will receive feedback from a mathematics or science teacher educator (i.e., coach) in order to continue to improve their practice.

As Park Rogers explains, “The VTS context especially affords preservice teachers multiple opportunities to rehearse their teaching within a short time span, without disrupting learning in a real classroom, all while receiving immediate and expert feedback from specialized mathematics and science teacher educators. Furthermore, incorporating real-time feedback and opportunities for multiple rehearsals, all within an immersive whole class context, will allow preservice teachers to take risks in their practice and try out novel pedagogical moves that they may not feel secure enough, or have opportunities, to try in an actual classroom.”

“We must find a way to continue to prepare high-quality math and science teachers through this pandemic and beyond,” says Park Rogers. “Through this collaboration, we hope to offer teacher educators and their preservice student teachers a solution to the current dilemma the global pandemic of COVID-19 has created, and also alternative or supplementary methods for targeting core teaching practices even when we are able to safely return to classrooms to work with real children.”

This material is based upon work supported by the National Science Foundation under Grant 2037983. The opinions expressed are those of the author and do not necessarily represent views of the National Science Foundation.

By Catherine Winkler, Indiana University.



## TWEETS

- Now streaming on #Netflix: #TheUniverse’s episode on the #celestial purposes of ancient #Roman monuments featuring IDIA Lab. Check it out! <https://bit.ly/37HQ6Mw>
- Meet3D is a #virtual #collaboration space that brings people together to share, learn, and work - wherever they are. <https://twitter.com/i/status/1326962972300693505>
- @IDIA\_Lab HCI #Designer, Michael Rhoades published his paper “Exploring the Nexus of #Holography and #Holophony in #VisualMusicComposition” in the @LeonardoISAST [https://www.mitpressjournals.org/doi/abs/10.1162/lmj\\_a\\_01093](https://www.mitpressjournals.org/doi/abs/10.1162/lmj_a_01093) @mitpress



## Mesa Verde National Park Augmented Reality Dioramas

STEP HOUSE



HOME

MESA TOP VILLAGE



STEP HOUSE

SPRUCE TREE HOUSE



MESA TOP VILLAGE

SPRUCE TREE HOUSE



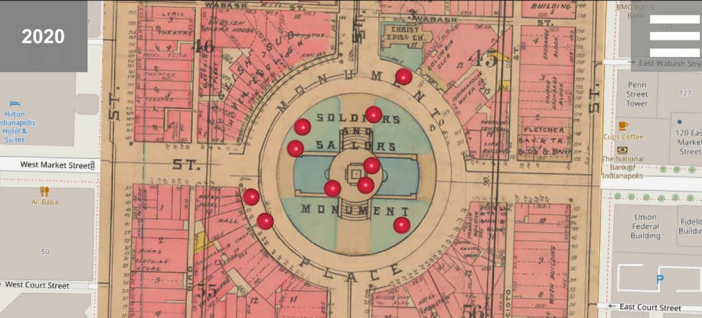
SPRUCE TREE HOUSE

Select the diorama you would like to see  
in augmented reality

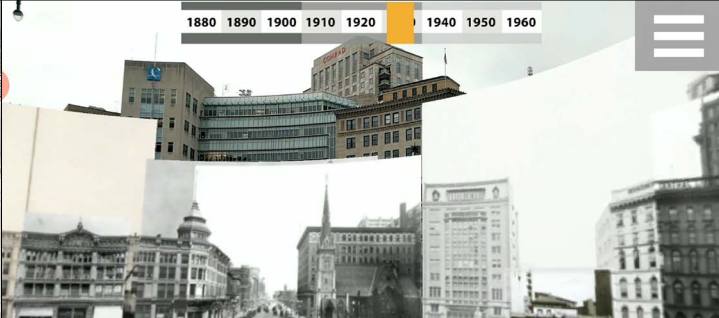
MESA VERDE NATIONAL PARK MOBILE APP

Ball State University's IDIA Lab has been contracted by the US Department of the Interior to develop virtual visitor experiences for the Mesa Verde National Park. The park preserves and interprets the archeological heritage of the Ancestral Pueblo people who made it their home for over 700 years, from 600 to 1300 CE. Today, the park protects nearly 5,000 known archeological sites, including 600 cliff dwellings.

The application will bring to life well-known museum dioramas and locative walking tours of the park. Augmented reality and interactive 3D experiences will help tell the stories of the UNESCO World Heritage site - including the transformation of static elements of the historic dioramas with animated figures and interactive elements. The application will be available on both Google Play and AppStore in 2021.



2020



1880 1890 1900 1910 1920 1940 1950 1960

VIRTUAL COMPANION: INDIANAPOLIS

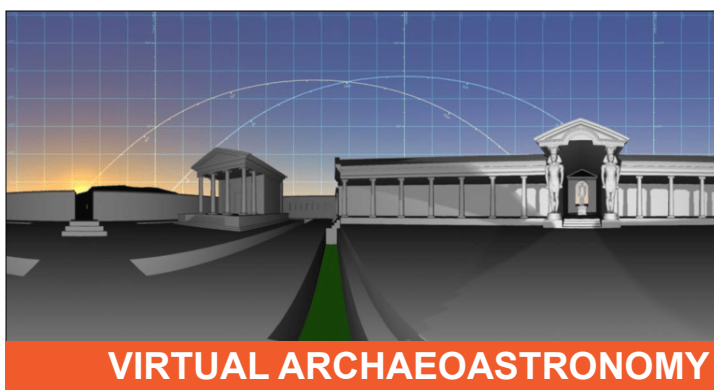
*Virtual Companion: Indianapolis* is a mobile application that uses historic photographs and maps of downtown Indianapolis, IN to create an immersive interpretation of historic phases of the city center. The application uses augmented reality to recreate historic Monument Circle - establishing the perspective of the vantage points of the original photograph. This project is a prototype for a larger potential city-wide endeavor bringing to life significant neighborhoods and sites within the city. It is developed as a possible collaboration by the Institute for Digital Intermedia Arts at Ball State University with the Polis Center at Indiana University Purdue University Indianapolis and the Indiana Historical Society.

<https://youtu.be/EtioZpjXek>



IDIA Lab – in collaboration with BSU Assistant Professor of Architecture, Kristin Barry – has designed the cultural heritage mobile application, Virtual Columbus Experience – allowing users to virtually tour the rich architectural history of Columbus, Indiana. This locative mobile app was produced with fellowship support of Ball State University’s Digital Scholarship Lab. Though a relatively small city, Columbus has made itself a cradle of modern architecture, commissioning many buildings and public works since the middle of the 20th century. The number of landmark buildings and notable architects to have worked in the city has earned it the nickname “Athens on the Prairie.”

With data and artifacts gathered by Kristin Barry’s immersive class, users of the app can explore 3D models of key buildings commissioned over the years, survey timelines showing when architects were active or buildings were constructed, and meet Columbus’ famous architects – such as Eero Saarinen, I.M. Pei, and Harry Weese. After its launch, Virtual Columbus Experience will seek further funding to expand the scope and depth of the project across the community.



Ball State University’s IDIA Lab Director, John Fillwalk co-authored a paper on virtual archaeoastronomy with Georg Zotti, Ludwig Boltzmann Institute for Archaeological Prospection and Bernard Frischer, Indiana University Bloomington. *Serious Gaming for Virtual Archaeoastronomy published in Studies in Digital Heritage.* [https://www.researchgate.net/publication/345456243\\_Serious\\_Gaming\\_for\\_Virtual\\_Archaeoastronomy](https://www.researchgate.net/publication/345456243_Serious_Gaming_for_Virtual_Archaeoastronomy)



Ball State University’s IDIA Lab was contracted to develop a competition proposal for the Moon Village Association. Using 3D modeling and animation, the proposal consisted of visioning transport, deployment and construction of equipment from Earth to the Moon necessary to create permanent lunar habitat structures. Models of vehicles, domed habitats and spacecraft were visualized for the project using both current NASA concept and new designs.





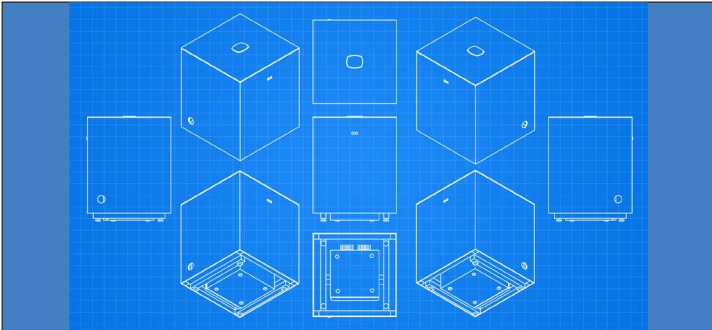
**VIRTUAL WELLNESS SIMULATOR**

IDIA Lab is developing a multiuser wellness simulation for Amazon’s new Lumberyard game engine. The project will allow users to learn and apply knowledge about nutrition, mental and physical health in a dynamic and social virtual setting. The environment includes shared experiences such as exercise, eating, meditation and yoga. Real life data will be passed into the simulator through the patients use of Fitbit exercise bands.



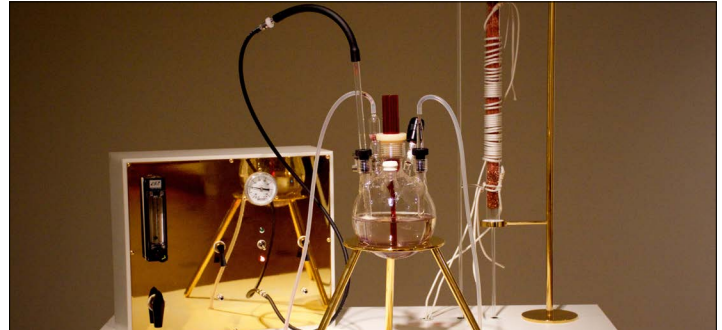
**ANCIENT ROME RESEARCH**

IDIA Director John Fillwalk and staff are researching a new theory of an architectural feature of Hadrian’s Villa - a UNESCO World Heritage site in Tivoli, Italy. Rocca Bruna, a large temple structure facing the city of Rome from the edge of the villa complex, is being investigated as a signaling tower in an interactive simulator. The project will be submitted as part of a journal article in digital archeology.



**ARTIFICIAL INTELLIGENCE ART**

*Wishing Well v2.0* creates an environment where visitor’s vocal interactions shape the substance and experience of the artwork through artificial intelligence. Wishes are spoken and collected by AI and transformed by Amazon’s text to speech synthesis. The tone of the collection of wishes is analyzed by IBM Watson which alters sound and color of the light produced in the installation.



**ENGAGING TECHNOLOGY II**

IDIA recently published an exhibition catalog from a show at the David Owsley Museum of Art - curated by John Fillwalk. The exhibit built upon the success of a prior exhibition at DOMA that examined the emergence of Intermedia Art. This recent show shifted the curatorial emphasis on STEAM – science, technology, engineering, arts and mathematics. <https://www.amazon.com/dp/B08PW1ZTLK>

## ABOUT IDIA

The Institute for Digital Intermedia Arts at Ball State University explores the intersections between the arts, sciences and technology. Scholarly, creative and pedagogical projects investigate virtual reality, Human Computer Interface, augmented reality, mobile apps, visualization and 3D simulation. The lab’s staff, faculty and students develop collaborations in partnership with a host of international clients in this innovative studio initiative designing research at the forefront of emergent media design.