



ICAT CREATIVITY + INNOVATION DAY

Exhibit and Event Catalog

May 4, 2020

10 am - 4 pm

Virtual Event

<https://icat.vt.edu/events/2020/05/icat-c-i-day-2020.html>

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Welcome

ICAT Creativity + Innovation Day is a celebration of the work that happens when teams of talented and creative people come together to address complex challenges using creative applications and/or cutting-edge technologies. Virginia Tech students and faculty have explored, through coursework and research projects, their own creative ideas. They share their work at this celebration. In normal years, this takes place in a face-to-face, expo-style event. This year, the event is online. It will include two webinars, virtual tours of spaces on campus that support creativity and innovation, and projects submitted by Virginia Tech faculty and students. We invite everyone to join us on May 4, 2020 as we celebrate their work.



Phyllis Newbill
Outreach and Engagement Coordinator Center for
Education Networks and Impacts Virginia Tech

Live Events

1:00 PM Keynote

Fusionist Asta Roseway will share her transdisciplinary journey as a co-founder of the artist-in-residence program at Microsoft Research.

2:00 PM Panel Discussion

Thought leaders at the nexus of science, engineering, arts, and design will be discussing the ICAT C+I Day projects that piqued their interest. Panelists Patty Bartlett (retired, Smithsonian), Ben Congleton (Olark), Domhnaill Hernon (Nokia Bell Labs), Andrew Kim (Steelcase), and Asta Roseway (Microsoft Research) will be facilitated by CENI director Lisa McNair.



Domhnaill Hernon Andrew Kim Patricia Bartlett Asta Roseway Ben Congleton

Open (at the) Source

HokieNauts: The NASA S.U.I.T.S. (Spacesuit User Interface Technologies for Students) Team

David Haas - Computer Vision

Anjali Sapra - Computer Vision

Nina Morris - Interface Design

Charlotte Cannon - Interface Design

Rebecca Miller - Interface Design

Ethan Candelario - Graphic Design

Jimmy Singer - Graphic Design

Vina Shen - Graphic Design

Sam Schoedel - Note-taking System

Nathan Moeliono - Note-taking System

Emily Harris - 3D Modelling

Brady Blauvelt - 3D Modelling

Sam Lally - 3D Modelling

Olivia Foster - Navigation

Nick Prete - 3D Modelling

Adi Sircar - VR Development

Wallace Santos Lages - Faculty Advisor

Meaghan Anne Dee - Supporting Faculty

Phat Nguyen - Supporting Faculty

HokieNauts: The NASA S.U.I.T.S. showcases the work of the Virginia Tech student team that participated in the NASA SUITS (Spacesuit User Interface Technologies for Students) Design Challenge. The official space turkeys of Virginia Tech, the HokieNauts designed and created space suit information displays within an augmented reality (AR) environment. The work is intended to aid astronauts in performing spacewalk tasks.

Memory Bank

Tacie Jones, MFA, Human-Centered Design PhD

Vasia Ampatzi, MFA in Creative Technologies

Jessie Mann, Translational Biology Medicine and Health, Neuroscience PhD

Najla Mouchrek, Human-Centered Design PhD

Thomas Tucker, School of Visual Arts

Zach Duer, School of Visual Arts

Rachel Lin Weaver, School of Visual Arts

Memory Bank is an ICAT funded project

Merging the disciplines of creative technology, socially-engaged art, and neuroscience, Memory Bank artistically interprets neuroimaging data to investigate how emotional memory is recalled and visually expressed by memory-holders, exploring the potential for empathy and human connectivity by emphasizing the signature brain patterns associated with participants' recalled experiences of love.

Recursions of Escher

Reza Tasooji

Sam Williams

Tanner Upthegrove

Dennis Gracanic

Through a unique visual environment inspired by M.C. Escher, viewers will gain a new perspective on Escher's art. The goal is to provide a new understanding of the interplay between the science and Escher's art.

The theme is Metamorphosis III artwork, Escher's largest print, created 1967--1968.

A sequence of grid patterns, starting and ending with the word *metamorphose*, includes a variety of shapes, from checkered and hexagonal to elongated diamond shapes.

These patterns are morphed and transformed into various animal shapes that are "lifted" from the print's plane and presented in three dimensions.

The audio component illustrates these transformations.

Zoologia Fantastica in the Mist: Bringing Borges's World to Virtual Reality

Caleb Flood, Creative Technologies MFA

Dashiel Carrera, Creative Writing MFA

Eric Schoenborn, Creative Technologies MFA

Jasmine Shah, Creative Technologies MFA

Faculty Advisor: Zachary Duer

Zoologia Fantastica in the Mist is an ICAT funded project

Zoología Fantastica in the Mist: Bringing Borges's World to Virtual Reality is a 3D interactive story world that brings to life several creatures from Jorge Luis Borges's fable anthology *Zoología Fantastica*. In this adaptation, Borges guides a little boy through a misty, magical realm in order to help him identify and understand mythological creatures. As each new creature appears, original music plays, 3D models of the creatures materialize, and a dynamic story environment shifts with the viewer's movements.

ICAT Creativity + Innovation Day Exhibits

#VTDITC: Hip Hop Studies at Virginia Tech

#VTDITC: Hip Hop Studies at Virginia Tech | [instagram.com/VTDITC](https://www.instagram.com/VTDITC)

Exhibitors:

Craig Arthur, University Libraries, #VTDITC: Hip Hop Studies at Virginia Tech

Bryan Hancock, University Libraries, #VTDITC: Hip Hop Studies at Virginia Tech

Description: Digging in the Crates: Hip Hop Studies at Virginia Tech, or #VTDITC, exists to foster a sense of community among artists, fans, and scholars. We hope to model that students' and community members' personal interests are worthy of academic study, and further institutionalize Hip Hop Studies' presence at VT, the academy, and the larger community.

The Process: #VTDITC, founded in 2016, is the result of the intentional collaboration of numerous transdisciplinary partner organizations. Our monthly seminar series seeks to celebrate scholarship through arts based research, culturally responsive pedagogy, community creation, and experiential learning. We offer free studio hours in Newman Library's Media Design Studio B (Fridays 2-5), media literacy instruction for the community, practitioners for hire, and Hip Hop Study Hours at the Residential College at West Ambler Johnston (Wednesday 5:30-7).



Are you still watching? Using eye-tracking to understand learning from mobile media

Cognitive Developmental Science (CoDeS) Lab | kchoi.org

Exhibitors:

Koeun Choi, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Taylor Covington, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Anvitha Metpally, College of Science, School of Neuroscience at Virginia Tech Cognitive Developmental Science (CoDeS) Lab

Valerie Salmon, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Ava Bir, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Molly Simek, College of Science, Biochemistry, Chemistry Undergraduate Research Assistant

Sara Belay, College of Science, School of Neuroscience at Virginia Tech Cognitive Developmental Science (CoDeS) Lab

Katie Johnson, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Eva Grumbine, College of Liberal Arts and Human Sciences, School of Public and International Affairs, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Caroline Kammer, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Bethany Grocock, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Eman Ayaz, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Rhea Bhatia, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Breanne De Vera, College of Science, Biological Sciences Cognitive Developmental Science (CoDeS) Lab

Michelle Tran, College of Science, School of Neuroscience at Virginia Tech Cognitive Developmental Science (CoDeS) Lab

Alexandra Copeland, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Eunkyung Shin, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Jessica Resor, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Jisun Kim, College of Liberal Arts and Human Sciences, Human Development and Family Science Cognitive Developmental Science (CoDeS) Lab

Description: Is using mobile media beneficial for learning? Participants will learn about eye-tracking technology and how it is used to understand attention and learning from mobile media. We will showcase videos of eye-tracking research in action, explaining how to use eye-tracking glasses to track eye movements moment by moment while viewers are in motion.

The Process: Our audience will learn about eye-tracking technology and how it is used to understand attention to and learning from mobile media. We will showcase videos of eye-tracking research in action. In these videos, participants wear eye-tracking glasses and watch videos on a screen through two conditions: either by holding the screen (portable) or leaving the screen on a table (fixed). We will then look at which condition results in better attention to and comprehension of video. This will help the audience to think about how mobile media affects their attention and learning.



AWS Tobacco Settlement

Virginia Tech AWS Tobacco Settlements Capstone Team

Exhibitors:

Rahul Ray, College of Engineering, Computer Science

Description: In Fall 2019, the CS5604 class built a functioning search engine/information retrieval system on the Computer Science Container Cluster. Our team is working to help make that run on Amazon Web Services (AWS). The search engine is indexed to a collection of 14 million documents that relate to the settlement between US states and the 7 large tobacco companies. We will improve the indexing from page indexing to line indexing for the approximately 8,000 deposition documents. This will proceed after organizing all documents with tags indicating deposition, so those that actually are transcripts, as well as each of the associated files (e.g., exhibits), are classified.

The Process: We had to convert page indexing to line indexing for 8000 deposition documents by giving access to the virtual machine (VM), allowing for linewise indexing, and by testing cases that are required to ensure that the script works as needed. We then pushed 8000 deposition documents to elastic search for the index of records. Post accomplishing that task we finished page indexing for the remaining documents by again giving access to the VM and retrieving all of the metadata. Finally we properly document all work done in a final report and final presentation.

Behavior of colors in watercolor

Aline de Souza | <https://alinesouzadesouza.wordpress.com/>

Exhibitors:

Aline de Souza

Description: This exhibit is about the characteristics of colors in watercolor. We'll be comparing colors in terms of texture/smoothness, transparency/opacity, staining, granulation and others. We'll look at what happens when you mix colors, when their characteristics may come through in the mixture. Finally, I'll draw a simple tree or animal talking about color behavior and my choices while painting.

The Process: I plan to share my paintings and color comparisons through videos. I don't know how the virtual space is going to be. If people can video chat with me, I could demonstrate painting directly. If they can't, they can look at the videos and images.

Steps that had to happen to create my project:

1- Get watercolor paper, watercolor and brush.

2- Set up a my phone with its camera pointing down, with the phone standing on top of books, beside my drawing space so that I can film what I'm painting.

3- Introduce colors and make comparisons in groups of two colors per comparison. I plan on starting by showing Windsor Blue in comparison to Indigo. Go through characteristics: transparency, granulation etc. Talk briefly about how it feels and what it means for painting if a color is very transparent or if a color is very opaque etc.

4- Make a mixing chart to show gradual mixing and visualize each mix.

5- Paint something while talking about color choices and bringing back some of the concepts we saw in the previous steps. The painting will be something that is simple for me to paint, such as trees, birds or squirrels.



Benthos 360

Institute for Creativity, Arts, and Technology | <https://icat.vt.edu/projects/2019-2020/major/particles-of-progress.html>

Exhibitors:

Jessica Robinson, Institute for Creativity, Arts, and Technology, School of Visual Arts

Matthew Hull, Institute for Critical Technology and Applied Science

Justin Perkinson, College of Liberal Arts and Human Sciences, Cinema School of Performing Arts, Creativity + Innovation, Center for Human-Computer Interaction

Tanner Upthegrove, Institute for Creativity, Arts, and Technology

Description: Dive with us beneath the Clinch River as we document the conservation of Appalachia's endangered freshwater mussels - one of the most imperiled animals on Planet Earth. Benthos 360 transports you to their underwater environment in 360°, as you follow a Restoration Biologist fighting to save them.

The Process: Benthos 360 explores how immersive technology can help improve public awareness of imperiled species and how individuals and communities can support efforts to save them. Experience the beginnings of an immersive documentary about endangered species conservation that illustrates the tension between humans, technology, and our planet. The documentary is scheduled for completion in 2020, but the process of making it is a spectacle in itself using immersive 360-degree underwater video.



Bringing Animation Into the Woods: a performance in isolation

Nate King - Associate Professor - School Of Visual Arts | www.nathan-andrew.com

Exhibitors:

Nate King, College of Architecture and Urban Studies, Creative Technologies

Description: As a response to ideas of isolation and social distancing, I took my projector to the woods to create a solo installation of my current animation, Everything Has Been Changing. I wanted to activate the rock face with movement, but without witness, in order to explore performance solely for oneself.

The Process: I started the project by creating looping animations that have different run times in order to composite them together and create a weave of animation. For example, if animation A is 4 seconds, and animation B is 3 seconds, we know the total loop needs to be 12 seconds. I searched for a location to install the animation and decided upon Falls Ridge Preserve due to the large rock surface I could use as a screen. The projector was powered with an external battery block, which lasted over an hour.



Efficient Web Archive Searching

Multimedia/Hypertext Group 9

Exhibitors:

Yijing Wu, College of Engineering, Computer Science Multimedia/Hypertext Group9

Xiaolin Zhou, College of Engineering, Computer Science Multimedia/Hypertext Group 9

LIN ZHANG, College of Engineering, Computer Science Multimedia/Hypertext Group 9

Jinyang Li, College of Engineering, Computer Science Multimedia/Hypertext Group9

Ming Cheng, College of Engineering, Computer Science

Description: This project aims to find a method to convert URLs to a sortable and shortened format locally to improve web archive access efficiency. The audience can compare the efficiency of the new algorithms.

The Process: First, we need to understand the composition of the URL and decide which parts of the URL should be used. Then, search for useful algorithms and compare the assumed efficiency. Next, we implement the selected algorithms and test their actual efficiency. Lastly, we pick the best algorithm for the research results. The required technologies are PyArrow, python, and parquet.



Envisioning Future Head-Worn Augmented Reality Interfaces

Center for Human-Computer Interaction, Virginia Tech | <https://hci.icat.vt.edu/>

Exhibitors:

Feiyu Lu, College of Engineering, Computer Science

Shakiba Davari, College of Engineering, Computer Science

Doug Bowman, College of Engineering, Computer Science

Description: It is widely believed that AR glasses will be the next-generation personal computing platform. Lightweight, powerful AR glasses with an all-day battery life have the potential to give users hands-free access to any information, anytime, anywhere without the need for any physical displays. An intelligent AR interface will need to handle challenges such as avoiding occlusion of important real-world objects, using real-world surfaces when appropriate, and determining how and when content should move along with the users. However, due to the fact that such interfaces barely exist nowadays, there are still limited insights into how such interfaces would look and how they would adapt to different contexts. In our demonstration, we will showcase our envisioned future of context-aware AR interface. Users will be able to experience the typical life of a future all-day AR user and see how AR interfaces could adapt themselves to different contexts. The interface we designed will be able to avoid occluding important real-world objects, be aware of user activities and change fixation, and be conversation-sensitive to provide information that users need. We hope that our showcase will allow a glimpse of the future, and further inspire the future design of adaptive interfaces for head-worn AR displays.

The Process: Future Augmented Reality (AR) interfaces should seamlessly react to user behaviors in various contexts. In this demo, we illustrate our insights into how future AR interfaces could adapt to environment and user activities. Our showcase will inspire the future design of adaptive interfaces for head-worn AR displays. We used the Magic Leap One AR headset to prototype the interface. The project will be demonstrated virtually via Mozilla Hubs.



Exploring Robotically 3D Printed Structures in Virtual Reality

Design, Research, and Education for Additive Manufacturing Systems Lab | <https://dreams.mii.vt.edu/>

Exhibitors:

Joseph Kubalak, College of Engineering, Mechanical Engineering Design, Research, and Education for Additive Manufacturing Systems Lab

Description: Advances in robotics allow us to 3D print structures in new and exciting ways, but visualizing those structures can be difficult on a screen. In virtual reality, these structures come to life by enabling 3D exploration. Attendees will be able to see robotically printed structures in VR and in real life.

The Process: There are three components to this project: i) a custom MATLAB toolpath planner ii) a Unity virtual reality environment, and iii) a robotic printer. The MATLAB workflow optimizes a geometry and toolpath based on the end-use application. The resulting structure is difficult to view on a screen - hence the second component of the exhibit. The VR environment enables the user to easily explore and validate the structure. From there, the toolpath is sent to the robotic printer for fabrication.

ICAT Day Page: <https://icat.vt.edu/events/2020/05/icat-c-i-day-2020/exploring-robotically-3d-printed-structures-in-virtual-reality.html>



From Unknown to Workflow: A Network Science Knowledge Graph for Researchers

Virginia Tech

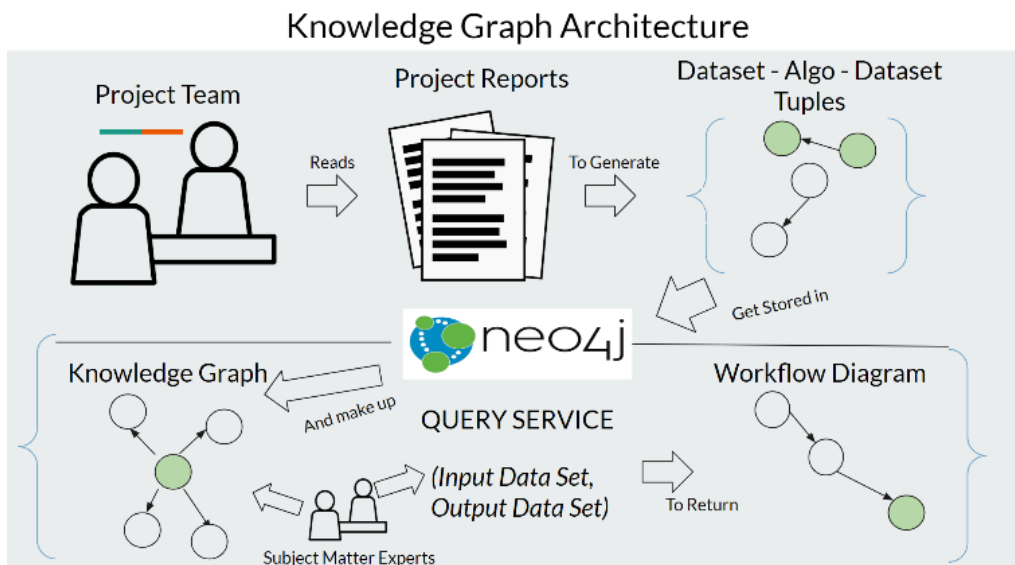
Exhibitors:

Emma Meno, College of Engineering, Computer Science

Kyle Vincent, College of Engineering, Computer Science

Description: Subject-matter-experts' (SMEs') research increasingly involves advanced analysis. Our proposed knowledge graph interface bridges the gap between users and workflow management systems by supporting information queries and returning workflows. We plan to demo our graphical application and interface.

The Process: Our project is part of the Multimedia, Hypertext, and Information Access capstone. We have been parsing through previous CS 5604 (Information Storage & Retrieval) projects to identify triples for building the ontology and knowledge graph. Parallel to extracting triples, we are working on developing the knowledge graph architecture, involving researching Neo4J and GRANDStack infrastructure. The most difficult part of the project has been determining whether tools provide viable path queries.



Get the job! An immersive simulation of sensory overload

3D Interaction Group | <https://research.cs.vt.edu/3di/>

Exhibitors:

Leonardo Pavanatto Soares, College of Engineering, Computer Science 3D Interaction Group

Wallace Lages, College of Architecture and Urban Studies, Institute for Creativity, Arts, and Technology, School of Visual Arts Virginia Tech

Shakiba Davari, College of Engineering, Computer Science

Feiyu Lu, College of Engineering, Computer Science

Anthony Folino, College of Engineering, Computer Science

Samat Imamov, College of Engineering, Computer Science

Satvik Chekuri, College of Engineering, Computer Science

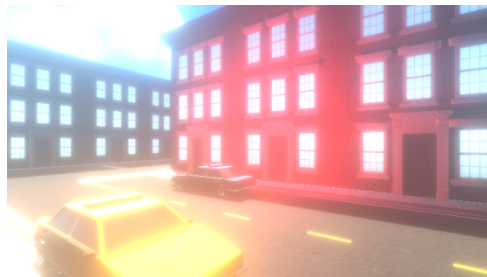
Leslie Blustein, College of Engineering, Computer Science

Doug Bowman, College of Engineering, Institute for Creativity, Arts, and Technology, Computer Science

Emily Harris, College of Architecture and Urban Studies, School of Visual Arts

Description: We provide a compelling virtual reality experience where users experience the daily challenges of people with sensory issues through interactive storytelling. Users experience some common hypo- and hypersensitivity symptoms and have to interactively overcome them.

The Process: Our project was created based on the theme of the Institute of Electrical and Electronics Engineers (IEEE) Virtual Reality 2020 3DUI Contest, "Embodiment for the Difference." We formed a group of 10 people, including faculty, graduate and undergraduate students from Computer Science and the School of Visual Arts. We focused on the problem of sensory overload because we cannot perceive it in our daily lives. We designed and prototyped our solution through the course of three months, with weekly meetings. Disciplines included programming, Human-Computer Interaction, modeling, behavioral animation, and VR technologies.



Helping Introduce VR to World Language Classrooms Using Instructional Design

Instructional Design and Technology graduate program, School of Education |
<https://liberalarts.vt.edu/departments-and-schools/school-of-education/academic-programs/instructional-design-and-technology.html>

Exhibitors:

Alicia Johnson, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Ghadah Almutairy, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Rebecca Clark, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education,

Ginny Clark, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education,

Henry Zhenhuan Yang, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Mingyu Li, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Description: Come experience the instructional design process for a project in the EdTech industry. As we describe our work with Redshift Education (a company creating Virtual Reality learning for World Language classrooms), we will demonstrate the complex process of an Instructional Design project.

The Process: The VT IDT Internship Design Team designed and developed instructive learning objects for Redshift Education (met through the Apex Center for Entrepreneurs at VT). Using VT Library Fusion Studio as a base, the team successfully designed, developed and user-tested several learning objects for Redshift with a blend of Instructional Design, Project Management, and Interactive and Graphic Design practices. With Zoom, Slack and Google Drive we continued our design teamwork during COVID19.



Interactive Design Solutions for Everyday Problems

Instructional Design & Technology Graduate Program | <https://liberalarts.vt.edu/departments-and-schools/school-of-education/academic-programs/instructional-design-and-technology.html>

Exhibitors:

Alicia Johnson, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Bushra Abdulkarim Alghamdi, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Amal Hamdan A Aljohani, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Kamla Suleiman Al Amri, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Taylor Brooks, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Yingying Fan, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Chris Finch, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Kelli Fleming, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Tian Meng, College of Liberal Arts and Human Sciences, Instructional Design and Technology School of Education

Description: Instructional Design & Technology graduate students have spent the semester creating an interactive web or app design solution to a problem of their own choosing. Students will demonstrate their user-tested digital prototypes and design process with the public.

The Process: IDT graduate students research a problem using a blend of Design Thinking and Instructional Design processes. Beginning with Empathy towards target users and Defining the problem, students spend weeks designing, reviewing, iterating then developing, reviewing, iterating leading to a final digital prototype. The process includes expert reviewed paper prototypes, rough wireframes and workable prototypes. Students complete the course with a working prototype, usability testing, and design documents.

LACE: Understanding Blockchains through Kinetic Sculpture

Computer Science, School of Visual Arts, Institute for Creativity, Arts, and Technology, Institute for Critical Technology and Applied Science | www.laceproject.org

Exhibitors:

Sam Blanchard, College of Architecture and Urban Studies, School of Visual Arts Virginia Tech

Kirk Cameron, College of Engineering, Computer Science

Description: Blockchains. Though we hear them mentioned frequently in the media, few people outside of the computing field grasp the intricate and varied methods by which these systems operate. The hype and volatility surrounding their use in cryptocurrencies has led to a public perception that blockchains and their proliferation are potentially dangerous technologies. With LACE we can demystify this technology by translating data movement through a living sculpture that physically represents blockchain computation as it propagates throughout a decentralized and distributed network.

The Process: The ongoing development of the LACE project is thoroughly documented on our project Website www.laceproject.org.



Linux Laptop Orchestra L2Ork Tweeter: Connecting Communities Through Music

Virginia Tech | l2ork.music.vt.edu

Exhibitors:

Ivica Bukvic, College of Liberal Arts and Human Sciences, Institute for Creativity, Arts, and Technology, School of Performing Arts

Description: L2Ork Tweeter is a free open source, collaborative, online (telematic), and cross-platform laptop orchestra jamming tool destined to bring current, past, and aspiring L2Orkists and the community members closer through music. Inspired by the COVID-19 social distancing, it relies only on the standard built-in desktop and laptop inputs, including keyboard and mouse/trackpad. It allows for participants to shape their instrument sound while learning basics about the audio synthesis. They can then utilize a tracker-like tool to build patterns, loops, as well as mix and modify their parameters while collaborating synchronously with up to 10 other users or performers. L2Ork Tweeter also allows for participants to chat with each other, and offers virtually unlimited additional number of guest (audience) slots who can join in to listen to the evolving music making experience. It also allows for offline composition and practice and as such may be applicable in other scenarios, e.g. live performance and DJing. Users' creations, including instruments, tracker patterns, and entire sessions can be shared and resumed at a later time. The project's name is inspired by its tracker's 64-note limit, making it a musical counterpart to the popular social media platform Twitter. This video showcases an example of a musical groove built using 5 out of 10 participant slots. For additional info visit <http://l2ork.icat.vt.edu/main/tweeter>

The Process: L2Ork Tweeter is built using Purr-Data (a.k.a. Pd-L2Ork) visual programming language that has been developed by the Linux Laptop Orchestra community. It requires a client and a server and utilizes an array of computer science concepts that were necessary to make the project possible. It also relies on the knowledge of music, music technology, and the creative technologies in music, three closely related, yet distinct areas. It leverages these elements to facilitate social interaction and community building through music. As a result, its focus is on usability and flexibility, while keeping the user interface simple and collaboration-centric.



Live Action VR

Center for Human-Computer Interaction

Exhibitors:

Wallace Lages, Institute for Creativity, Arts, and Technology, College of Architecture and Urban Studies, School of Visual Arts Virginia Tech,

Tianyu Ge, College of Architecture and Urban Studies, School of Visual Arts ,

Sam Lally

Jessica Robinson, College of Architecture and Urban Studies, Institute for Creativity, Arts, and Technology, School of Visual Arts

Justin Perkinson, College of Liberal Arts and Human Sciences, Cinema School of Performing Arts, Creativity + Innovation, Center for Human-Computer Interaction

Description: Live Action VR is a research project created to understand the potential of immersive experiences that combine techniques from cinema and virtual reality. Instead of using computer generated characters, Live Action VR uses real actors inside a synthetic virtual environment.

The Process: Our work started by crafting an open-ended narrative, which leverages how actors create emotional connection with an audience. To make the transition between reality and VR more seamless, we created a detailed digital version of one of the ICAT's studios, based on photos and measurements from the real location. We then developed a custom software, which takes a stereoscopic input from a camera rig, removes the background, and merges the resulting images with 3D models of the environment. The result is 3D livestream of the actor inside a virtual environment. The final step was to develop appropriate controls to support the narrative progression, for example, to turn off the lights at critical moments of the story.



Media Building Ceramic Hallway Installation

Global Forum on Urban and Regional Resilience | <https://globalforum.vt.edu/>

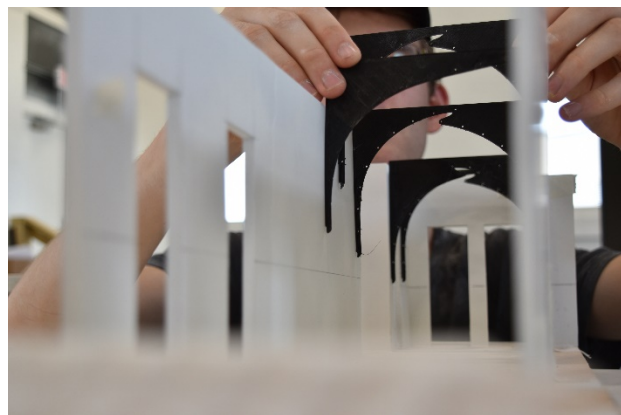
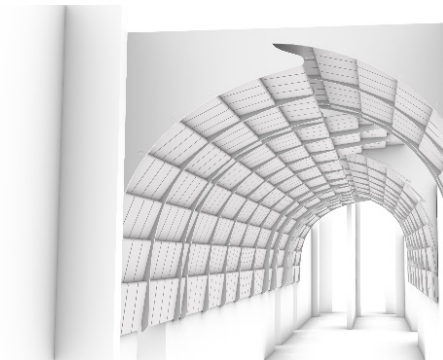
Exhibitors:

Theresa Moriarty, College of Architecture and Urban Studies, GFURR

Dorotea Ottaviani, College of Architecture and Urban Studies, Dean's office

Description: The ceramic hallway installation is an immersive exhibition of ceramics and light. The space transforms the originally bare hallway into an exhibition space for ICAT projects using wood, ceramics, and light.

The Process: The installation was a collaboration of students, faculty and industry partners. To retrofit the space for ICAT, the team took inspiration from the existing glazed wainscoting and arched windows of the old school building. Through research into ceramic materials and glazes, and structural research for the supporting skeleton, the team developed the system supporting wood ribs and hanging ceramic tiles to form a second-skin along the length of the hallway.



MUS 4014: Spatial Sound and Music Class Expo

School of Performing Arts | <https://www.performingarts.vt.edu/>

Exhibitors:

Eric Lyon, College of Liberal Arts and Human Sciences, School of Performing Arts

Description: Students in MUS 4014, "Advanced Electroacoustic Research: Spatial Sound and Music" will present their binaural creative work in this session. Visitors will be able to view a recording of this session, and listen to high-quality binaural music created for headphone listening by students in this class.

The Process: The class was initially designed to teach multichannel spatial composition for high-density loudspeaker arrays (HDLAs) including the 24.4 channel Perform Studio and the world-leading 140-channel Cube system, both located in the Moss Arts Center. After initial instruction in multichannel recording and the simulation of spatial experience on high-density loudspeaker arrays, our class was forced to abandon our multichannel learning environments due to COVID-19. The class then refocused on binaural sound - the creation of 3D sound images for headphone listening. Building on the educational foundation from the first part of class, students delved into encoding multichannel sound into binaural format. This process resulted in the work that will be presented and discussed at this session.

Propolis - immersive exhibition

Propolis - immersive exhibition

Exhibitors:

Reneé Alarid, College of Architecture and Urban Studies, Creative Technologies

Description: The audience is for children ages 4-14 who will be able to track a day in a life of a honeybee. The exhibit will consist of voice overs, audio, and motion graphics to describe how important honey bees are to the economy.

The Process: This capstone project will showcase this researcher's skills in graphic design, spatial sound, architecture, exhibition design, and character modeling.



Research and Curricular Innovation through Transdisciplinary Communities (Destination Areas)

Office of the Provost | https://www.provost.vt.edu/destination_areas.html

Exhibitors:

Catherine Amelink, Provost's Office

Description: This exhibit will showcase highlights in curricular and research innovation that is emerging from the transdisciplinary communities at Virginia Tech known as Destination Areas. The work is the result of over 150 faculty members coming together across the university in thematic focus areas to address compelling and complex problems that impact the human condition.

The Process: The research projects and curriculum highlights are the result of three years of work that has challenged the traditional disciplinary structures of the university.

Social Media Storytelling on the Appalachian Trail

Computer Science Department

Exhibitors:

Kelly Ervin, College of Engineering, Computer Science

Julia Nguyen, College of Engineering, Computer Science

Lindah Kotut, College of Engineering, Computer Science

Scott McCrickard, College of Engineering, Computer Science

Description: Social media is great for sharing pieces of our lives, but it is often difficult to see the big picture. This project provides interactive visualizations of social media posts about the Appalachian Trail. These allow users to explore what happens along the trail and reminisce on their experiences.

The Process: All posts on the r/AppalachianTrail subreddit and all public Instagram and Twitter posts containing the hashtag #AppalachianTrail from 2019 were scraped for this project. Data was aggregated into JSON format, then the text portion of each post was cleaned and analyzed using python scripts. Where post location was unavailable, appropriate locations were determined based on post text. All visualizations were created using HTML/CSS and Javascript (D3).



Student Electroacoustic and Film Score Compositions

Composition at Virginia Tech | <https://www.facebook.com/vtcomposition/>

Exhibitors:

Charles Nichols, College of Liberal Arts and Human Sciences, Institute for Creativity, Arts, and Technology, Music

Leslie Fontaine, College of Liberal Arts and Human Sciences, Music

Brianna Magill, College of Liberal Arts and Human Sciences, Music

William Rhodes, College of Liberal Arts and Human Sciences, Music

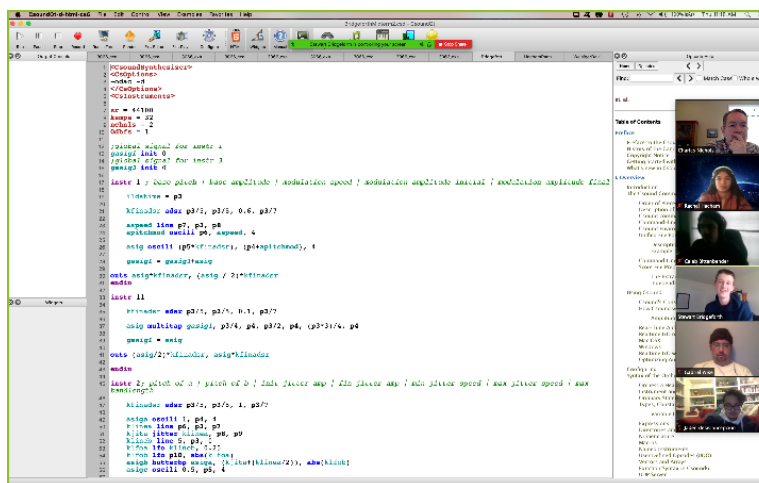
Rachel Hachem, College of Liberal Arts and Human Sciences, Music

Caroline Flynn, College of Liberal Arts and Human Sciences, Music

James Gilchrist, College of Liberal Arts and Human Sciences, Music

Description: Students in the Composition program in the School of Performing Arts at Virginia Tech will present their electroacoustic fixed media and film scores, composed for the MUS 3066 and MUS 2066 classes, taught by SOPA professor and ICAT fellow Charles Nichols.

The Process: Students in MUS 3066 composed fixed media electroacoustic music, programming digital audio synthesis and processing instruments in the Csound programming language and note lists in the Blue integrated music environment. Students in MUS 2066 composed film scores for public domain movies, using digital audio sampler and synthesizer plugins, in the REAPER digital audio workstation.



Studios Network Showcase

Virginia Tech University Libraries | lib.vt.edu/create-share/studios

Exhibitors:

Ellen Boggs, University Libraries

Description: The Studios Network offers a showcase of the tools, technologies, and creation processes available in Newman Library. This showcase includes 3D printing and scanning, virtual reality immersion, data visualization, media production, board games, and more!

The Process: We will share our creation processes by providing interactive demonstrations of the equipment as well as information on how to get involved in the Studios at Newman Library.

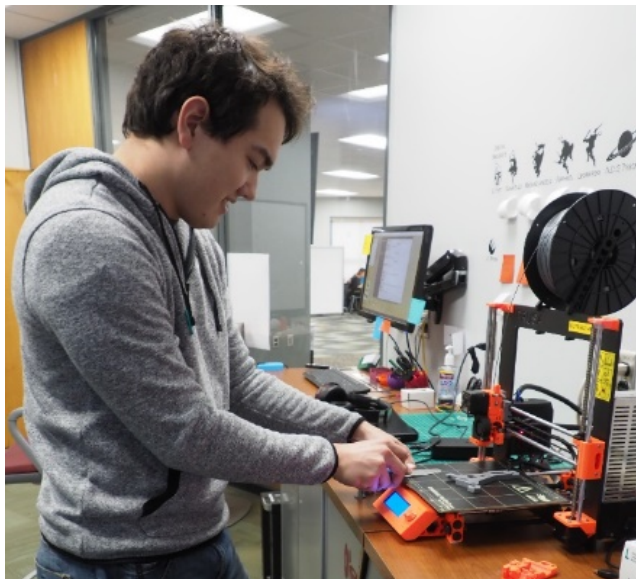


Table of Motion

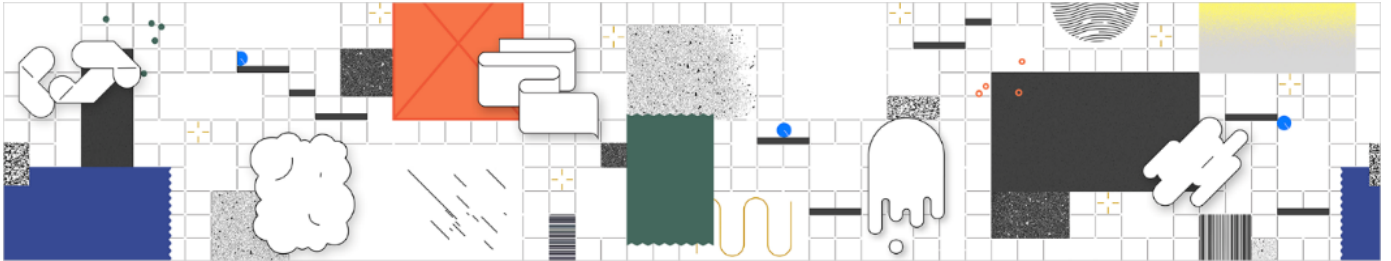
Creative Technologies

Exhibitors:

Boyoung Lee

Description: Table of Motion is a looping motion graphic that explores the movements of various graphic shapes. The key subjects of this work are contemplation and infinity that are generated by random, repetitive, and continuous movements. This allows viewers to have a thought-removing experience and introspective moment when they gaze at timeless movements.

The Process: In this project, I explored the way to overlap repetitive movements and juxtapose graphic elements to create visual rhythm. After collecting elementary graphic shapes and visual metaphors from daily life, I laid them out in Photoshop, planning what kind of movements should be applied to each visual element. I used After Effects to create this motion graphic and precisely calculated the timing of each movement, along with its path in order to make the work smoothly loop.



Textile Space: Klim Helmets

Textile Space

Exhibitors:

Forest Kim, College of Architecture and Urban Studies, School of Architecture + Design

Sam Melnick, College of Architecture and Urban Studies, School of Architecture + Design

Rachel Wolniak, College of Architecture and Urban Studies, School of Architecture + Design

Description: Working with the company Klim, we developed solutions to prevent fogging in snowmobile helmets.

The Process: We did extensive testing and research with the helmets both online and on an electric bike before quarantine. We investigated processes and solutions to the problem and came up with simple prototypes and graphics to help convey the idea of our theoretical solutions.



Time Garden

School of Visual Arts, School of Performing Arts

Exhibitors:

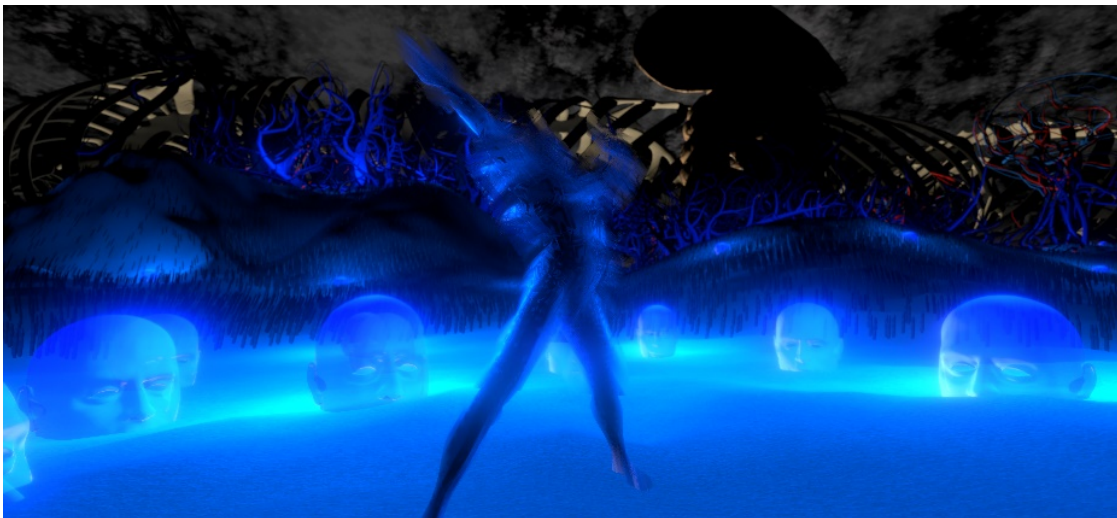
Zach Duer, College of Architecture and Urban Studies, School of Visual Arts

Scotty Hardwig, College of Liberal Arts and Human Sciences, School of Performing Arts

Charles Nichols, College of Liberal Arts and Human Sciences, School of Performing Arts

Description: Time Garden is a virtual reality art installation that synthesizes movement, music, and visual arts. Experience environments that hybridize the human body and technology, and where body and movement can replicate and simulate in surreal digital fantasies and cubist geometrical abstractions.

The Process: Movement artist Scotty Hardwig, composer Charles Nichols, and visual artist Zach Duer met for three hours every week, following an iterative creative process. In the studio, we conducted motion capture on Scotty's movements, scanned his body to create 3D models of his limbs, constructed virtual environment landscapes out of the scanned 3D models and captured motions, recorded the vocal and bodily sounds to set the musical palette, and created systems to pass data between software systems.



Virtual reality (VR) brings STEM alive for middle school age children and their teachers

STEM+ Lab by Commonwealth Learning Systems, LLC | www.stemplus.net

Exhibitors:

Reza Tasooji, College of Engineering, Computer Science

Denis Gracanin, College of Engineering, Computer Science

Jim Murphy

Holly Gillcash, Stem+ by Commonwealth Learning Systems

Sam Williams, College of Engineering, Computer Science

Lee Ann O'Dell, Commonwealth Learning Systems, LLC

Description: The team from the STEM+ Lab by CLS demonstrates how virtual reality can be leveraged to create a highly engaging STEM curriculum for middle school students. The demonstration will show, in real time, what the student sees in the VR headset, the choices they have as they move through the a simulated experiment, and the outcomes of those choices. A second curriculum track developed for teacher professionals will be demonstrated using the same topical areas demonstrated for children.

The Process: CLS partnered with research scientists from the department of computer science engineering at Virginia Tech, and in-service STEM educators from Salem Public Schools to develop multi-dimensional STEM simulations designed for both student and teacher learning. The curriculum was designed to address the newly adopted Virginia Department of Education (VDOE) middle school science standards, which were informed by the Next Generation Science Standards www.nextgenscience.org. The innovative aspect to the project is that it has two tracks, one for the teacher to learn how best to teach the content, and a second for the children to learn the content.

The design process for this project started with identifying the partners so that the content was contextualized appropriately to the needs of the student and the teacher. Research scientists from computer science engineering partnered with STEM educated middle school teachers and their work was facilitated by CLS experts in teacher professional learning. Then, topics from the VDOE middle school science curriculum were chosen and a multi-disciplinary, physical science unit was developed to reinforce the three dimensions of the new standards: practices, cross-cutting concepts, and disciplinary core ideas.

The VR headsets were then programmed with the content and field tested with teachers and students at the STEM+ Lab at the Roanoke Higher Education Center.

The disciplines that came together in the creation of this project included the physical sciences, engineering, computer science, and social sciences (learning science and educational research sciences).

Virtual Sensory Interfaces Project

School of Visual Arts | <https://www.sova.vt.edu/>

Exhibitors:

Thomas Tucker, College of Architecture and Urban Studies, "Institute for Creativity, Arts, and Technology", School of Visual Arts

Tohm Judson

David Franusich, "Institute for Creativity, Arts, and Technology", School of Visual Arts

Daniel Monzel, College of Architecture and Urban Studies, School of Visual Arts

Description: The video demo None will showcase an ongoing interactive Virtual Reality immersive experience that engages all five senses using an HTC VR VIVE set. The VR event will have an audience member enter the VR space where they will be immediately immersed in an infinite virtual void. Out of the darkness, objects emerge. These seemingly floating virtual objects can be actually touched and manipulated within the virtual space while simultaneously releasing an explosion of sound and scents. Participants will interact with the physical VIVE tracked forms animated by puppeteers and be able to place these 3D forms into a multiple layered virtual measure which sits above and around the immersive space, creating a unique sound depending upon the layer, custom changes created by the participant, and how the object interacts with the other forms within the virtual measure.

The Process: Here is a link of the process.

<https://www.youtube.com/watch?v=h8ptfkdBuQ&t=274s>



Visualizing Virginia Tech History: If This Place Could Talk...

Visualizing Virginia Tech History | vt150.omeka.net

Exhibitors:

Paul Quigley, College of Liberal Arts and Human Sciences, History Virginia Tech

David Hicks, College of Liberal Arts and Human Sciences, History and Social Science Education

Kenny Barnes

Ren Harman, College of Liberal Arts and Human Sciences, English VT Stories

Carlos Augusto Bautista Isaza, Computer Science

Bridget Olson, College of Liberal Arts and Human Sciences, School of Visual Arts Creative Technologies

Daniel Monzel, College of Architecture and Urban Studies, Creative Technologies

Jessica Taylor, College of Liberal Arts and Human Sciences, History

Joe Forte, University Libraries, Virginia Tech Publishing

Bradley Kraft, College of Liberal Arts and Human Sciences, History and Social Science Education Virginia Tech

Suzanne Shelburne, History and Social Science Education Virginia Tech

Nicolas Gutkowski, University Libraries, Institute for Critical Technology and Applied Science, College of Engineering, Computer Science

Doug Bowman, College of Engineering, Institute for Creativity, Arts, and Technology, Computer Science Center for Human-Computer Interaction

Thomas Tucker, School of Visual Arts

Emily Humes, College of Liberal Arts and Human Sciences, History

Todd Ogle, University Libraries, "Institute for Creativity, Arts, and Technology", Virginia Tech

Alexandra O'Dea

Description: We're a transdisciplinary group of faculty and students using creative technologies to re-interpret VT history. Learn about our Augmented Reality tour of Solitude. Check out digital exhibits on student protests in the age of Vietnam; the enslaved people who lived and worked on this land; and more.

The Process: We're funded by the University Council on VT History. We assembled a team of faculty and students from history, computer science, education, visual arts, and the libraries—to pool our expertise, knowledge, and methodologies to create truly transdisciplinary projects. We meet weekly to share ideas and provide feedback from our different disciplinary perspectives. We've used historical research, Augmented Reality, projection mapping, and more to reveal new perspectives on the university's past.

ICAT Creativity + Innovation Day Team

Phyllis Newbill, Center for Educational Networks and Impacts, Institute for Creativity, Arts, and Technology

Dylan Parker, Institute for Creativity, Arts, and Technology

Holly Williams, Institute for Creativity, Arts, and Technology

Ben Knapp, Institute for Creativity, Arts, and Technology

George Hardebeck, Institute for Creativity, Arts, and Technology

Tanner Upthegrove, Institute for Creativity, Arts, and Technology

Melissa Wyers, Institute for Creativity, Arts, and Technology

Tom Martin, Institute for Creativity, Arts, and Technology

Haseb Alim, Center for Educational Networks and Impacts

Julee Farley, Center for Educational Networks and Impacts

Lisa McNair, Center for Educational Networks and Impacts

Kimberly Keith, Center for Educational Networks and Impacts

Jamie Little, Center for Educational Networks and Impacts

Susan Bland, Moss Arts Center

Katie Gehrt, Moss Arts Center

Meggin Hicklin, Moss Arts Center

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