

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA, 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.  
PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

|   |                                |   |
|---|--------------------------------|---|
| 1. REPORT DATE (DD-MM-YYYY)<br>17-01-2020 | 2. REPORT TYPE<br>Final Report | 3. DATES COVERED (From - To)<br>21-Aug-2015 - 20-May-2019 |
|---|--------------------------------|---|

|   |   |
|---|---|
| 4. TITLE AND SUBTITLE<br>Final Report: Fulldome Development for Interactive Immersive Training Capabilities | 5a. CONTRACT NUMBER<br>W911NF-15-1-0493 |
|   | 5b. GRANT NUMBER                        |
|   | 5c. PROGRAM ELEMENT NUMBER<br>106012    |

|            |                      |
|------------|----------------------|
| 6. AUTHORS | 5d. PROJECT NUMBER   |
|            | 5e. TASK NUMBER      |
|            | 5f. WORK UNIT NUMBER |

|   |  |
|---|--|
| 7. PERFORMING ORGANIZATION NAMES AND ADDRESSES<br>Institute of American Indian Arts<br>83 Avan Nu Po Road<br><br>Santa Fe, NM 87508 -1300 | 8. PERFORMING ORGANIZATION REPORT NUMBER |
|---|--|

|  |  |
|--|--|
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS (ES)<br>U.S. Army Research Office<br>P.O. Box 12211<br>Research Triangle Park, NC 27709-2211 | 10. SPONSOR/MONITOR'S ACRONYM(S)<br>ARO                  |
|  | 11. SPONSOR/MONITOR'S REPORT NUMBER(S)<br>67276-CS-REP.1 |

|  |
|--|
| 12. DISTRIBUTION AVAILABILITY STATEMENT<br>Approved for public release; distribution is unlimited. |
|--|

|   |
|---|
| 13. SUPPLEMENTARY NOTES<br>The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation. |
|---|

|              |
|--------------|
| 14. ABSTRACT |
|--------------|

|                   |
|-------------------|
| 15. SUBJECT TERMS |
|-------------------|

|                                 |                   |                    |                                      |                     |  |
|---------------------------------|-------------------|--------------------|--------------------------------------|---------------------|--|
| 16. SECURITY CLASSIFICATION OF: |                   |                    | 17. LIMITATION OF ABSTRACT<br><br>UU | 15. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON<br>Mats Reiniusson |
| a. REPORT<br>UU                 | b. ABSTRACT<br>UU | c. THIS PAGE<br>UU |                                      |                     | 19b. TELEPHONE NUMBER<br>505-424-2349              |

# RPPR Final Report

## as of 17-Jan-2020

Agency Code:

Proposal Number: 67276CSREP

Agreement Number: W911NF-15-1-0493

### INVESTIGATOR(S):

**Name:** Mats Reiniusson  
**Email:** mreiniusson@iaia.edu  
**Phone Number:** 5054242349  
**Principal:** Y

**Name:** Charles Veasey  
**Email:** veasec@gmail.com  
**Phone Number:** 5056999178  
**Principal:** N

Organization: **Institute of American Indian Arts**

Address: 83 Avan Nu Po Road, Santa Fe, NM 875081300

Country: USA

DUNS Number: 120476858

EIN: 850377670

**Report Date:** 20-Aug-2019

Date Received: 17-Jan-2020

**Final Report** for Period Beginning 21-Aug-2015 and Ending 20-May-2019

**Title:** Fulldome Development for Interactive Immersive Training Capabilities

**Begin Performance Period:** 21-Aug-2015

**End Performance Period:** 20-May-2019

**Report Term:** 0-Other

Submitted By: Mats Reiniusson

Email: mreiniusson@iaia.edu

Phone: (505) 424-2349

**Distribution Statement:** 1-Approved for public release; distribution is unlimited.

### STEM Degrees:

### STEM Participants:

**Major Goals:** Objectives and Intellectual Merit:

The intellectual merit of this project lies in its ability to partner a unique minority-serving institution with diverse talents and resources to develop not only STEM-based curriculum, but

timely research for emerging immersive Fulldome and other technologies. Our research goal is to improve the interactivity of immersive technology and develop supporting applications that can increase the training and educational capabilities of immersive environments.

#### 1. Research and Educational Objectives

Research will involve content and tool development, and exploration into the use of immersion and simulation to promote STEM learning. In addition to further developing hardware- software infrastructure for Fulldome and immersive displays to deliver true interactive virtual environments, this research project will develop innovative, culturally relevant educational applications for immersive technology that fuse the arts and STEM arenas.

Simultaneously, we will develop curriculum that enhances the STEM educational needs of IAIA students while offering specific training in computer programming and interactive immersive technologies. Through curriculum and training made possible by this technology, students will gain hands-on experience working with an interactive immersive environment.

This research project will thus enhance IAIA's capacity to deliver cutting edge technology training, enhance STEM components of IAIA's liberal arts curriculum, and support students' application of their creative capabilities into high-technology STEM fields. This will increase the economic and professional opportunities for IAIA students, and help develop an educated workforce in virtual and live immersive technology industries.

#### 1a. Research Objectives:

- Research and develop real and synthetic environments and virtual and live interactive content for simulation, training, and other Fulldome application areas including scientific visualization and immersive media.
- Investigate fundamental problem areas of group interaction, perception, and interactive display in the development of Fulldome application areas.
- Update dome tools and technologies, including computer vision and auto-calibration, that

## RPPR Final Report as of 17-Jan-2020

will expand the functionality of the immersive dome to include real time deployment and interactivity.

- Develop and refine high-fidelity, interactive immersive media platforms and fast-response production pipelines for 360 immersive reproduction.
- Research 3D sound and its impact on immersion and simulation.
- Investigate telepresence and interactivity within the Fulldome and VR headsets.
- Extend Fulldome research and production to reproduce virtual environments on arbitrary projection surfaces.
- Research and development of interaction with human biosensors within immersive environments.

These objectives support the project goal of creating interactive Fulldome and immersive experiences for education, workforce development, and virtual training capabilities.

### 1b. Educational Objectives:

Develop a sequence of 6 new courses at IAIA over 3 years. Courses will drive undergraduate research in the technical focus areas of this research project, and will integrate Digital Dome technology as a central feature of IAIA's STEM educational offerings and curriculum.

- Create internship and independent study opportunities for students with local, regional and national leaders in virtual and immersive technologies and digital media.
- Increase recruitment, retention, and graduation rates at IAIA. Student researchers will:
- Create new immersive content for the Dome using 3D reproduction software. This content will create a framework into which other research will be built.
- Develop an understanding of 360 degree audiovisual techniques.
- Create interactivity and other media projects for public presentation.
- Develop effective multicultural pedagogical approaches to innovating arts and STEM subject areas in education. This model will be widely shared with other educational institutions.
- Develop culturally based educational content that will enhance the educational merit of the emerging Fulldome and other immersive technologies.
- Become familiar with research and methods of reporting through demonstration and detailed reports.

**Accomplishments:** Educational Instruction under the proposed program "Computer Programming for the Arts" The course Audio Processing and Spatialization" was taught in the fall semester of 2017 by Robert Drummond a New Mexico audio and video installation artist. This course outlines digital audio synthesis, processing, and spatialization and provides an advanced understanding of audio applications. It continues the study of digital signal processing and generative design. Creative projects were developed by students through programming, electroacoustic composition, and sound art. Course was finalized with a public student performance December 7th in the new 24.4 ambisonics surround sound dome with live interactive controllers. Final show was well visited by IAIA students and the local community.

The ten students were comprised of 5 IAIA fulltime students. One student was in the Studio Arts department and the other four were in the Cinematic Arts department.

During spring semester of 2018 David Beining/M. Reiniusson taught the course "Immersive Environments". David Beining is the Director of Immersive Media at ARTS Lab, University of New Mexico and an immersive audio and video installation artist/instructor. This course focused on executing an immersive work of art incorporating all aspects of production in order to create a large- scale user experience. Students proposed, designed, and developed an immersive work incorporating elements of kinetic sculpture, expanded cinematic, and interactive theatre.

This is the capstone course for the proposed Minor in "Computer Programming for the Arts" and was finalized with an explorative and enlightening collaboration with students and faculty in the new Performing Arts Department with a dance, acting, video, graphics, animation content in the live interactive performance.

The four students were comprised of 4 IAIA fulltime students. One student was in the Studio Arts department and the other three were in the Cinematic Arts department.

### Technology Research and Development

Research and development focused on systems integration and calibration during the third year of the grant. With the DoD award #W911NF-15-R-0025, IAIA was able to update its facilities 2017 with

new projectors, speakers, and interactive hardware.

The new 4k video projector system has successfully been used during fall 2017 and spring 2018 for 360 film screenings and live interactive performances. The installed video playback software to replace vDome did not

## RPPR Final Report as of 17-Jan-2020

perform as planned and is currently being replaced with the Vioso playback system that also has built in dome calibration.

The new high resolution 24.4 ambisonics surround audio system have created a spatially accurate three-dimensional space. This Genelec audio system has the possibility to do auto calibration of 3D audio spaces that is very useful in the IAIA Digital Dome since we have a movable dome and projection screens.

During the year 2017/18 students and faculty have explored the possibilities of virtual reality HMD, controllers, in the HTC VR studio that has become very popular within the student body. The motion capture suit from Synertial is being integrated into curriculum and training will take place with faculty and students.

During the fall 2017 IAIA had Zack Settel as visiting artist from SAT in Montreal. Zack Settel founded and directed the immersive audio research group at the Société des Arts Technologiques (La SAT) in Montreal. As well as full time composer he is also in (arts/science) collaboration with the Center for Intelligent Machines at McGill, working on immersive video/audio/music.

During his residency, Zack Settel presented his interactive work to IAIA students and the digital arts communities of Santa Fe in a two-hour event on Friday November 10. He also presented his works followed by a 45-minute discussion with the public on the state, of the art form. In addition to the performance, he also conducted two seminars on digital arts audiovisual creation in interactive environments. The first seminar focused on artistic approaches and methods, while the second focused on techniques, such as real-time audio rendering for high definition audio systems, such as the IAIA 24.4-channel ambisonics system. Settel also worked with the students in the "Audio Processing and Spatialization" course critiquing, discussing and offering suggestions of how to build, refine and improve the student work.

In spring 2018 IAIA had two visiting artists from University of North Texas, David Stout and Stephen Lucas. David Stout is a highly experienced and skilled artist, composer-performer and innovator of cross-media visual/sound interactive generated work.

His award-winning works include live cinema, interactive video, electro-acoustic music and performances. He currently directs the Hybrid Arts Laboratory at the University of North Texas, where he coordinates the Initiative for Advance Research in Technology and the Arts (iARTA) and holds joint positions in Music Composition and Studio Art – New Media.

Stephen Lucas, composer, intermedia artist, and software developer works together with David at the University of North Texas, College of Music and Advance Research in Technology and the Arts (iARTA).

Students and local community were invited to take part in the free workshop in how to make electronic art with Max/Mitter led by David Stout and Stephen Lucas. Workshop was held at IAIA and was a unique opportunity for IAIA students, faculty, staff and local community to learn this program for video and audio creation and interactivity. In addition, a live interactive performance of the "Janus Switch" by David Stout assisted by Stephen Lucas took place in the IAIA Digital Dome on March 29th. The Janus Switch is a techno-poetic realization of ideas, using signal streams switched rapidly back and forth to create a wide range of sonic and visual interactions. This performance was attended by students, faculty and the local community in the IAIA Digital Dome.

Virtual Interactive Museum

Virtual Reality Design and model building

Rebecca Gogh, IAIA alumni worked with 3D modeling of the interactive, immersive, virtual museum as temporary staff during 2017/18 under guidance of Charles Veasey.

She successfully developed the 3D model for VR Museum. Her position also included working with students and VR in the new HTC VIVE VR studio. She also worked with IAIA work study students primarily involved in Photogrammetry and integrating objects from the IAIA museum collections. During the fall 2017 and spring 2018 students focused on 3D digitizing of art work from the IAIA museum collections. Sixty pieces of art work were successfully photographed and will during the fall 2018 be made into 3D models that will populate the IAIA Virtual Museum.

Charles Veasey Independent Contractor virtual museum project fall 2018. The scope of this project is to design, develop and integrate a Content Management System (CMS) for the Virtual Museum software integrating the IAIA Museum Collections and Cinematic Arts Archive. The Virtual Museum software and Unity project files will be delivered targeting Windows 10 OS. The software will be designed and developed for 16:9 and VR screens. It will support keyboard, mouse, Xbox controller, and VR controller.

Content Management System (curates the virtual environment) • Gallery (virtual environment for the IAIA Collections)

- Theater (virtual environment for the Cine Archive)
- Archive (searches IAIA Collections and Cine Archive)
- Content Management System (CMS) • Media Viewer (displays artwork and metadata)

Under the five-month grant extension, additional images of art from the IAIA National Collection were obtained

## RPPR Final Report as of 17-Jan-2020

using photogrammetry. With the collection being housed in the same building as the Fulldome, it has been very easy to select work that can then be digitized and used by the students. The 3D images were incorporated into classroom teachings and student projects. One student, Nic

### **Training Opportunities:** Workshops:

Zack Settel conducted two seminars on digital arts audiovisual creation in interactive environments. The first seminar focused on artistic approaches and methods, while the second focused on techniques, such as real-time audio rendering for high definition audio systems, such as the IAIA 24.4-channel ambisonics system. Settel also worked with the students in the "Audio Processing and Spatialization" course critiquing, discussing and offering suggestions of how to build, refine and improve the student work. Students and local community were invited to take part in the free workshop in how to make electronic art with Max/Jitter led by David Stout and Stephen Lucas. Workshop was held at IAIA Mac labs and was a unique opportunity for IAIA students, faculty, staff and local community to learn this program for video and audio creation and interactivity.

**Results Dissemination:** Nothing to Report

**Honors and Awards:** Nothing to Report

**Protocol Activity Status:**

**Technology Transfer:** Nothing to Report

### **PARTICIPANTS:**

**Participant Type:** PD/PI

**Participant:** Mats Reiniusson

**Person Months Worked:** 12.00

Project Contribution:

International Collaboration:

International Travel:

National Academy Member: N

Other Collaborators:

**Funding Support:**

**Participant Type:** Undergraduate Student

**Participant:** Christopher Stalling

**Person Months Worked:** 4.00

Project Contribution:

International Collaboration:

International Travel:

National Academy Member: N

Other Collaborators:

**Funding Support:**

**Participant Type:** Undergraduate Student

**Participant:** Katrina Benally

**Person Months Worked:** 4.00

Project Contribution:

International Collaboration:

International Travel:

National Academy Member: N

Other Collaborators:

**Funding Support:**

**Participant Type:** Undergraduate Student

**Participant:** Gabriel Dreamer

**Person Months Worked:** 6.00

**Funding Support:**

**RPPR Final Report**  
as of 17-Jan-2020

Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Participant Type:** Undergraduate Student

**Participant:** Damien Moore

**Person Months Worked:** 8.00

**Funding Support:**

Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Participant Type:** Undergraduate Student

**Participant:** Nathaniel Fuentes

**Person Months Worked:** 9.00

**Funding Support:**

Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Participant Type:** Undergraduate Student

**Participant:** Fern Seiden

**Person Months Worked:** 2.00

**Funding Support:**

Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Participant Type:** Undergraduate Student

**Participant:** Zack Settel

**Person Months Worked:** 1.00

**Funding Support:**

Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Participant Type:** Consultant

**Participant:** Stephen Lucas

**Person Months Worked:** 1.00

**Funding Support:**

Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Participant Type:** Consultant

**Participant:** Robert Drummond

**RPPR Final Report**  
as of 17-Jan-2020

**Person Months Worked:** 4.00  
Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Funding Support:**

**Participant Type:** Consultant  
**Participant:** David Beining  
**Person Months Worked:** 4.00  
Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Funding Support:**

**Participant Type:** Consultant  
**Participant:** Charles Veasey  
**Person Months Worked:** 1.00  
Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Funding Support:**

**Participant Type:** Consultant  
**Participant:** David Stout  
**Person Months Worked:** 1.00  
Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Funding Support:**

**Participant Type:** Consultant  
**Participant:** Rebecca Gough  
**Person Months Worked:** 9.00  
Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Funding Support:**

**RPPR Final Report**  
as of 17-Jan-2020

## **Final Report**

**Institute of American Indian Arts**

**Mats Reiniusson, Project Director**

**May 20, 2019**

## **Fulldome Development for Interactive Immersive Training Capabilities**

**Contract Number: W911NF1510493**

### **Major Goals:**

#### Objectives and Intellectual Merit:

The intellectual merit of this project lies in its ability to partner a unique minority-serving institution with diverse talents and resources to develop not only STEM-based curriculum, but timely research for emerging immersive Fulldome and other technologies. Our research goal is to improve the interactivity of immersive technology and develop supporting applications that can increase the training and educational capabilities of immersive environments.

#### 1. Research and Educational Objectives

Research will involve content and tool development, and exploration into the use of immersion and simulation to promote STEM learning. In addition to further developing hardware-software infrastructure for Fulldome and immersive displays to deliver true interactive virtual environments, this research project will develop innovative, culturally relevant educational applications for immersive technology that fuse the arts and STEM arenas.

Simultaneously, we will develop curriculum that enhances the STEM educational needs of IAIA students while offering specific training in computer programming and interactive immersive technologies. Through curriculum and training made possible by this technology, students will gain hands-on experience working with an interactive immersive environment.

This research project will thus enhance IAIA's capacity to deliver cutting edge technology training, enhance STEM components of IAIA's liberal arts curriculum, and support students' application of their creative capabilities into high-technology STEM fields. This will increase the economic and professional opportunities for IAIA students, and help develop an educated workforce in virtual and live immersive technology industries.

#### 1a. Research Objectives:

- Research and develop real and synthetic environments and virtual and live interactive content for simulation, training, and other Fulldome application areas including scientific visualization and immersive media.
- Investigate fundamental problem areas of group interaction, perception, and interactive display in the development of Fulldome application areas.
- Update dome tools and technologies, including computer vision and auto-calibration, that will expand the functionality of the immersive dome to include real time deployment and interactivity.
- Develop and refine high-fidelity, interactive immersive media platforms and fast-response production pipelines for 360 immersive reproduction.
- Research 3D sound and its impact on immersion and simulation.
- Investigate telepresence and interactivity within the Fulldome and VR headsets.
- Extend Fulldome research and production to reproduce virtual environments on arbitrary projection surfaces.
- Research and development of interaction with human biosensors within immersive environments.

These objectives support the project goal of creating interactive Fulldome and immersive experiences for education, workforce development, and virtual training capabilities.

#### 1b. Educational Objectives:

Develop a sequence of 6 new courses at IAIA over 3 years. Courses will drive undergraduate research in the technical focus areas of this research project, and will integrate Digital Dome technology as a central feature of IAIA's STEM educational offerings and curriculum.

- Create internship and independent study opportunities for students with local, regional and national leaders in virtual and immersive technologies and digital media.
- Increase recruitment, retention, and graduation rates at IAIA.

Student researchers will:

- Create new immersive content for the Dome using 3D reproduction software. This content will create a framework into which other research will be built.
- Develop an understanding of 360 degree audiovisual techniques.
- Create interactivity and other media projects for public presentation.
- Develop effective multicultural pedagogical approaches to innovating arts and STEM subject areas in education. This model will be widely shared with other educational institutions.
- Develop culturally based educational content that will enhance the educational merit of the emerging Fulldome and other immersive technologies.
- Become familiar with research and methods of reporting through demonstration and detailed reports.

#### **Accomplishments Under Goals:**

Educational Instruction under the proposed program "Computer Programming for the Arts"

The course "Audio Processing and Spatialization" was taught in the fall semester of 2017 by Robert Drummond a New Mexico audio and video installation artist. This course outlines digital audio synthesis, processing, and spatialization and provides an advanced understanding of audio applications. It continues the study of digital signal processing and generative design. Creative projects were developed by students through programming, electroacoustic composition, and sound art. Course was finalized with a public student performance December 7th in the new 24.4 ambisonics surround sound dome with live interactive controllers. Final show was well visited by IAIA students and the local community.

The ten students were comprised of 5 IAIA fulltime students. One student was in the Studio Arts department and the other four were in the Cinematic Arts department.

During spring semester of 2018 David Beining/M. Reiniusson taught the course "Immersive Environments". David Beining is the Director of Immersive Media at ARTS Lab, University of New Mexico and an immersive audio and video installation artist/instructor. This course focused on executing an immersive work of art incorporating all aspects of production in order to create a large-scale user experience. Students proposed, designed, and developed an immersive work incorporating elements of kinetic sculpture, expanded cinematic, and interactive theatre. This is the capstone course for the proposed Minor in "Computer Programming for the Arts" and was finalized with an explorative and enlightening collaboration with students and faculty in the new Performing Arts Department with a dance, acting, video, graphics, animation content in the live interactive performance.

The four students were comprised of 4 IAIA fulltime students. One student was in the Studio Arts department and the other three were in the Cinematic Arts department.

#### Technology Research and Development

Research and development focused on systems integration and calibration during the third year of the grant. With the DoD award #W911NF-15-R-0025, IAIA was able to update its facilities 2017 with

new projectors, speakers, and interactive hardware.

The new 4k video projector system has successfully been used during fall 2017 and spring 2018 for 360 film screenings and live interactive performances. The installed video playback software to replace vDome did not perform as planned and is currently being replaced with the Vioso playback system that also has built in dome calibration.

The new high resolution 24.4 ambisonics surround audio system have created a spatially accurate three-dimensional space. This Genelec audio system has the possibility to do auto calibration of 3D audio spaces that is very useful in the IAIA Digital Dome since we have a movable dome and projection screens.

During the year 2017/18 students and faculty have explored the possibilities of virtual reality HMD, controllers, in the HTC VR studio that has become very popular within the student body. The motion capture suit from Synertial is being integrated into curriculum and training will take place with faculty and students.

During the fall 2017 IAIA had Zack Settel as visiting artist from SAT in Montreal. Zack Settel founded and directed the immersive audio research group at the Société des Arts Technologiques (La SAT) in Montreal. As well as full time composer he is also in (arts/science) collaboration with the Center for Intelligent Machines at McGill, working on immersive video/audio/music.

During his residency, Zack Settel presented his interactive work to IAIA students and the digital arts communities of Santa Fe in a two-hour event on Friday November 10. He also presented his works followed by a 45-minute discussion with the public on the state, of the art form. In addition to the performance, he also conducted two seminars on digital arts audiovisual creation in interactive environments. The first seminar focused on artistic approaches and methods, while the second focused on techniques, such as real-time audio rendering for high definition audio systems, such as the IAIA 24.4-channel ambisonics system. Settel also worked with the students in the "Audio Processing and Spatialization" course critiquing, discussing and offering suggestions of how to build, refine and improve the student work.

In spring 2018 IAIA had two visiting artists from University of North Texas, David Stout and Stephen Lucas. David Stout is a highly experienced and skilled artist, composer-performer and innovator of cross-media visual/sound interactive generated work.

His award-winning works include live cinema, interactive video, electro-acoustic music and performances. He currently directs the Hybrid Arts Laboratory at the University of North Texas, where he coordinates the Initiative for Advance Research in Technology and the Arts (iARTA) and holds joint positions in Music Composition and Studio Art – New Media.

Stephen Lucas, composer, intermedia artist, and software developer works together with David at the University of North Texas, College of Music and Advance Research in Technology and the Arts (iARTA).

Students and local community were invited to take part in the free workshop in how to make electronic art with Max/Jitter led by David Stout and Stephen Lucas. Workshop was held at IAIA and was a unique opportunity for IAIA students, faculty, staff and local community to learn this program for video and audio creation and interactivity. In addition, a live interactive performance of the "Janus Switch" by David Stout assisted by Stephen Lucas took place in the IAIA Digital Dome on March 29th. The Janus Switch is a techno-poetic realization of ideas, using signal streams switched rapidly back and forth to create a wide range of sonic and visual interactions. This performance was attended by students, faculty and the local community in the IAIA Digital Dome.

### Virtual Interactive Museum

Virtual Reality Design and model building

Rebecca Gogh, IAIA alumni worked with 3D modeling of the interactive, immersive, virtual museum as temporary staff during 2017/18 under guidance of Charles Veasey.

She successfully developed the 3D model for VR Museum. Her position also included working with students and VR in the new HTC VIVE VR studio. She also worked with IAIA work study students primarily involved in Photogrammetry and integrating objects from the IAIA museum collections. During the fall 2017 and spring 2018 students focused on 3D digitizing of art work from the IAIA museum collections. Sixty pieces of art work were successfully photographed and will during the fall 2018 be made into 3D models that will populate the IAIA Virtual Museum.

Charles Veasey Independent Contractor virtual museum project fall 2018. The scope of this project is to design, develop and integrate a Content Management System (CMS) for the Virtual Museum software integrating the IAIA Museum Collections and Cinematic Arts Archive. The Virtual Museum software and Unity project files will be delivered targeting Windows 10 OS. The software will be designed and developed for 16:9 and VR screens. It will support keyboard, mouse, Xbox controller, and VR controller.

Content Management System (curates the virtual environment)

- Gallery (virtual environment for the IAIA Collections)
- Theater (virtual environment for the Cine Archive)
- Archive (searches IAIA Collections and Cine Archive)
- Content Management System (CMS)
- Media Viewer (displays artwork and metadata)

Under the five-month grant extension, additional images of art from the IAIA National Collection were obtained using photogrammetry. With the collection being housed in the same building as the Fulldome, it has been very easy to select work that can then be digitized and used by the students. The 3D images were incorporated into classroom teachings and student projects. One student, Nicholas Fuentes, used the images to construct a virtual Museum that could be projected within the Fulldome as a part of his Senior Project. This allowed anyone to “walk” through the exhibit, and virtually interact with each piece. The virtual museum served several purposes: 1) Fragile art works could be viewed by innumerable people without any danger of harming the pieces, 2) The art has the potential to be taken to multiple locations and viewed repeatedly for a fraction of the cost of having the actual art pieces packed and shipped, 3) Many students have been trained in the use of the Fulldome system and the photogrammetry software. The majority of the IAIA students that are being trained in the use of the Fulldome are Cinematic Arts majors and Museum Studies majors. This will allow them to use the techniques in the burgeoning film and television industry in New Mexico and across the country, Museums, and educational institutions.

Charles Veasey was an Independent Contractor for the virtual museum project. He designed, developed, and integrated a Content Management System (CMS) for the Virtual Museum software integrating the IAIA Museum Collections and Cinematic Arts Archive. The Virtual Museum software and Unity project files were then delivered targeting Windows 10 OS. The software was designed and developed for 16:9 and VR screens, and it supports keyboard, mouse, Xbox controller, and VR controller. All the components of the system are connected through a user menu, and a help screen is available for each component.

### **Training Opportunities:**

Workshops:

Zack Settel conducted two seminars on digital arts audiovisual creation in interactive environments. The first seminar focused on artistic approaches and methods, while the second focused on techniques, such as real-time audio rendering for high definition audio systems, such as the IAIA 24.4-channel ambisonics system.

Settel also worked with the students in the “Audio Processing and Spatialization” course critiquing, discussing

and offering suggestions of how to build, refine and improve the student work.

Students and local community were invited to take part in the free workshop in how to make electronic art with Max/Jitter led by David Stout and Stephen Lucas. Workshop was held at IAIA Mac labs and was a unique opportunity for IAIA students, faculty, staff and local community to learn this program for video and audio creation and interactivity.

**Results Dissemination**

Nothing to Report

**Plans Next Reporting Period**

None – End of grant

**Honors and Awards**

Nothing to Report

**Protocol Activity Status**

**Completed**

**Technology Transfer**

Nothing to Report

**Distribution Statement:**

---

Approved for public release; distribution is unlimited.

## Participants

---

**First Name:** Mats **Last Name:** Reiniusson  
**Project Role:** Faculty  
**National Academy Member:** N  
**Months Worked:** 12  
**Countries of Collaboration**

**First Name:** Christopher **Last Name:** Stalling  
**Project Role:** Undergraduate Student  
**National Academy Member:** N  
**Months Worked:** 4  
**Countries of Collaboration**

**Last Name:**  
**First Name:** Katrin **Last Name:** Benally  
**Project Role:** Undergraduate Student  
**National Academy Member:** N  
**Months Worked:** 4  
**Countries of Collaboration**

**First Name:** Gabriel **Last Name:** Dreamer  
**Project Role:** Undergraduate Student  
**National Academy Member:** N  
**Months Worked:** 6  
**Countries of Collaboration**

**First Name:** Damien **Last Name:** Moore

**Project Role:** Undergraduate Student

**National Academy Member:** N **Months Worked:** 8

N

**Countries of Collaboration**

---

**First Name:** Nathaniel **Last Name:** Fuentes  
**Project Role:** Undergraduate Student  
**National Academy Member:** N **Months Worked:** 9  
**Countries of Collaboration**

**First Name:** Fernan **Last Name:** Seiden  
**Project Role:** Consultant  
**National Academy Member:** N **Months Worked:** 2  
**Countries of Collaboration**

**First Name:** Zack **Last Name:** Settel  
**Project Role:** Consultant  
**National Academy Member:** N **Months Worked:** 1  
**Countries of Collaboration**

**First Name:** Stephen **Last Name:** Lucas  
**Project Role:** Consultant  
**National Academy Member:** N **Months Worked:** 1  
**Countries of Collaboration**

**First  
Name:**

Rober  
t

**Last  
Name:**

Drummond

**Project  
Role:**

Consultant

**National Academy Member:**

**Months Worked:**

4

N

**Countries of Collaboration**

---

**First Name:** David **Last Name:** Beining  
**Project Role:** Consultant  
**National Academy Member:** **Months Worked:** 4  
N  
**Countries of Collaboration**

**First Name:** Charles **Last Name:** Veasey  
**Project Role:** Consultant  
**National Academy Member:** **Months Worked:** 1  
N  
**Countries of Collaboration**

**First Name:** David **Last Name:** Stout  
**Project Role:** Consultant  
**National Academy Member:** **Months Worked:** 1  
N  
**Countries of Collaboration**

**First Name:** Rebecca **Last Name:** Gogh  
**Project Role:** Consultant  
**National Academy Member:** **Months Worked:** 9  
N  
**Countries of Collaboration**



# IAAIA

INSTITUTE OF  
AMERICAN INDIAN ARTS

Museum

Archive

 Login

 Settings

 About

SEARCH ...

Q V ALL



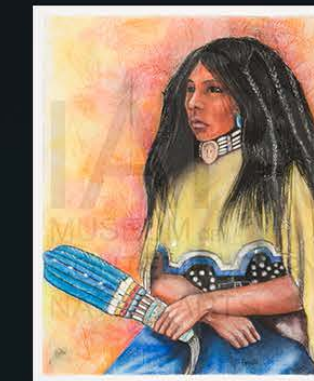
**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



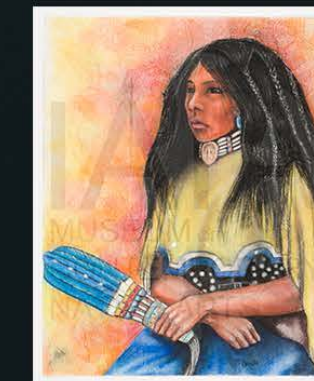
**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



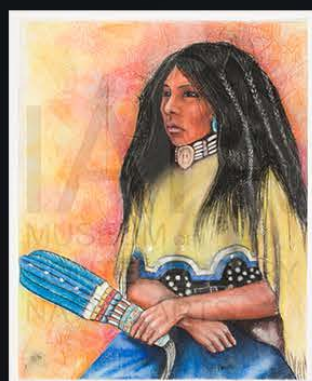
**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



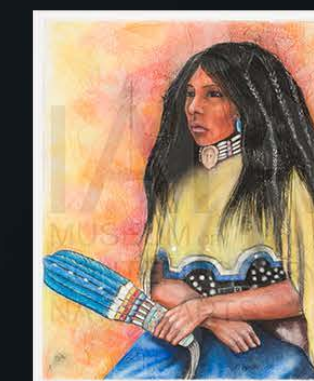
**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



The Virtual Museum features the contemporary art collection of the Institute of American Indian Art. The artwork was digitally prepared and integrated into a curated virtual environment. The Virtual Archive allows you to search and browse IAIA's entire collection, which encompasses over 8,000 items including paintings, weavings, and sculpture. The Virtual Museum is an educational development project made possible by a STEM grant from by the DoD.

The Institute of American Indian Arts is a fully accredited four-year college whose mission is to empower creativity and leadership in Native arts and cultures through higher education, lifelong learning, and outreach. Through the concept of art as a traditional path of creativity, IAIA excels at skill building, provoking thought and providing exceptional educational opportunities. IAIA is a place to embrace the past, enrich the present and create the future. To move ahead to paths yet unexplored and undiscovered.



Username

Password

Log In

A login form centered on a dark blue background. It consists of three vertically stacked rectangular boxes. The top box is dark grey and contains a white person icon followed by the text 'Username'. The middle box is also dark grey and contains a white padlock icon followed by the text 'Password'. The bottom box is bright green and contains the text 'Log In' in white. A white mouse cursor arrow is positioned over the 'Log In' button.

## ADMINISTRATOR

Gallery Layout

Theater Playlist

Archive Database



## GALLERY LAYOUT

✓ FLOOR 2 ✓ ✕

1



**Augue interdum velit**  
Moyah, Courtney (White Mountain Apache/Pima/Papago)

3D

+ Add New



## THEATER PLAYLIST



1



**To Cry in the Dark**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



Add New

**+ ADD NEW ITEM**

You are logged in as **Administrator**. You can add, edit, and delete items in the database.

SEARCH ...

Q **ALL**



A-75

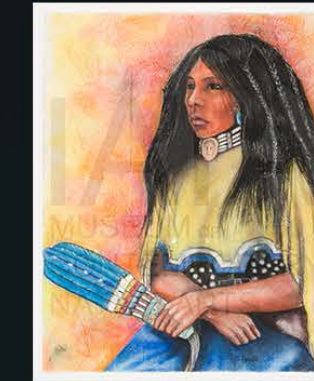
**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



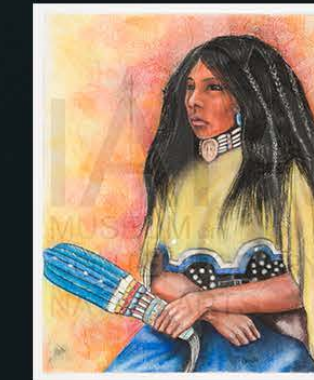
**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)



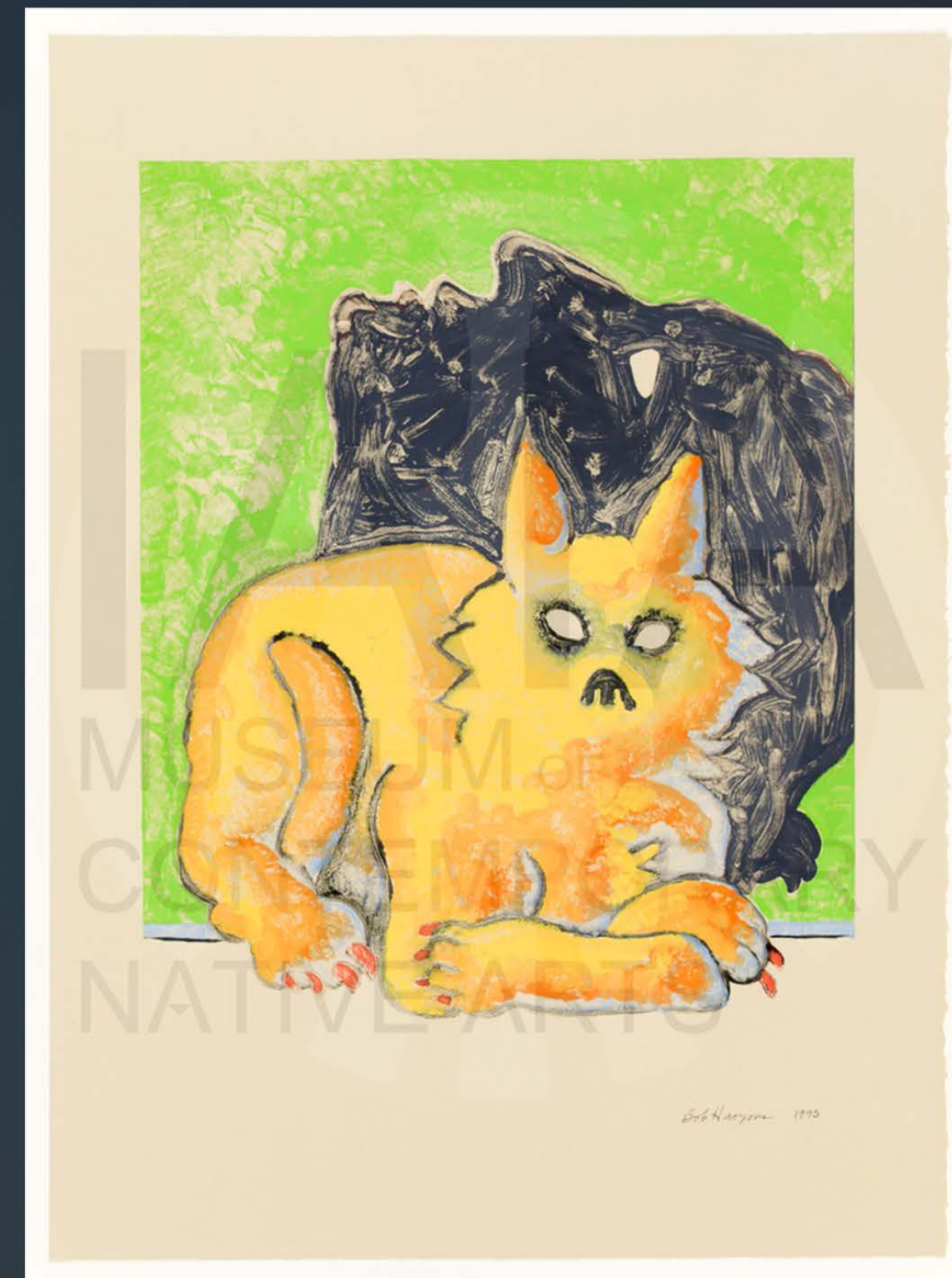
**Augue interdum velit**

Moyah, Courtney (White Mountain Apache/Pima/Papago)

Moyah, Courtney (White Mountain Apache/Pima/Papago)

## Augue interdum velit

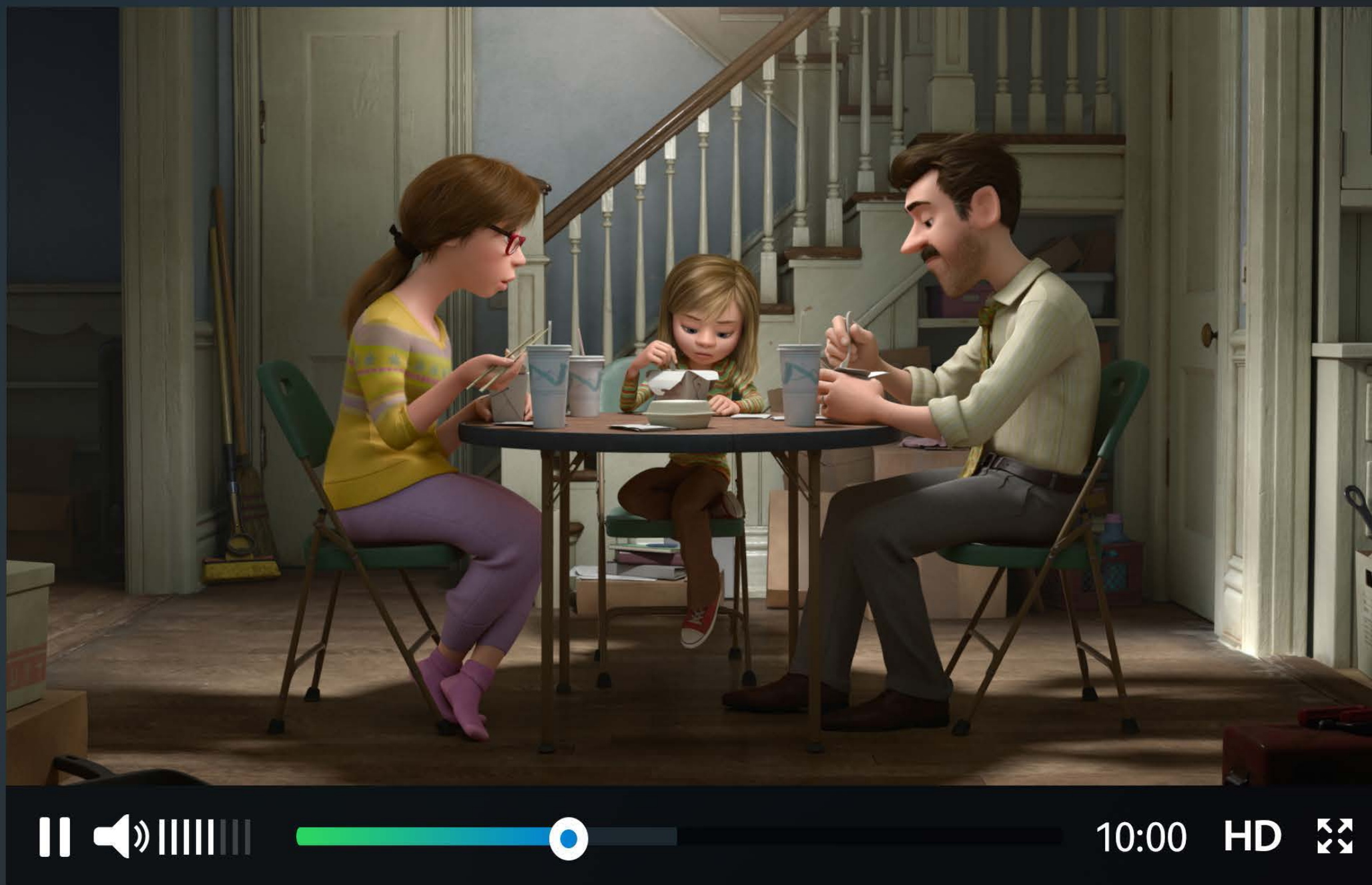
Ink on Watercolor Paper  
Height: 26.25 in, Width: 22 in,  
Drawing of an abstract portrait in black ink on white paper.



Moyah, Courtney (White Mountain Apache/Pima/Papago)

## Augue interdum velit

Ink on Watercolor Paper  
Height: 26.25 in, Width: 22 in,  
Drawing of an abstract portrait in black ink on white paper.





# GAME CONTROL



Gallery

Theater

Archive

Settings

Exit

Cancel

Title

Quit

## GALLERY

Ground

Floor 2

Floor 3

Floor 4

Terrace