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1-1-2022

LeARn to Play: Capturing Motion and Creating AR Graphics

Vinny Argentina
University of Alabama in Huntsville

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RCEU 2022 Project Proposal

Project Title

LeARn to Play: Capturing Motion and Creating AR Graphics

Faculty Information

Name: Vinny Argentina

Status: Associate Professor

Department/Program: Art, Art History & Design

College: Arts Humanities and Social Sciences

Phone: 256 824 6521

UAH Email: vinny.argentina@uah.edu

Proposal ID   RCEU22-ARS-VMA-02

RCEU 2022 Project Proposal

I. Project Description

This proposal assembles a multidisciplinary research team from the UAH College of Arts, Humanities & Social Sciences, the UAH College of Science, and the UAH College of Business to leverage Augmented Reality (AR) and principles of gamification in order to enhance the quality, efficacy, and accessibility of remote music instruction. The project arose from the worldwide pivot within academic institutions from in-person to remote instruction in response to the COVID-19 pandemic. The teaching and learning of music performance was particularly challenged by the remote setting as it is a skill-based platform which depends heavily upon a centuries-old, highly effective pedagogy rooted in individualized instruction and live, interactive demonstration. When forced into the remote realm, we found that the ability to effectively demonstrate technique and assess student achievement was severely impaired. This project endeavors to not only eliminate those limitations imposed by remote learning but to wholly reimagine 21st century music instruction (and instruction of any skill-based practice, for that matter) through the use of AR and gamification technologies in order to elevate, advance, expand, democratize, and modernize skill-based pedagogy.

II. Student Duties, Contributions, and Outcomes

The selected student will work with the faculty mentor to learn the hardware and software for our newly acquired optical motion capture system, then experiment with and design the system configuration needed for accurate musician hand capture on a guitar. The student will then capture multiple performances by our guitar instructor and clean up mocap data as necessary. The final steps will be applying mocap data to a mesh and skeleton in Unity. The student will also be responsible for making or selecting a detailed hand mesh as well as rigging and tuning the deformations of the mesh to be as realistic as possible.

The final student contribution to the project will be the animated 3D guitar instructor hands that are used as AR graphical overlays. It's possible that full body capture will also be done for this project to help demonstrate posture, guitar orientation, etc from any angle, but we do not anticipate the selected student needing to model a full character at this time.

The biggest take away from this project for the student will be an in-depth understanding of how to troubleshoot and run a high-end optical motion capture system. Motion capture is a desirable skill in the workforce and the level of experience and understanding gained from working on this project will provide the student with a tremendous advantage. The selected student will also learn how to rig detailed, anatomically correct models, as well as how to prepare assets and animations for use in a real-time engine. Finally, the selected student will learn many industry best practices and tools needed in professional work, such as task scheduling/tracking and version control.

III. Student Selection Criteria

Previous experience with animation is necessary for the success of this project, so a minimum of one of the following animation skill development courses is required: ARS 321 Organic Modeling, ARS 322 3D Animation, or ARS 324 Technical Art. Students with 2 or more of these classes and additional technical experience are preferred. In addition to having experience with animation, a proven track record of having a positive attitude, good organizational skills, troubleshooting skills, strong communication skills, and being self-motivated are important factors that will be considered. Students will be evaluated based on their letter and portfolio materials - please make sure you include a link to your online portfolio!

IV. Project Mentorship

The selected student will work on-campus in both Wilson Hall and in the motion capture studio in Morton Hall. Working hours will be flexible, but full time work (40 hours per week) will be expected. The faculty mentor will work with the selected student to help familiarize them with the tools and skills needed for the project, but a good deal of independent troubleshooting and problem solving is also expected from the selected student. The mentor will work with the student directly on production requirements ranging from modeling and rigging, to helping with brainstorming mocap setup options, mocap cleanup, and implementing assets in game. The mentor will oversee all work on the project as art and technical director to help ensure high quality technical and aesthetic goals are achieved. Finally, the faculty mentor will create and help maintain a Subversion repository for project files as well as a project and milestones in Shotgrid for task/time tracking.