VR/AR Development for Student Learning at MADE@UF

Proposer: Samuel R. Putnam, Assistant University Librarian, Marston Science Library, srputnam@ufl.edu; Sara R. Gonzalez, Ph.D., Assistant University Professor, Marston Science Library, saragonz@ufl.edu; Matthew Pendleton, Senior Director, Department of Information Technology, UF Division of Student Affairs, MattP@ufsa.ufl.edu; Sriram Kalyanaraman, Professor of Journalism, College of Journalism and Communications, sri@jou.ufl.edu

Sponsoring Organization: Marston Science Library, George A. Smathers Libraries

Purpose and Specific Objectives: To enable and enhance virtual and augmented reality (VR/AR) development for the University of Florida community.

Marston Science Library (MSL) and Infinity Hall's Made@UF development environments have become hubs for virtual and augmented reality development at UF. Within Made@UF, students can develop VR/AR on VR-capable computers using technology such as Oculus Rift, HTC Vive, Microsoft Hololens, Samsung Gear VR, Google Daydream, and OSVR. As technology advances and VR/AR become more ubiquitous, Made@UF seeks to forge ahead and provide the tools, opportunities, and training for UF to become notable in VR/AR development. This team seeks to leverage these assets already in place at MSL and Infinity Hall to achieve this goal. With the funds from this technology fee proposal, the project team will:

- Increase access to new technology in MADE@UF in order to enable development that incorporates gesture control, brain-computer interface (BCI), and wireless VR by fall 2018; and,
- Expand student use of VR/AR technology beyond the libraries by circulating VR backpacks, VR gaming systems, and AR headsets by fall 2018.

Impact/Benefit:

MSL is the most visited library on campus, with over 600,000 patrons during the fall 2017 semester alone, while Infinity Hall houses 312 student entrepreneurs. Marston Science Library and Infinity Hall are the only places on campus where patrons can borrow this variety of equipment. For example, Oculus Rift was circulated 264 times in 2017. From October through December 2017 alone, collaborative development spaces in Made@UF were reserved 230 times. From fall 2017 to the present, Made@UF hosted 5 workshops and 2 events serving approximately 200 participants learning and experiencing VR/AR; 3 workshops are yet to be hosted before the end of the spring 2018 semester.

The project team posits that it is important to capitalize on this VR/AR development climate by expanding and increasing access for students. This development climate is not strictly beneficial to computer science and engineering students. Several different disciplines have benefited from VR/AR development in Made@UF.

Below are examples of the different VR/AR projects developed in Made@UF during the fall 2017 semester, representing the integration of several disciplines across campus:

- Interior designers used a VR project called "Empathy in Interior Design" that put the user in a wheelchair as they attempt to navigate a store they designed. The experience helps interior designers make their spaces more accessible for all users.
- Building construction benefited from a project that allowed students and instructors to visit job sites virtually and examine potential safety issues. The experience allows students to experience multiple job sites in a short period of time without any travel or risk associated with being on a live construction site.
- Non-native English speakers who are on a tour of the UF campus can experience the tour translated in their native language using augmented reality and Bluetooth beacons, making campus more accessible to all people.
- Students with an autism spectrum disorder can work with therapists to interact with potentially stressful situations through VR. This experience walks students through the TSA screening process at the airport to prepare them for a fraught situation.
- Pediatricians can use VR to hear the difference between normal and abnormal heart sounds. This interactive training for pediatricians can reduce hospital referrals for their patients, which saves patient time and money as well as hospital resources.
- Doctors benefit from an AR application developed to overlay patient information on the doctors' glasses. This immediate access can help eliminate medical errors, the third leading cause of patient death in the United States.

Every discipline on campus benefits from virtual and augmented reality. Made@UF is the only place on campus where this development can happen due to its accessibility by all those in the UF community. Students can use this equipment and space as a valuable career building tool. Alec Hoffman, UF student and former president of Gator VR, told the team:

> Thanks to the Made@UF program, UF students have access to industry grade hardware that enables us to get an invaluable head start in an industry that didn't exist just a few years ago. I am immensely grateful for Made@UF's investment in us students, and it has been a great help in Gator VR's efforts to grow a VR community here at UF.

Shannon Butts, Ph.D. candidate in English, uses Made@UF to hold workshops that benefit her research areas. Butts told the team:

Working with Made@UF has helped me advance my research with mobile writing technologies, 3D printing, virtual reality, and community literacy initiatives. For the past three years, I have used Made@UF equipment and resources to build several augmented reality applications based in Paris, France; Atlanta, Georgia; and in Paynes Praire State Park in Gainesville, Florida. In addition, I have partnered with Made@UF to teach technology workshops and develop community resources for the University of Florida as well as open source making communities online. Working with Made@UF has enabled me to learn more about emerging technologies, while also building my research portfolio and extending my pedagogical practice.

Faculty also benefit from Made@UF as a resource for their teaching. Dr. Stephen H. Arce, Lecturer and Primary Faculty member in Biomedical Engineering, told the team:

> I chose Made@UF because Marston is a common resource for all students, located centrally on campus, and the Made@UF space is visible to everyone passing through to study in the bottom floor. The space was also equipped with the tools I needed to demonstrate the process of coding and compiling apps for mobile devices. In the future, I plan to focus the workshop on only a few students and do more one-on-one instruction with each student at their own work station.

With funds from this technology fee, Made@UF users will be able to expand the potential of their creations through access to proposed technology hardware. The following introduces equipment to be purchased and a summary of each item's applicability.

- Leap Motion Universal VR Bundle in conjunction with the Oculus Rift or HTC Vive allows users to incorporate gesture recognition into their projects. Gesture recognition is when a computer interprets human gestures in order to interact with and control computer programs.
- Emotiv EPOC+ measures the electrical activity of the brain and uses that activity to interact with your computer. This brain-computer interface allows users to interact with the virtual world using only their brain.
- Playstation 4 VR will allow students to deploy VR experiences anywhere a television is present. Playstation 4 VR applications can be developed on VR-capable computers in Made@UF. However, users wishing to deploy their VR experiences outside of the libraries can do so much easier.
- HP Z VR Backpack Workstation removes the desktop and laptop from the VR experience by allowing users to strap their PC on their back. These backpacks work with existing VR systems to create an untethered VR experience.
- Magic Leap One is a cutting-edge mixed reality headset that advances well beyond the capabilities of the Microsoft Hololens, the current industry standard.
- HTC Vive Wireless Adapter pairs with our current HTC Vives to create an untethered VR experience. By removing the cords, users participate in a more immersive experience with greater flexibility.

Equipment Storage:

Marston Science Library and Infinity Hall will provide dedicated and secure storage space for all Made@UF VR/AR technology. Individually, each item will receive its own case for safe handling when being checked out from their respective locations.

Checkout Procedures at MSL and Infinity Hall:

- To borrow equipment, patrons will visit Marston Science Library's service desk or the Infinity Hall's front desk staff to pull requested items from the secured storage area and initiate checkout procedures and review the Equipment Loan Borrower Agreement form and due date with patron.

- All items will be available on a first-come, first-served basis. No reservations required.

- An online guide and webpage will be created where patrons can browse and check availability of equipment, view equipment descriptions, and view and download manuals.

- Leap Motion VR Bundles, Playstation 4 VR systems, Emotiv EPOC+, HP Z VR Backpack Workstation, and Magic Leap One in Made@UF in Marston Science Library will have a checkout period of 7 days with the exception of the HTC Vive Wireless Adapters, which will be added to the current HTC Vive kits available for checkout.

- Leap Motion VR Bundles, Playstation 4 VR systems, Emotiv EPOC+, HP Z VR Backpack Workstation, and Magic Leap One items in Infinity Hall will be available for use in Made@UF in Infinity Hall with the

exception of the HTC Vive Wireless Adapters, which will be added to the current HTC Vive kits available for checkout.

- Extended loans will be available by special request only and granted at the discretion of Student Affairs and MSL on a case-by-case basis.

- Heavy-duty cases with removable padding will allow convenient transport and protection of VR/AR equipment.

Sustainability:

The Libraries and Student Affairs support this proposal and will maintain and support use of the equipment as needed. Maintenance costs will be absorbed by the UF Libraries and Student Affairs, respectively.

Timeline:

Timeframe in Month(s)	Action
Award notification – July 2018	• Preliminary plan for deployment by project team.
August 2018	• Funds awarded. • Technology purchased.
September 2018	• Hardware is cataloged (MSL) and prepared for circulation (MSL & Infinity). • Documentation created to accompany technology. • Instructional material created to assist users. • Work with IT to install necessary software on Made@UF computers. • Plan 4 workshops for students to gain hands-on experience.
September 2018 – November 2018	• Classes and campus organizations work with PIs to integrate into course or club projects. • Update the Libraries webpages and Library guides to promote availability of new hardware and borrowing procedures. • Create and disseminate promotional material describing new hardware availability and examples of practical applications. • Email information about new technology to Made@UF mailing list. • Host kick-off events for students and faculty to interact with new technology. • Host workshops for the UF community related to the availability and potential benefits of integrating new technology in coursework, scholarship, and other applications.
Future Semesters	• Classes and organizations continue to utilize the technology. • Continue to offer workshops on using the technology.

Budget: $16,619.85

The proposed quantity and current list price of each of the equipment and software items are listed below and may be adjusted based on prices of latest available technologies at the time of the Technology Fee award. Every effort will be made to find the best prices for all of the equipment purchased.

Qty	Description	Per Item	Total	Image
9	Leap Motion Universal VR Bundle (with cases)	$89.99	$809.91	
4	Playstation 4 VR (with cases)	$749.99	$2,999.96	
2	Emotiv EPOC+ 14 Channel Mobile EEG (with cases)	$799.99	$1,599.98	
2	HP Z VR Backpack G1 Workstation	$3,299.00	$6,598.00	
4	Magic Leap One (with cases)	$1,003.00	$4,012.00	
6	HTC Vive Wireless Adapter	$100.00	$600.00