Workshop Title : **Modeling Environmental Data for VR**

Presenter:

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Abstract:

This workshop introduces participants to the capacity of virtual reality (VR) to facilitate the communication and understanding of the quantifiable information generated through design simulation and analysis. Participants will be introduced to VR as a representation tool through a hands-on demonstration, an illustrated and guided workflow through how virtual environments are generated, and a collective data integration exercise using Unity 3D. The virtual model will focus on representing building and urban analysis data including daylighting, temperature variation, airflow, resource allocation, demographic distribution and zoning. During the workshop, participants will be able to virtually walk through and interactively engage with coinciding layers of building and city data. Upon conclusion, it is anticipated that participants will infer how VR design environments can encourage comprehension of quantifiable data that is critical to optimizing design for healthy, intelligent and resilient buildings and urban environments.

Keywords:

Virtual Reality, Immersive Representation, Energy Analysis, Data Visualization, Simulated Environments

Learning Objectives:

Upon completion of the workshop participants will be able to:

- Design an interactive, immersive virtual environment using digital modeling software, video gaming engines, and a virtual reality headset.
- Describe the capacity of VR as a representational tool for design and simulated content.
- Conceive and translate quantifiable data through spatially occupiable representation.
- Recognize the relationship between analysis data and formal, physical components.

Background:

The advent of consumer grade virtual reality (VR) devices have made full-scale immersive representation of design environments readily accessible. While software developments have made the inclusion of design models in the virtual environment a fairly simple export process, methods for translating critical data from simulation analysis into these environments remain under-established. Analysis data is traditionally represented through 2D methods like charts, tables, or false-color-mapped plans. These flattened representation methods sometimes makes it difficult to correlate the data with its physical situation.

Using VR to visualize analysis data in 3D creates an immersive method for communicating and understanding the spatio-temporal character of simulated conditions and the potential impacts on comfort, development, climate and economics, but it requires the invention of new methods for representing this data. This workshop will challenge participants to create their own methods for representing data 3-dimensionally. The resulting model will include the geometry of a portion of a city as well as measured demographic, economic and climactic data collected by the presenters in advance.

The content has been modified to fit the constraints of the workshop format and is expected to allow for maximum exposure to new techniques and methods in the provided time and with the available resources.

Intended Audience:

Educators, designers, and practitioners interested in the communication and comprehension of simulated data using new immersive 3-dimensional representation techniques.

Presenter Biography:

Amber Bartosh is a LEED-accredited architect and interior designer who has designed and managed award-winning projects in the United States, China, Kuwait, and the U.A.E. She received her B.A. in Art and Architecture from Rice University and her M.Arch from the Southern California Institute of Architecture (SCI-Arc). Amber is currently an Assistant Professor at Syracuse University School of Architecture, a Syracuse Center of Excellence Faculty Fellow, and co-director of the Interactive Design and Visualization Lab (IDVL). Her work focuses on the architectural application of emergent materials through physical prototyping and advanced visualization technologies including virtual reality simulation.

Her collaborative research project, Virtual Environment for Design Analysis (VEDA), completed with lab partner Dr. Bess Krietemeyer, is a precedent for the workshop and explores the capacity of VR as a representation tool for energy data. (Technology | Architecture +

Design, May 2017) More information on this publication and other research interests can be found on the Interactive Design and Visualization Lab (IDVL) website at http://idvl.syr.edu/

Proposed Schedule (3 hours):

Hour 1: Introduction & Instruction

Participants will be invited to experience data-integrated VR environments created by the presenter using the VR headset in the Interactive Design Visualization Lab (IDVL) at the CoE.

Hour 2: Instruction & Work Session

Participants will be guided through the process of creating 3D representations of quantifiable data and incorporating these data sets in immersive virtual reality environments using Unity3D.

Hour 3: Experience & Discussion

Participants will be able to virtually walk through and interact with the environmental model that they have collaboratively produced. This model will include the base urban content prepared by the presenters layered with the 3-dimensionally represented quantified data produced by the participants. While in the VR environment participants will be able to interact with the data, selectively turn on and off content, and overlay multiple visualizations simultaneously. In this way, the presenters hope that participants will witness how the VR representation of simulated analysis data enables a new method for communicating environmental information and discovering novel relationships between data sets.

Post-Workshop:

If the space and time is available, presenters will host an open-house session for all conference attendees to experience the virtual environment created during the workshop. In this way, the relevance of the workshop's content will extend to a broader audience and stimulate discussion between attendees.

Materials provided:

2 desktops and VR headsets for the workshop as well as the necessary tripods, power, and extension cords.
Detailed electronic and hardcopy handouts will be provided to all participants.

Laptop Required:

All participants will need a laptop with modeling software of their preference with the capacity to export model files as a .fbx file. Windows and Mac laptops will be supported.
Recommended that participants install the freely available gaming engine software, Unity3D, on their laptops prior to the workshop but this is not requisite for participation.

Space and Enrollment:

Enrollment should be limited to 20. Participants may work in groups of 2-3. The workshop will be hosted in the Interactive Design & Visualization Lab (IDVL) at the Syracuse Center of Excellence (CoE).