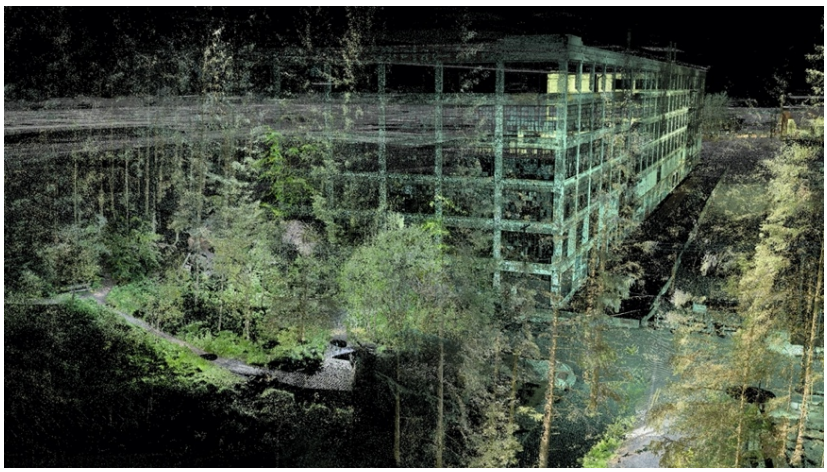
ARTS ENGINE

EMPATHY IN POINT CLOUDS: RECONSTRUCTING SPATIAL IDEAS AND STORYTELLING THROUGH IMMERSIVE TECHNOLOGIES IN ARCHITECTURE



Architects make representations of spatial ideas as part of the design process and for public presentation. The architecture student translates spatial ideas to drawings and models. The experience of these spaces are only imagined by the student and one outside of the design process. This team will enable the architecture student to translate and test spatial ideas in the design process through immersive technologies using point clouds generated from photogrammetry and LiDAR. In addition to scanning and photogrammetry, this team will test design methodologies (experimenting with VFX and VR), create templates for workflow documentation, and establish a database for site scans and student projects.

This initiative focuses on integrating LiDAR scanning and photogrammetry into the curriculum of architecture. The conceptual extension of existing, conventional methods of measuring, drawing, modeling, and designing will:

1. produce more effective and engaging communication of spatial ideas while simultaneously broadening the toolset in architectural education
2. document, track and build upon research and workflows through creation of templates and databases for public access, and
3. stage opportunities to work in interdisciplinary teams to establish initial experiments, build upon these in coursework, and consider other tools and technology given the necessity of architecture to reconsider materials and methods of construction due to climate change.

The relationship between professional practice and education in architecture is symbiotic. Historically, technology developed in the military and/or higher education moves to market, is integrated in professional practice, and then introduced in foundational courses of architecture. Conventional techniques of communication such as plans, sections, axonometric, and perspective are directives from the profession as seen in the artifacts of a client presentation and construction documents. In the past few decades the reverse of this exchange has occurred, as tools and technology of education have moved to professional practice. Software programs such as Rhino and Maya, and hardware such as laser cutters, 3D printers and the equipment of fabrication labs that are standard in schools of architecture have pressured professional offices to have access to these tools given the potential in practice and the education and skills of newly hired interns. The use of tools and technology in practice and architectural education broaden their conception and use as they migrate from one sector to the other.

The UARTS Faculty Engineering/Arts Student Team (FEAST) will be engaged in the following:

- Coordinate the use of the Velodyne VLP-16 Hi-Res Puck sensor, borrowed from the Robotics Institute, accessories (GPS, conventional tools of measure) and softwares (Veloview, ReCap, AutoCAD/Rhino) to produce a point cloud model of a site.
- Compare this to the point cloud model of the 3D terrestrial scanner.
- Document existing architectural models using photogrammetry. Documentation of range of techniques (distance, angles, setup, etc.) tested to enable comprehensive point cloud, high-resolution model as candidate for seaming into site scans using the rotational puck and/or 3D terrestrial scanner.
- Experiment and test integrations of VFX and XR in design process and presentation.
- Develop templates and formats for tracking and documentation of fieldwork (scanning and conventional measure), photogrammetry, workflows of fieldwork, design process.
- Develop database to collect scans from LiDAR and photogrammetry of different scales of environments/sites and assets.
- Develop database of projects.
- Documentation of workflows, procedural pipelines, etc. to build upon as work continues and team members move in and out of the research.

Meeting Time and Location

Tuesdays and Fridays, 8-9am

Students Sought

Machine Vision (4)

- Student skills: LIDAR/rotational puck sensors, point clouds
- Likely majors: ROB, CS, EE, CE

Remote Sensing and GIS (4)

- Student skills: photogrammetry, surveying, ArcGIS, documentation of workflows, procedural pipelines, establishing a database for scans
- Likely majors: ARCH, CEE, EECS

VR and 3D Visualization (4)

- Student skills: Maya, Adobe CC, Rhino, AutoCAD, Recap, Metashape Pro, Unity, Houdini/Blender, architecture design process and foundational skills of representation
- Likely majors: ARTDES, ARCH, SI

FACULTY PROJECT LEAD

Dawn Gilpin is Lecturer IV in Architecture at the University of Michigan, Taubman College of Architecture and Urban Planning where she teaches drawing, design, and representation. After receiving her M. Arch. from Southern California Institute of Architecture in Los Angeles Gilpin worked in the offices of Architectural Alliance and Meyer, Scherer, and Rockcastle in Minneapolis. Gilpin taught design and representation at the University of Minnesota where she co-directed a semester abroad in Oaxaca, Mexico and co-designed and participated in the exhibition The Home Show/Architecture Studio, at the Walker Art Center in Minneapolis. Co-founder and director of Adams + Gilpin, she works on a range of projects and creative endeavors focused on the reconfiguration of the status of accessibility within domesticity. Gilpin is honored to be a multiple-year recipient of the Donna Salzer Award for Teaching Excellence. Gilpin's 2016 Wallenberg Studio, "The Radical and The Preposterous: Mind the Gap", won one of six ARCHITECT Studio Prizes.