

# Assignment 01

## Site Modeling with LiDAR and Physical Fabrication

**Course:** Arch 565 - Advanced Computer Applications II

**Due Date:** Tuesday, February 17<sup>th</sup>

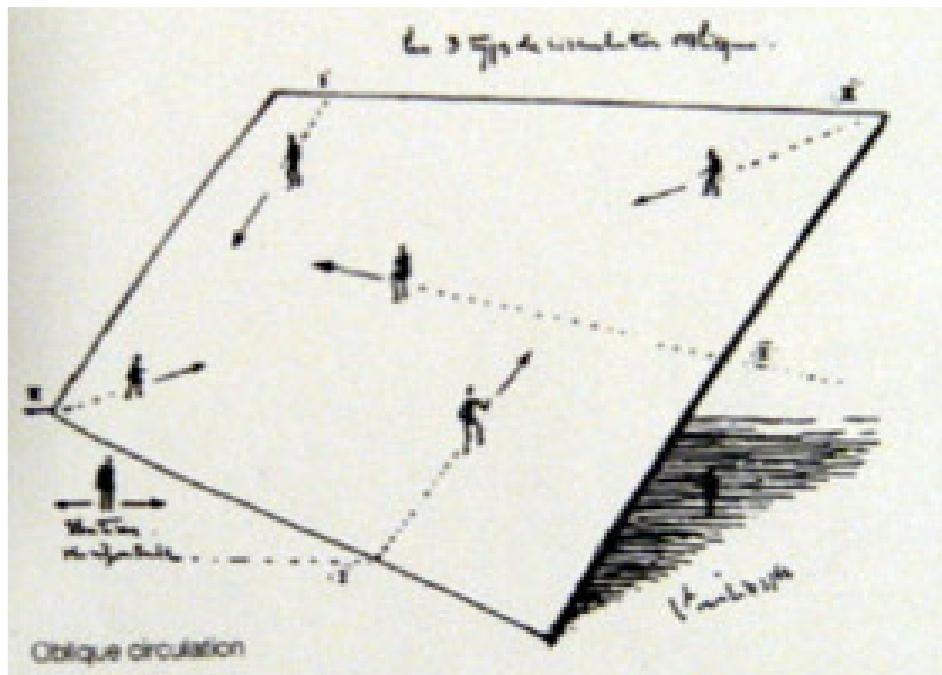
**Weight:** 25% of Assignments grade

### Overview

This assignment challenges you to combine emerging digital documentation technologies with traditional physical modeling techniques to create a hybrid site model. Using LiDAR scanning, you will capture a portion of the built environment and its topography, process the data into a clean 3D model, and translate it into a physical representation through digital fabrication methods. The goal is to develop skills in spatial accuracy, digital-to-physical workflows, and critical reflection on the role of computational technologies in architectural practice.

### Objectives

- Gain hands-on experience with LiDAR-based site documentation.
- Process point cloud data into usable 3D models for architectural analysis.
- Integrate digital modeling and computational fabrication to produce a physical site model.
- Reflect on the accuracy, limitations, and opportunities of LiDAR technology compared to traditional site modeling.



<https://spacesymmetrystructure.wordpress.com/rheotomic-surfaces/>

## Assignment Tasks

### 1. Site Selection & Scanning

- Gather LiDAR data for your project site through publicly available sources.
- OR:
  - Select a small urban or landscape site (approx. 50' x 50' minimum).
  - Use a LiDAR-enabled device (iPad Pro, LiDAR scanner, or equivalent) to capture the site, including topography, vegetation, and built features.
  - Perform multiple scans to ensure complete coverage and minimize data gaps.

### 2. Data Processing & Digital Modeling

- Import the LiDAR data into appropriate software (e.g., Autodesk Recap, CloudCompare, Rhino, Grasshopper).
- Clean and align the point cloud, removing noise and filling gaps.
- Generate a simplified but accurate 3D model suitable for fabrication (surface mesh or contour model).

### 3. Physical Fabrication

- ~~Translate the digital model into fabrication-ready files.~~
- ~~Use laser cutting, CNC milling, or 3D printing to produce a physical site model at a scale of your choosing~~
- ~~Assemble and finish the physical model, ensuring clarity and legibility of site features.~~

### 4. Documentation & Reflection

- Submit a short (2-3 page) illustrated report or journal documenting your workflow, including scanning process, data cleaning, model preparation, fabrication, and assembly.
- Critically evaluate the strengths and limitations of LiDAR technology in architectural site analysis and how it compares to traditional surveying and hand-built modeling

## Deliverables

- **Digital Submission:** Cleaned point cloud, processed 3D model, and fabrication-ready files (.3dm, .dwg, or .stl) these are for your record and do not need to be uploaded.
- ~~Physical Submission: physical site model assembled and finished.~~
- **Report Submission:** PDF (2-3 pages) with workflow documentation, images, and critical reflection

## Evaluation Criteria

- **Technical Proficiency (30%)** - Accuracy and clarity of LiDAR scanning, data processing, and digital modeling.
- **Craft & Fabrication (30%)** - Precision, scale accuracy, and finish of the physical model.
- **Workflow Integration (20%)** - Clear translation between digital and physical methods.
- **Critical Reflection (20%)** - Depth of analysis in the written report regarding opportunities and limitations of LiDAR in architectural workflows.

## Grading Rubric (100 points total)

Criteria	Excellent (A: 90-100)	Satisfactory (B-C: 70-89)	Needs Improvement (D-F: <70)
<b>Technical Proficiency (30 pts)</b>	Point cloud capture is complete, accurate, and well-processed; 3D model is clean, detailed, and fabrication ready.	LiDAR data is captured with minor gaps; 3D model is serviceable but contains simplifications or minor errors.	LiDAR scan is incomplete or poorly processed; 3D model is inaccurate, messy, or unusable for fabrication.
<b>Craft &amp; Fabrication (30 pts)</b>	Physical model is precise, clean, and well assembled; scale and features are legible; fabrication techniques are skillfully applied.	Physical model shows reasonable accuracy but has noticeable imperfections or assembly flaws; scale legibility is adequate.	Model is poorly fabricated, incomplete, or unclear; features are illegible; craftsmanship is lacking.
<b>Workflow Integration (40 pts)</b>	Seamless translation from LiDAR to 3D model to physical fabrication; workflow demonstrates clear understanding of digital / physical integration.	Workflow is mostly clear but has gaps; some inefficiencies or issues in moving between digital and physical steps.	Workflow is fragmented, incomplete, or shows little understanding of how digital and physical processes connect.
<b>Critical Reflection (30 pts)</b>	Report clearly documents workflow with images; reflection demonstrates deep, critical insight into opportunities and limitations of LiDAR vs. traditional methods.	Report documents workflow but with limited detail; reflection is descriptive rather than analytical, with surface level critique.	Report is incomplete, unclear, or missing; reflection lacks insight, depth, or meaningful evaluation.