

ROBO PINCH

DIGITAL DESIGN, ARCHITECTURAL MODELS, ROBOTIC FABRICATION

Project Director: Professor Karl Daubmann
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Applicant's Role: experiment workflow design, material and robot action testing, plaster casting, exhibition design and installation
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RoboPinch includes the robot as a speculative collaborator in the production of plaster form and volume studies. Plaster is inexpensive, moves quickly from liquid to solid, and can be worked after it is formed. Coupling a process with an inexpensive fabric and flexible form-work allows for additional distortions prior to the material phase- change.

Gaudi's hanging chain models stand as amazing precedents as they allow for the small-scale speculation of much larger work as informed by physical, tactile, and gravitational feedback. Where the human hand excels in the tangible and sensual relationship to material, the robotic hand brings precision, reproducibility, and the ability to recalibrate and tune design decisions. This project couples a parametric solid modeling tool into the process so slight digital revisions can be made and additional solid forms translated into material.

While this project resides in a very technical and technological domain, broader design and educational ambitions are central. This project brings robotic and human collaborators together but is very clear about why each party is involved. The project makes voluptuous and volumetrically complex, manifold models using very precise tools through a delicate balance of prediction, discovery, and validation. The models are reproducible, delicate, and imprecise at the same time.

The final output of this project is a series of speculative 'houses'. The models are imagined as in-habitat but in-ground solid/void and building/site relationships. RoboPinch considers the fact that architects must always work in an environment of translation, output, and conversion. We use small tools at our desks analogous to large industrial machines. Like Louis Kahn considering the crane as an extension of the body, we see robots as extensions of ourselves able to bring new abilities and capacities, helping us to uncover and discover new design opportunities in this act of translation.





ROBOTIC MANIPULATION OF FABRIC FORMWORK FOR THE CREATION OF PLASTER ARCHITECTURAL MODELS

Translation does not always result in a 1:1 exchange but instead, new discoveries can be made through the translation process. Within a discipline such as architecture that historically relies on others to execute designs, translating from digital to physical becomes one more exchange to discover additional insights into a design. In response to this translation-heavy practice, many new technologies are emerging that both capture and communicate instructions for construction. The connection between digital tools and computer-controlled output gives architects the opportunity to speculate on form, material, and the process of making. Industrial robotics offers an opportunity for this speculation with the confidence that decisions can later be translated to larger processes.

As a means to investigate the translative impact of industrial robotics, fabric-formed plaster models became a focus to explore this topic. Architectural plaster models offer a rich territory for exploration as the volume and weight inevitably distort flexible form-work. The phase change from fluid to solid allows for distortions, sags, and wrinkles while freshly cast plaster can still be modified through cutting, carving, and drilling. This project developed a process of creating malleable plaster molds to be precisely and robotically distorted during casting, and robotically post-processed to further modify form and volume.

