

# Interactive Crafts VS Digital Sculpting

## Real-Time Robotic 3D Ceramic Forming

3D printing becomes achievable by taking advantage of industrial robot's flexibility, accuracy and working range. As a globally well-known company, Xubrance successfully breaks the limitation of traditional 3D printed furniture and products by combining customized robotic fabrication process with refined and sophisticated design details. By utilizing the data from the visual camera and material sensors, designers can monitor material properties in real time and make constant justification to the extrusion speed of the printing nozzle and the associated movement of the robotic arm. Our software can also analyze the design geometry and assign different rate of speed, acceleration and radian approximation to the robot motion.

New design strategies such as generative design and collaborative design are enabling new ways of approaching material exploration through robotics. Typically, the outcomes of a fabrication process are predetermined, however, with the introduction of sensors, design and fabrication process may be interrupted by real-time feedback. This workshop will explore the potential for creative practitioners to adopt robotic fabrication processes augmented with the introduction of sensors. Using an inexpensive toolbox of sensors useful for digital fabrication, participants in the workshop will construct and integrate sensing apparatus into a 3D printing process to explore the role of material feedback in an on-going design process. The goal of this workshop is to investigate the possibility of complex geometrical form and intricate material textures through digital design and robotic fabrication of customized 3D printing products.

## Participants' Involvement and Learning Goal

The target of this workshop is to let participants design and fabricate 3d-Printed ceramic products. In design phase, the students will learn to make complex geometry using mesh modeling technique through Autodesk Maya and ZBrush. In fabrication phase, the students will take their design from Maya and use Rhino, Grasshopper and Kuka PRC to generate robotic fabrication commands. At the same time, the students are introduced to control varies sensors using Arduino and collect data form material like plastic melting temperature and solidification range. The ideal output of this workshop is a series of full scale 3d printed ceramic prototypes.

The students will be divided into two main groups, one group will focus on digital sculpting using Maya, Zbrush, the other group will use interactive design tools and Arduino sensors to test the possibilities of computer aided real-time crafts. At the end, these two polarized directions will merge, and the final outcome will be the hybrid of both methods

## Infrastructure Requirements & Budgets/ Funding:

- TWO KUKA KR6 R900 Robot
- Ceramic Kiln /Furnace
- Arduino Package

- Rhino 5.0 + Grasshopper + Firefly + KUKAprc
- Autodesk Maya
- ZBrush

## Schedule

Day 1: Introduction of KUKAprc, Maya and ZBrush

Day 2: Design modeling with Maya and ZBrush

Day 3: Introduction to material sensed by Arduino

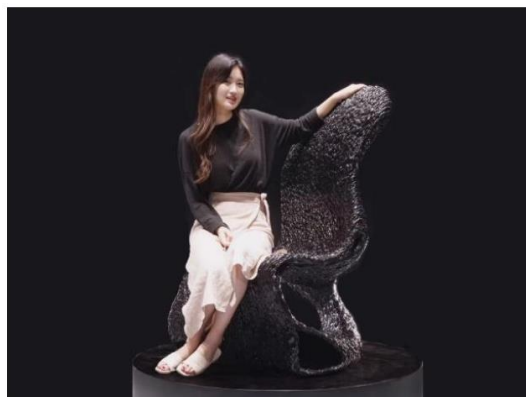
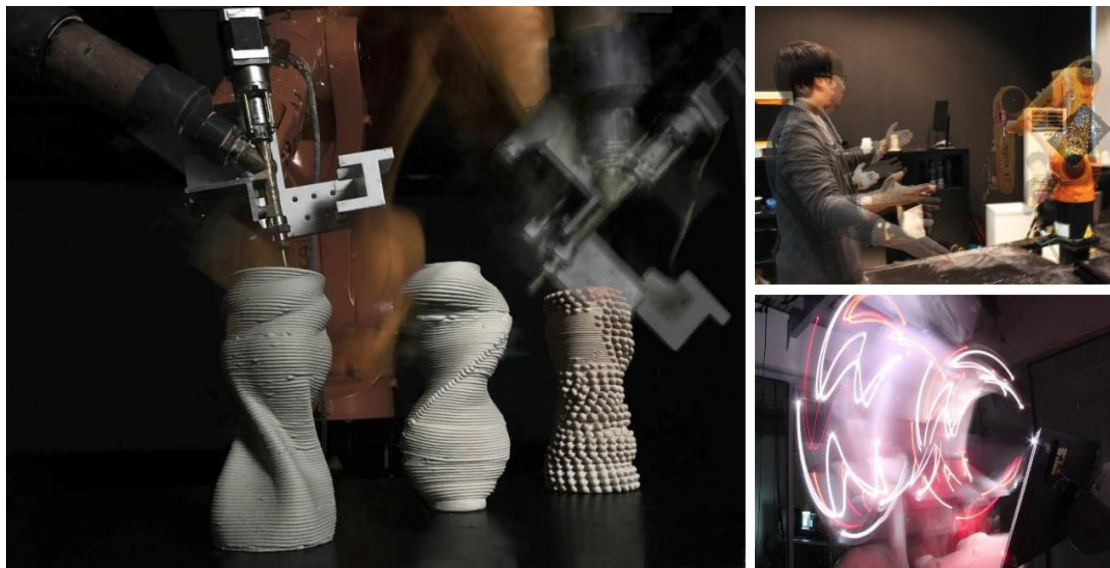
Day 4: Robotic 3D printing clay

Day 5: Baking and final review

## Maximum of Participants:

Maximum of 20 participants

## Workshop Reference



## Tutor introduction



**Steven Ma**

Founder and chief design officer of Xuberance



**Meng Hao**

Director of SCI-Arc Asia Robot Lab