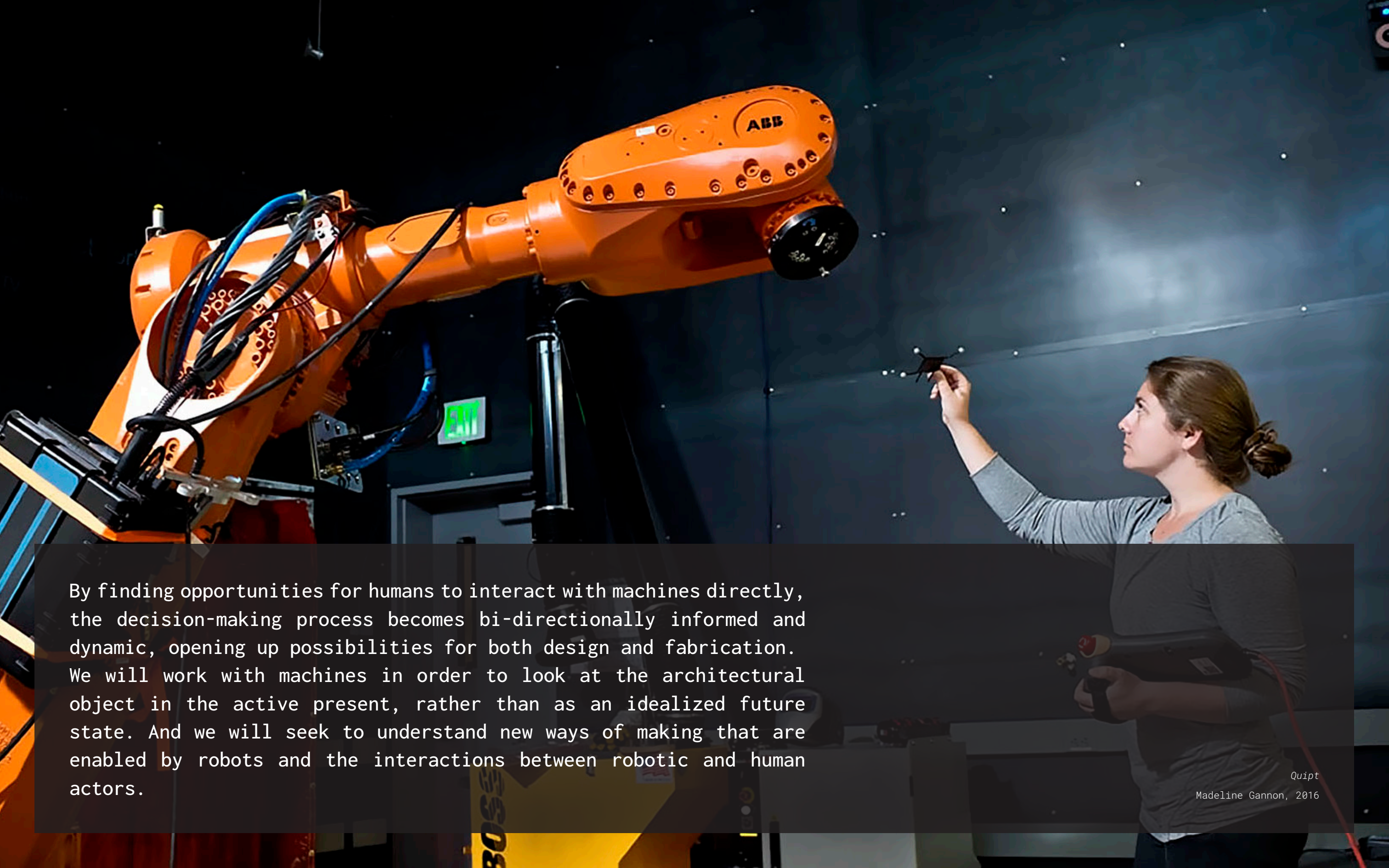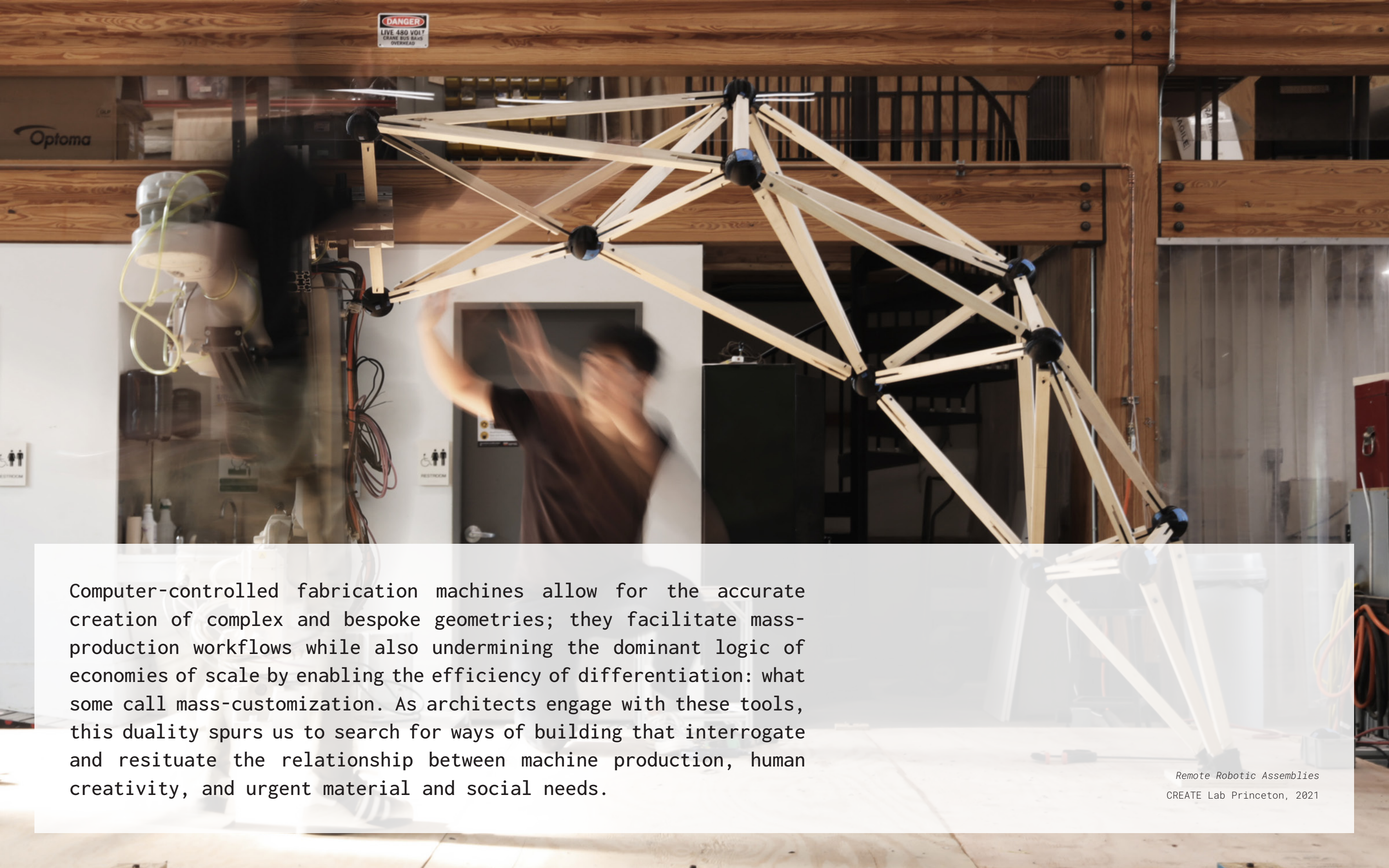# Digital Design and Making: New Approaches

AR-508 UE-L

Computer-controlled fabrication machines allow for the accurate creation of complex and bespoke geometries; they facilitate mass-production workflows while also undermining the dominant logic of economies of scale by enabling the efficiency of differentiation: what some call mass-customization. As architects engage with these tools, this duality spurs us to search for ways of building that interrogate and resituate the relationship between machine production, human creativity, and urgent material and social needs.

Remote Robotic Assemblies
CREATE Lab Princeton, 2021
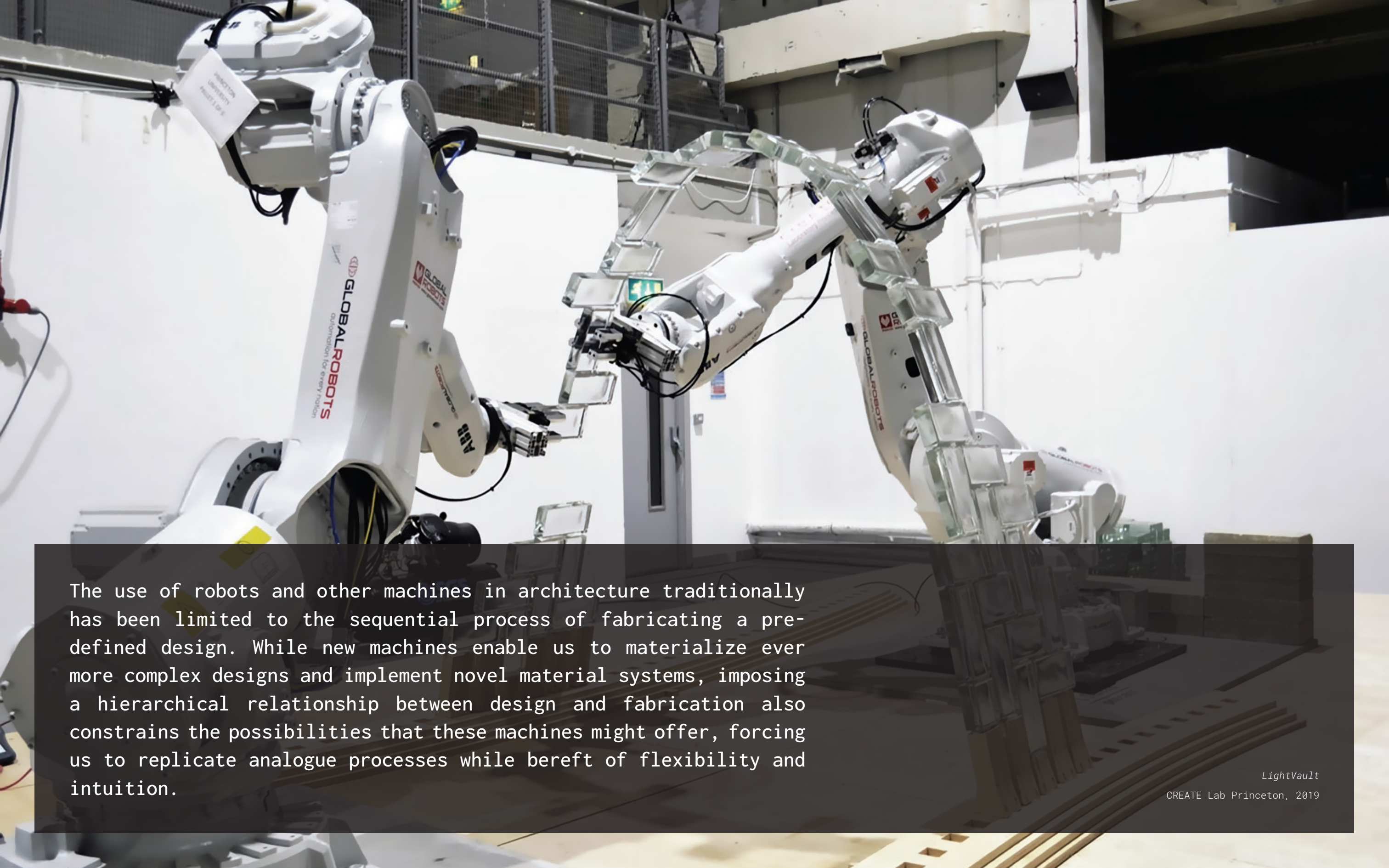
The use of robots and other machines in architecture traditionally has been limited to the sequential process of fabricating a pre-defined design. While new machines enable us to materialize ever more complex designs and implement novel material systems, imposing a hierarchical relationship between design and fabrication also constrains the possibilities that these machines might offer, forcing us to replicate analogue processes while bereft of flexibility and intuition.

LightVault
CREATE Lab Princeton, 2019

Instead of separating the processes of design versus fabrication to their assigned actors - humans and machines - this course aims to define architecture as a collective process of design and fabrication, one that involves not just the construction of a structure but also its operation/existence, reconfiguration or disassembly.

LightVault
CREATE Lab Princeton, 2019

By finding opportunities for humans to interact with machines directly, the decision-making process becomes bi-directionally informed and dynamic, opening up possibilities for both design and fabrication. We will work with machines in order to look at the architectural object in the active present, rather than as an idealized future state. And we will seek to understand new ways of making that are enabled by robots and the interactions between robotic and human actors.

Quipt
Madeline Gannon, 2016
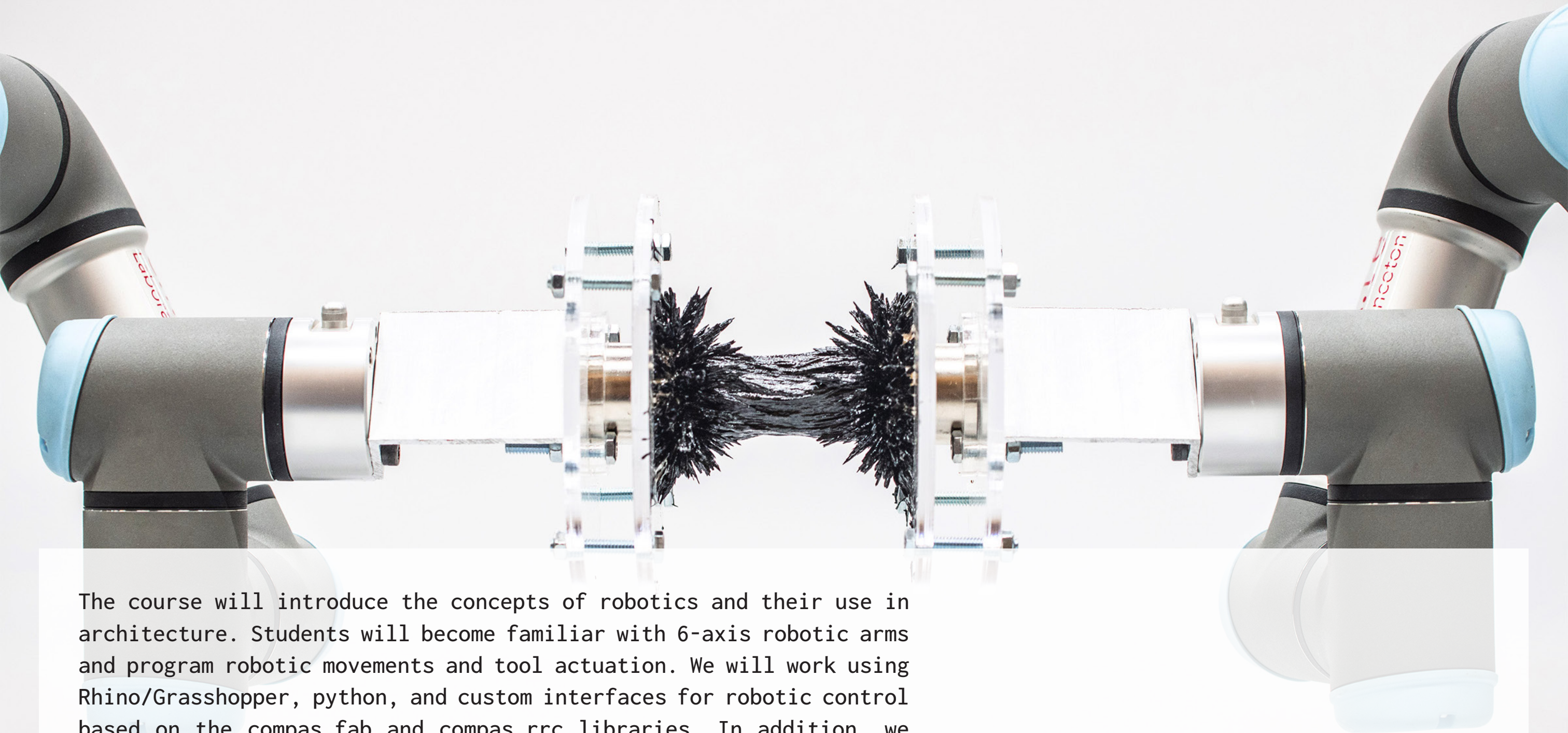
The course will introduce the concepts of robotics and their use in architecture. Students will become familiar with 6-axis robotic arms and program robotic movements and tool actuation. We will work using Rhino/Grasshopper, python, and custom interfaces for robotic control based on the compas_fab and compas_rrc libraries. In addition, we will look at means of interaction between robots and humans from the fields of Human-Computer Interaction (HCI) and Human-Robot-Interaction (HRI).

FerroField
Emmanuel Osorno, Yinong Tao, Zaid Alghata, 2019
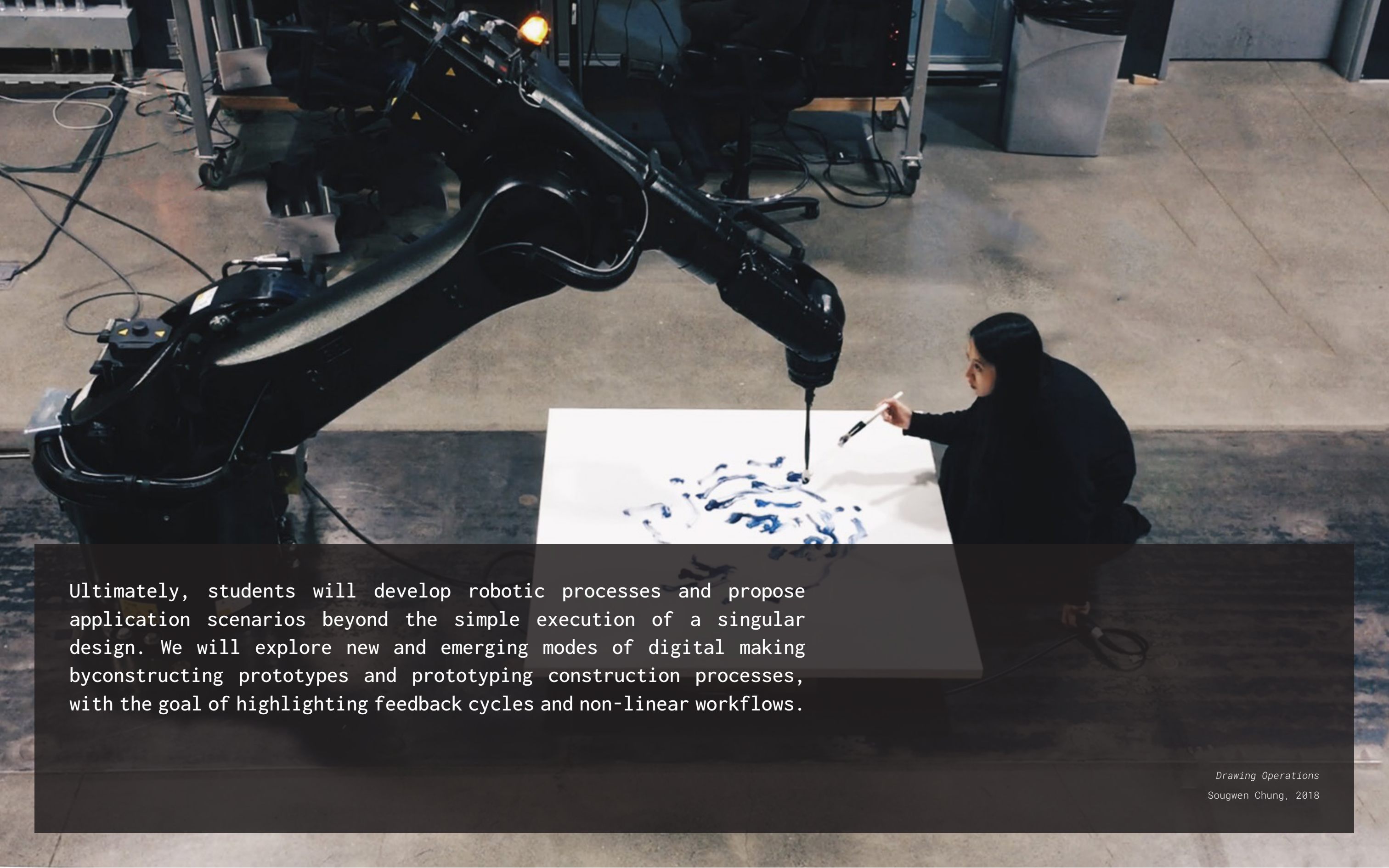
Ultimately, students will develop robotic processes and propose application scenarios beyond the simple execution of a singular design. We will explore new and emerging modes of digital making byconstructing prototypes and prototyping construction processes, with the goal of highlighting feedback cycles and non-linear workflows.

Drawing Operations
Sougwen Chung, 2018
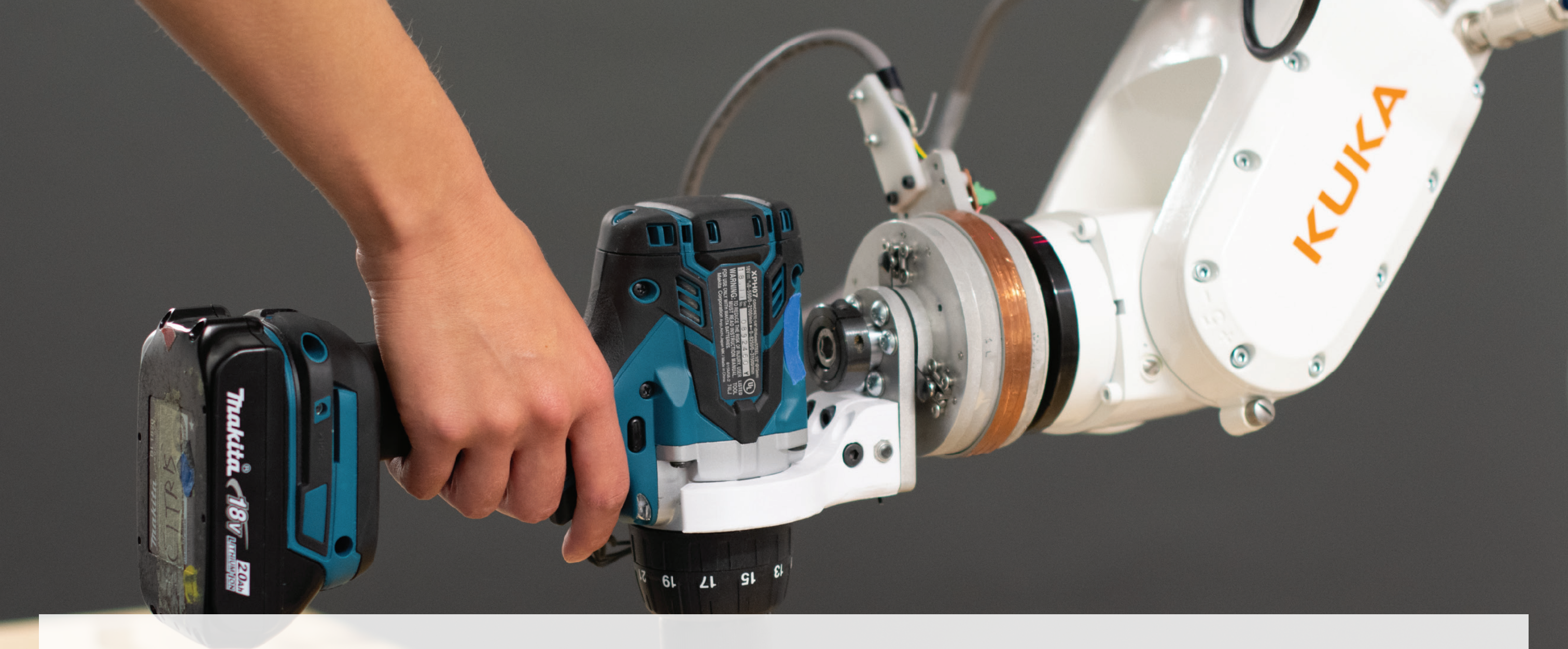
We want to ask how we can engage technology to ideate new processes that address the problems resulting from the traditionally linear hierarchy of design and construction processes. Rethinking them involves rethinking the tasks that machines and humans can perform. The search for the space between automation and creativity not only provides a way of discovering new design possibilities but allows us to question the expected roles within our discipline and identify applications of high impact for our society.

Adroid
Rundong Tian and Eric Paulos, 2021