

Designing for the Physical World

Adriana Schulz

Associate Professor of Computer Science
Brown University



ABSTRACT

Generative models have transformed our ability to create images, geometry, and other digital content. But designing objects for the physical world requires more than generating something plausible or visually compelling. Physical artifacts must also be manufacturable and satisfy functional and performance requirements, turning design into a search through complex, highly constrained spaces.

It is tempting to think generative models will simply absorb this challenge without the need for explicit optimization. I will argue the opposite: optimization is not merely still relevant; it is becoming more powerful. The recent success of AI is, at its core, a success of large-scale optimization, and it has dramatically expanded what practical optimization can do. But harnessing this power requires rethinking how we represent designs—not treating representations as fixed and building optimizers around them, but instead designing representations for optimization. Through examples from computational design and digital fabrication, I will show how this perspective can make difficult inverse problems tractable and enable new tools for creating objects that work in the physical world.

BIO

Adriana Schulz is an Associate Professor of Computer Science at Brown University. Her research develops computational tools for designing physical artifacts, combining ideas from geometry processing, machine learning, and programming languages. She grew up in Brazil and completed her Ph.D. in Computer Science at MIT in 2018, before joining the faculty at the University of Washington and later Brown. Her work has been recognized with an Alfred P. Sloan Fellowship, an NSF CAREER Award, the CRA Anita Borg Early Career Award, MIT Technology Review's Innovators Under 35, and the ACM SIGGRAPH Significant New Researcher Award.