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Robotic Fabrication & Architectural Design

Robert Stuart-Smith

ISBN	9781957183961
Publisher	ORO Editions
Binding	Hardback
Territory	World excluding USA, Canada, Singapore, Thailand, Vietnam, Cambodia, Indonesia, Brunei, Philippines, Malaysia, and Australasia. India non-exclusive.
Size	254 mm x 203 mm
Pages	240 Pages
Illustrations	200 color
Price	£40.00

- State-of-the-art research into robotic fabrication for architectural design
- Cutting-edge design-research
- A visual guide through the first 3 years of a uniquely structured post-professional program into advanced fabrication and computational design
- Hear directly from students of the program – about their studies and diverse careers post-study
- Looking to branch into a more innovative career? The MSD-RAS builds knowledge in advanced robotic fabrication, AI and generative design
- See how the MSD-RAS empowers graduates to operate in leading areas of industry, research and practice
- Ivy league Institution's rigorous approach to course pedagogy and student development
- How do we address societal, economic and environmental challenges of our time? How can architecture meet the productivity and affordability needs of our present and future urban growth?
- How do we avoid generalized design solutions? MSD-RAS program leverages adaptive forms of robotic fabrication to enable custom design responses at industrial levels of production
- Leveraging robotic fabrication we can more easily cater for diverse peoples, activities and environments without creating more waste or cost implications
- Want to see how architectural design might evolve to leverage Fourth Industrial Revolution technologies?
- How can the architecture and construction industries evolve to incorporate AI and robotic fabrication technologies?
- What career opportunities are there for designers or engineers who want to leverage AI and robotic fabrication in buildings?

Robotics & Autonomous Systems 1: Integrated Approaches to Fabrication, Computation and Architectural Design presents design research from the University of Pennsylvania Weitzman School of Design's MSD-RAS program. At present, architectural design and construction approaches are unable to meet immediate and projected societal needs in productivity, affordability, and sustainability or to adequately engage with the diverse conditions found in our built environment. The MSD-RAS seeks to address these challenges through bespoke design solutions that are integral to a critical and creative approach to production. Implied in the term "RAS", the program seeks to harness the potential of AI and robotic systems to work more adaptively than automation affords. Primarily operating through the development of robotically fabricated prototypes, projects are presented that incorporate custom approaches to generative computational design, machine learning, robot tooling, real-time adaptive robot programming, sensor feedback, material and manufacturing processes or human-in-the-loop activities. Serving as a graphical reflection on the first three years of the program, research projects are presented alongside interviews with some of the program's graduates together with insights into the exciting career trajectories they embarked on post-study. Essays from the program's faculty dive deeper into several core topics such as the MSD-RAS's approach to design research, critical engagement with industrial manufacturing processes, and the integration of semi-autonomous workflows in design and production. Also discussed is the program's unique integrated approach to coursework and why it is inducive to the creation of novel collaborative work that expands design agency into unchartered territories and careers.

Robert Stuart-Smith is Director of the MSD-RAS Program, an assistant professor of architecture, and an affiliate faculty in engineering's GRASP Lab at the University of Pennsylvania. He also directs the Autonomous Manufacturing Research Lab in Penn's Department of Architecture and University College London's Department of Computer Science.

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Published 25th Mar 2025