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Robotics in Architecture <> Robotic Architecture: Why Can’t a Building be as Smart as a Car?

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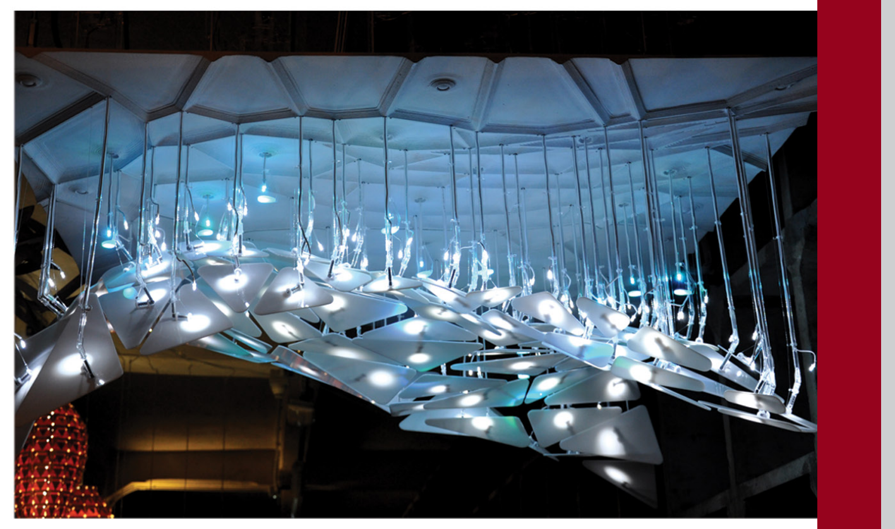
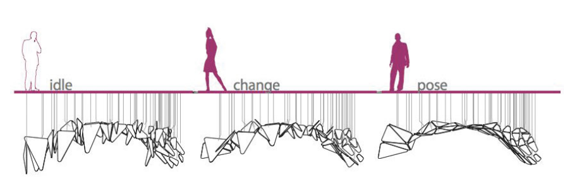
ROBOTICS IN ARCHITECTURE < > ROBOTIC ARCHITECTURE

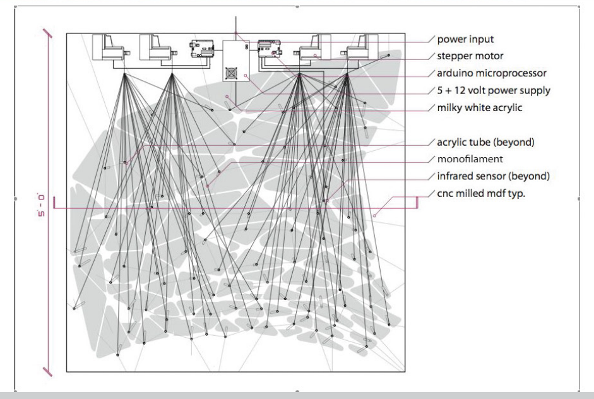
Why can't a building be as a smart as a car?

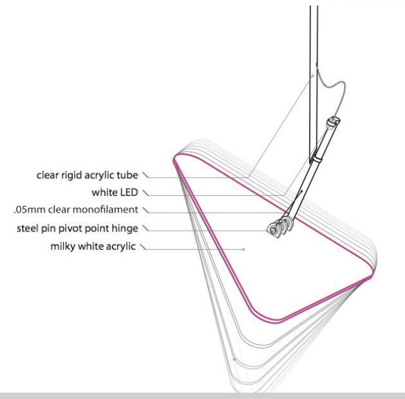
► **JOSHUA VERMILLION** // ARCHITECTURE, ROBOTICS

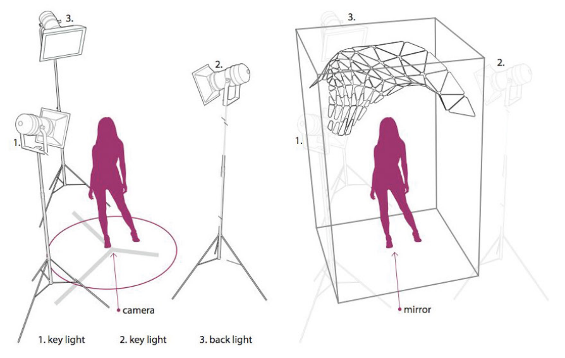
Morpholuminescence was a spatial installation developed as a lighting design competition entry. The posture of the human subject is tracked by proximity sensors to control hinged triangular petals and variably tuned lighting. When activated, the petals begin to close to form a faceted but continuous acrylic light surface while the lighting color and intensity changes.











► ABOUT THE AUTHOR

Joshua Vermillion is an Associate Professor at UNLV's School of Architecture. In addition to co-editing two books, Joshua has spoken, published, and presented peer-reviewed research worldwide about the topics of computational design, digital fabrication, embedding situated technologies and robotics into the built environment, as well as how "digital craft" augments research, pedagogy, and practice. As an educator, Joshua's students have won design awards and competitions, and as a designer, his collaborative work has been featured in diverse media outlets including a variety of exhibitions, magazines, books, and blogs. Josh built his first robot at the age of six out of cardboard, Lego, and scotch tape.

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► PROJECT DESCRIPTION

Introduction:
Why can't a building be as smart as a car? Currently automobiles of all varieties contain numerous sensors—close to 400 sensors for high-end models. Cars display speed, engine temperature, distance traveled, or the amount of fuel consumed, but these don't come close to accounting for the amount of data your car collects. Newer vehicles can sense when you are wearing your seatbelt (and when you aren't), monitor air pressure and engine temperature, help you answer your phone without using your hands, and detect when your tires are spinning too fast, or when your tires have locked up. Some cars are equipped with cameras and distance sensors that prevent the driver from getting too close to traffic or from hitting objects while in reverse. Others have features that are activated by voice command. Car problems are diagnosed by plugging the vehicle into a computer, and, in the not-so-distant future, they might even become driverless, autonomous vessels that sense, communicate with, and react to neighboring cars in real-time. As time marches on, cars sense and collect more and more data and use this information to respond to various driving scenarios in order to enhance performance.

Suffice to say, the built environment is also rich with opportunities for embedding and integrating digital technologies and sensors to create responsive and adaptable systems—to become smarter. This poster outlines selected moments from a thirteen-year body of work in research, design, and prototyping of responsive systems that act spatially with the environment at installation scale.

Background:
Assuming that the design of the built environment will increasingly integrate physical computing systems, does our architectural repertoire of skills and knowledge need to be adjusted to meet these challenges? In particular, how do we educate and prepare architecture professionals for a future of physically active and interactive environments (which spans multiple knowledge domains)? Of course, it seems impractical to propose that professional architects will also have to be professional programmers, engineers, and electricians. Fortunately, it is not necessary to have a comprehensive understanding of these topics to begin prototyping a physical computing system. At small scale, results can be achieved by borrowing and repurposing snippets of programming, hacking widely available hardware, learning from any number of web resources posted by a very active global community of makers, and simply experimenting with components—tinkering substitutes for expertise.

Robotics, sensing, physical computing, and digital fabrication are all topics that have been prioritized by U.S. funding programs such as the National Science Foundation, the Department of Defense, and the Department of Education. This poster presents the start of a framework-based around the concept of tinkering--for introducing these systems into design education. Play, experimentation, iteration, and the rest of the qualities of tinkering are certainly not new to design education. Indeed, the larger value proposition is that designers are uniquely equipped to facilitate a tinkering framework to provide novel solutions to complex problems and can provide value to multi-disciplinary teams from engineering and science. As opposed to the STEM disciplines that rely on reductive, convergent research methods, designers are trained for divergent thinking to integrate ideas and solutions at various scales to large problems that can't be well defined or easily measured.