

The Robotic Chair: Entropy and Sustainability

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The Robotic Chair: Entropy and Sustainability

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Sometimes the simplest solutions are the soundest, the most sustainable and the most evocative. This truism has proven itself in the fields of mathematics, engineering, design and art. It also holds its promise with regard to *The Robotic Chair*, by artist Max Dean, engineer Raffaello D'Andrea, and artist and designer Matt Donovan, shown in Kitchener at the Regional Children's Museum, in collaboration with the Kitchener-Waterloo Art Gallery.

The seemingly plain, sturdy, wood-veneer chair resembles the generic chairs Canadian children sit on in grade school. Yet, unexpectedly, responding to the commands of a "nerve center" located in its seat, the chair is programmed to collapse boisterously into a random, disconnected stack. Guided by an overhead vision system, the base then acts autonomously to reconstruct the chair. It slowly drives itself across the floor, finding each strewn component, the chair's legs and back, and proceeds to re-attach them in order. Eventually, the chair warily hoists itself upright: from entropy order resumes.

The chair is the brainchild of Max Dean, who first conceived of it in 1985 for the Artist-in-Residence Program at the National Museum of Science and Technology in Ottawa. Preliminary investigation in the robotic art realm was done with the assistance of engineer George Hollinworth who brought expertise in the field of control systems to the project. In the original concept, a robotic arm was housed in the seat of the chair, allowing the chair to collect its pieces and slot them into the base. The initial exploration served as a point of departure to produce a full-scale model of the chair and an animated video (by Kristan Horton) that depicts the chair's potential movement patterns.

In this early developmental phase, however, several technical problems remained without suitable solutions: no answer was found as to how long the arm should be in order to allow the chair to recover far-cast pieces and re-assemble itself; the

necessary scale of the robotic arm was disproportionate to the stature of an ordinary chair; furthermore, the mechanics that would enable the chair to stand up on its own were still unclear. The piece was left unresolved.

In 2001, Max Dean enlisted the help of Raffaello D'Andrea and Matt Donovan to collaborate on *The Table: Childhood*, a project he had originally envisioned in 1984. This robotic interactive work, now part of the collection of the National Gallery of Canada, attempted to reverse the roles of the viewer and the object. Equipped with motion sensors, the white, otherwise non-descript table followed viewers around the gallery and attempted to form relationships with them through movement. From this collaboration, *The Robotic Chair* got its second wind.

The three men, Dean, Donovan and D'Andrea, brought specific expertise to the project that shifted *The Robotic Chair's* development to focus on finding the simplest aesthetic, design and engineering solutions. For Dean, the chair needed to be as generic looking as possible. It had to be simple in line and maintain a utilitarian aspect so that viewers would identify with the everyday object without attempting any formal judgment. This requirement dictated that the chair would respect certain proportions and use certain materials. For Donovan, the main issues were weight and resilience. The chair must collapse exuberantly thousands of times and still be able to get itself together and stand. Finally, for D'Andrea, the challenge resided in the design of simple yet durable control systems and efficient computer programming. He proposed abandoning the more spectacular robotic arm concept in favour of housing the robot in the seat of the chair. He also argued that existing technology should be used to avoid the potential fragility of untested technologies. As system engineer for the project, D'Andrea figured out how the robot would accomplish its Sisyphean task with a solution that now involves fourteen motors, two gearboxes and many other parts, as well as a sophisticated algo-

rithm. The design prototyping began in 2003 and was completed in 2006.

In an interview, Max Dean commented that viewers value the chair for the part of themselves they see in it. "It's continually reassembling itself," he says. "Somewhat like what we do in our own lives. We fall apart and put ourselves back together." And indeed, the simplicity of the chair and its movement (D'Andrea likens the hoisting of the chair to the movement of a two year-old getting back up after a fall) allow identification with the object, at once vulnerable and resilient. In this meeting of art, design and engineering, the chair speaks most evocatively of sustainability; the repetition of the cycle of entropy to order reveals a process of resilience that can be maintained indefinitely. It refers to the potential endurance of art, science, and humanity, and the various systems on which they depend. The work also draws from a sensibility that echoes that of Surrealism; viewers will never be able to look at the object in the same way again.

Viewers who might not have the occasion to visit *The Robotic Chair* in Kitchener will have the opportunity to see it on YouTube, where the chair has now become an online video hit with 800,000 download requests. However, the commonplace scale and appearance of the chair, the loud clatter of crashing parts, the squeaking of robot wheels on the platform, all this makes for a tangible experience that is at once comical, touchingly tragic and poetic, an experience that requires the viewer's presence in close proximity. From entropy to order, the performance lasts between six and twelve minutes. ←

Max Dean, Raffaello D'Andrea,
Matt Donovan, *The Robotic Chair*
The Children's Museum,
Kitchener, Ontario

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Max DEAN, Raffaello D'ANDREA, Matt DONOVAN, *The Robotic Chair*, 2006. Photo: Nicholas Feldman-Kiss.

