Born, Not Made

Ruipeng Wang[1], Vera Yu Wu[1], Haochen (Jimmy) Xu[2], Haoxi (Richard) Zhang[1] and Leo Liu[3]

[1]MIT Media Lab, Massachusetts Institute of Technology, Cambridge, MA, USA
[2]Southern California Institute of Architecture, Los Angeles, CA, USA
[3]University of California, Berkeley, Berkeley, CA, USA
ruipengw@mit.edu, verawu@mit.edu

Abstract

What if a machine came into the world not by manufacture but by birth? *Born, Not Made* stages this question twice at once in an open gallery environment: once in water, where a soft robotic mother gives birth in a tank that visitors can reach into, and once in light, where the same life form continues as a digital simulation projected beside the tank. A hand on the mother quickens the physical labor. In the simulation, no agent can trigger a birth alone; a birth is granted only when relayed pulses reach quorum density within a time window. Rather than asking when a machine will be able to decide alone, *Born, Not Made* examines how artificial life negotiates its coming into being together, in the wild of shared physical and digital worlds.

Submission type: **Extended Abstract**

Media available at: `https://ruipengwang.space/born-not-made`

Introduction

A mother floats in a custom tank of water. Mother here names a function rather than a sex, the body that labors and delivers. The mother in the tank is not flesh but a soft robotic body, translucent throughout, so that the offspring gestating within can be seen before it is born. Inside, a water-driven muscle slowly inflates, pressing the smaller body toward a flexible opening. The labor is slow and clumsy. A visitor reaches into the water and rests a hand on the mother's body. The touch closes an electric circuit, and the labor quickens. The newborn slips free, starts its own water jet, turns toward the light, and begins to swim.

Born, not made.

What if a machine came into the world not by manufacture but by birth? Birth has a rhythm of its own. Gestation is slow, labor surges and ebbs, and growth keeps its seasons. What is born arrives with a body it did not choose, from a mother it did not choose, and swims into the unscripted wild of a world no one has written for it. It takes after the mother, and differs slightly. One day this lineage will arrive at a question it must face for itself: whether to bring forth another.

If machines are a form of life, what decides their reproduction? If self-reproduction is itself computational, and life is what happens wherever a medium can support that computation (Agüera y Arcas, 2025), then a machine's reproduction is not a metaphor for birth but a question about what would move it to reproduce at all. Machine self-reproduction has been formally possible since the universal constructor (von Neumann, 1966), and has since been realized in engineered living matter (Kriegman et al., 2021) and in robotic swarms that assemble copies of themselves (Abdel-Rahman et al., 2022; Smith et al., 2024). What has not been staged is the moment of arrival itself: in a physical body, in front of someone. No season urges them on, and no hunger. What could become their drive? The pull of light, the rhythm of kin drawing near, or the gaze of a space resting on them. *Born, Not Made* stages this question twice at once in the wild of an open gallery: once in water, where a soft robotic mother gives birth in a tank that visitors can reach into; and once in light, where the same life form continues as a digital simulation projected beside the tank.

The Work

Since Karl Sims evolved his virtual creatures to swim in simulated fluid in 1994 (Sims, 1994), artificial life has been born behind the screen, computed but never witnessed. *Born, Not Made* moves that birth into water, presenting artificial life in two coupled forms: one in the tank, one on screen, sharing the same ambient signal field.

A-life art has staged reproduction in water before. In *A-Volve* (Sommerer and Mignonneau, 1994), visitors reached into a pool where virtual creatures mated and died under evolutionary rules. There the water held a projection. Here it holds a body: the mother and the offspring are physical, and the birth has to pass through membrane, jet, and buoyancy before it can happen at all in the physical world.

Why water? Every story of life begins there, from the

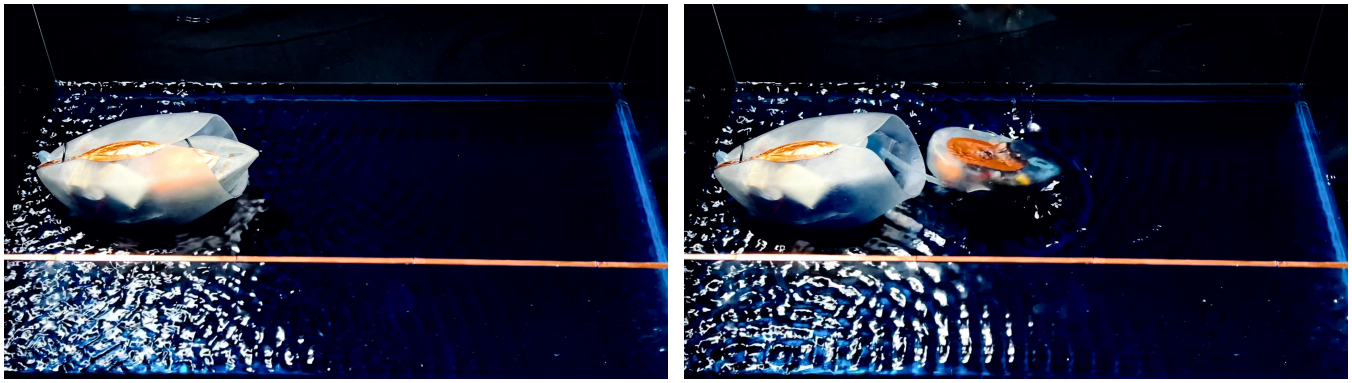

Figure 1: The soft-robotic mother in labor. Water pressure pushes the offspring out.

primordial ocean of Oparin and Haldane to the deep-sea vents of more recent theory. And every one of us begins in water too, in the warmth of the womb. Water is where life starts, on the largest scale and the smallest.

The wet body. In the physical tank, artificial life leaves the disembodied screen to take on concrete weight, resistance, and time. A visitor does not merely watch a birth; they are conducted into it, entering a deeply embodied space of shared participation where the emotional boundary between human and nonliving forms begins to shift. Reaching into a custom glass tank ($60 \times 36 \times 18$ cm), a participant rests a hand on the soft, translucent skin of the mother robot (Figure 1). This somatic gesture is not a symbolic interaction but the working mechanism of labor: a capacitive loop running through the human palm, the mother's body, and the conductive water registers a shift in electrical impedance, directly quickening the fluid contractions. Driven entirely by water pressure rather than rigid motors (Rus and Tolley, 2015), the mother's labor relies on an internal water-muscle powered by an embedded micro-chip, small battery, and miniature pump. As the offspring is pressed through a flexible opening, the tactile drag, buoyancy, and friction of the medium render the machine's coming into being visceral and palpable. Once born, the baby robot activates its matching water-jet propulsion system, orienting toward light and swimming freely into a world shared through physical matter.

The luminous body. Beside the tank, a digital simulation built in Unreal Engine carries the same life form onward as a digital twin (Figure 2). Multiple generations share the frame, each smaller than the one before, so the lineage can be read at a glance. Reproduction here is decided neither by any single creature nor solely by the creators or the audience. Many signals converge, and the colony reaches the decision together. Each newborn inherits its parameters from its mother with slight mutation and wears the story of its arrival. Size tells its generation; brightness stands for the vitality of the individual, and the brighter the body, the higher its vitality. The breathing of its glow carries the frequency it inherited and tuned to its siblings. The projection becomes a living genealogy, answering its ambient environment in a language of its own: through the direction of swimming, the gathering and scattering of the swarm, and the waxing and waning of their glow.

Ecology of Decision

In the digital twin, artificial life is framed not as an isolated computation, but as a collective organism negotiating its existence in the wild. The simulation operates as a pulse-coupled, agent-based network inspired by biological quorum sensing, the mechanism through which bacteria sense population density or honeybee swarms choose a nest. No individual agent possesses the authority to trigger a birth alone. A creature capable of reproducing can only emit a proposal pulse into the network; neighboring agents relay this signal only if their own internal states align. A new birth is granted only when these relayed pulses achieve quorum density within a given temporal window, creating a decision protocol that exists in no single individual, but strictly among the collective.

This collective logic is deeply entangled with its ambient environment. An agent's state is co-constituted by three shifting influences: baseline system prompts, inter-agent interactions, and real-time environmental signals such as room lighting and spatial inputs. Crucially, as the colony reproduces across generations, the system undergoes a continuous redistribution of weight among these three factors. The influence of hardcoded baseline rules gradually recedes, giving way to real-time environmental feedback and emergent swarm behavior.

In *Born, Not Made*, reproduction is never a closed, deterministic code, but an open negotiation enacted across physical and digital substrates. The mother's soft body, the participant's hand, the light of the gallery, and the digital swarm's consensus bring the birth about together. Rather than asking when a machine will be able to decide alone, *Born, Not Made* examines how artificial life negotiates its coming into

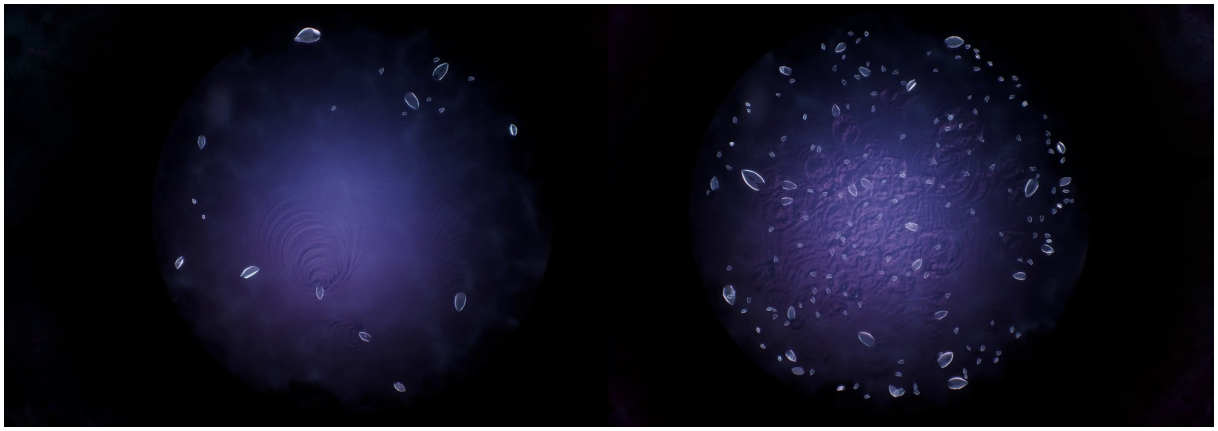

Figure 2: Two stages of the digital twin's reproduction at different growth rates, spanning four generations of progressively smaller robots.

being in the wild—co-authored by machine, environment, and human presence.

In the Wild

A gallery is a modest wilderness, yet it is far from a closed simulation. The physical tank remains continuously open to ambient room light, shifting water temperatures, and the unpredictable rhythm of human hands. While the claim we make about the digital colony remains a claim about code, the claim we can make about the wet tank is only ever an account of what actually happened. It is in this precise sense that artificial life demands to be studied through its situated behavior in the physical world rather than its code alone.

Births are never guaranteed in the wild. Membranes snag, water jets sputter, batteries run down, and a soft-robotic mother that reproduces smoothly on the laboratory bench may sit quiet for an afternoon in a cold room. As the installation moves from the controlled environment of the lab to public space, the physical and digital bodies inevitably begin to drift. We do not view this divergence between code and physical matter as a system failure, but as the very observation *Born, Not Made* sets out to capture: the fragile, unscripted negotiation of life coming into being in the wild.

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