Submission for : http://www.indiecade.com/Submissions

Describe your game in about 300 words. This should cover main mechanics, theme, and inspirations. Use this space to provide a well rounded overview of your game.

There will be space later in the form to describe your artistic intent and how your game is innovative.

Crescent Loom is a game about creating life.

Players construct a creature from the ground up by knitting bones, stitching muscles, and weaving neurons into a functional body and brain, then swim through an alien ocean, interacting with a player-populated sandbox ecosystem. Based on real science, Crescent Loom is a user-friendly way of interacting and experimenting with biologically-realistic simple organisms.

Since the body simulation is entirely physics-based, players must consider the hydrodynamics of their creature as they snap together limbs and organs. Beyond muscle contraction, there's no pre-programmed movement, so the first puzzle is to make a body that can propel itself through the water.

To swim, creatures have to control their muscles — which means stitching together a brain. Players connect neurons to "motor cells" that activate muscles. and figure out which configurations of neurons lead to smooth swimming. By adding sense receptors (e.g. whiskers and eyes), players can bestow creatures with complex reactions to their environments. Neurons are simulated down to the level of neurotransmitters and ion channels, but most of the complexity is hidden under-the-hood. Connecting cells is a simple drag-and-drop operation for the player.

Creatures can be saved to an online database and then loaded to populate other players' oceans. The game tracks creatures' performance to determine how likely a creature is to show up in another player's game, establishing a dynamic ecosystem driven by a basic process of natural selection.

The game is currently sandbox-only, but I plan on adding a campaign mode to provide a structure for mastering the basic mechanics and generating interesting design puzzles. As players master the basic concepts, they'll unlock the more advanced organs and types of neurons. I want to smooth out the learning curve such that Crescent Loom will become the best way to learn basic neuroscience.

Artist Statement (required)

Describe your intentions creating this piece in about 300 words. This should answer not only why you created this but also why it matters to you and people in general. The artistic statement is a space to talk about the creative and your intent as it connects to your practice and submission.

The idea for Crescent Loom grew out of my own neuroscience research on small motor circuits that control repetitive behaviors. It's designed to give people an interactive way to learn about the basic biology of our brains and bodies, even if they have no background in science. In many ways, Crescent Loom delivers on the promise of Spore (2008) to give people to tools to design their own unique life-forms and share them with the world.

Personally, learning about neural circuits has caused me to see animals differently; the fact that a tiny spider is able to perform so many delicate actions and navigate the gigantic world becomes even more wondrous when you know how much complexity goes into even the most simple of behaviors. I want people to come away from Crescent Loom with the understanding to better marvel at the feat that is existence.

Thematically, the weaving/stitching/sewing metaphors are an intentional move away from the tendency to equate brains with computers (they are not) and to avoid intimidating technical jargon. I'm also avoiding the typical ending in classic artificial-life stories (e.g. Frankenstein) where the created turns on the creator. Rather, Crescent Loom showcases the beauty and elegance of simple life-forms - and by extension, our own biology.

Statement of Innovation (required)

Describe how your submission is unique and pushing beyond the edge of how we currently think about play and games in around 300 words. Use this space to highlight content, technical, theoretical, and other innovations in your piece.

Crescent Loom combines sophisticated neural simulation with modern design techniques to make a colorful, accessible, and fun game with a crunchy educational core.

It's common knowledge that the first games-as-education were ham-fisted, to say the least. They crammed school-style drill-and-test into the framework of contemporary arcade games. Game design has since matured; now, the best educational games teach with their core mechanics, allowing players to explore a subject from viewpoints that no other medium can provide. SimCity (1989-onward) challenges players with the basics of urban zoning. Crusader Kings II (2012) unfurls the history of medieval Europe from dozens of viewpoints. Kerbal Space Program (2015) presents players with orbital physics and its engineering constraints in action.

Crescent Loom applies this philosophy to neuroscience, an area hitherto unexplored by games. Current neuron simulation software is technically-focused to a fault and essentially impossible to use without extensive training and background knowledge. While Crescent Loom is still relatively sophisticated in how it simulates neurons (down to the level of ion channels and neurotransmitters), it hides much of the technical detail under the hood and provides the player with only the details necessary to create functional creatures.

Games are no longer an infant "just-for-entertainment" medium (if, indeed, they ever were). We've developed a powerful set of design tools to construct experiences. Moving forward, the most important games will be ones that use this power to change people and society for the better. Crescent Loom is designed from the ground up to be both a compelling game and a source of real-world scientific knowledge.

* Creator Background (required)

Tell us your or your team's creative history, describing who does what and the work that came before this piece. Treat it like a story.

I grew up on a blueberry farm outside of Portland, Oregon, so there wasn't a lot for a teen to do besides play games. At some point during middle school, I found a "Game Programming for Teens" book at Goodwill with a demo CD for a programming language called Blitz Basic. Soon, I was making games for class assignments - it was a small public school, and I think my teachers were happy to see something a little different.

During college, almost on a whim, I threw together a summer Kickstarter campaign to make an Asteroids-like space shooter (groundbreaking content, I know!) called Rubicon. I didn't really know what I was doing, but managed to pull it together and hit my 3-month launch deadline. It was an intense period of teaching myself the technical skills, project management, and design focus necessary to launch a game on my own.

 When I was young, I swore (with all the earnestness of a child) to dedicate my life to making *real* artificial intelligence. I ended up deciding to approach it from the angle of mimicking nature, so I focused on learning the mechanics of basic nervous systems. My undergraduate thesis in biology involved putting frog brains in dishes and mapping the activity of individual neurons in the mating-call circuit.

When I graduated, I found myself at a crossroads: should I continue on the academic track, or pursue this game-making thing? Making Crescent Loom is my answer to that question. I hope it becomes my first step in a career of science-based indie games.

* Submission Background (required)
Tell us the journey of how this piece got made, including funding, resources, and anything that affected its creation process. Treat it like a story.

Crescent Loom is a synthesis of my last decade of my life:

- As I mentioned above, I've been interested in biologically-realistic artificial intelligence since forever.

- In college, I encountered LogiSim: an interactive logic editor that gave you AND, OR, and NOT gates as building blocks. Over the course of the the class, we eventually used these to construct a programmable calculator. I loved this process of starting with a simple interactive tool and gradually building up to something that originally seemed impossibly complicated.

- In contrast, circuits in neuroscience are usually just presented as static wiring diagrams. Trying to unravel how they actually work requires a great deal of background knowledge, combing through the text, and visual imagination. I found myself wanting an aid in visualizing how neurons interacted, but current neuron simulation software is technical to the point of absolute inaccessibility.

- I read a paper by Eve Marder that presented fundamental functional units in neural circuits, showing how a variety of behaviors can arise from different configurations of one or two neurons. This blew my mind, and reminded me of my experience with LogiSim. Why didn't something like it exist for neuroscience?

- I started being more politically aware. I've come to believe that part of a scientist's job is education and outreach in some form. Seeing the success Kerbal Space Program has had in wrapping orbital physics into a fun game, it seemed obvious to try to do the same for neuroscience.

- My first game was funded through Kickstarter, so I was reasonably confident I would be able to secure the resources to develop a prototype for Crescent Loom through crowdfunding. Also, since one of my design goals was accessibility, it made sense to involve the public from the start.

So: I saw an unfilled niche for a highly-accessible interactive neural circuit simulator, and I happened to have the right combination of skills to fill it.