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Member Success Case Study | Written By: Audrey Woods

Leela AI

Artificial intelligence is one of the most talked-about subsets of computer science these days. With the media buzz around generative AI programs like ChatGPT, the excitement surrounding autonomous vehicles, and the ecosystem of startups applying AI solutions to industries such as architecture, medicine, and finance, it's easy to see why the global AI market is expected to grow exponentially in the coming years.

But there's more than one way to create an artificial intelligence system, and the methods that underlie a system's construction could have long-term consequences for safety, trustworthiness, and overall societal impact.

That's why MIT spinoff and CSAIL Alliances Startup Connect member [Leela AI](#) is basing their video intelligence platform on real-world common sense, reasoning, and deduction modeled on the way infants learn, compiling these innovations into a manufacturing support system that could optimize production pipelines and change the future of AI technology.

GETTING THEIR START

In the 1990's, the three co-founders of Leela AI were students together on MIT's campus doing research in computer architecture (Dr. Milan Minsky), cognitive science (Dr. Cyrus Shaoul), and artificial intelligence (Henry Minsky). During this period, Henry Minsky was exposed to exciting research being done by a graduate student named Gary Drescher under the guidance of then-MIT Professors Marvin Minsky and Seymour Papert. Drescher, bringing the groundbreaking work of child psychologist Jean Piaget to the field of computer science, was applying infant learning schemas to artificial intelligence in an effort to design AI that learned about the world the way babies do.

Despite this breakthrough being what Henry Minsky describes as "the best thing he'd ever seen," research in this area languished for many years. The computers of the 1990's and early 2000's simply didn't have the power to support the complexity needed to bring Drescher's idea of a common-sense learning AI to the market. But six or seven years ago, Henry Minsky found himself wondering, "maybe it's time to haul this stuff out and see if we can reproduce the results Drescher had and see where we can go from there." After successfully testing Drescher's algorithms in his spare time and replicating the same learning schemas with an artificial intelligence, Henry Minsky joined with Dr. Shaoul and Dr. Milan Minsky to form Leela AI.

THINKING DIFFERENTLY ABOUT ARTIFICIAL INTELLIGENCE

Named after the old Sanskrit word for divine play—or the play of creation, destruction, and re-creation—the Leela system is fundamentally different from other common AI structures being used today. Based on human cognition, Leela combines causal learning and deep learning, adding a layer of real-world reasoning that pulls in "the best pattern recognition needed for the job," explains Dr. Milan Minsky.

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THINKING DIFFERENTLY ABOUT ARTIFICIAL INTELLIGENCE *(continued)*

Leela's novel structure—a hybrid model that combines different AI approaches—gives the system several advantages. Because the system learns like an infant, it doesn't need massive and repetitive training, instead gaining knowledge by testing a hypothesis several times and continually adding to its real-world understanding. This makes it more efficient than giant language models or autonomous systems that require expensive training and often re-training for new situations or different uses. Leela can explain why it makes specific decisions because it is learning based on reality, which overcomes modern concerns about AI systems being “black boxes.” And finally, Leela is reliable because it is only learning from the physical world and therefore can't make deductions or decisions that are out of line with reality the way some generative AI models can.

When it came time to apply their idea to a marketable product, the founders describe how computer vision made the most sense. Dr. Milan Minsky says vision is “perhaps the most advanced” of the human senses and that developing Leela's intelligence with vision “seemed like a natural first step.”

With their starting niche settled, it was time to seek out customers for their intelligent visual system.

REAL-WORLD APPLICATION: IMPROVING MANUFACTURING PROCESSES

Initially, Henry Minsky describes how “the first application we were looking at was: can we do some sort of video monitoring of elderly people in their home?” On the surface, this seemed like a great starting point, since the area of elder care is already overburdened and projected to suffer increasingly serious personnel shortages in the coming years. However, due to the complexities of the medical system, there was no clear buyer for such a product, and patients weren't excited about installing cameras in their homes.

With the help of an MIT-affiliated program called [NSF I-Corps](#), the Leela AI founders were able to hone in on a better fit for their intelligent system: manufacturing.

“It turned out that manufacturing was a nice sweet-spot where people are doing the same thing every day, more or less, with the same things and the same lighting,” Dr. Milan Minsky says, explaining that computer vision systems are already common in factories to check for product defects or for security purposes. She says Leela AI is “adding a level of flexibility that allows us to do what we're calling process inspection.” As the Leela intelligence watches what's happening on a factory floor, it builds up a large database that can be mined for almost any information, including how much time is spent on certain tasks, which shifts are most efficient, what movements are happening most often, etc. Such insight allows manufacturing companies to examine their pipelines for optimization opportunities, deploy labor most effectively, increase value-added time, and identify and transfer best practices.

The Leela AI founders are quick to emphasize that their system is about more than increasing productivity, although that's an important element. Ergonomics is an adjacent area of interest, as well as safety. Leela can be trained to watch for situations in which workers, for example, make a repetitive movement too many times and might need a break, or breach important safety protocols. And because Leela's intelligence is grounded in reality, it can be adjusted and tuned to offer actionable analytics in a variety of real-world use cases.

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REAL-WORLD APPLICATION: IMPROVING MANUFACTURING *(continued)*

With the current shortage of industrial engineers and preventative support, especially as manufacturing companies reshore after the delays and difficulties of the pandemic, Leela AI wants their system to become an assistant or co-pilot to the plant manager, industrial engineer, and operations team. They imagine if a company only has, say, one industrial engineer for a given shift, that person might be able to support far more work with the use of their product. Dr. Milan Minsky hopes Leela AI can “augment the need for ergonomics and safety professionals at these plants as well,” keeping employees safe and healthy.

CSAIL ALLIANCES: HIRING, CONNECTIONS & SERENDIPITY

Another thing that helped the Leela AI founders narrow down their target customer was engaging with CSAIL Alliances. The various industry conversations and presentations facilitated by Alliances helped Leela AI further clarify their mission and market fit. “It’s not always straightforward,” Henry Minsky says of making connections on campus, explaining, **“there’s a serendipity in that you just never know who’s breezing through one of the labs, and that can sometimes lead to really interesting connections.”**

For that reason, Leela AI values events like the CSAIL Alliances Annual Meeting, which bring together companies and researchers for conversations around the technological challenges of the day. Dr. Milan Minsky says of the Annual Meeting that it’s “a great combination of cutting-edge research and startups,” with a unique focus on innovation they find motivating.

Dr. Shaoul adds that connecting with students and faculty is equally important to Leela AI, emphasizing the ever-present need for technical startups to find talent. Dr. Shaoul “just loves talking to the students and finding out what they’re doing and what they’re interested in,” and says he’s excited to meet the new faculty and researchers CSAIL has recently brought on in the AI space. Toward that end, the Leela AI team is planning to give a lecture at CSAIL this summer, which Dr. Shaoul hopes will facilitate further conversations.

Generally, Dr. Milan Minsky thinks **“it’s wonderful to stay connected”** to MIT through programs like CSAIL Alliances.

LOOKING FORWARD

With a business model established, Leela AI is now excited to build on their existing product and fulfill industry needs. Henry Minsky says, “we’re learning a lot from the customers and we’re trying to listen very carefully to what they find useful.” One thing they’re working on is expanding the capacity of Leela to not only observe but also alert users when something’s going wrong, make recommendations to improve manufacturing processes, and chat with customers about what’s happening in the moment they’re in, something even the most advanced large language models can’t yet do. Dr. Milan Minsky pointed out that tackling these challenges also involves creating simulated environments—or a “digital twin” of the manufacturing floor—to experiment with what a change could look like, a tool customers might find valuable in its own right.

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LOOKING FORWARD *(continued)*

Dr. Milan Minsky summarizes the vision for Leela AI by saying, “anywhere people and machines are interacting to make and ship goods, having an eye in the sky that understands the entire set of operations and can pull in resources where they’re needed—whether it’s people or materials—is what we’re doing.”

While the founders are currently focused on satisfying their customer’s requests, Henry Minsky believes the work they’re doing “has much greater application.” Dr. Milan Minsky agrees, emphasizing the importance of Leela’s explainability and real-world common sense as a way to address current AI safety concerns. Dr. Shaoul concludes that their long-term ambition to create truly intelligent AI comes from the ideals they cultivated while at CSAIL. He says, “**our company’s DNA is CSAIL’s DNA**,” which is why they’re all looking forward to engaging deeper with the resources available to them through CSAIL Alliances.