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Artificially Intelligent Engineers—How AI Will Kill All Engineering Jobs.

-And Why It Is a Good Thing.

Since its inception, AI has accomplished some impressive feats. However AI's Engineering feats are often overlooked. Just like in every other industry, AI will have a tremendous impact, in how we build, design and test machines.

Over the course of recorded human history the progression of engineering technology is evident, but AI takes this progression to an exponential level.

F-117 Nighthawk (Source)

In 1970s Lockheed Martin's F-117 Nighthawk was the first stealth fighter jet to ever take flight. The structural design process involved designing the fuselage on a computer and then fabricating that computer design. The end product was a sharply angled fuselage that had horrible aerodynamics.

In the late 1980s when Lockheed Martin was designing the next generation stealth fighter f-22 Raptor, computer aided design vastly got better and hence the engineers were able to design a fighter jet that was vastly more aerodynamic while still maintaining its stealth.

F-22 Raptor (Source)

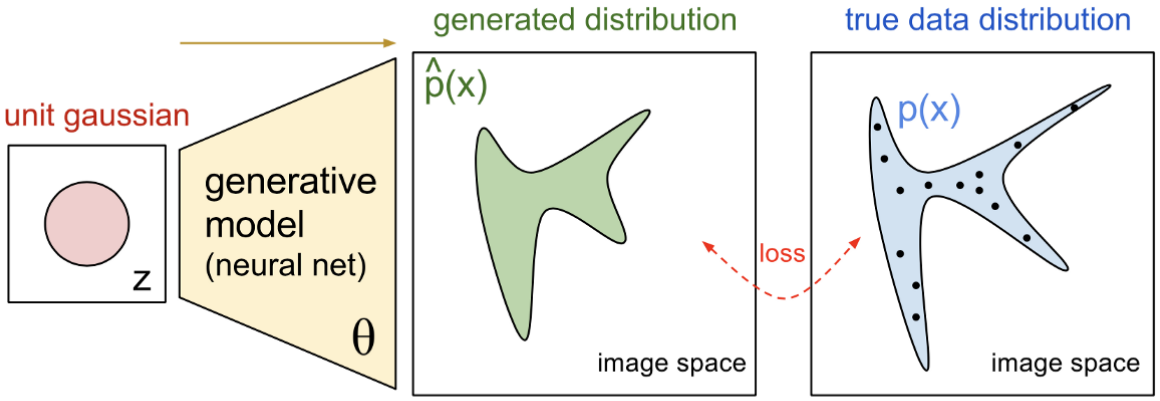
The designing of the Raptor was an example of a massive improvement in engineering capability, but even this process has limitations.

Currently engineering is an expensive, iterative, and time consuming process. Humans still come up with a huge part of the design based on their experience, knowledge, and creativity that is eventually tested and refined. The low information bandwidth between the computer and human engineer doesn't help either. Finally, humans are only capable of coming up with

a small number of solutions to a given problem due to the limits to our brain mass and lifespan.

This particular step of the engineering process is where we are observing drastic improvement through AI.

Today, you can give “AI Engineers” a set of design requirements and it renders a model from scratch using a class of machine learning algorithms called generative Models.



Generative model problem space visualization (Source)

Generative Models are capable of generating a complex optimal solution to a problem that involves a lot of variables. For example designing cars involve finding the optimal balance between ergonomics, structural integrity, fuel efficiency, etc.

Thanks to generative models we are beginning to see creative machines with deep impacts in engineering process.

Speaking of cars, imagine the perfect race car. With the perfect balance of tensile strength and weight and aerodynamics and all variables on a flawless synergy. Designing such a car would be impossible for both humans and computers because there are just too many possible combinations of variables involved in car-making.

This is where a generative model based approach can be used, as shown by the Bandito Brothers.

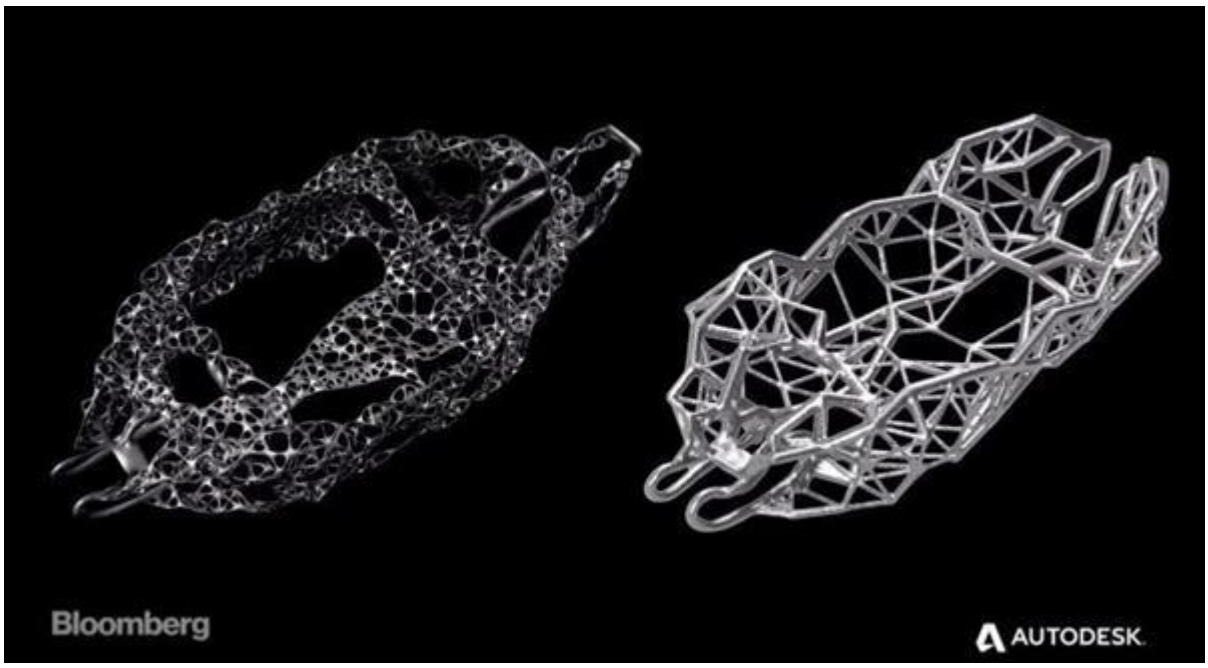
The Bandito Brothers created the most optimal race car chassis called Hackrod.

They hooked up stretch sensors to all the stress points on a traditional race car and collected 4 billion data points over a week.

The designers took this data and fed it to a generative model known as Dream catcher (by Autodesk) with a goal specified: Create the lightest possible frame, given a certain amount of structural integrity.

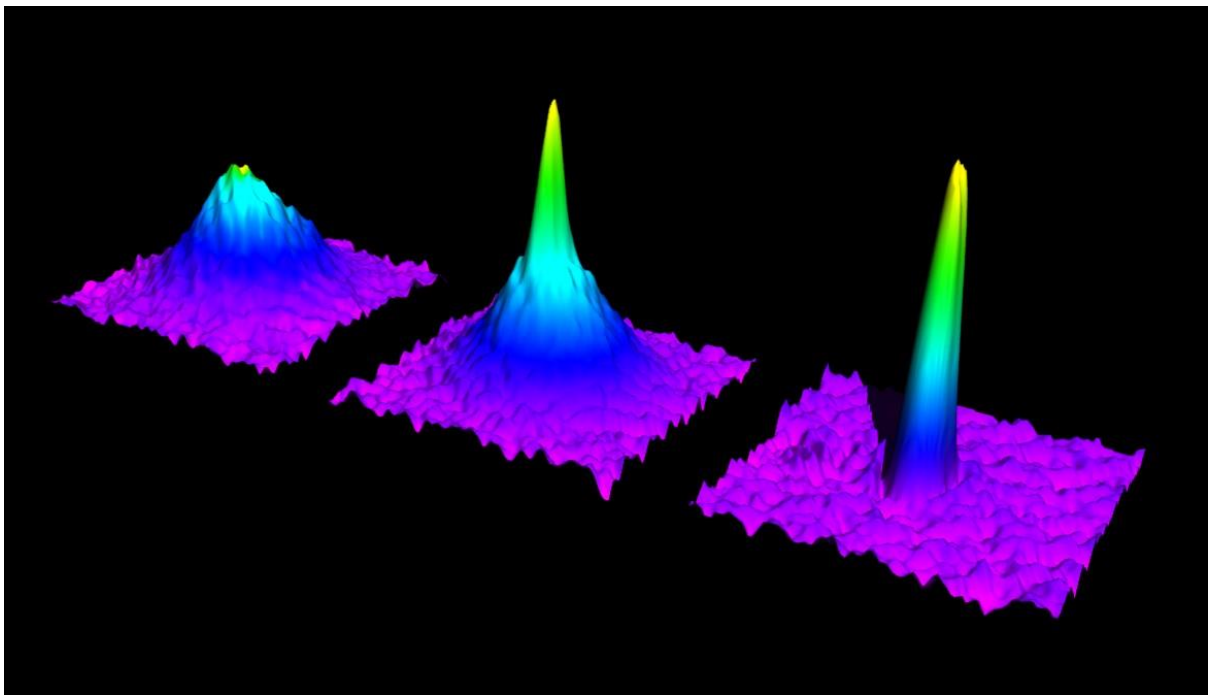
The Dreamcatcher software began to utilize the massive amount of data in order to start the optimization process. The development of the design required a tremendous amount of computing power. This is due to the fact that the development of the design required the exploration of an immensely large problem space with a lot of variables; which is logical since there are an unlimited number of ways a car can be designed.

Finally after hours of computing the model ended up creating a unique race car design that resembled a skeletal structure. Since these algorithms work very similar to the way evolution does, it's quite expected to observe such a result. This design is not something that a regular design production algorithm could arrive at since the problem space is too large.



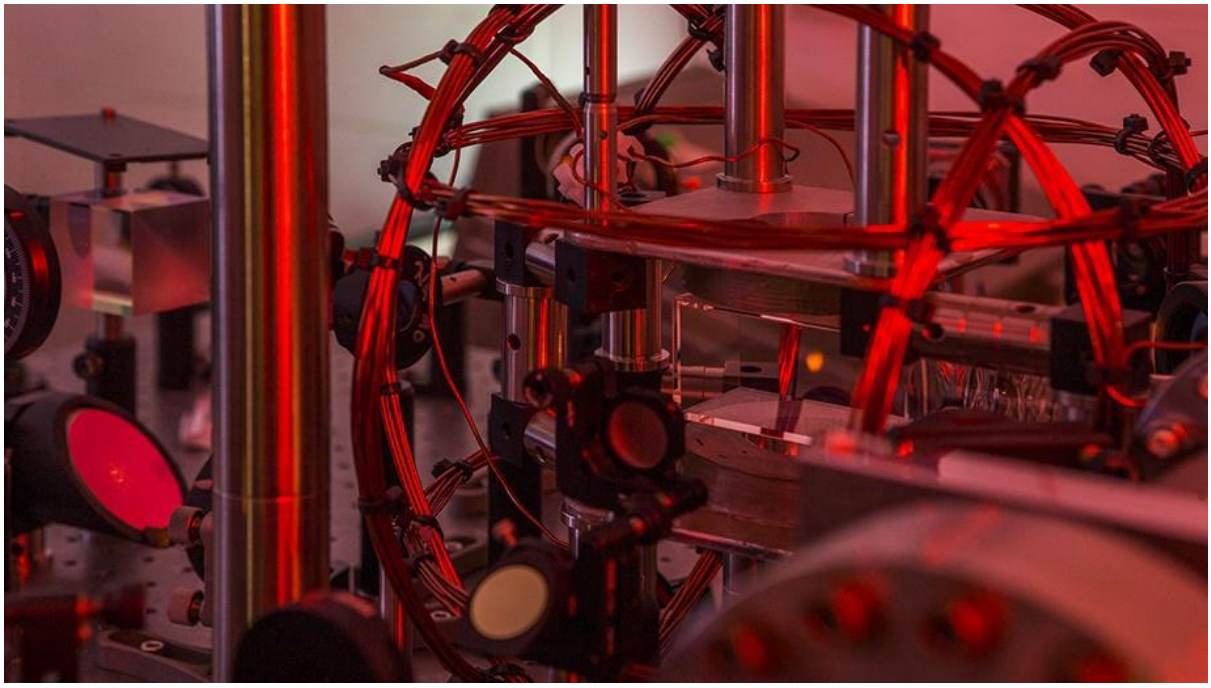
Hack rod chasis (Source)

In addition to engineering solutions, generative models have proven themselves in the field of Quantum Physics. Specifically in the creation of the 5th state of matter—Bose Einstein Condensate. In order to create this 5th state of matter, a temperature in the nano kelvins must be reached (colder than outer space).



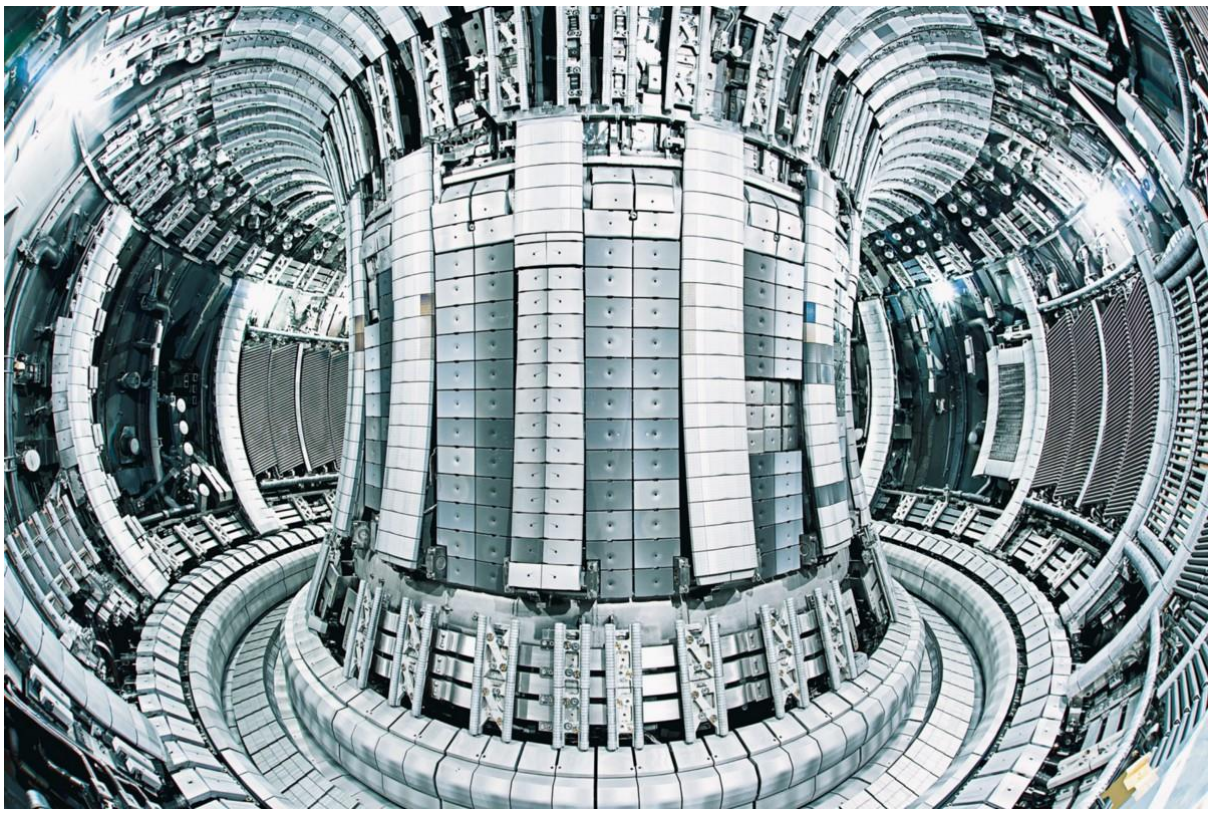
Bose-Einstien Condensate (Source)

The matter is cooled via precisely controlled lasers (counter intuitive but true). In 2001, Eric A Cornell, Wolfgang Ketterle, and Carl E Wieman received the Nobel prize for being the first to create Bose Einstein Condensate. In May, 2016 a research team from the Australian National University hooked up a generative model to a bunch of atomic lasers and within an hour was able replicate the Nobel prize winning experiment that created BEC. This a testament to the power of generative models. It shows that no matter how complex a problem is, a generative AI can solve it by learning through continuous trial and errors.



BEC lab apparatus (Source)

Similar to the engineering problem that Dreamcatcher solved, there is an engineering optimization problem out there that could make massive leaps toward our clean and sustainable energy future. I'm of course talking about the designing of a Nuclear Fusion Reactor.



Fusion reactor(Source)

A fusion reactor is essentially a reactor that creates a self sustain plasma. The reactor continuously extracts energy from this plasma. This could potentially power humanity for thousands of years to come. Currently no feasible fusion reactor exists because the energy put in exceeds the energy put out or in other words, it's not self sustaining. The reason that modern day fusion reactors are so inefficient is because the design of their containment chambers do not allow them to be self sustaining. This presents an optimization problem similar to that solved by Dreamcatcher. The optimal reactor shape must be able sustain the plasma and extract energy while not melting down.

If a generative model like Dreamcatcher were given the rules of thermodynamics, nuclear science, material science, etc and was allowed to train on a massive computer for a relatively short period of time, the generative model would efficiently explore the problem space through continuous trial and error and likely arrive at the optimal fusion reactor design. This would give humanity decades of clean sustainable energy.

A future where all machines are engineered by AI is definitely not be a bad thing. As concepts of “job” continues to be challenged by AI improvements, human engineers of tomorrow will be building these smart AI systems rather than making design decisions.

It might also liberate engineers from the shackles of labor and allow them to take on more high level tasks involving purpose, motivation and direction. It will give those with non engineering degrees the ability to create and design, bringing art and science together

One day, AI Engineers might just allow us to retire at birth and follow our passions instead of a ruthless fight to the death for survival.