

Machines of Loving Grace

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Machines of Loving Grace is the title of a book written by John Markoff. Markoff is a science writer for the New York Times who has followed technology for the last 30 years. In the last few years, we have seen an escalation of technologies, ranging from drones and robots to Artificial Intelligence and the Internet of Things. This has prompted some of our best thinkers to challenge what is happening. Stephen Hawking has remarked: "the development of full artificial intelligence could spell the end of the human race." Bill Gates and Elon Musk have both voiced concerns about the birth of super intelligence or machines that can think.

However, Markoff offers a balanced and interesting view on how technology will impact everyone. Markoff breaks it down between two fronts: Artificial Intelligence (AI) and Intelligent Augmentation (IA). AI is about building systems that replicate human capabilities and IA is about extending what humans do through the use of technology. In the past, these two fronts were quite distinct, never crossing over. But now the lines are becoming very blurred and therein lies the next technological revolution. In just the last two years, we have seen agricultural drones enabling higher crop yields, neuromorphic chips configured like human brains, agile robots walking across uneven terrain and genome editing for diagnosing brain disorders.



Do It Yourself brain scientists or neurohackers are hard at work in Brooklyn trying to decrypt brainwaves. These young entrepreneurs are part of NeuroTechX, an international collaboration of researchers and inventors working on projects such as Cloudbrain. Cloudbrain is a set of artificial intelligence machine-learning algorithms that looks at patterns, explaining how we speak and allowing our thoughts to directly control devices.

Consider findings from the McKinsey Global Institute report titled Disruptive Technologies: Advances that will Transform Life, Business, and the Global Economy:

- Advances in 3-D printing that create just-in-time inventory threaten the jobs of 320 million manufacturing workers around the world
- Automation of knowledge will have a \$ 5 trillion to \$ 7 trillion impact on white-collar jobs
- Renewable energy, such as solar which has decreased in cost by more than 85% will shift economic power away from countries supported by fossil fuels

"In the 2030s, we are going to send nano-robots into the brain (via capillaries) that will provide full immersion virtual reality from within the nervous system and will connect our neocortex to the cloud. Just like how we can wirelessly expand the power of our smartphones 10,000-fold in the cloud today, we'll be able to expand our neocortex in the cloud."
- Ray Kurzweil, Director of Engineering for Google



However, Markoff (pictured on the left) explains that despite this massive disruption, many jobs will also get created. According to Forrester Research, 22.7 million jobs will be lost by 2025, or 16% of the workforce. However, another 13.6 million jobs will get created in areas such as software engineering, automation design, and support services; resulting in a net loss of 9.1 million jobs in ten years.

Markoff also believes that technology has limitations when it comes to scaling. It seems most of us believe that technology can scale indefinitely - faster processing times (scaling up) or less physical storage (scaling down). However, Markoff notes that some things are no longer scaling such as the cost of transistors.

Markoff also divides technological change in terms of generations; i.e. each generation will view and use technology differently. This also applies to different cultures. For example, in China where people often do not have time alone, young users of the most advanced ChatBot have “toilet time.” They engage in conversations that almost become addictive. A survey found that 25% of the users ended their conversations with the ChatBot by saying: “I love you.”

“Data-driven statistical machine learning will allow us to surpass human performance in many areas, from solving the hardest crossword in the blink of an eye to proposing architectural designs for cities. For autonomous systems such as service robots, it will be critical to attain sufficient moral competence in order for them to navigate the complexities and intricacies of human, social and moral norms without causing us unnecessary harm.” – Matthias Scheutz, Professor of Cognitive and Computer Science, Tuft University

Another great reporter from the New York Times, Thomas Friedman has also discussed the IT Revolution, indicating that it is flying under the radar without much publicity. According to Friedman, the IT Revolution is the biggest thing happening on the planet today. It will change every job, every school and every industry. We are going from connected to hyper-connected and from inter-connected to inter-dependent. No one is talking about it, but everyone is living it. Friedman jokes that the Receptionist in his office has been replaced by a micro-chip.



The jobs of the future will be those jobs that interact with the robots. Obtaining special certifications in fields such as artificial intelligence and physical robotic systems will be your key to securing a job. Take for example DeepQA, a software architecture that does deep content analysis and evidence-based reasoning. DeepQA analyzes natural language input and delivers relevant answers from a combination of existing natural language text and databases. Another example is the robo-advisor. Venture Capitalist are providing over \$ 1 Billion to fund the development of these services. According to A.T. Kearney, “Robo-advisory services will become mainstream over the next three to five years.”

“Industries will be transformed. Major companies will fall. Old systems will collapse as entrepreneurs figure out how to optimize and reinvent inefficient businesses, products, and services to provide consumers (us) with all things better, faster and cheaper. According to the Olin School of Business, 40% of today's Fortune 500 companies will be gone in the next 10 years.” – Peter Diamandis, co-author of Bold and Chairman of Singularity University

Tom Friedman recommends that everyone “invent” their own job. As Friedman says, “everyone should become a paranoid optimist” and take extreme individual initiative in order to survive. Markoff also expresses concerns over what is happening, noting that a “tremendous amount of power and responsibility” is in the hands of designers behind artificial intelligence (when a robot replaces a human) vs. intelligence augmentation (when a robot is an auxiliary assistant to a human). Markoff refers to Norbert Wiener, the MIT mathematician whose book *Cybernetics* touched off the first debate about robots and the future. To quote Wiener: “We can be humble and live a good life with the aid of the machines or we can be arrogant and die.”

Perhaps the well-known Astro Physicist Neil DeGrasse Tyson sums it up best: We should not get too comfortable with our apps and devices, thinking that we are somehow well-informed through the use of these technologies. But instead we should recognize that it is the arts and sciences that have always defined civilizations. And because we face huge issues – transportation, energy, hunger, climate to name a few, we should never separate ourselves from these realities. This is how we keep the current technological revolution grounded in reality, by staying informed on what defines us and the issues impacting our future.

<https://www.youtube.com/watch?v=Pe9G6GiH4Os>