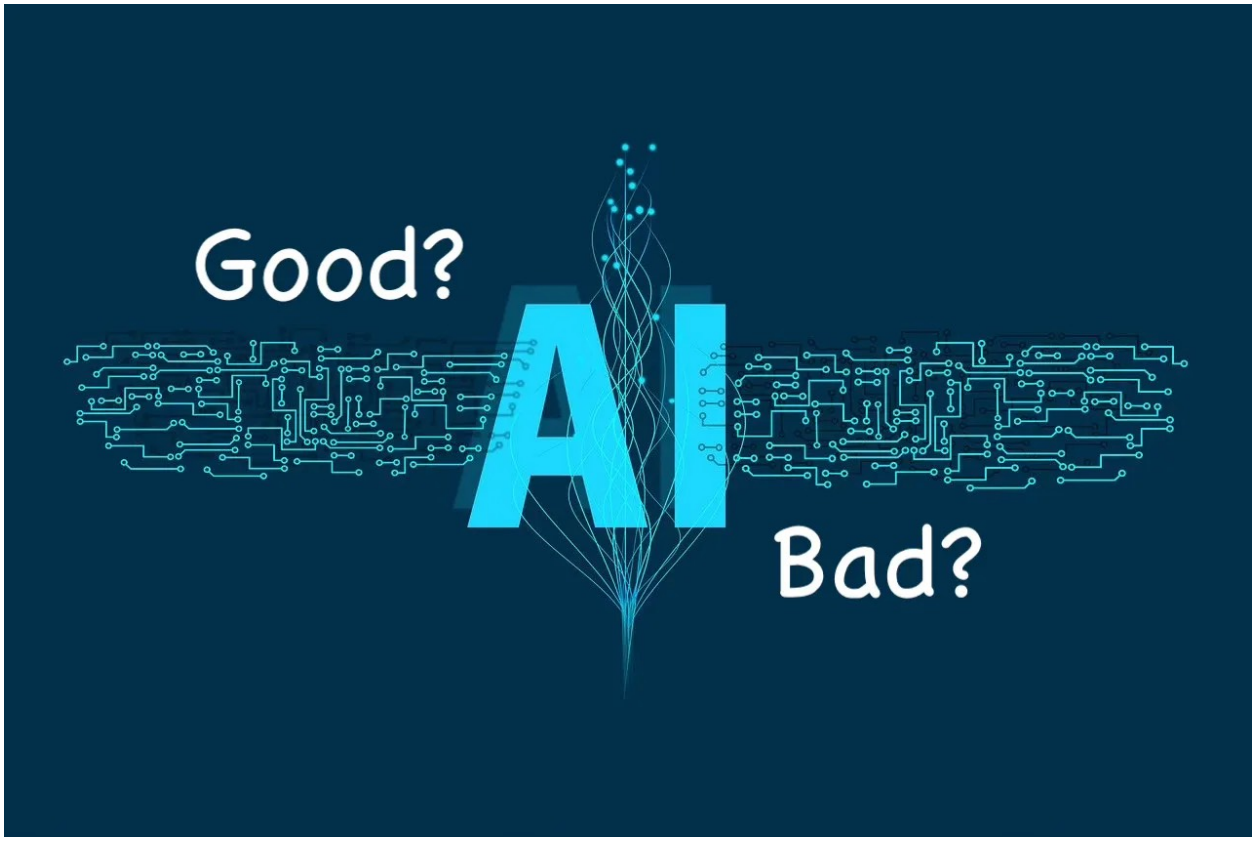


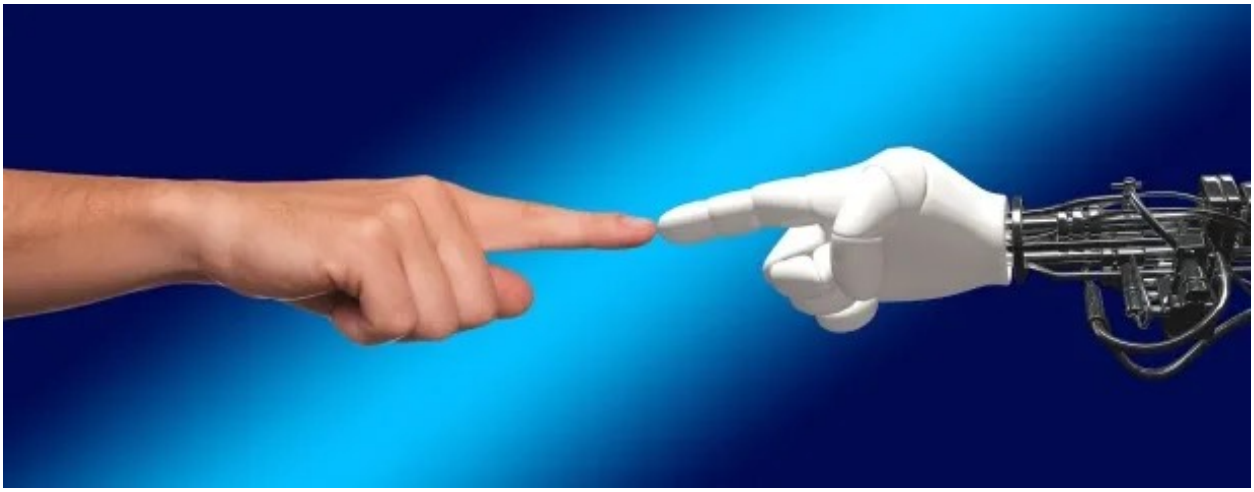
What About AI in 2024?

By

Mark McGee

AI Today

It's been 17 years since the publication of *A History of Man's Quest for Immortality* where I described the status of AI research at that time. How about today? It's amazing how much things have changed in just 17 years. With knowledge now doubling every day, we can see how quickly AI will grow in the coming months and years.



Types of AI are based on likeness to the human mind — ability to think and even “feel” human. AI systems include reactive machines, limited memory machines, theory of mind, and self-aware AI.

- **Reactive machines** – older machine types that do have the ability to learn. Reactive machines are not memory-based. They are still in wide use today. Computers are an example of Reactive Machines.
- **Limited memory machines** – current AI systems are capable of learning from data to make decisions. That includes learning from previous learned information. Limited memory machines use image recognition for both learning and how to solve problems in the future.

Virtual assistants, self-driving vehicles and chatbots are examples of Limited Memory AI.

- **Theory of Mind** – this is a next level for AI innovation. This is where AI would be able to discern human thought processes, emotions, beliefs and needs. Researchers are working on ways for AI machines to "understand" human beings.
- **Self-aware AI** – this is a type of "self consciousness" where a machine would be "aware" of itself and be able to form a representation of itself. Many researchers believe they need to develop Theory of Mind machines before they'll be able to build Self-aware AI (also known as Artificial consciousness (AC), Machine Consciousness (MC) and Synthetic Consciousness (SC), including research into cognitive robotics).

AI and Supercomputers

Remember *Deep Blue*? It was a supercomputer that played chess with then reigning world champion Gary Kasparov in the 1990s. Kasparov won the 1996 match, but lost the 1997 rematch making Deep Blue the first supercomputer to defeat a reigning world chess champion in a tournament. Even though that was the first time many people had heard the term “supercomputer,” the word had been around for decades.

It was first used in the 1920s for some IBM tabulators being used at Columbia University. The 1960s saw the development of the UNIVAC LARC, the CDC 1604, the IBM 7030, the ManchesterAtlas, and the CDC 6600. Some historians believe the U.S. Navy’s IBM NORC was a type of supercomputer for its time. Computer scientists continued to build faster and faster supercomputers in the 1970s, 80s, 90s and 2000s.

The processing speed of today's supercomputers is many times faster and plays an important role in AI development.

Housed at the Oak Ridge National Laboratory, **Frontier** has held number one since the June 2022 list. The supercomputer has an HPL (high performance Linpack) benchmark score of 1.194 exaflops, uses AMD Epyc 64C 2GHz processors, and is based on the HPE Cray EX235a architecture. The system has a total of 8,699,904 combined GPU and CPU cores, and uses HPE's Slingshot 11 network for data transfer. The supercomputer has also been awarded 8th place on the Green500, a biannual ranking of supercomputers by energy efficiency. Data Center Dynamics

In just the past twenty years the speed of supercomputers has expanded greatly. The language is a bit strange for those of us who don't work in that 'world.' For example, the computing speed increased from 7.226 TFLOPS for the IBM ASCI White supercomputer in 2000 to 415.53 PFLOPS for the Fugaku supercomputer in 2020.

Here's a quick language explainer for those of us in journalism and communication. These are from Indiana University's Information Technology Services —

- **GigaFLOPS —** A 1 gigaFLOPS (GFLOPS) computer system is capable of performing one billion (10^9) floating-point operations per second. To match what a 1 GFLOPS computer system can do in just one second, you'd have to perform one calculation every second for 31.69 years.
- **TeraFLOPS —** A 1 teraFLOPS (TFLOPS) computer system is capable of performing one trillion (10^{12}) floating-point operations per second. The rate 1 TFLOPS is equivalent to 1,000 GFLOPS. To match

what a 1 TFLOPS computer system can do in just one second, you'd have to perform one calculation every second for 31,688.77 years.

- **PetaFLOPS —** A 1 petaFLOPS (PFLOPS) computer system is capable of performing one quadrillion (10^{15}) floating-point operations per second. The rate 1 PFLOPS is equivalent to 1,000 TFLOPS. To match what a 1 PFLOPS computer system can do in just one second, you'd have to perform one calculation every second for 31,688,765 years.
- **ExaFLOPS —** A 1 exaFLOPS (EFLOPS) computer system is capable of performing one quintillion (10^{18}) floating-point operations per second. The rate 1 EFLOPS is equivalent to 1,000 PFLOPS. To match what a 1 EFLOPS computer system can do in just one second, you'd have to perform one calculation every second for 31,688,765,000 years.

What is the fastest supercomputer in 2024?

The 500 fastest supercomputers are spread across 35 countries, of which 29 countries have more than one system. From November 2017 until November 2022, China had the highest number of supercomputers.

But as of June 2023, the US has resumed the top position on the Top500 list, and the number has since increased from 150 supercomputers to 161 in November. China has 104 and is followed by Germany, which has 36 supercomputers. Japan and France round out the top five, with the UK, Canada, Italy, South Korea, the Netherlands and Canada completing the top 10.

The US is also the leader in terms of performance, measured in maximal Linpack performance achieved (Rmax) at 3,725,851 teraFLOPS (TFLOPS). That is well ahead of China's 407,239 TFLOPS.

The Frontier system at the Oak Ridge National Laboratory (ORNL) in Tennessee, US, is the only exascale machine reported with a High-Performance Linpack (HPL) exceeding one Exaflop per second (1 EFLOP/s).

Techopedia.com

2024 ‘may’ see the introduction of an even faster supercomputer -

> Europe is set to launch its first exascale computer in 2024 to rival the most powerful supercomputers in the world.
>
> Jupiter will be housed at the Jülich Supercomputing Centre in Germany and is expected to be capable of one exaflop, or one billion-billion (1,000,000,000,000,000,000) calculations per second. The cost of building and operating the supercomputer for six years is projected at €500 million ($545 million).
>
> Jupiter is being designed to tackle "the most demanding simulations and compute intensive AI applications in science and industry," according to the center. These applications include training large language models, simulations for developing functional materials, creating digital twins of the human heart or brain for medical

purposes, validating quantum computers, and high-resolution simulations of Earth's climate. AI Business

Jupiter, an exascale machine in Germany, is slated to come online at the end of 2024. An exascale upgrade to the Fugaku supercomputer in Japan is planned for 2029. And France is currently planning to build an exascale system called Jules Vernes, although a release date has yet to be announced. Science.org

Using AI

Just seven years ago 15-hundred business leaders were asked about AI and only 17 percent said they were familiar with it (Deloitte, 2017). Many of the leaders who were familiar with AI were not clear how they could use it in their businesses. That was seven years ago. What about now?

> While the uses of this new technology are still up for debate, leaders seem to agree on a timeline for incorporation. In a recent survey of just over 400 corporate leaders at the director level or higher, Insight Enterprises found nearly three-quarters (72%) of respondents want artificial intelligence incorporated into their business within three years. CFO.com

Business leaders are seeing the potential of AI and want to use it. However, what about consumers? Most of us already have some experience with artificial intelligence through —

- computers
- smart phones
- smart automobiles
- onboard navigation systems
- smart maps
- self-driving cars
- autonomous vehicles
- smart kitchens
- smart televisions
- smart air conditioners
- home security
- image analysis software
- video editing software
- gaming software
- virtual assistants
- digital personal assistant
- travel assistant

- social media
- remote working
- remote learning
- marketing and advertising
- robotic assistance
- factory robotics
- humanoid robots
- Virtual Reality
- Augmented reality
- Metaverse
- web-connected vacuum cleaners
- weather warning apps
- medical diagnosis and treatment
- drug development
- online banking
- finance and investment
- online shopping
- speech and facial recognition systems
- drones
- air travel
- web searches

- smart cities
- law enforcement

What's next for businesses and consumers on the AI front?

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