

Technology Trends

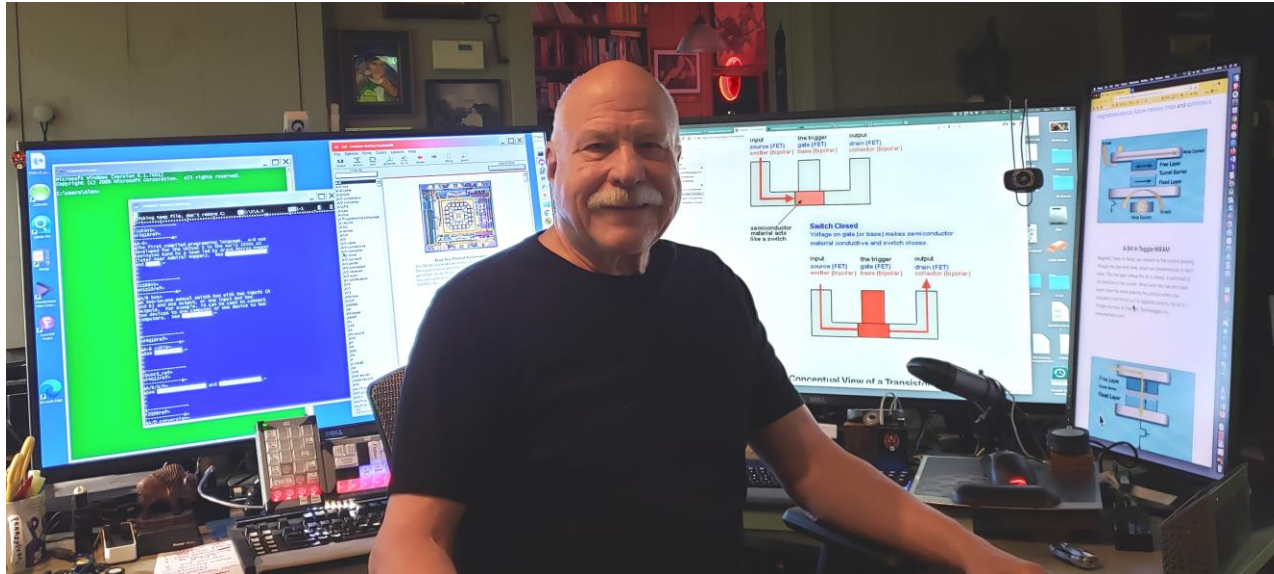
Artificial Intelligence and Machine Learning

Center for Learning in Retirement

CLR Fall 2020

Glen Maxson & Alan Freedman

Who Are We?



Alan Freedman

alan@computerlanguage.com, (215) 297-8082

<https://www.computerlanguage.com>

Glen Maxson

glenmaxson@gmail.com, 267-866-7827

<http://www.seniortechadvisor.com>



Dates – we meet Tuesday (9:25 a.m.-10:40 a.m.) for 12 weeks

Week 1 – Sept. 15

Week 2 – Sept. 22

Week 3 – Sept. 29

Week 4 – Oct. 6

Week 5 – Oct. 13 (this is Fall Break at Del Val, but we'll continue to meet)

Week 6 – Oct. 20

Week 7 – Oct. 27

Week 8 – Nov. 3

Week 9 – Nov. 10

Week 10 – Nov. 17

Week 11 – Nov. 24 (Alan will likely cover this class as Glen will be out of town)

Week 12 – Dec. 1 (last day of class for CLR is Dec. 4)

Communication and Meeting Logistics

- A weekly reminder will be sent to all members registered for this class the evening before each class with the Zoom meeting link, as well as a [link](#) to slides for the class
- The Zoom session will be active by 9:00am Tuesday morning so feel free to come early to chat about anything that comes to mind
- Class will start promptly at 9:25am and will end at 10:40am, so if you're not early, please be on time
- Feel free to reach out to Alan and Glen during the week:
 - Glen Maxson, glenmaxson@gmail.com, 267-866-7827
 - Alan Feedman, alan@computerlanguage.com, (215) 297-8082

Web sites

- <http://www.seniortechadvisor.com> (all class slides provided here each night before class)
- <https://www.computerlanguage.com/> (Alan's Computer Desktop Encyclopedia)

Today's Objective

- Technology Trends
 - Why are we talking about this?
 - What will we be discussing?
 - Talk about the underlying technology that makes all this possible...

The Why

- The world is changing
 - Rapidly – too fast for humanity to cope? Perhaps...
 - We need to understand the potential and implications of new technologies
 - Assess the benefits and risks

The What

- Artificial Intelligence & Machine Learning
- Robots & Drones
- Autonomous Transportation Systems
- Surveillance
- (Cyber) Crime, Security & Warfare
- Medical Tech
- Media (incl. Social Media)
- (Virtual) Money & Blockchain
- Communication
- Earth & Sky
- Space

The Driver in the Driverless Car: How Our Technology Choices Will Create the Future

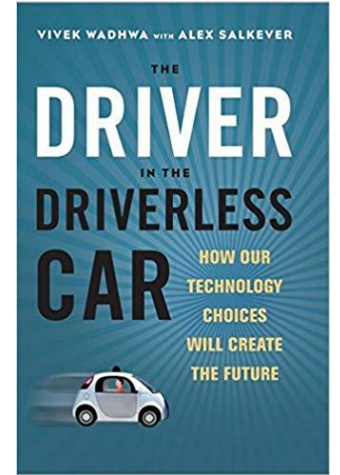
Meet the authors:



Vivek Wadhwa is a Distinguished Fellow at Carnegie Mellon University's College of Engineering. He is a globally syndicated columnist for The Washington Post and author of *The Driver in the Driverless Car: How Our Technology Choices Will Create the Future*; *The Immigrant Exodus: Why America Is Losing the Global Race to Capture Entrepreneurial Talent*



Alex Salkever is a writer, futurist and technology leader and surfer (he lived in Hawaii for over a decade chasing his passion). He is the co-author of "*The Driver in the Driverless Car: How Our Technology Choices Can Change the Future*". The book was named as a Finalist in the 2017 McKinsey / Financial Times Book of the Year Competition



2017

Three Questions

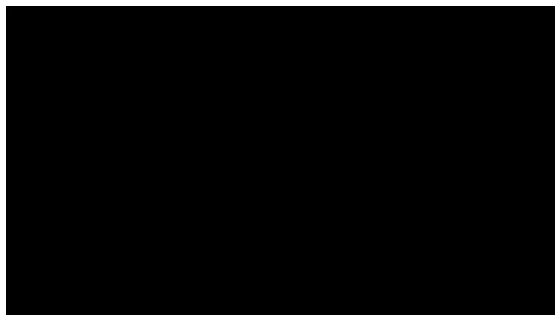
Wadhwa offers three questions to ask about every emerging technology:

- Does it have the potential to benefit everyone equally?
- What are its risks and rewards?
- Does it promote autonomy or dependence?

Looking at a broad array of advances in this light, he emphasizes that 'the future is up to us to create—that even if our hands are not on the wheel, we will decide the driverless car's destination'.

Salkever – videos ([source](#))

Intro (2 min)



Good (1.5 min)

Bad (2 min)

Salkever - videos

Intro (2 min)

Good (1.5 min)

Bad (2 min)

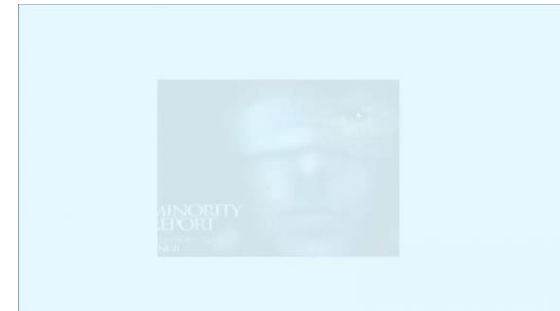


Salkever - videos

Intro (2 min)

Good (1.5 min)

Bad (2 min)



Book Summary

Premise – what future do we want, Mad Max or Star Trek? If we get this right, we can create the amazing future of Star Trek...

- AI – single task vs. applied intelligence
- Jobs – not enough jobs, ‘gap growing’
- OnDemand – ‘digitized’ retail, sensors/AI, robots, drones...
- Health – we are ‘data’, our doctors are ‘software’, genomics*
- Energy – unlimited, clean, (almost) free – generation and storage problem solved by mid- 2000s – clean water, light, communications, health, food...

*Genomics - the branch of molecular biology concerned with the structure, function, evolution, and mapping of genomes.

Artificial Intelligence – What is it?

Artificial intelligence (AI, also **machine intelligence**, MI) is **intelligence** demonstrated by **machines**, in contrast to the **natural intelligence** (NI) displayed by humans and other animals. In **computer science** AI research is defined as the study of "**intelligent agents**": **any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals**. The term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other **human minds**, such as "learning" and "problem solving".

Machine Learning

Machine learning is a subset of artificial intelligence in the field of computer science that often uses statistical techniques to give computers the ability to "learn" (i.e., progressively improve performance on a specific task) with data, without being explicitly programmed.

Machine learning evolved from the study of pattern recognition and computational learning theory in artificial intelligence, machine learning explores the study and construction of algorithms that can learn from and make predictions on data – such algorithms overcome following strictly static program instructions by making data-driven predictions or decisions, through building a model from sample inputs.

Machine learning is sometimes combined with data mining, where the latter subfield focuses more on exploratory data analysis and is known as unsupervised learning.

Within the field of data analytics, machine learning is a method used to devise complex models and algorithms that lend themselves to prediction. These analytical models allow researchers and data scientists to "produce reliable, repeatable decisions and results" and uncover "hidden insights" through learning from historical relationships and trends in the data.

Algorithms and Prediction from [‘The Social Dilemma’](#)



Chris Anderson & Sebastian Thrun Q&A

- Question 1 – How does Machine Learning work?

Sebastian Thrun – What AI is – and isn't (24:21)

Question 1 (3 min)



Question 2 (3 min)

Question 3 (2 min)

Question 4 (6.5 min)

Question 5 (4 min)

Chris Anderson & Sebastian Thrun Q&A

- Question 2 – How do self-driving cars work?

Sebastian Thrun – What AI is – and isn't (24:21)

Question 1 (3 min)

Question 2 (3 min)

Question 3 (2 min)



Question 4 (6.5 min)

Question 5 (4 min)

Chris Anderson & Sebastian Thrun Q&A

- Question 3 – How can you use AI to help detect skin cancer?

Sebastian Thrun – What AI is – and isn't (24:21)

Question 1 (3 min)

Question 2 (3 min)

Question 3 (2 min)



Question 4 (6.5 min)

Question 5 (4 min)

Chris Anderson & Sebastian Thrun Q&A

- Question 4 – ‘Machines’ make us stronger, but is there the possibility of a ‘run-away effect’?
- [Elon Musk](#)’s alarming views on the dangers of A.I. first went viral after he spoke at M.I.T. in 2014—speculating that **A.I. was probably humanity’s “biggest existential threat.”**
- [Stephen Hawking](#) is **concerned that artificial intelligence could replace humans**. The world-renowned physicist fears that somebody will create AI that will keep improving itself until it’s eventually superior to people. He says the result of this will be a “new form” of life.

Sebastian Thrun – What AI is – and isn't (24:21)

Question 1 (3 min)

Question 2 (3 min)

Question 23(2 min)

Question 4 (6.5 min)

Question 5 (4 min)



Chris Anderson & Sebastian Thrun Q&A

- Question 5 – Is human creativity different than the ‘creativity’ that computers can do?
- And why would I want to be beamed to Mars anyway?

Sebastian Thrun – What AI is – and isn't (24:21)

Question 1 (3 min)

Question 2 (3 min)

Question 3 (2 min)

Question 4 (6.5 min)

Question 5 (4 min)

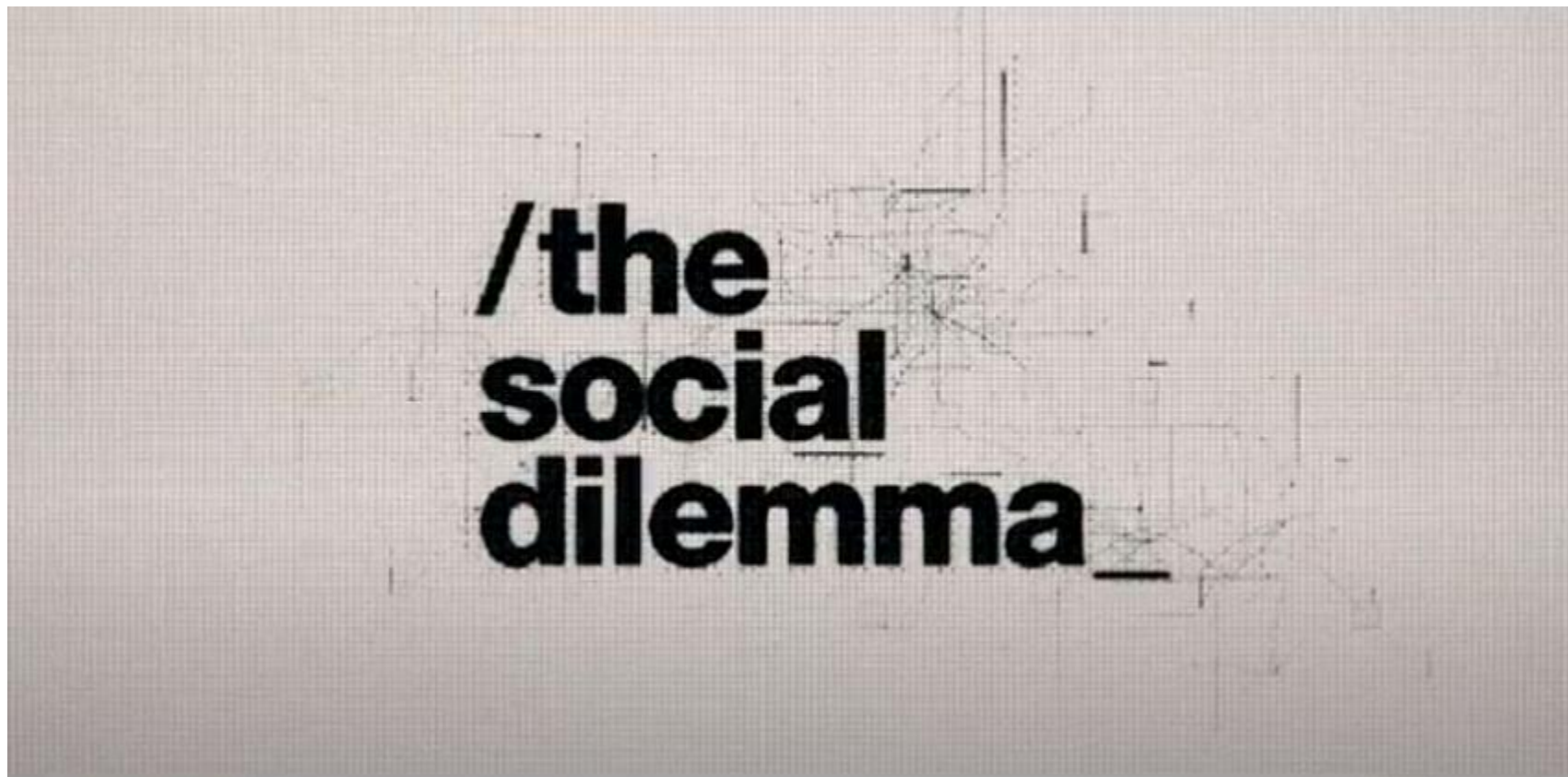


Sebastian Thrun – What AI is – and isn't (24:21)

- Computers define their own rules – ex. Alpha Go
- Inflection point – computer technology and access to (lots of) data
- Deep learning – ex. Voyage, self-driving cars
- Neural networks – dermatology, ethics
- Competitions – cheap labor
- Machines make us stronger
- Big revolution – specialization, massive data
- Becoming super-creative – rise to a new level of empowerment
- 150 years of innovation - pace of invention ever increasing

Beam me to Mars – I don't think so...

A Short Clip from '[The Social Dilemma](#)'



Who is [Tristan Harris](#)?

AI training AI

Layers upon layers of AI training AI and building AI. Think of [DeepMind's AlphaGo](#) as an example. If DeepMind can use an AI to build an AI that can more quickly train itself to beat the best AlphaGo bot, then it can build an AI that helps it build a better TPU.

So you have a virtuous (vicious) cycle of AI code creating a better TPU, then that TPU is manufactured and used with the code to build better code, and the better code is with the new TPU to design a better TPU, and the TPU is used with the best available coded AI to build even better AI. You see where this is going. Soon, humans have no understanding of how the AI is making the gains that it is making, and the AI is able to train itself faster than we ever imagined.

*A tensor processing unit (TPU) is an **AI** accelerator application-specific integrated circuit (ASIC) developed by Google specifically for neural network machine learning*

More AI videos

1. [Introducing GeForce GTX G-Assist](#) (1 month ago, 2.16M views)
2. [Daddy's Car: a song composed by Artificial Intelligence - in the style of the Beatles](#) (7 months ago, 1.55M views)
3. [Google's Deep Mind Explained! - Self Learning A.I.](#) (1 year ago, 1.30M views)
4. [Artificial Intelligence](#) (4 months ago, 1.02M views)
5. [Most Advanced A.I. Robot Admits It Wants to Destroy Humans After Glitch During TV Interview](#) (1 year ago, 913K views)
6. [The incredible inventions of intuitive AI | Maurice Conti](#) (2 months ago, 859K views)
7. [Putting Google's AI Through the Turing Test](#) (5 months ago, 825K views)
8. [Artificial Intelligence in Google's Dinosaur](#) (English Sub) (1 year ago, 802K views)
9. [Can we build AI without losing control over it? | Sam Harris](#) (6 months ago, 711K views)
10. [Are We Approaching Robotic Consciousnesses?](#) (1 year ago, 698K views)

[Artificial Intelligence](#)



Discussion

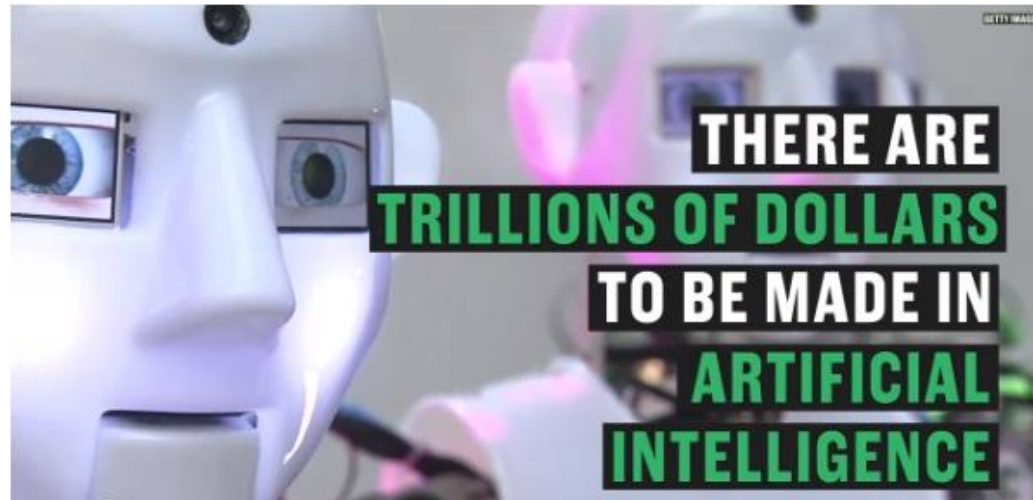
- Does this 'emerging' technology' have the potential to benefit everyone equally?
- What are its risks and rewards?
- Does it promote autonomy (self-determination) or dependence?

Artificial Intelligence

- [Why Google wants to think more like you and less like a machine](#)
 - **Brain interpretation**
 - People are astonishingly capable of making sense of language, even though it is often ambiguous
 - **Tech needs neuroscience**
 - [Hiring from the neuroscience sector](#) to gather people with backgrounds in understanding how biological brains perform computations
 - **Biological thinking**
 - Biological brains work nothing like digital computers. Brains are massively parallel, harnessing the power of a huge number of relatively slow and simple processing elements working together. Digital computers instead do one thing at a time, albeit extremely fast.

Artificial Intelligence

- [Bill Gates: 'A.I. can be our friend'](#)
 - "AI is just the latest in technologies that allow us to produce a lot more goods and services with less labor. And overwhelmingly, over the last several hundred years, that has been great for society," explains Gates.
 - "This extra productivity is a very very good thing used in an enlightened way," says Gates.



Artificial Intelligence

- [ELON MUSK'S BILLION-DOLLAR CRUSADE TO STOP THE A.I. APOCALYPSE](#)
 - Facebook uses A.I. for targeted advertising, photo tagging, and curated news feeds
 - Microsoft and Apple use A.I. to power their digital assistants, Cortana and Siri
 - Google's search engine from the beginning has been dependent on A.I.

Musk's alarming views on the dangers of A.I. first went viral after he spoke at M.I.T. in 2014—speculating that A.I. was probably humanity's “biggest existential threat.”



Artificial Intelligence

9 of the most jaw-dropping things Elon Musk said about robots and AI in 2017

The good

- 1. Your self-driving car will automatically take you where you want to go
- 2. There's no reason your Tesla won't be able to fly in the future
- 3. Robots will move so fast you need a strobe light to see them

The bad

- 4. Robots will do everything better than us

The scary

- 5. The global arms race for AI will cause World War III
- 6. AI is a greater risk than North Korea
- 7. "AI is a fundamental risk to the existence of human civilization."
- 8. Governments will force companies to turn over AI tech at gunpoint
- 9. "AI will be the best or worst thing ever for humanity."

Artificial Intelligence

- [Sebastian Thrun and Chris Anderson: What AI is -- and isn't | TED Talk](#)
- [Philipp Gerbert: The basics of AI for business | TED Talk](#)
- [Sam Harris: Can we build AI without losing control over it? - TED Talks](#)
- [True Artificial Intelligence will change everything | Juergen ... - YouTube](#)
- [Artificial Intelligence: it will kill us | Jay Tuck | TEDxHamburgSalon ...](#)

Discussion

- Does this 'emerging' technology' have the potential to benefit everyone equally?
- What are its risks and rewards?
- Does it promote autonomy (self-determination) or dependence?

More AI videos

1. [Introducing GeForce GTX G-Assist](#) (1 month ago, 2.16M views)
2. [Daddy's Car: a song composed by Artificial Intelligence - in the style of the Beatles](#) (7 months ago, 1.55M views)
3. [Google's Deep Mind Explained! - Self Learning A.I.](#) (1 year ago, 1.30M views)
4. [Artificial Intelligence](#) (4 months ago, 1.02M views)
5. [Most Advanced A.I. Robot Admits It Wants to Destroy Humans After Glitch During TV Interview](#) (1 year ago, 913K views)
6. [The incredible inventions of intuitive AI | Maurice Conti](#) (2 months ago, 859K views)
7. [Putting Google's AI Through the Turing Test](#) (5 months ago, 825K views)
8. [Artificial Intelligence in Google's Dinosaur](#) (English Sub) (1 year ago, 802K views)
9. [Can we build AI without losing control over it? | Sam Harris](#) (6 months ago, 711K views)
10. [Are We Approaching Robotic Consciousnesses?](#) (1 year ago, 698K views)

Elon Musk

Elon Musk Compares Building Artificial Intelligence To “Summoning The Demon”

Musk: *I think we should be very careful about artificial intelligence. If I had to guess at what our biggest existential threat is, it's probably that. So we need to be very careful with artificial intelligence.*











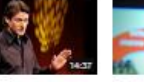



















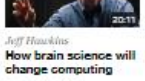


















I'm increasingly inclined to think that there should be some regulatory oversight, maybe at the national and international level, just to make sure that we don't do something very foolish. With artificial intelligence we're summoning the demon. You know those stories where there's the guy with the pentagram, and the holy water, and he's like — Yeah, he's sure he can control the demon? Doesn't work out.

Bill Gates

- [Bill Gates: I do not agree with Elon Musk about A.I. 'We shouldn't panic about it'](#)
 - "The so-called control problem that Elon is worried about isn't something that people should feel is imminent," says Gates, according to a transcript of the interview published by the WSJ Magazine Monday. "We shouldn't panic about it."
 - [Head of A.I. at Google slams the kind of 'A.I. apocalypse' fear-mongering Elon Musk has been doing](#)
 - [Elon Musk: Governments will obtain AI technology 'at gunpoint' if necessary](#)
 - [Facebook CEO Mark Zuckerberg: Elon Musk's doomsday AI predictions are 'pretty irresponsible'](#)
 - [Warren Buffett and Bill Gates think it's 'crazy' to view job-stealing robots as bad](#)

Artificial Intelligence

Videos

 <p>Daniel Shackelford 3 things about the future of work (and why they're not true) Posted Mar 2015 Rated Informative, Persuasive</p>	 <p>Chuck New A funny look at the unintended consequences of technology Posted Feb 2016 Rated Funny, Persuasive</p>	 <p>Margaret Mitchell How we can build AI to help humans, not hurt us Posted Feb 2015 Rated Informative, Inspiring</p>	 <p>Sebastian Thrun and Chris Anderson What AI is – and isn't Posted Nov 2017 Rated Fascinating, Informative</p>	 <p>Zeynep Tufekci We're building a dystopia just to make people click on ads Posted Oct 2017 Rated Informative, Persuasive</p>	 <p>Martin Ford How we'll earn money in a future without jobs Posted Oct 2017 Rated Informative, Persuasive</p>	 <p>Sloman Sankar The rise of human-computer cooperation Posted Sep 2012 Rated Informative, Fascinating</p>	 <p>Ken Goldberg 4 lessons from robots about being human Posted May 2012 Rated Inspiring, Fascinating</p>	 <p>Sherry Turkle Connected, but alone? Posted Apr 2012 Rated Inspiring, Persuasive</p>	 <p>Vijay Kumar Robots that fly ... and cooperate Posted Mar 2012 Rated Fascinating, Ingenious</p>	 <p>Martin Haughey The line between life and not-life Posted Nov 2011 Rated Fascinating, Informative</p>	 <p>Daniel Wolpert The real reason for brains Posted Nov 2011 Rated Fascinating, Informative</p>
 <p>Anshika Naypal What intelligent machines can learn from a school of fish Posted Sep 2017 Rated Informative, Fascinating</p>	 <p>Noriko Arai Can a robot pass a university entrance exam? Posted Aug 2017 Rated Informative, Fascinating</p>	 <p>Robin Hanson What would happen if we upload our brains to computers? Posted Aug 2017 Rated Fascinating, Informative</p>	 <p>Isaac Rubinov What moral decisions should driverless cars make? Posted Aug 2017 Rated Informative, Fascinating</p>	 <p>Tom Gruber How AI can enhance our memory, work and social lives Posted Aug 2017 Rated Informative, Inspiring</p>	 <p>Joseph Roizen How computers learn to recognize objects instantly Posted Aug 2017 Rated Informative, Fascinating</p>	 <p>Cynthia Brezina The rise of personal robots Posted Feb 2011 Rated Fascinating, Inspiring</p>	 <p>Heather Knight Silicon-based comedy Posted Jan 2011 Rated Funny, Fascinating</p>	 <p>Peter Molnar Meet Milo, the virtual boy Posted Aug 2010 Rated Fascinating, Ingenious</p>	 <p>Dennis Hong My seven species of robot – and how we created them Posted Apr 2010 Rated Ingenious, Inspiring</p>	 <p>Rodney Brooks Robots will invade our lives Posted Sep 2008 Rated Informative, Fascinating</p>	 <p>Rod Ljapun Building "self-aware" robots Posted Oct 2007 Rated Fascinating, Ingenious</p>
 <p>Anub Jain Why we need to imagine different futures Posted Jun 2017 Rated Inspiring, Informative</p>	 <p>Mehdi Orvikhani-Sayeghdar What happens in your brain when you pay attention? Posted Jun 2017 Rated Inspiring, Fascinating</p>	 <p>Garry Kasparov Don't fear intelligent machines. Work with them Posted May 2017 Rated Inspiring, Fascinating</p>	 <p>Stuart Russell 3 principles for creating safer AI Posted May 2017 Rated Informative, Fascinating</p>	 <p>Joy Buolamwini How I'm fighting bias in algorithms Posted Mar 2017 Rated Informative, Inspiring</p>	 <p>Grady Booch Don't fear superintelligent AI Posted Feb 2017 Rated Inspiring, Informative</p>	 <p>Jeff Hawkins How brain science will change computing Posted May 2007 Rated Fascinating, Informative</p>					
 <p>Mauricio Cluini The incredible inventions of intuitive AI Posted Feb 2017 Rated Fascinating, Inspiring</p>	 <p>Kevin Kelly How AI can bring on a second Industrial Revolution Posted Dec 2016 Rated Informative, Inspiring</p>	 <p>Zeynep Tufekci Machine intelligence makes human morals more important Posted Oct 2016 Rated Informative, Persuasive</p>	 <p>Sam Harris Can we build AI without losing control over it? Posted Sep 2016 Rated Informative, Fascinating</p>	 <p>Anthony Goldblown The jobs we'll lose to machines – and the ones we won't Posted Aug 2016 Rated Informative, Inspiring</p>	 <p>Blaise Agüero y Arcas How computers are learning to be creative Posted Jun 2016 Rated Fascinating, Informative</p>						
 <p>Oscar Schwartz Can a computer write poetry? Posted Jan 2016 Rated Informative, Fascinating</p>	 <p>Chieko Asakawa How new technology helps blind people explore the world Posted Apr 2015 Rated Inspiring, Courageous</p>	 <p>Nick Bostrom What happens when our computers get smarter than we are? Posted Apr 2015 Rated Informative, Fascinating</p>	 <p>Fei-Fei Li How we're teaching computers to understand pictures Posted Mar 2015 Rated Inspiring, Informative</p>	 <p>Jeremy Howard The wonderful and terrifying implications of computers that can learn Posted Dec 2014 Rated Informative, Fascinating</p>	 <p>Ray Kurzweil Get ready for hybrid thinking Posted Jun 2014 Rated Informative, Fascinating</p>						
 <p>Lorry Page Where's Google going next? Posted Mar 2014 Rated Informative, Inspiring</p>	 <p>Alex Wasser-Gross A new equation for intelligence Posted Feb 2014 Rated Fascinating, Informative</p>	 <p>Guy Hoffman Robots with "soul" Posted Jan 2014 Rated Fascinating, Ingenious</p>	 <p>Ken Jennings Watson, Jeopardy and me, the obsolete know-it-all Posted Apr 2013 Rated Funny, Informative</p>	 <p>John Lloyd An animated tour of the invisible Posted Sep 2012 Rated Funny, Fascinating</p>	 <p>Andrew McAfee Are droids taking our jobs? Posted Sep 2012 Rated Informative, Persuasive</p>						

[Sebastian Thrun – What AI is – and isn't \(stop at 20:04 countdown\)](#)

[Garry Kasparov – Don't fear intelligent machines. Work with them \(15:21\)](#)

[Sam Harris – Can we build an AI without losing control of it? \(14:28\)](#)