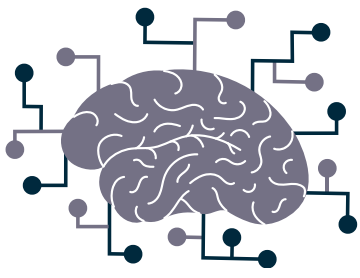# Artificial Intelligence

What is AI?

A CATALYST *Primer created by humans*

Artificial Intelligence is an emerging technology which refers to **machines** that **simulate intelligent human behaviour**. Generative AI (GenAI) is a type of AI that can **produce new** text, image, audio, and video **content** in response to **user prompts** (e.g. ChatGPT, Llama 3.1, Midjourney, Perplexity, Sora)

How Does AI Work?

Human inputs into the AI system help machines learn patterns, make predictions, and perform tasks. AI machines undergo **deep learning,** which is built upon **artificial neural networks**. These neural networks contain multiple, networked **layers** of artificial **neurons** or **nodes**. Each neuron/node receives inputs, assigns them weight, performs calculations, and passes the results to the next layer. Over time, the AI deep learning model learns how to **predict outputs** that are closer to the actual outputs, and even make predictions on **new, unseen data,** based on **learned patterns**.

How Might AI Impact Me?

Rapidly evolving AI technology continues to **disrupt established sectors** ranging from commerce, education, healthcare, and law, to creative fields such as illustration, music, and the performing arts. These changes are felt by consumers, providers, and practitioners across these fields.

NLB | National Library Board Singapore

AI in the Wild

Prompt Engineering in GenAI:

Google Arts & Culture

Say what you see!

Are you ready to learn the art of prompting?

Start Level 1

I've generated images with Google AI, and you have to try to generate a class match.

I'll be on hand with prompt tips along the way.

Prompt engineering is the process of refining prompts to generate text, image, audio, or video outputs through the GenAI model. Try your hand at it with Google Arts & Culture's Say What you See tool.

AI on Screen:

AI Expert Stuart Russell Breaks Down Artificial Intelligence in Films & TV | Break It Down

BLACK MIRROR

BREAK IT DOWN

Watch on

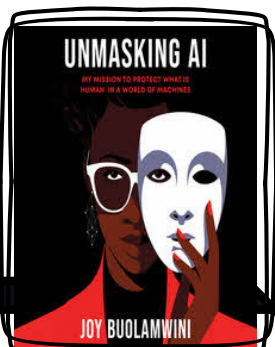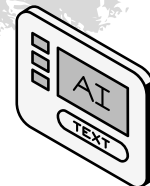Stuart Russell

HUMAN COMPATIBLE

AI and the Problem of Control

We've all seen AI featured in many films and television shows. Can we envision these on-screen scenarios unfolding in reality? Hear from AI expert, Professor Stuart Russell in this video.
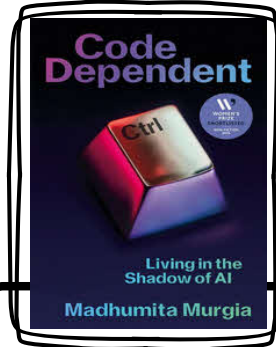
Professor Russell also wrote: Human Compatible: Artificial Intelligence and the Problem of Control (2019) available as a book [call no.: 006.3 RUS] or audiobook.

National Library Board's Resources on AI (book, e-book, audiobook):

AI TEXT

UNMASKING AI
MY MISSION TO PROTECT WHAT IS HUMAN IN A WORLD OF MACHINES
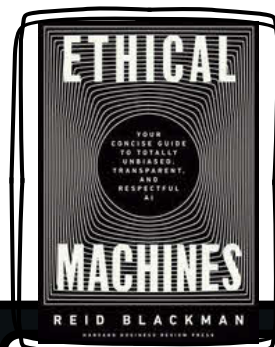JOY BUOLAMWINI

Unmasking AI: My Mission to Protect What is Human in a World of Machines (2023)
By: Joy Buolamwini
e-book & audiobook
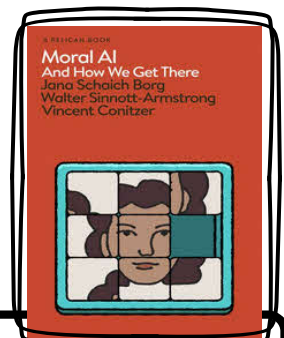
Code Dependent
Ctrl
Living in the Shadow of AI
Madhumita Murgia

Code Dependent: Living in the Shadow of AI (2024)
By: Madhumita Murgia
Call no.: 303.4834 MUR
book, e-book, audiobook

ETHICAL
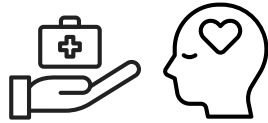YOUR CONCISE GUIDE TO TOTALLY UNBIASED, TRANSPARENT, AND RESPECTFUL AI
MACHINES
REID BLACKMAN

Ethical Machines: Your Concise Guide to Totally Unbiased, Transparent, and Respectful AI (2022)
By: Reid Blackman
Call no.: 174.90063 BLA
book, e-book & audiobook

A PELICAN BOOK
Moral AI
And How We Get There
Jana Schaich Borg
Walter Sinnott-Armstrong
Vincent Conitzer

Moral AI: And How We Get There (2024)
By: Jana Schaich Borg, Walter Sinnott-Armstrong, Vincent Conitzer
e-book & audiobook

AI & Healthcare

Can AI help us lead healthier lives? The technology is rapidly transforming the healthcare ecosystem in many ways, such as:

- Predictive health and continuous care, enabled by consumer wearables
- Enhanced disease detection and diagnosis
- Accelerated drug discovery and development
- Improved efficiency through automation of administrative tasks

Explore more of the latest AI applications in healthcare at the links below:

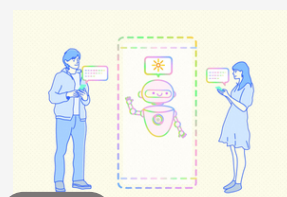**READ** No longer science fiction, AI and robotics are transforming healthcare (PwC)

WATCH 4 Ways Artificial Intelligence is Transforming Healthcare (Med School Insiders)

In Singapore, AI is being deployed via:

- Generative AI for routine documentation
- Imaging AI and AimSG platform to scale early detection
- Developing multi-variate AI models for predictive preventive care for major severe diseases

Transforming Healthcare through Technology (MOH)

READ

Can AI chatbots replace friends and therapists in providing mental health support? (CNA)

Chatbot therapy for mental health?
AI chatbots provide an accessible and judgment-free space where people may feel more comfortable sharing their unfiltered thoughts than with friends. However, experts emphasise the need for human interaction for deeper connections and timely interventions.

Challenges and Concerns for AI in Healthcare

- Inaccuracy of information provided by AI chatbots
- Heightened data risks with personal medical information
- Bias against certain demographic groups
- Depersonalisation of care and loss of human connection

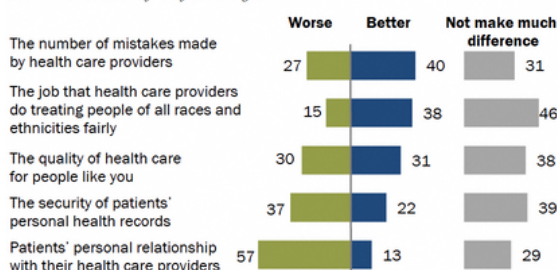Watch researchers and journalists discuss these issues in depth →

WATCH

AI IN THE HEALTHCARE INDUSTRY?

WSJ TECH NEWS BRIEFING

Can AI in Healthcare Be Trusted? (WSJ)

READ

% of U.S. adults who say the use of artificial intelligence in health and medicine to do things like diagnose diseases and recommend treatments would make each of the following ...

	Worse	Better	Not make much difference
The number of mistakes made by health care providers	27	40	31
The job that health care providers do treating people of all races and ethnicities fairly	15	38	46
The quality of health care for people like you	30	31	38
The security of patients' personal health records	37	22	39
Patients' personal relationship with their health care providers	57	13	29

What is narrow AI and how can it improve healthcare? (World Economic Forum)
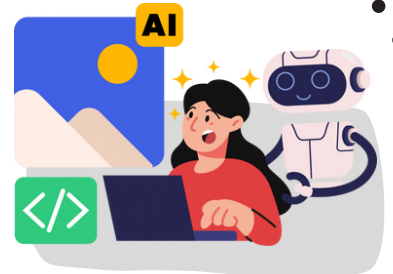
How can we build trust in AI for Healthcare?

AI's applications in healthcare encounter varying levels of scepticism among patients and providers. This article details three pillars that are essential for building trust in AI in healthcare: reliable, unbiased data, robust regulation, and enforcement of data protection.

AI & Education

Are you confident enough to entrust AI with your learning? For many around the world, AI-powered "Education 4.0" is becoming reality. Some schools have even begun experimenting with "teacherless" classrooms, where learning is mediated by AI platforms.

AI has the potential to deliver **personalised learning** and **data-enabled insights on student performance**, as well as provide **administrative support for educators**. Explore these transformations at the links below:

READ & WATCH
The future of learning: How AI is revolutionizing education 4.0 (World Economic Forum)
School introduces UK's first 'teacherless' classroom using artificial intelligence (Sky News)

In Singapore, AI applications are being rolled out in schools to support students and teachers:

Learning feedback assistants mark and provide personalised feedback on students' work.

Adaptive learning systems enable students to learn at their own pace based on their responses to questions and activities.

Authoring Copilot helps teachers plan lessons, designing lesson activities and quizzes.

READ
What are MOE's newest artificial intelligence tools, and how are schools using them? (The Straits Times)

WATCH
MOE harnessing new technology to transform how teachers teach and students learn (CNA)

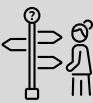## Challenges and Concerns for AI in Education

Threats to **skills development** from over-reliance on AI

Ethical dilemmas around **plagiarism and cheating**

Loss of personal touch in guiding and nurturing students

Concerns around **misinformation and credibility** of sources

Education revolution or AI hype bubble?

South Korea plans to overhaul its education system with AI-powered textbooks, but many are concerned about misinformation and the impact of too much digital exposure on students' wellbeing.

READ
South Korea's plan for AI textbooks hit by backlash from parents (Financial Times)

How can we build trust in AI for Education?

This global insights report recommends:

- **Protection of sensitive information** through robust data privacy and security protocols
- **Training and upskilling opportunities** to make the most use of new AI systems
- **Equity and inclusion as design principles** to ensure the benefits of AI education accrue fairly

READ
Shaping the Future of Learning: The Role of AI in Education 4.0 (World Economic Forum)

How do students and teachers feel about AI?

I would say the best thing to do is train us on what this is.

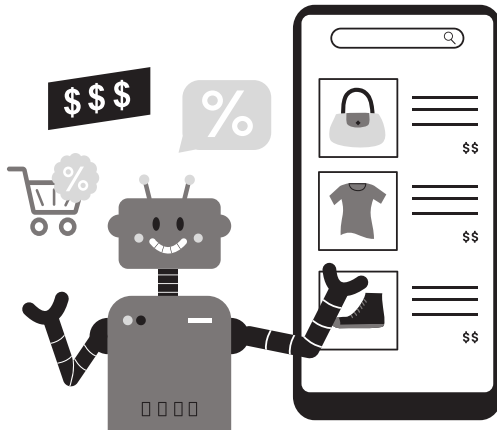Thoughtful and Ethical Approaches to Using AI in Schools (foundry10)

You shouldn't solely depend on ChatGPT for information. It's just not going to help you in the future.

READ
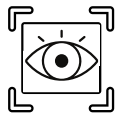Student Perceptions of AI: Use, Trust, and Literacy (foundry10)

AI & Retail

Ever wondered how e-commerce sites have an uncanny ability to predict your heart's desire?
That might be AI at work. AI offers the promise of personalized recommendations and an enhanced consumer experience. AI has also transformed merchandising and product development, supply chain and logistics, marketing, and support functions across the retail landscape.

Challenges and Concerns for AI in Retail

Data privacy, misuse, and Surveillance issues that erode consumer trust.

Copyright and Intellectual Property Infringements arising from exploiting visual search and image recognition functions.

Safety and Security issues arising from deepfake frauds, and other AI-based scams.

Inventory management using AI that leads to out-of-stock items, leaving consumers frustrated.
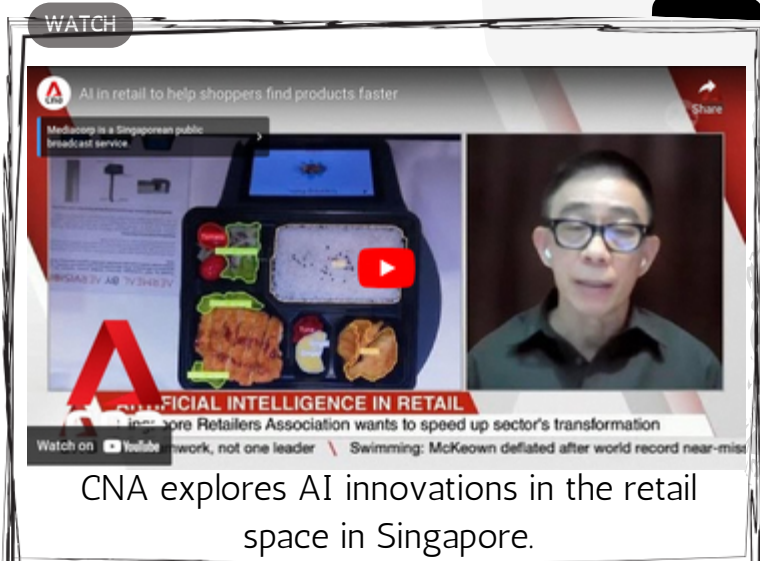
Real-Life Examples:

Fast fashion retailer Shein uses AI algorithms to identify trending designs across the internet, then transmits the data to its supplier factories for production. Shein has been sued for **multiple intellectual property violations.**
Read more on Shein's use of AI to steal designs on a large scale (Fortune)

According to the Federal Bureau of Investigation's "Internet Crime Report 2023", **cyber threats and fraud scams** led to **losses of over $12.5 billion in 2023**, a 22% increase over the previous year.
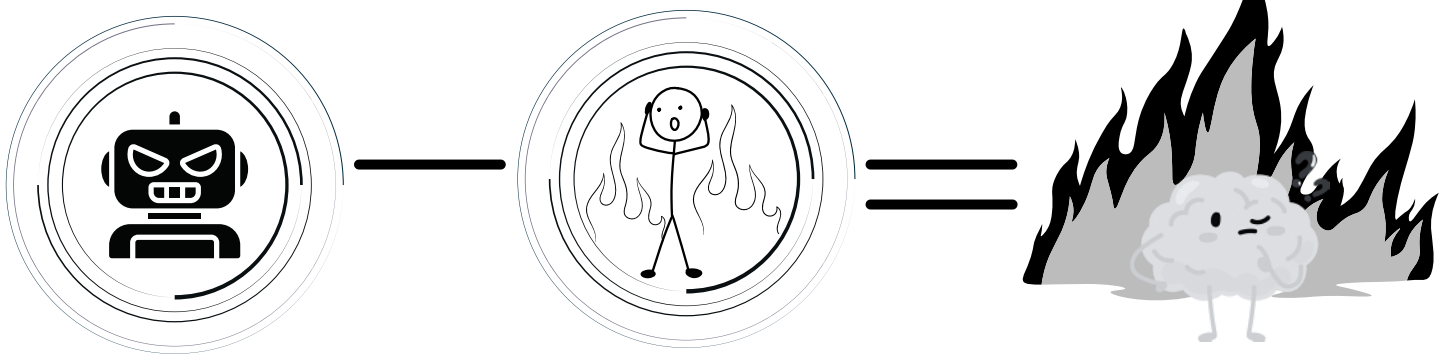
In May 2024, personal information of **560 million** customers of ticketing platform **Ticketmaster** was leaked to the dark web. The leaked information included names, addresses, last four digits of their credit card numbers and card expiration dates.
Ticketmaster Data Breach in 2024 (CNA)

Consider **weighing** the options between:

Personalization
Novelty
Immediacy

Privacy
Sustainability
Delayed Gratification

HMMM

WATCH

AI in retail to help shoppers find products faster

Mediacorp is a Singaporean public broadcast service

ARTIFICIAL INTELLIGENCE IN RETAIL
Singapore Retailers Association wants to speed up sector's transformation
...work, not one leader \ Swimming: McKeown deflated after world record near-miss

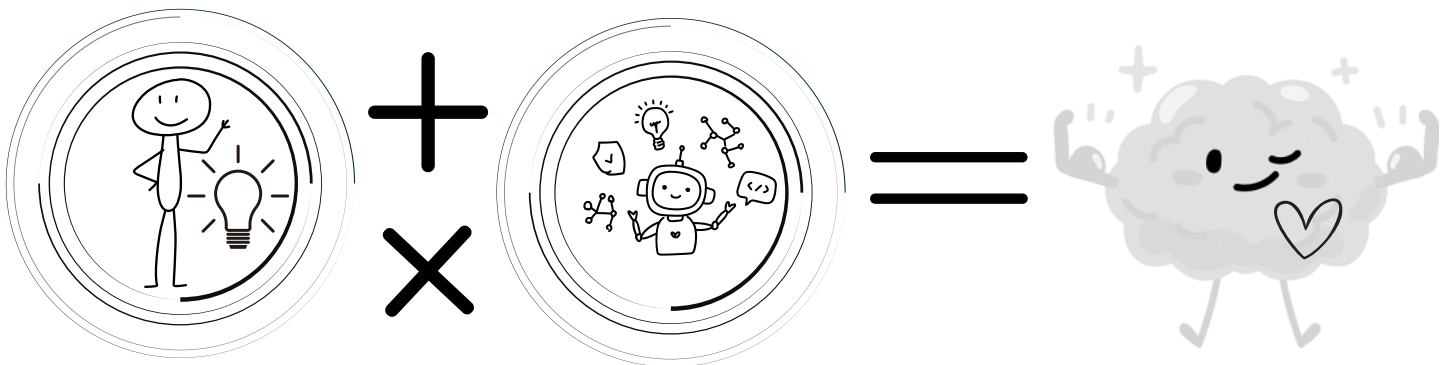CNA explores AI innovations in the retail space in Singapore.

AI is poised to revolutionize the retail industry in Singapore, with potential cost and time savings, and a plausible solution to the labour shortage. Find out more in this Channel News Asia video.

Balancing the Equation

How might we balance AI technology with humanity such that it leads to improved life and learning outcomes? Purely banking on AI and omitting the human from the equation is neither feasible nor desirable.

Thrust into the age of AI, we can consider how to center human beings and efforts and amplify them with responsible use of AI technology for beneficial social impact.

Consider the Following for Discerning the Use of AI:

Context:
In what situations would it be reasonable to adopt AI? In what other circumstances would it be illogical or unsuitable to do so? What are some factors we should take into consideration when making these decisions?

People:
Who benefits? Who loses? If the power and control over AI is concentrated in the hands of a select few to impact the lives of many, what can we do to narrow this gap and reduce inequality?

Environment:
AI is powered by large volumes of electricity and water. Is this truly the most optimal use of our limited resources? Are we inflicting more harm to our planet? How can AI use be more sustainable?

Regulation:
Are there parameters and guidelines that help inform decisions on whether and how to use AI in a fair, balanced, and judicious manner on any scale? How can we limit the harms and abuse of AI?

Nuance:
How can we cultivate both a healthy curiosity, and a fair skepticism of AI, such that we can think deeply and critically about the applications of AI in our lives? The value in AI is evolving, and is collectively shaped by us.

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