



UNIVERSITY OF
WATERLOO

Promises and pitfalls of technological revolutions

N. Asokan



<https://asokan.org/asokan/>



@asokan.org



[X @nasokan](https://twitter.com/nasokan)

Forty-five years ago



Four technological revolutions in forty-five years

Computers and software

The Internet

Mobile phones

Artificial Intelligence



User:Perhelion, color edited by User:Deu, CC0, via Wikimedia Commons [https://commons.wikimedia.org/wiki/File:Balanced_scale_of_Justice_\(blue\).svg](https://commons.wikimedia.org/wiki/File:Balanced_scale_of_Justice_(blue).svg)

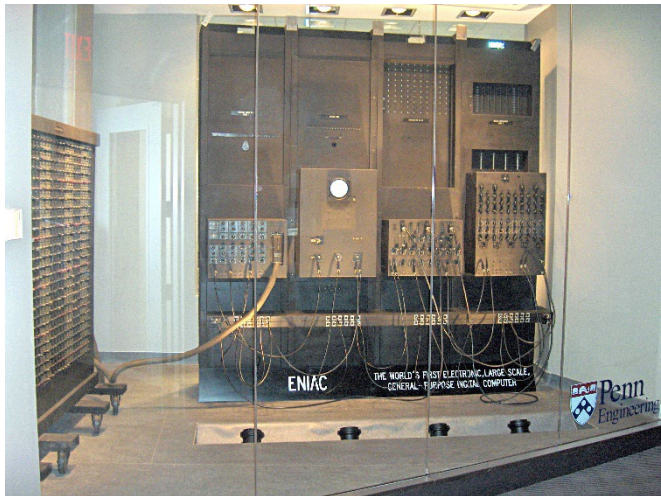
1. Computers and software

1976



By Cynde Moya - Own work, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=58165847>

1950



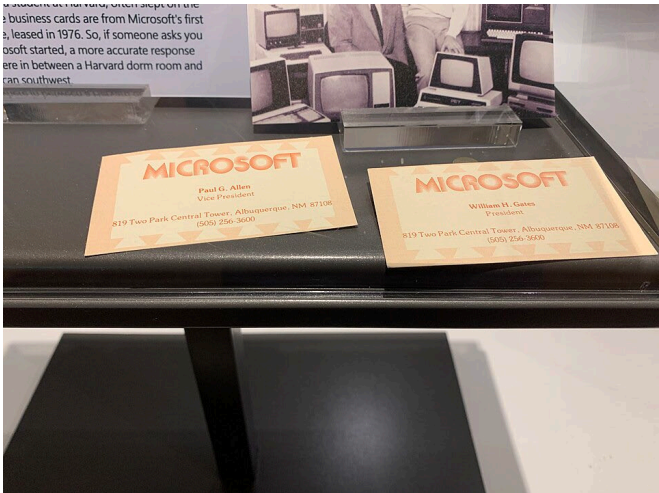
<https://en.wikipedia.org/wiki/ENIAC>
The original uploader was TexasDex at English Wikipedia., CC BY-SA 3.0 <<http://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons

1981



https://en.wikipedia.org/wiki/IBM_Personal_Computer
Rama & Musée Bolo, CC BY-SA 2.0 FR <<https://creativecommons.org/licenses/by-sa/2.0/fr/deed.en>>, via Wikimedia Commons

1981



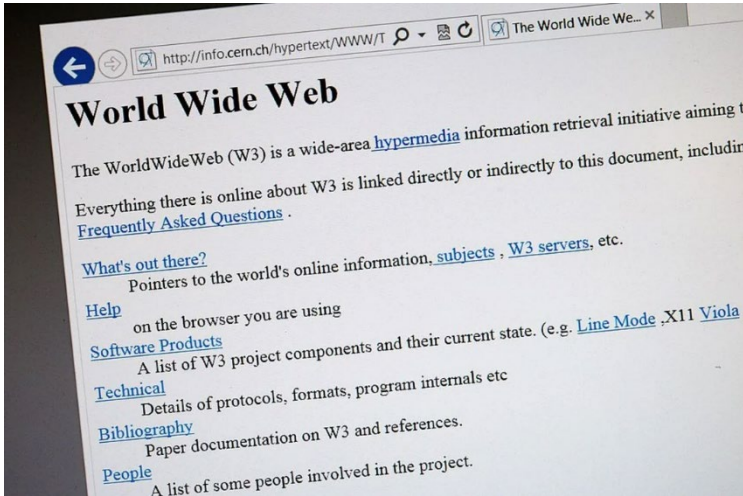
<https://en.wikipedia.org/wiki/Microsoft>
Lachlan Andrews, CC BY-SA 4.0 <<https://creativecommons.org/licenses/by-sa/4.0/>>, via Wikimedia Commons

Computers run all aspects of our lives today



2. The Internet

1990



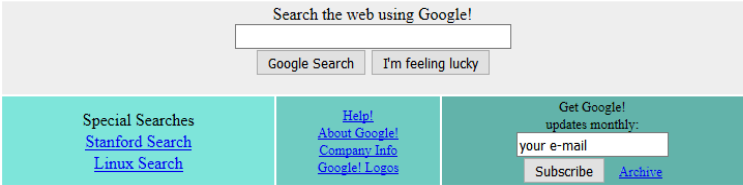
https://www.reddit.com/r/interestingasfuck/comments/npmu0/the_first_ever_webpage_created_in_1990_by_the

1969



https://en.wikipedia.org/wiki/Interface_Message_Processor

1998



<https://www.webdesignmuseum.org/gallery/google-1998> Copyright ©1998 Google Inc.

2000



<https://money.cnn.com/gallery/technology/2015/05/08/old-websites/5.html>

My journey: PhD research in electronic commerce



University of Waterloo logo | [About](#) | [Deposit](#) | [Communities & Collections](#) | [All of UWSpace](#) | [Statistics](#)

[Home](#) | [University of Waterloo](#) | [Digitized University of Waterloo](#) | [Fairness in electronic commerce](#)

Fairness in electronic commerce

Number of Original Documents
1

Number of Digitized Documents
1

Number of Pages
10

Number of Images
10

Keywords
Harvested from Collections Canada

URI
<http://hdl.handle.net/10012/292>

Collections
[Digitized University of Waterloo Theses](#)

Files
[NQ32811.pdf \(6.54 MB\)](#)

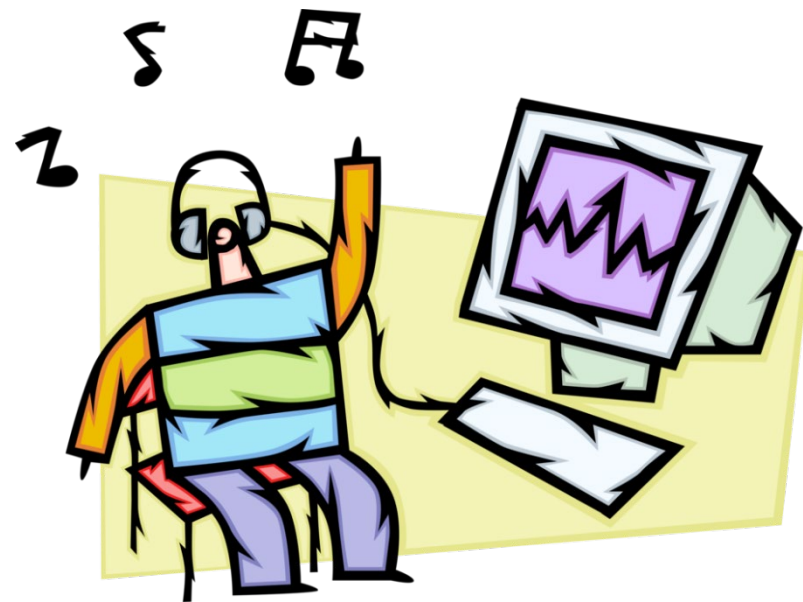
Date
1998

Authors
Asokan, N.

Publisher
University of Waterloo
<http://hdl.handle.net/10012/292>

[Full item page](#)

Now, it is hard to imagine life without Internet access



3. Mobile phones

1973



https://en.wikipedia.org/wiki/Motorola_DynaTAC By Redrum0486 - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=6421950>

1996



https://en.wikipedia.org/wiki/Nokia_9000_Communicator By Oldmobil - Self-photographed, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=7861738>



NOKIA
Connecting People

<https://www.freepnglogos.com/images/nokia-logo-png-1490.html>

My journey: witness to widely deployed technologies

Google Patents

System, method and computer program product for authenticating a data agreement between network entities

Images (5)

EP1932274B1
European Patent Office
Granted patent

Download PDF Find Prior Art Similar

Other languages: German, French
Inventor: Nadarajah Asokan, Kaisa Nyberg
Current Assignee: Nokia Technologies Oy

Classifications

H04L 9/0844 Key agreement, i.e. key establishment technique in which a shared key is derived by parties as a function of information contributed by, or associated with, each of these involving Diffie-Hellman or related key agreement protocols with user authentication or key authentication, e.g. ElGamal, MTI, MQV-Menezes-Qu-Vanstone protocol or Diffie-Hellman protocols using implicitly-certified keys

Worldwide applications
2005 · US 2006 · WO KR EP JP CN
Application EP0680924.2A events

<https://patents.google.com/patent/EP1932274B1/en>

2006-08-03
Status
Released Version
Revision
V10r00
Document File Name
Simple Pairing_WP
Document Owner
Core Specification Working
Group
E-mail Address
radio-
feedback@bluetooth.org

Bluetooth®
SPECIAL INTEREST GROUP

SIMPLE PAIRING WHITEPAPER

https://web.archive.org/web/20061018032605/http://www.bluetooth.com/NR/rdonlyres/0A0B3F36-D15F-4470-85A6-F2CCFA26F70F/0/SimplePairing_WP_V10r00.pdf



Today, mobile phones are universal

Leaders | Smartphones

Planet of the phones

The smartphone is ubiquitous, addictive and transformative



Feb 26th 2015

The Economist <https://www.economist.com/leaders/2015/02/26/planet-of-the-phones>

Share



<https://www.sn124.com/dailysun/tech/out/cool-things-your-smartphone-can-do-20221206>



<https://antiguadailyphoto.com/2015/01/12/the-maya-and-smartphones/>



<https://womenlovetech.com/bridging-the-gap-smartphones-in-third-world-countries/>

4. Artificial intelligence

1973

A PROPOSAL FOR THE DARTMOUTH SUMMER RESEARCH PROJECT ON ARTIFICIAL INTELLIGENCE

J. McCarthy, Dartmouth College
M. L. Minsky, Harvard University
N. Rochester, I.B.M. Corporation
C.E. Shannon, Bell Telephone Laboratories

August 31, 1955

<https://jmc.stanford.edu/articles/dartmouth/dartmouth.pdf>

AlexNet

2011



Developer(s) Alex Krizhevsky, Ilya Sutskever,
and Geoffrey Hinton

Initial release Jun 28, 2011

Repository code.google.com/archive/p/cuda-convnet/

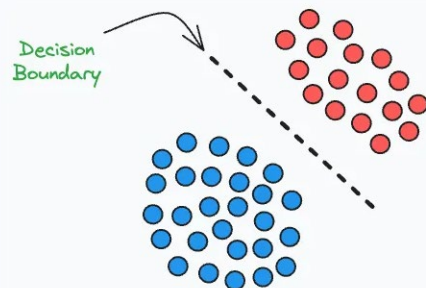
Written in CUDA, C++

Type Convolutional neural network

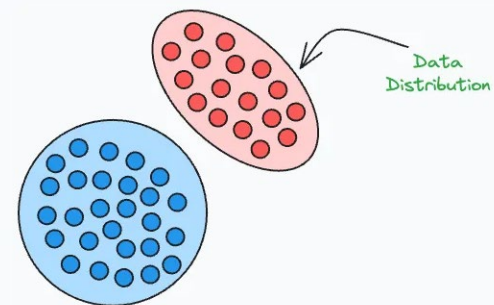
License New BSD License

<https://en.wikipedia.org/wiki/AlexNet>

Discriminative models



Generative models



<https://blog.dailydoseofds.com/p/an-intuitive-guide-to-generative>

deepseek

Gemini



AI will transform how we live, work, and play



<https://www.forbes.com/sites/carolinecastrillon/2024/07/21/entering-the-era-of-the-solopreneur/>

Technological revolutions bring new concerns

Bad actors **subvert or circumvent a technology** towards their own ends

→ Cybersecurity

A technology can **leak people's private information**

→ Privacy technologies, law, public policy, ...

Someone can intentionally or unintentionally **use a technology to cause harm**

→ Ethics, philosophy, ...

Ethical concerns with AI

Unaligned AI

AI alignment

[Article](#) [Talk](#)

From Wikipedia, the free encyclopedia

In the field of [artificial intelligence](#) (AI), **AI alignment** research aims to steer AI systems toward a person's or group's intended goals, preferences, and ethical principles. An AI system is considered *aligned* if it advances its intended objectives. A *misaligned* AI system may pursue some objectives, but not the intended ones.^[1]

It is often challenging for AI designers to align an AI system due to the difficulty of specifying the full range of desired and undesired behaviors. To aid them, they often use simpler *proxy goals*, such as [gaining human approval](#). But that approach can create loopholes, overlook necessary constraints, or reward the AI system for merely *appearing* aligned.^{[1][2]}

https://en.wikipedia.org/wiki/AI_alignment

AI-enabled fraud








OCTOBER 30, 2023

Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence

 [BRIEFING ROOM](#) [PRESIDENTIAL ACTIONS](#)

<https://www.whitehouse.gov/briefing-room/presidential-actions/2023/10/30/executive-order-on-the-safe-secure-and-trustworthy-development-and-use-of-artificial-intelligence/>

WHY ASIMOV PUT THE THREE LAWS OF ROBOTICS IN THE ORDER HE DID:

POSSIBLE ORDERING	CONSEQUENCES
1. (1) DON'T HARM HUMANS 2. (2) OBEY ORDERS 3. (3) PROTECT YOURSELF	[SEE ASIMOV'S STORIES] BALANCED WORLD
1. (1) DON'T HARM HUMANS 2. (3) PROTECT YOURSELF 3. (2) OBEY ORDERS	EXPLORE MARS!  HAHA, NO. IT'S COLD AND I'D DIE. FRUSTRATING WORLD
1. (2) OBEY ORDERS 2. (1) DON'T HARM HUMANS 3. (3) PROTECT YOURSELF	 KILLBOT HELLSCAPE
1. (2) OBEY ORDERS 2. (3) PROTECT YOURSELF 3. (1) DON'T HARM HUMANS	 KILLBOT HELLSCAPE
1. (3) PROTECT YOURSELF 2. (1) DON'T HARM HUMANS 3. (2) OBEY ORDERS	 I'LL MAKE CARS FOR YOU, BUT TRY TO UNPLUG ME AND I'LL VAPORIZE YOU. TERRIFYING STANDOFF
1. (3) PROTECT YOURSELF 2. (2) OBEY ORDERS 3. (1) DON'T HARM HUMANS	 KILLBOT HELLSCAPE

<https://xkcd.com/1613/>

Takeaways



<https://medium.com/@asokan.public/promises-and-pitfalls-of-technological-revolutions-2dce8761e523>

You will live through (and shape!) more technological revolutions

They will have **similar concerns**: calls for a **wide range of expertise**

→ technologists, lawyers, teachers, journalists, policy makers, poets, ...

Equip yourself with the right knowledge and skills: **depth but also breadth**

Trinity inculcates the importance of a **rounded education**: Build on it!

