IoT in Education:
Hype and Potential

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A *santai* talk delivered on Zoom on 23/10/2020 organized by FPP UPM. Attended by academics and postgrads of UPM and UM. It was a productive Friday.
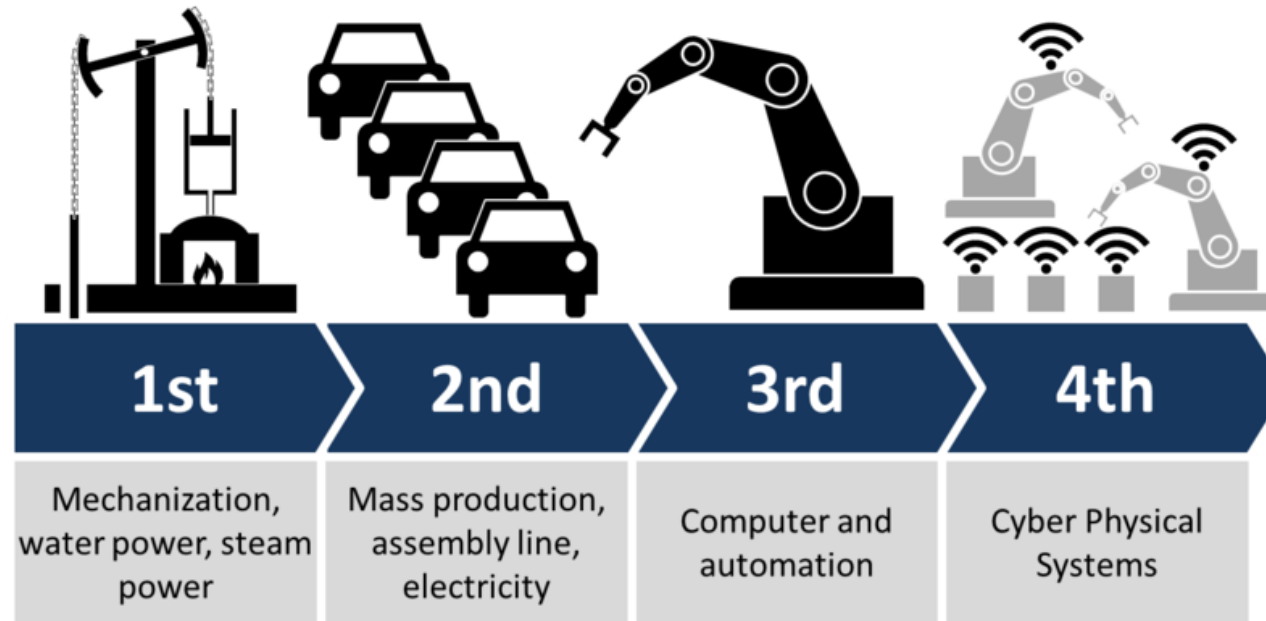
IoT
in Education
Hype and Potential

Explain to me like I'm 12 years old
Ceritakan seolah-olah saya 12 tahun

- *What is Internet of Things*
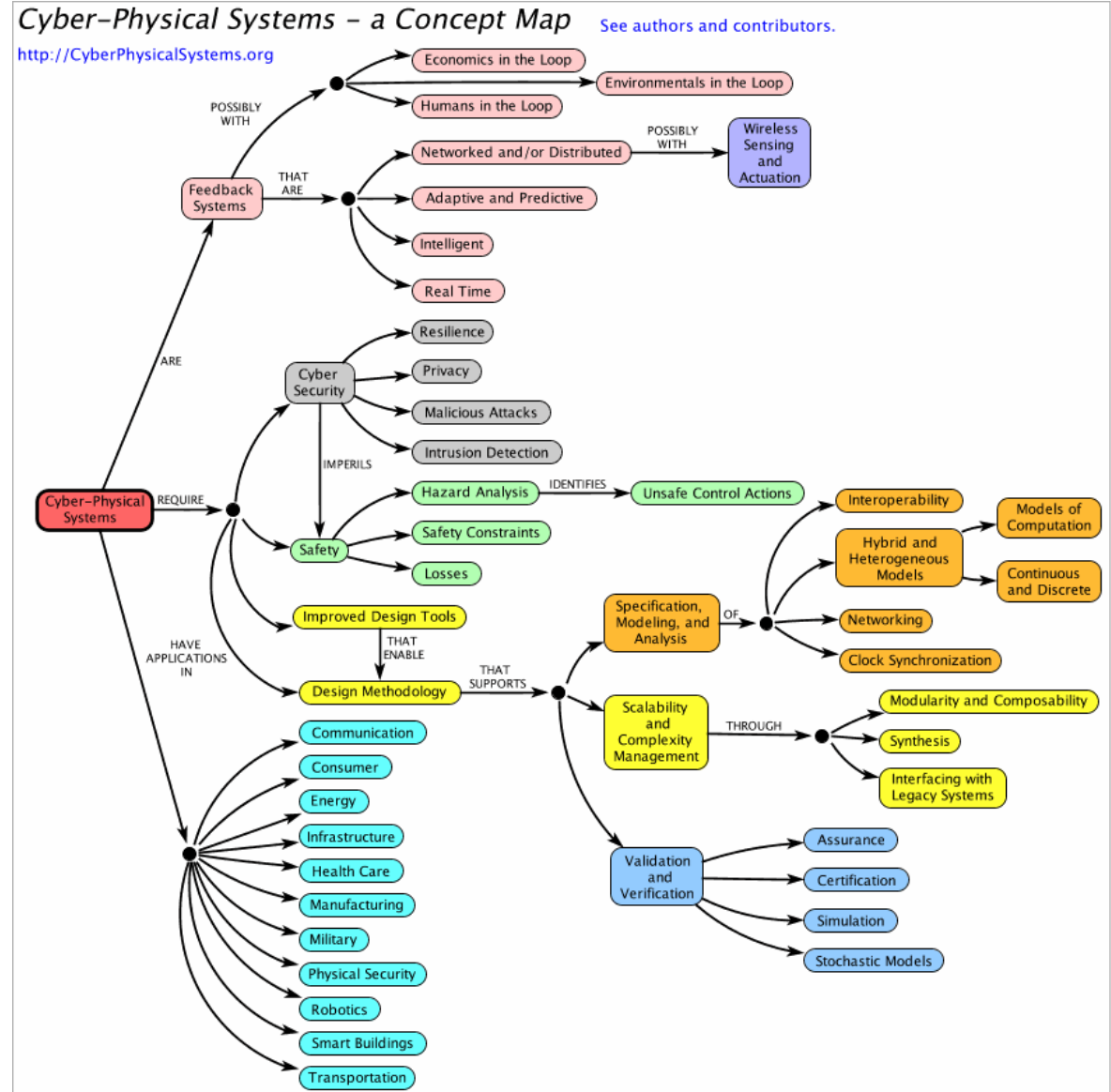- Apakah itu Internet of Things
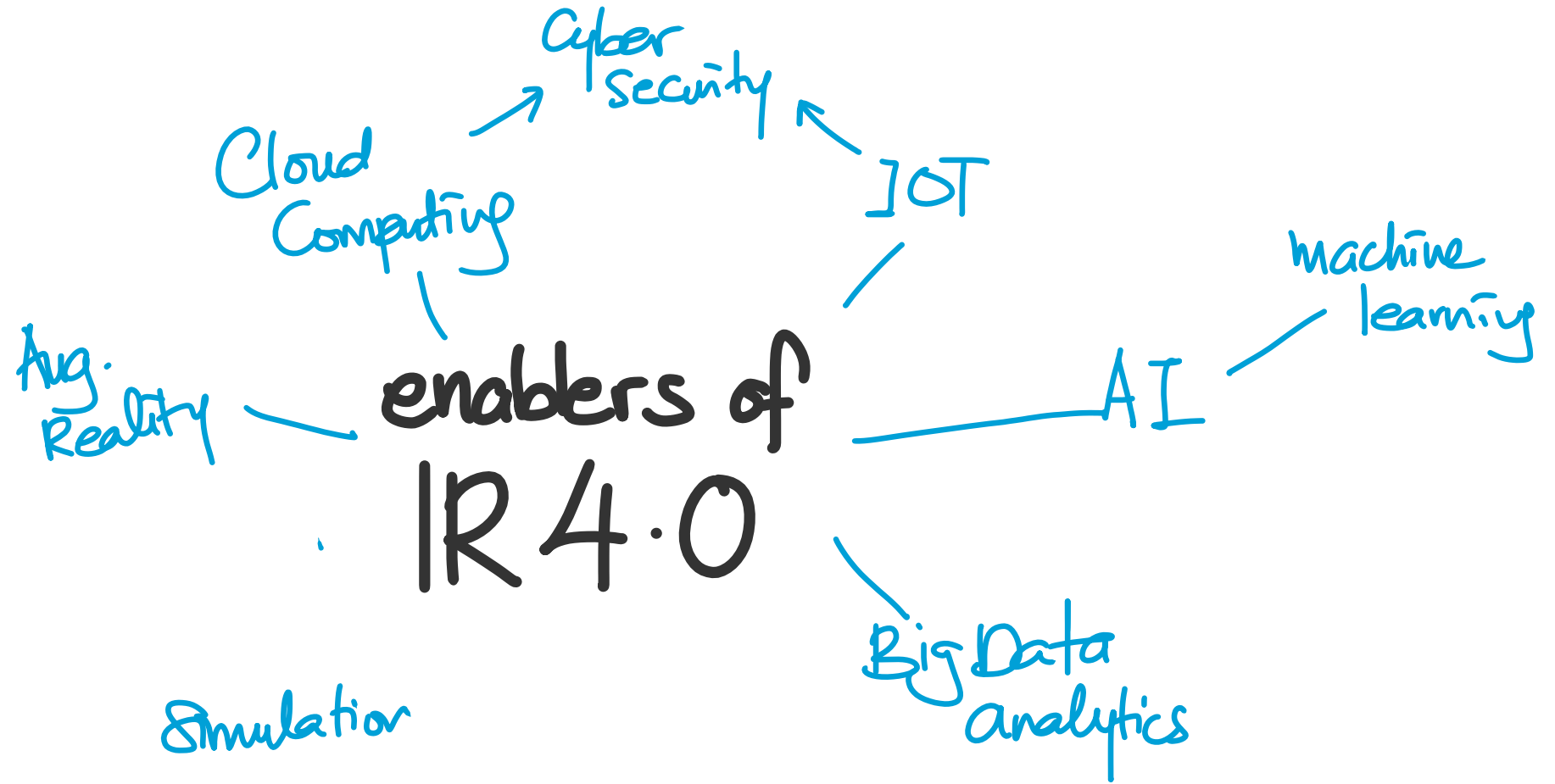
Atau

- *What is Industry 4.0*
- Apakah itu Industri 4.0

1st	2nd	3rd	4th
Mechanization, water power, steam power	Mass production, assembly line, electricity	Computer and automation	Cyber Physical Systems

Cyber-Physical Systems

are integrations of **computation**, **networking**, and **physical processes**.
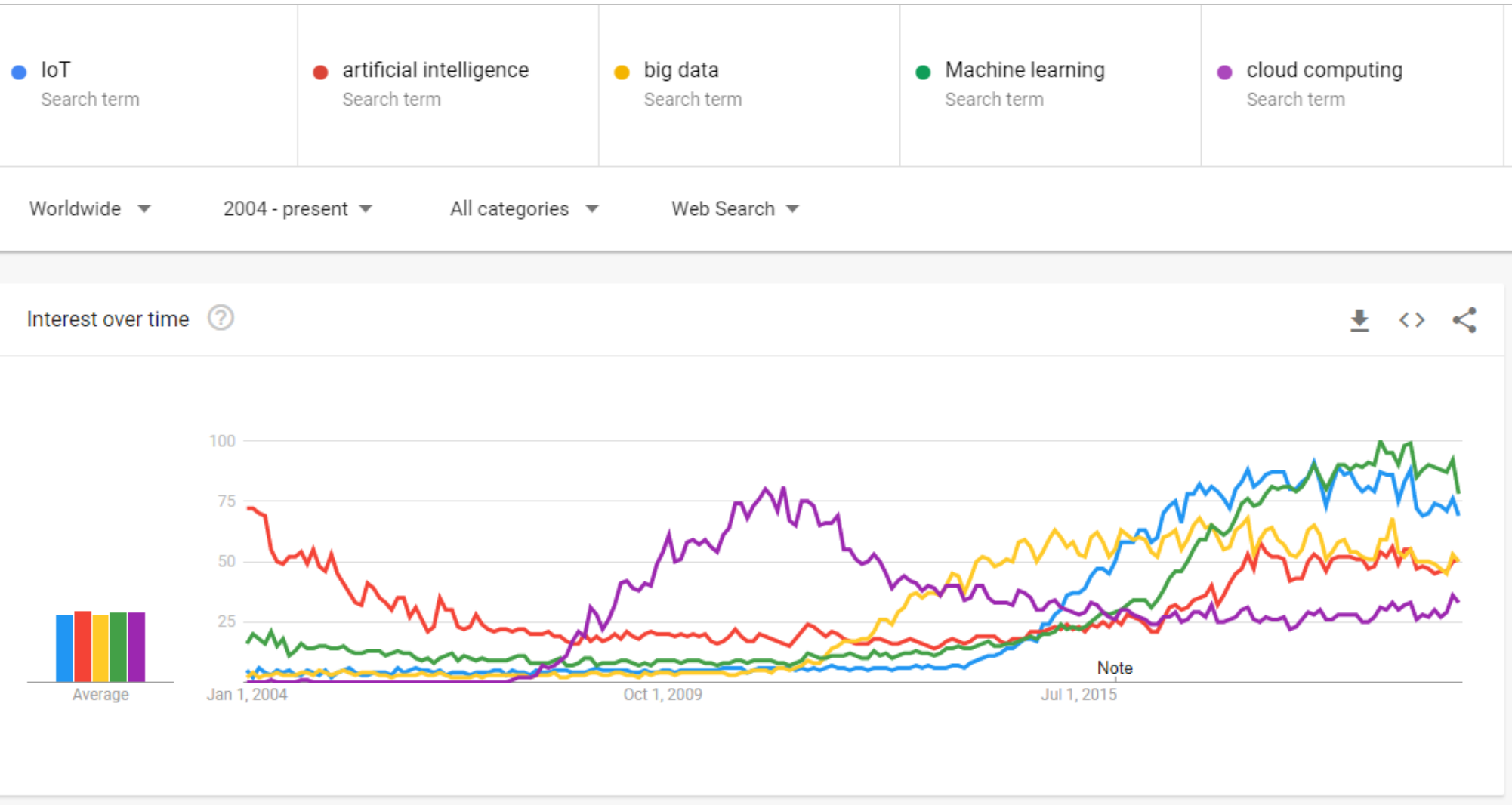
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https://ptolemy.berkeley.edu/projects/cps/

Cyber–Physical Systems – a Concept Map

enablers of IR4.0

Cyber Security

Cloud Computing

IOT

machine learning

AI

Aug. Reality

Big Data Analytics

Simulation
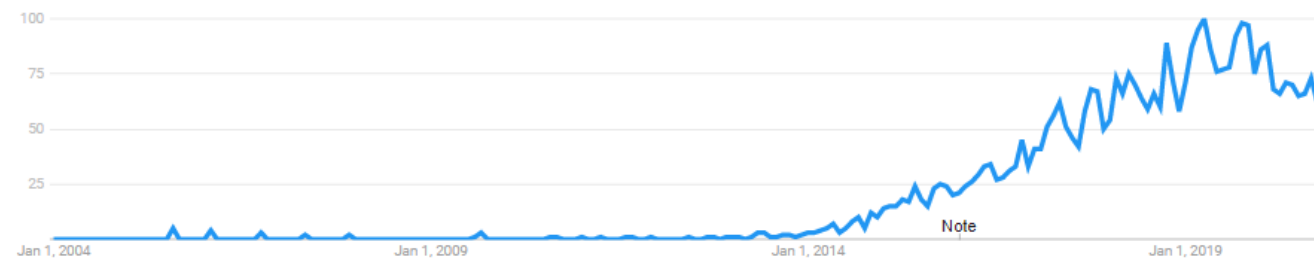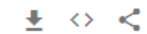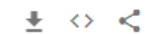
Forty percent of 'AI startups' in Europe don't actually use AI, claims report

11 💬

Companies want to take advantage of the AI hype

By James Vincent | Mar 5, 2019, 8:14am EST

f 🐦 ⤴ SHARE
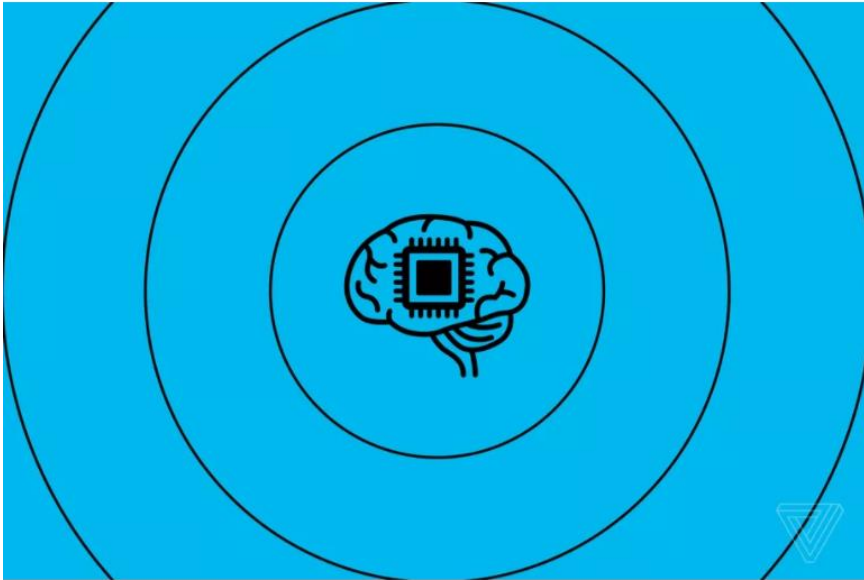
Illustration by Alex Castro / The Verge

Artificial intelligence is one of the most misused terms in tech today, and a new study apparently confirms how hyped the technology has become.

WIRED

Artificial Intelligence

Startups are exploiting AI's hazy definition to cash in on the hype

40 per cent of AI startups don't actually use AI in their products. Here is the reason why

—

By **WILL BEDINGFIELD**
12 Mar 2019

f 🐦 ✉

Credit **Studio Takeuma**

Cisco Survey Reveals Close to Three-Fourths of IoT Projects Are Failing

News Release

🕐 May 23, 2017

Released at marquee industry event IoT World Forum, the survey data also reveals keys to IoT success

LONDON - The Internet of Things World Forum (IoTWF), May 23, 2017 – IDC predicts that the worldwide installed base of Internet of Things (IoT) endpoints will grow from 14.9 billion at the end of 2016 to more than 82 billion in 2025[1]. At this rate, the Internet of Things may soon be as indispensable as the Internet itself.

📄 ARTICLE   Series > IoT Prototyping and Development

Why 76 Percent of IoT Projects Fail and How to Achieve Success

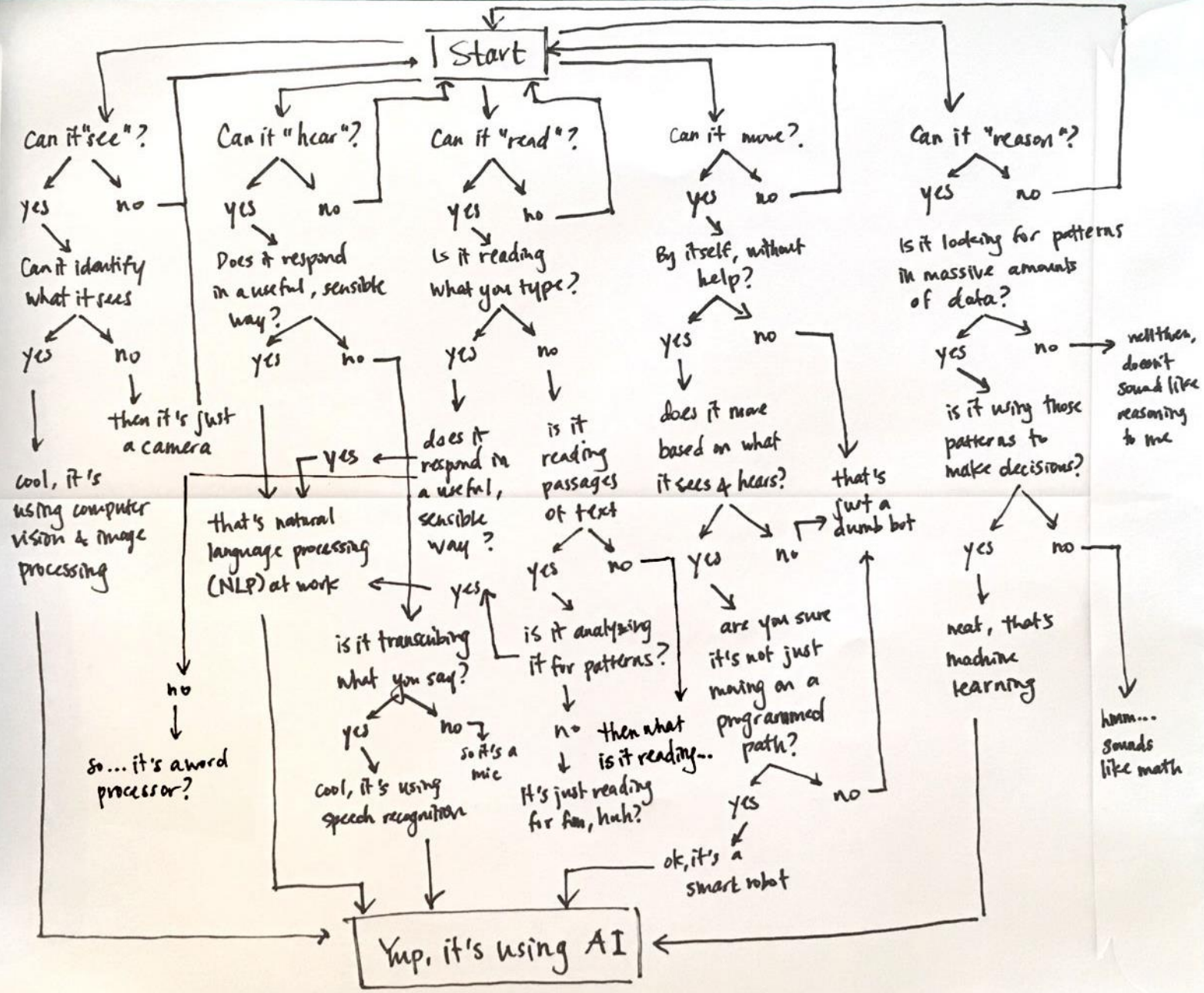Why do 76 percent of IoT projects fail? A lack of interdisciplinary collaboration is a core factor, leading to systemic problems like cybersecurity vulnerabilities. If the IoT industry is to live up to the hype that surrounds it, industry leaders need to rethink their approach.

i•t **IoT For All** - April 22, 2019

Illustration: © IoT For All

"Is it using AI?" The Algorithm, MIT Technology Review

By: Karen Hao

Start

Can it "see"?
- yes → Can it identify what it sees
  - yes → cool, it's using computer vision & image processing
  - no → then it's just a camera
- no →

Can it "hear"?
- yes → Does it respond in a useful, sensible way?
  - yes → that's natural language processing (NLP) at work
  - no → is it transcribing what you say?
    - yes → cool, it's using speech recognition
    - no → so it's a mic
- no →

Can it "read"?
- yes → Is it reading what you type?
  - yes → does it respond in a useful, sensible way?
    - yes →
    - no → is it analyzing it for patterns?
      - yes →
      - no → then what is it reading...
  - no → is it reading passages of text
    - yes →
    - no → It's just reading for fun, huh?
- no →

So... it's a word processor?

Can it move?
- yes → By itself, without help?
  - yes → does it move based on what it sees & hears?
    - yes →
    - no → are you sure it's not just moving on a programmed path?
      - yes → ok, it's a smart robot
      - no →
  - no → that's just a dumb bot
- no →

Can it "reason"?
- yes → Is it looking for patterns in massive amounts of data?
  - yes → is it using those patterns to make decisions?
    - yes → neat, that's machine learning
    - no → hmm... sounds like math
  - no → well then, doesn't sound like reasoning to me
- no →

Yup, it's using AI

"What kind of machine learning is this?"

The Algorithm,
MIT Technology Review

By: Karen Hao

AI

is it looking for patterns
in massive amounts of data?

yes   no

great! it's ←   → game over. you're looking
machine learning   at the wrong flowchart.

is it being told
what to look for?

yes   no   →   is it trying to reach
                      an objective through
                      trial and error?

ok, telltale sign   yes   no
of supervised learning

                    cool, definitely   then it must be
                    reinforcement learning unsupervised learning

is it using deep ←
neural networks?

yes   no

↳ ah, welcome to the land of   how boring. keep
  deep learning. add "deep" to   the technique's name as is
  the technique's name, eg:
  deep supervised learning

Hype Cycle for the Internet of Things, 2020
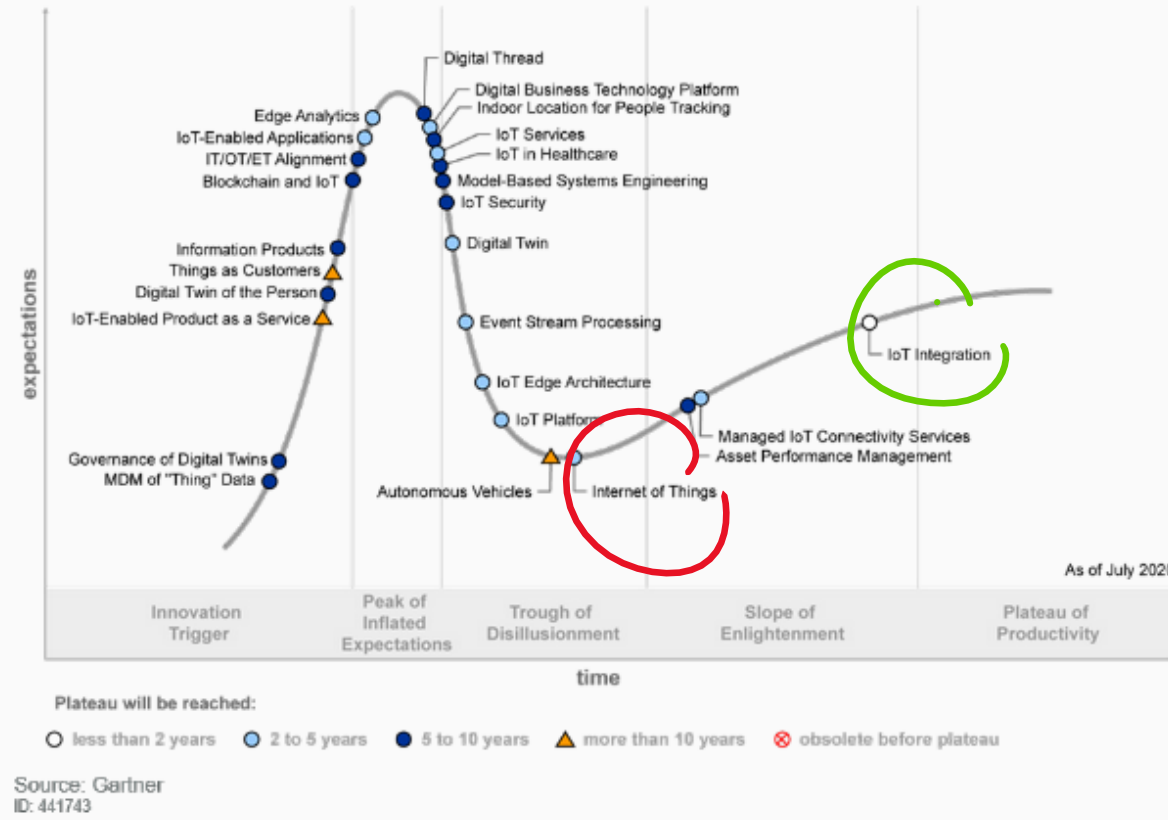
Innovation Trigger: A potential technology breakthrough kicks things off. Early proof-of-concept stories and media interest trigger significant publicity. Often no usable products exist, and commercial viability is unproven.

Peak of Inflated Expectations: Early publicity produces several success stories — often accompanied by scores of failures. Some companies take action; many do not.

Trough of Disillusionment: Interest wanes as experiments and implementations fail to deliver. Producers of the technology shake out or fail. Investments continue only if the surviving providers improve their products to the satisfaction of early adopters.

Slope of Enlightenment: More instances of how the technology can benefit the enterprise start to crystallize and become more widely understood. Second- and third-generation products appear from technology providers. More enterprises fund pilots; conservative companies remain cautious.

Plateau of Productivity: Mainstream adoption starts to take off. Criteria for assessing provider viability are more clearly defined. The technology's broad market applicability and relevance are clearly paying off.

Hospitals, Healthcare

- Empowered doctors to deliver superlative care by **remotely monitoring** the patients using IoT enabled devices.

- End-to-end connectivity to the **workflow of patient care**.

- Transformed the **healthcare industry** and is highly beneficial for doctors, patients, families, hospitals, and even the insurance companies.

- It can enable the machine to machine communication, interoperability, data movement, and information exchange that allows the healthcare industry to **deliver efficiency**.

Embedded Hardware

Embedded Hardware – Raspberry PI

A leading beneficiary of the rapid growth of the IoT will be the overall **embedded systems** market including providers of hardware, software, and operating systems

It is a network of things and this things is an Embedded Device which consist of electronics, controllers, processors, sensors, software's and a network to connect all these things together.

Banking, Finance, Blockchain

Blockchain at its core is a cryptographically secured, **distributed ledger** that allows for the secure transfer of data between parties.

Decentralization. Information is sent from the device to the cloud where the data is processed using analytics and then sent back to the IoT devices.
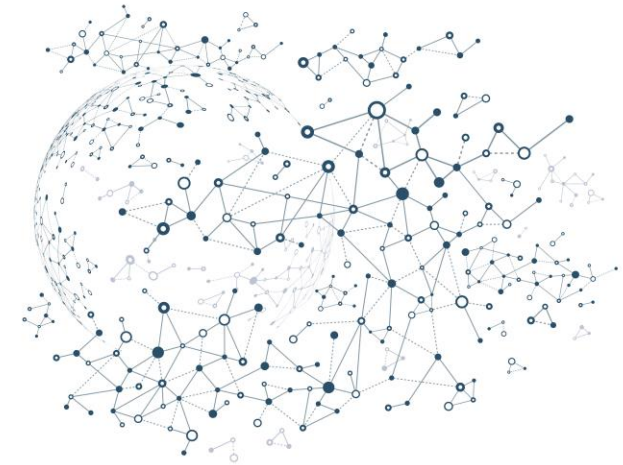
Smart contracts in blockchain networks will allow devices to function securely and autonomously by creating agreements that are only executed upon completion of specific requirements.
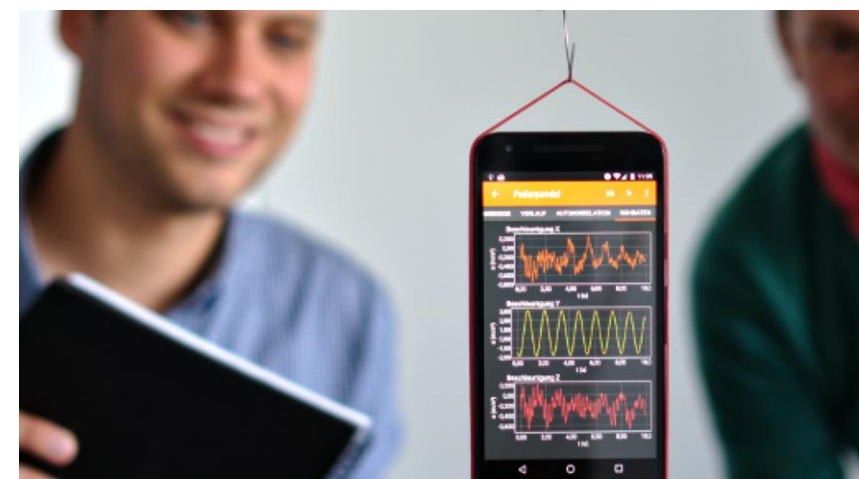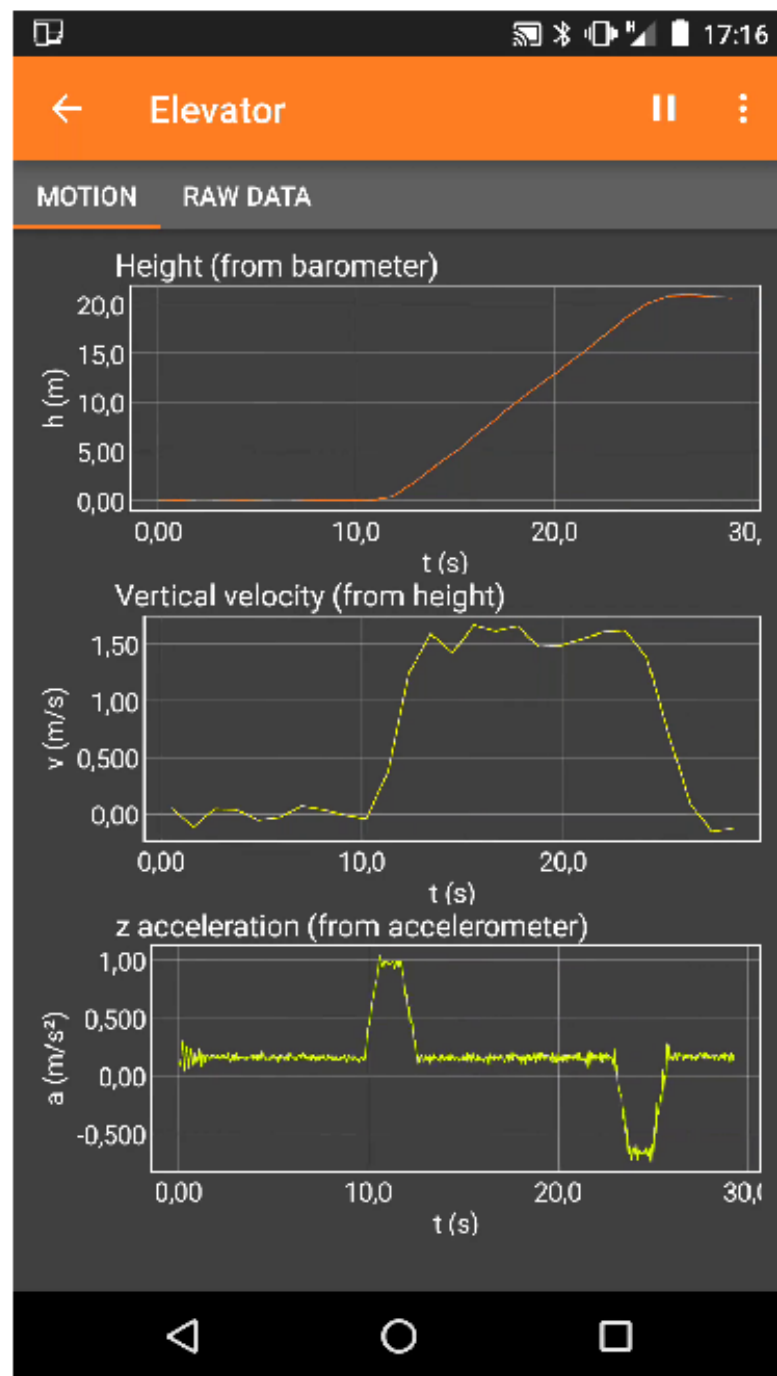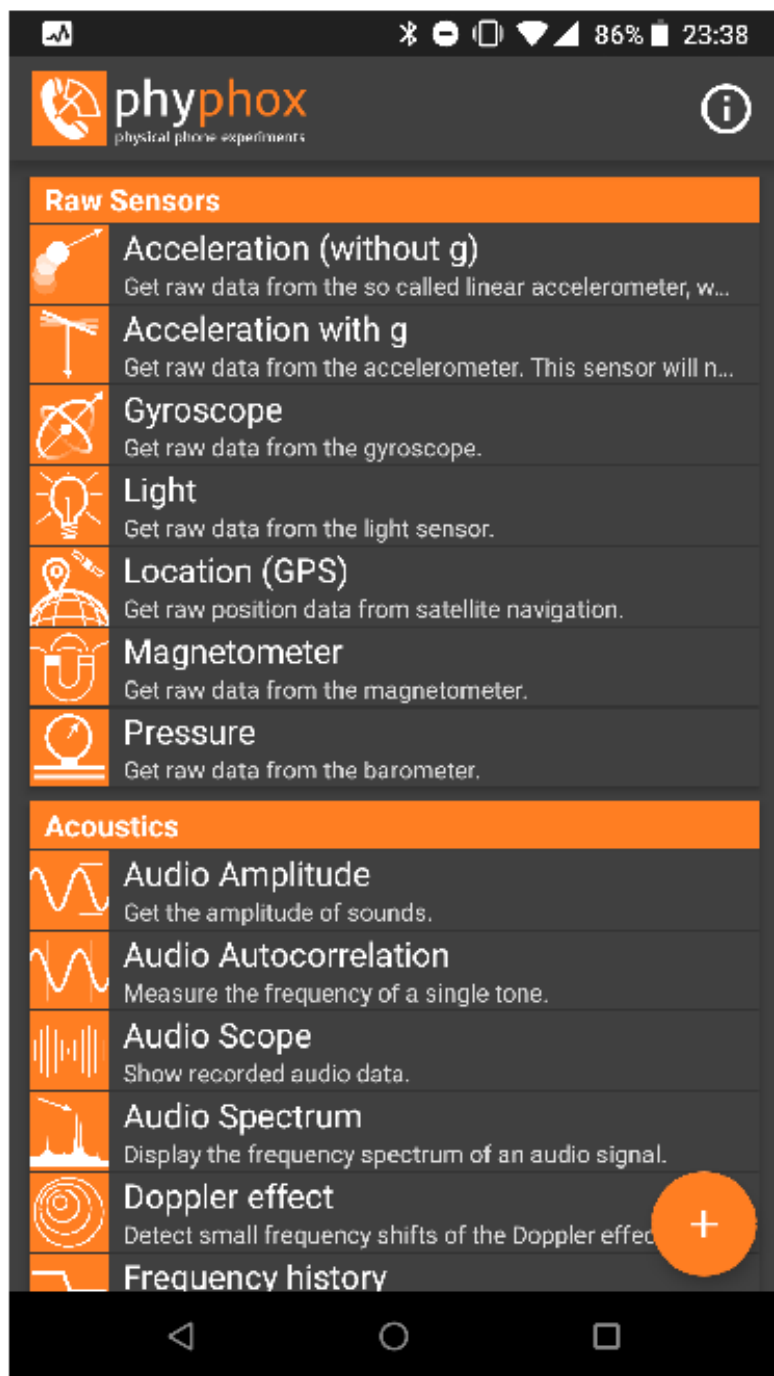
Blockchain
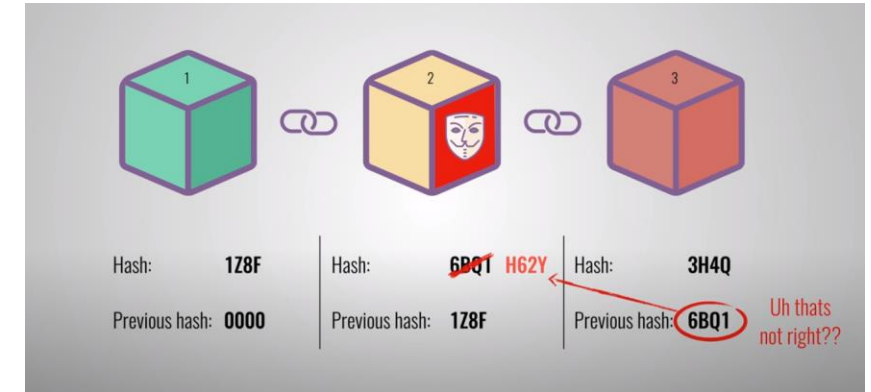
Can we explain the
concept of Blockchain

- what it aims to do?

- apart from 'banking' what else NEEDS
blockchain?

The most common IoT devices used in the classroom

- Interactive whiteboards
- Wireless door locks
- eBooks
- Attendance tracking systems
- Tablets and mobile devices
- Smart HVAC systems
- 3-D printers
- Electric lighting and maintenance
- Student iD cards
- Room temperature sensors
- Noise / Sound Level Sensor
- Security cameras and video

sciforce

Discussion

School Bus Tracking

School bus tracking solutions use sensors to track the location and performance of school busses to increase efficiency and ensure the safety of children riding to school.

Reflection

What can we do now?

How can we start?

Start small, start early?