First Coding Lesson - 2/25/22

- Mr. Li

About Me: Yingquan Li

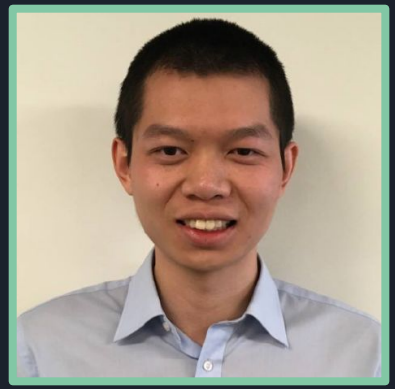
Age: 30 years old

Occupation: Engineer

Location: Philadelphia, Pennsylvania (University of Pennsylvania)

Favorite Food: Italian Cuisine

Favorite Movie as a Young Person: The Lion King, Tarzan



Second Coding Lesson - 3/11/22

- Mr. Li

Today we are going to learn about some computer history and some of the people that helped usher in the digital age...

It started with the Ancient Greeks: Antikythera Mechanism 🇬🇷

- The Ancient Greeks had prototyped an analog computer called the: **Antikythera Mechanism**.
- This is considered the world's first analog computer that could track the astronomical positions of stars/planets + eclipses.
- The remnants of the Antikythera Mechanism was discovered in a shipwreck in 1901.

Luminary #1: Ada Lovelace (1815 - 1853) 🇬🇧

- Mathematical prodigy who is widely considered the first computer programmer.
- Started working on Charles Babbage's **Analytical Engine** (an early computer) at age 18.
- At age 26, wrote what is considered the world's first algorithm for the Analytical Engine.

Luminary #2: Alan Turing (1912 - 1954) 🇬🇧

- Mathematician and theoretical computer scientist who developed the principles and ideas behind the modern day computer.
- Received a Ph.D. in mathematics at age 26.
- Worked at Bletchley Park during World War II as a code breaker, significantly enhanced the Allies war efforts by decoding the **German Enigma Machine**.

Luminary #3: Adm. Grace Hopper (1902 - 1992) 🇺🇸

- Nicknamed “Amazing Grace”; received a Ph.D. in mathematics at age 28.
- Computer scientist and Navy Admiral who invented the COBOL programming language still used today.
- Invented the term “computer bug” and worked for most of her life programming computers.

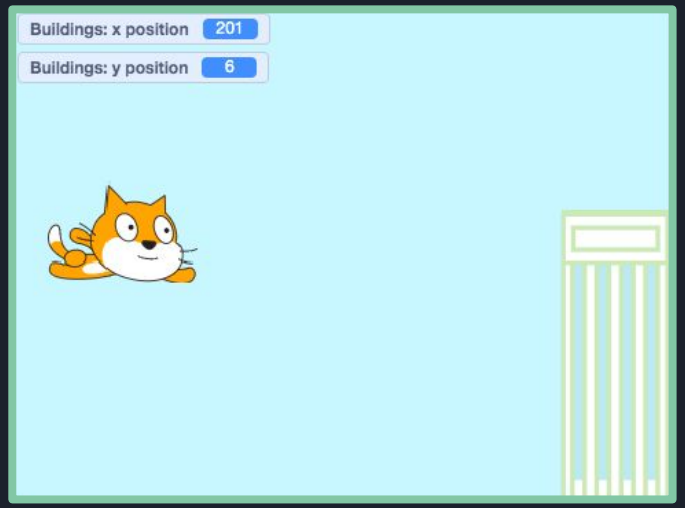
Luminary #4: Elon Musk (1971 - Present) 🇿🇦 🇨🇦 🇺🇸

- Started programming at a young age; taught himself to program, built a game called *Blastar* at age 12, and sold it for $500.
- Studied business (economics) and physics in college.
- Founder of companies you might know of: SpaceX, Tesla, OpenAI, The Boring Company, etc.

Video: 12 year old App Developer **Thomas Suarez**

Lesson for Today

Today, you will learn how to create a flowing cat:



Third Coding Lesson - 3/25/22

- Mr. Li

Today we are going to learn about an application of software and computer coding: self-driving cars...

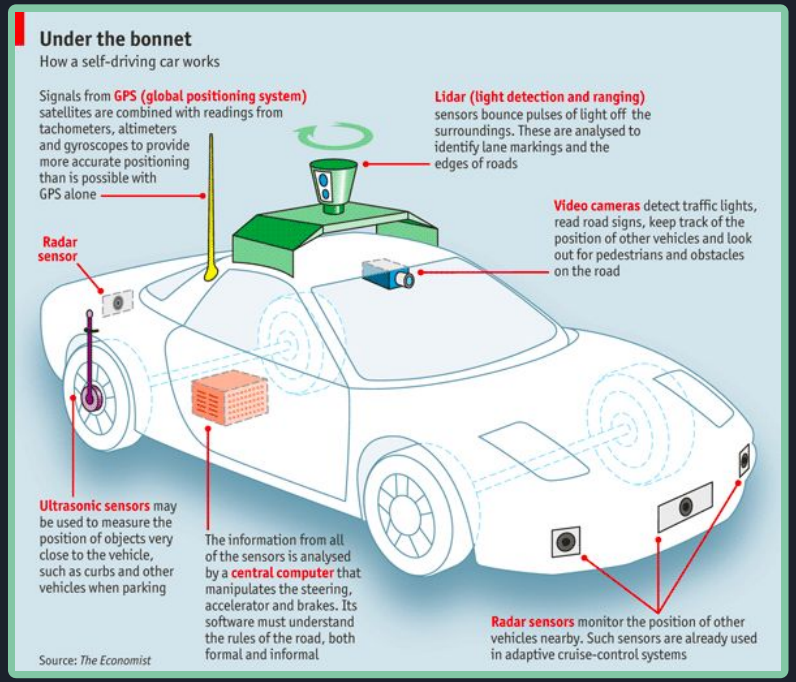
Carnegie Mellon University (1986): Navlab 1

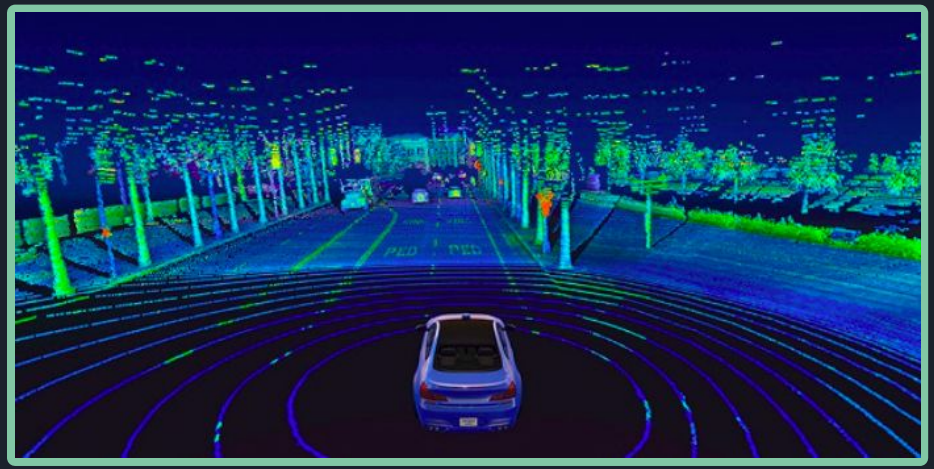
- In 1986, **Carnegie Mellon University's Robotics Institute** turned a Chevrolet Panel Van into a self-driving van.
- The van had 5 racks of computer hardware, including 3 Sun workstations.
- The van suffered from software problems; eventually the software problems were fixed and the van achieved a top speed of 20 mph.

DARPA Grand Challenge (2005): Stanley

- Self-driving cars were developed at research institutions throughout the 80s and 90s, mostly funded by government/military institutions.
- A breakthrough came in 2005 when the **Defense Advanced Research Projects Agency** (DARPA) hosted a challenge: develop a self-driving car to finish a 132 mile off-road course in the desert.
- **Stanley**, developed by the Stanford Racing Team + Volkswagen, won the competition and earning the team: $2 Million USD. Stanley used newly developed: **LiDAR technology**.

Self-Driving Cars: How do they work?



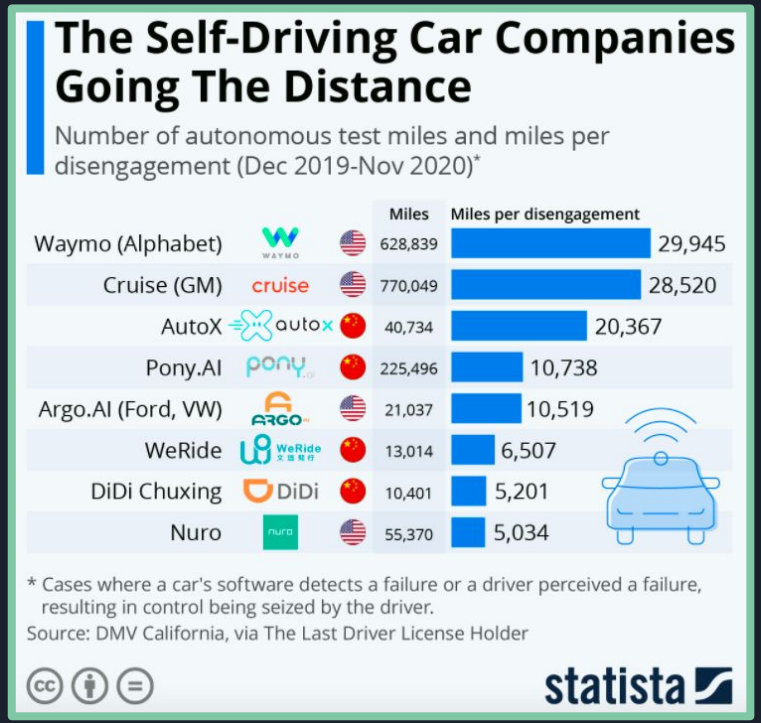


Commercializing Self-Driving Cars: Developments Today

Today, many companies are developing and working on self-driving cars: Tesla, Cruise, Waymo, Argo AI, Ford, Uber (See chart).

Benefits of Self-Driving Cars/Trucks

- Self-driving cars have the potential to save lives and make the roads safer.
- Self-driving cars have the potential to save people time and free up more time for important things such as: family time, running errands and more.
- Self-driving trucks have the potential to disrupt the trucking and shipping industry.



Video: Examples of Self-Driving Cars

- Example 1: Waymo LiDAR Technology
- Example 2: Mercedes-Benz Self-Driving Car

Fourth Coding Lesson - 4/15/22

- Mr. Li

Today we are going to learn about an application of software and computer coding: Robotics...

The Robotics Industry: A Growing Industry

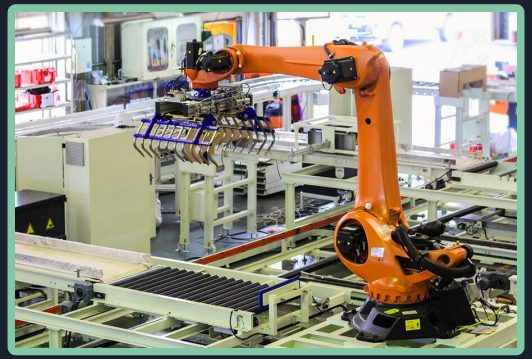
- “The Global market for robotics is estimated to increase from $55.8B in 2021 to $91.8B by 2026.” - BCC Research
- This is an exciting field and we are going to look at three different types of robots: **Autonomous Mobile Robots**, **Industrial Robots**, and **Humanoids**.
- A person who designs and works on robots is called a **roboticist**.

Robot Type #1: Autonomous Mobile Robots (AMVs)

- **Autonomous Mobile Robots** can understand and move through its environment independently.
- Used for repetitive tasks in factories to labor-intensive tasks in agriculture, logistics, hospitality, and other industries.
- Examples include: autonomous drones, mobile robots used for fulfillment, small robotic carts.

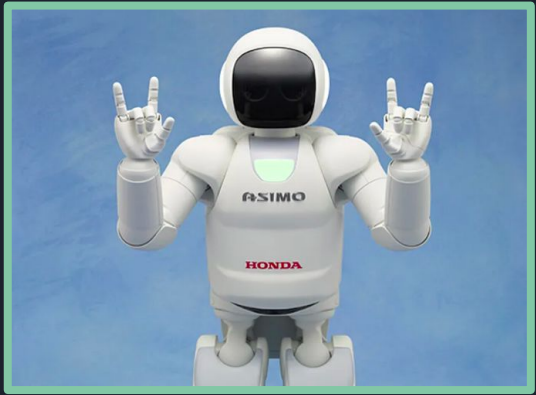
Robot Type #2: Industrial Robots

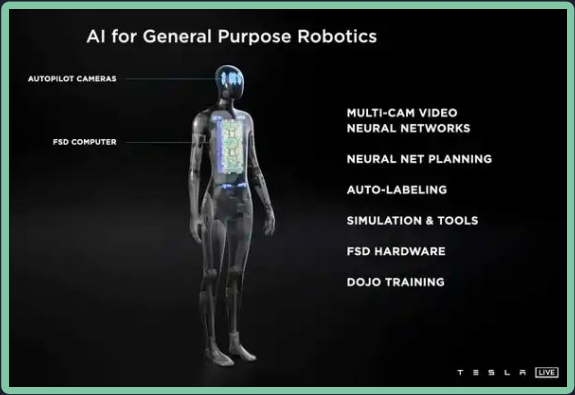
- **Industrial Robots** are used in **manufacturing**.
- Typical applications include: welding, painting, assembly, disassembly, packaging & labeling, product inspection and testing.
- Industrial robots can work with high speed, precision and endurance.



Robot Type #3: Humanoids

- **Humanoids** are robots that resemble humans in shape and form.
- They can automate tasks that humans do such as daily choirs and personal assistance.
- Humanoids are extremely advanced robots that still look and act like robots. To develop a robot that can truly think, reason and move like a person would achieve **Artificial General Intelligence (AGI)**.





Video: Examples of Robots

- Example 1: Honda ASIMO Humanoid Robot with fmr. President Obama.

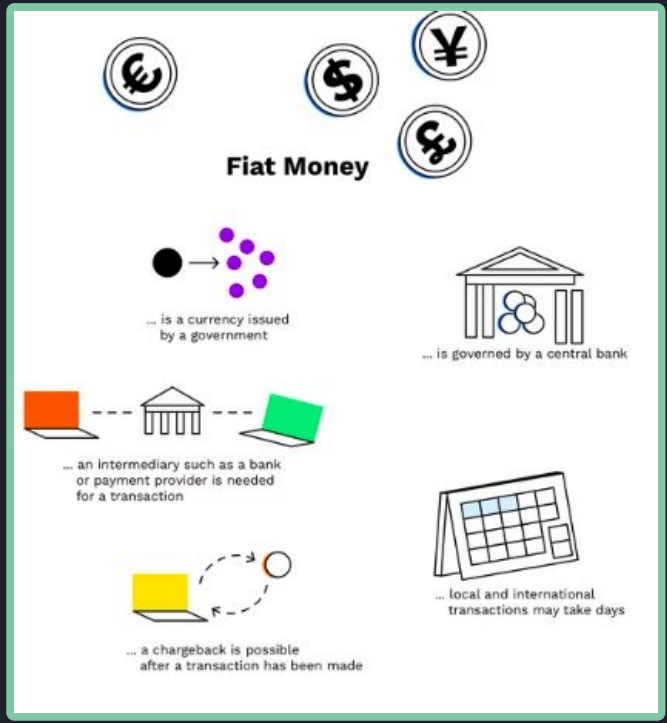
Fifth Coding Lesson - 4/29/22

- Mr. Li

Today we are going to learn about an application of software and computer coding: blockchain / cryptocurrencies...

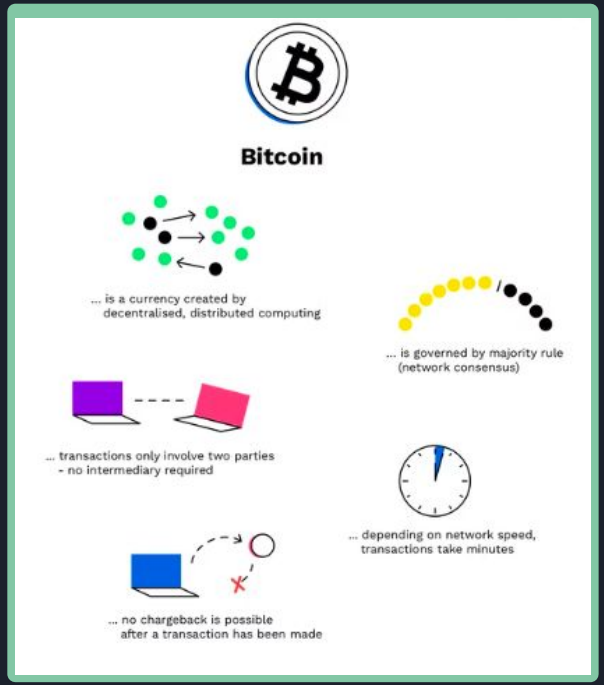
Traditional Banking System: Fiat Money (Dollars, Euros, Pounds, etc.)

- Physical medium of exchange; represented by **bills & coins**.
- Fiat money is issued by a government.
- **Centralized**. Issued and controlled by law and banks.
- **The Federal Reserve System** is the central bank of the U.S. and defines the national fiscal policy and protects the financial system.

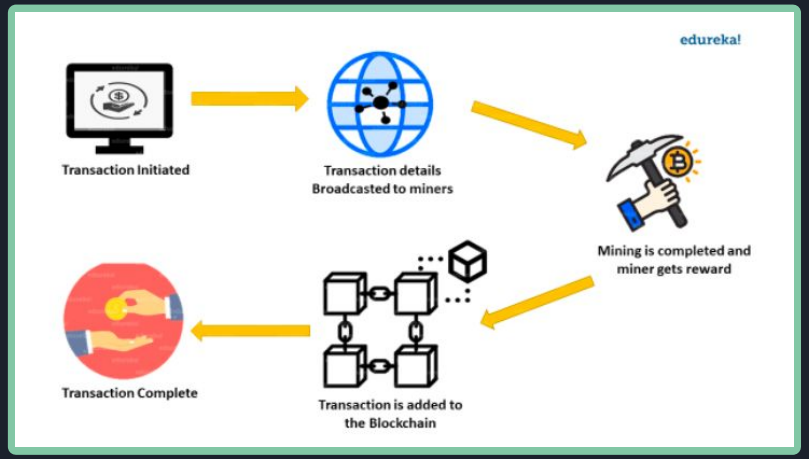


Cryptocurrencies (Crypto): A New Paradigm Shift

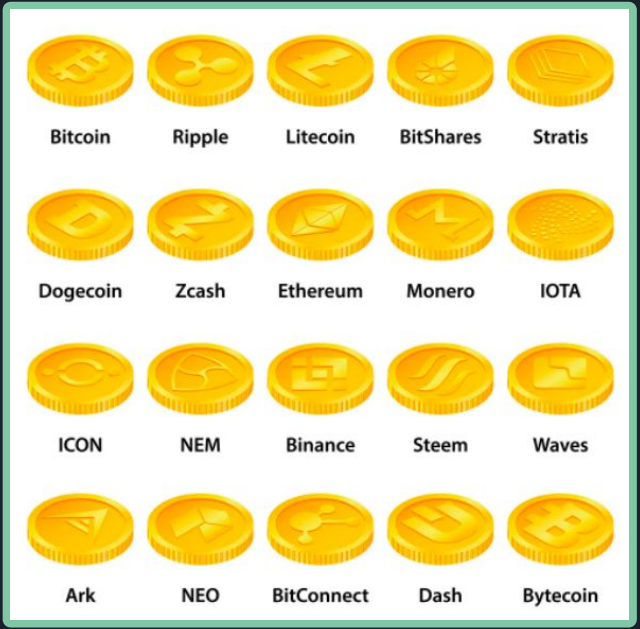
- **Digital medium of exchange**; produced by computers.
- Currency is traded and transferred by pieces of **computer code**; immutability, privacy, transaction verification and double-spending all solved by **cryptography and new blockchain technology**.
- **Decentralized**. Not controlled by any government or entity.



The Blockchain: Validating Crypto Transactions + Infrastructure for Bitcoin Mining



Popular Cryptocurrencies: A very Diverse Market… very Profitable, but very Volatile!



The Future: Ethical Questions of Cryptocurrency Adoption

- How will **criminal activity be monitored and stopped** (i.e. nefarious actors and nation states) when financial services is decentralized?

- The Blockchain and the system to mine Cryptocurrency such as Bitcoin is energy intensive; **what about the environmental costs**? **Decentralized Finance** (**DeFi**) is all based on computers and computers need energy to run.

- What about **consumer protection and regulation**? How do you balance innovation vs. regulations that protect society?

Video: Short Video Illustrating these New Technologies

- Video 1: Blockchain and Cryptocurrency Mining

Sixth Coding Lesson - 5/20/22

- Mr. Li

Today we are going to learn about Computer Science & Programming in Middle School, High School, and Beyond...

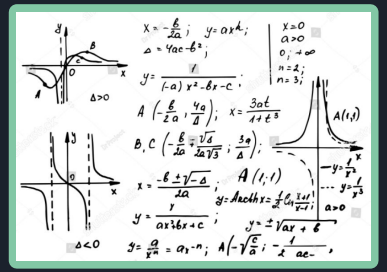
Specific Things to Do In: Middle School

- Focus and do well in the following subjects at school:
  - **Mathematics classes**
    - Work towards taking Algebra I at around 8th or 9th grade.
  - **English classes**
    - Develop good reading, writing, speaking, and overall communication skills
  - **Keep practicing coding and develop a passion for problem solving!**

Computer and Information Technology job growth percent increase expected from: 2019 - 2029

Specific Things to Do In: High School

- Take AP Computer Science A when ready:
  - **Prerequisites for AP Computer Science A**
    - **Algebra I**
    - **High School English**
- Other things that maybe helpful:
  - Get involved in 1) robotics club, 2) hackathons, and 3) internships (if possible)
  - Take more Math and Physics classes



Specific Things to Do In: College

- It really doesn't matter which school you go to; the more important thing is to find a school that fits best your learning style.
- The key: Find a school where you can be yourself and thrive!
- Get involved in a club or project that you are passionate about; challenge yourself and build something cool 💯.

Virginia Commonwealth U. team competing in the SpaceX Hyperloop Pod Competition (2018).

Specific Things to Do In: A Career; Two Quotes + a Challenge

- 1) "In your work, obviously, you'll meet many people. But ultimately it's about who you work with.

  Only those who choose the right people to work with will be able to do the work that they want." - **Toshio Suzuki, Japanese Animator**

- 2) "Sometimes it is the people no one imagines anything of who do the things no one can imagine." - **Alan Turing**

Challenge: Go out there and give it everything you got; go change the world, go do something bold and never hold back in anything! 💯 **- Mr. Li (Fri., 5/20/22)**

Video: A Growth Mindset

- Video 1: Growth Mindset presented by Khan Academy