

# Introduction to Emerging Technologies

CET139 – Emerging Technologies

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- Emerging Technologies – An Introduction
- Group Discussion
- Some Benefits of Emerging Technologies
- Pros and Cons of Emerging Technologies?

# Emerging Technologies – An Introduction

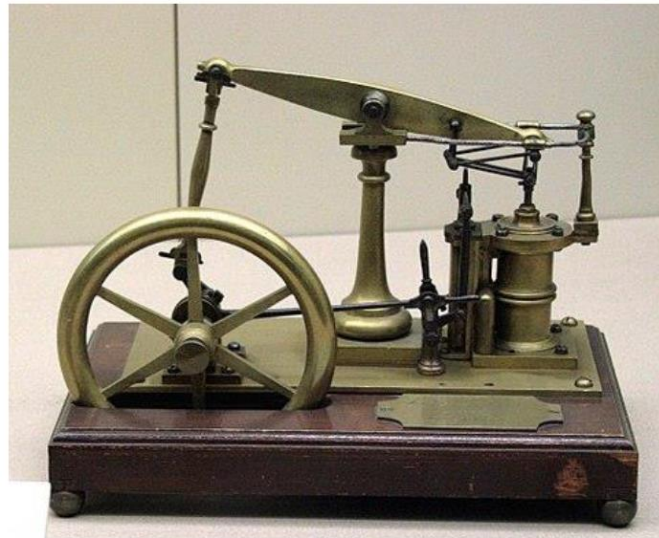
# Definition of Emerging Technology

- A technology whose development, practical applications, or both are still fully unrealized
- A technology is generally new but also includes older technologies finding new applications

*Are these sufficient to define an emerging technology?*

# Steam Engines?

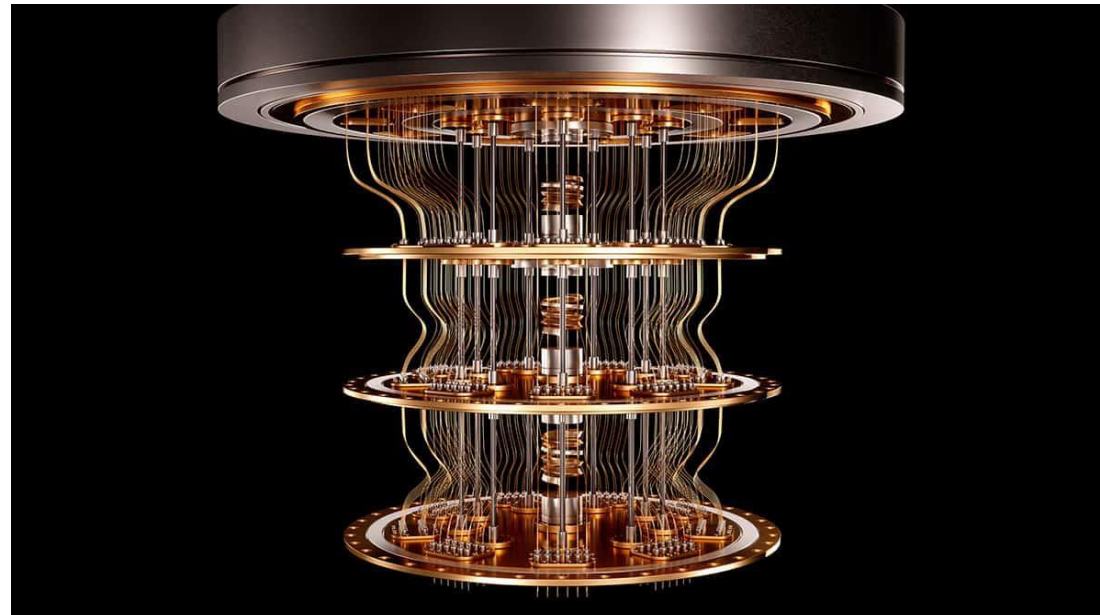
- By the 19th century, stationary steam engines powered the factories of the Industrial Revolution
- Steam engines replaced sails for ships on paddle steamers, and steam locomotives operated on the railways
  - [https://en.wikipedia.org/wiki/Steam\\_engine](https://en.wikipedia.org/wiki/Steam_engine)



*A model of a beam engine featuring James Watt's parallel linkage for double action.*

# Quantum Computer?

- Quantum Computer
  - A computer that exploits quantum mechanical phenomena
    - At small scales, physical matter exhibits properties of both particles and waves
  - Leverages this behavior using specialized hardware
    - <https://physicsworld.com/a/what-you-need-to-know-before-investing-in-quantum-technology/>





# Quantum Computer?

- Why is quantum computer an emerging technology?
  - Believed to be able to quickly solve certain problems that no classical computer could solve in any feasible amount of time
  - <https://www.penguin.co.uk/books/442598/quantum-computing-wired-guides-by-katwala-amit/9781847943262>



# 0G, 1G...?

- What is the meaning of these terms?

*0G, 1G, 2G, 2.5G, 2.75G, 2.9G, 3G, 3.5G,  
3.75G, 3.9G, 4G, 4.5G, 4.9G, 5G...*







- Telecommunication
  - Analog (i.e., continuous-value signals)
    - e.g., 0G, 1G
  - Digital (i.e., sequence of discrete and quantized samples)
    - From 2G to 5G and onwards
  - <https://www.shireeninc.com/types-of-wireless-networks/>
- Mobile networks
  - [https://en.wikipedia.org/wiki/Mobile\\_phone](https://en.wikipedia.org/wiki/Mobile_phone)

# Google Glass?



<http://www.quickmeme.com/meme/3uwav9>

# Google Glass?

- Google glass was an emerging technology
  - The smart spectacles the search giant unveiled in 2012
  - However, Google shelved the product in 2015
  - Its high price tag (\$1,500) and privacy concerns kept it from the mainstream
- In other words, the development of an emerging technology may result in some uncertainties 😞
  - Nevertheless, some of its research has been used in the virtual headset

# Revisit the Definition...

- A technology whose development, practical applications, or both are still fully unrealized
- A technology is generally new but also includes older technologies finding new applications

*Again, are these sufficient to define an emerging technology?*



# Extend the Definition

- A technology whose development, practical applications, or both are still fully unrealized
- A technology is generally new but also includes older technologies finding new applications
- It is also characterized by
  - *Radical novelty (in an application even if not in origins)*
  - *Prominent impact*
  - *Coherence*
  - *Relatively fast growth*
  - *Uncertainty*

- Cybersecurity
- Communication technologies
- Internet of Things (IoT)
- Automation
- Artificial Intelligence (AI)
- Database Technology etc.

Can you list **10** emerging technologies in Computer Science and **rank** them according to their importance to our lives?

- Healthcare improvement
- Safer online payment
- Telecommuting opportunities
- Instant communication
- Bring the family together virtually
- Easier life with artificial intelligence
- ...



Can you provide some other **advantages** and **disadvantages** emerging technologies can bring to us and **why**?

# Conclusion



- In this lecture, we have covered
  - The definition of emerging technologies
  - Some examples of emerging technologies
  - Pros and cons of emerging technologies