بِسْمِ اللهِ الرَّحْمٰنِ الرَّحِيْمِ “

In the name of Allah, the Most Gracious, the Most Merciful

4th IR and It’s Implication in Research

Md. Imam Sohel Hossain

Senior Scientific Officer

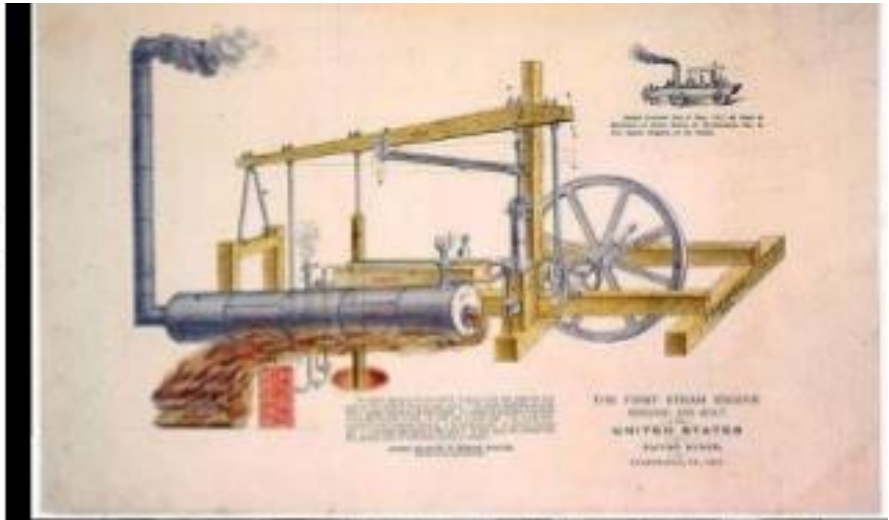
Leather Research Institute

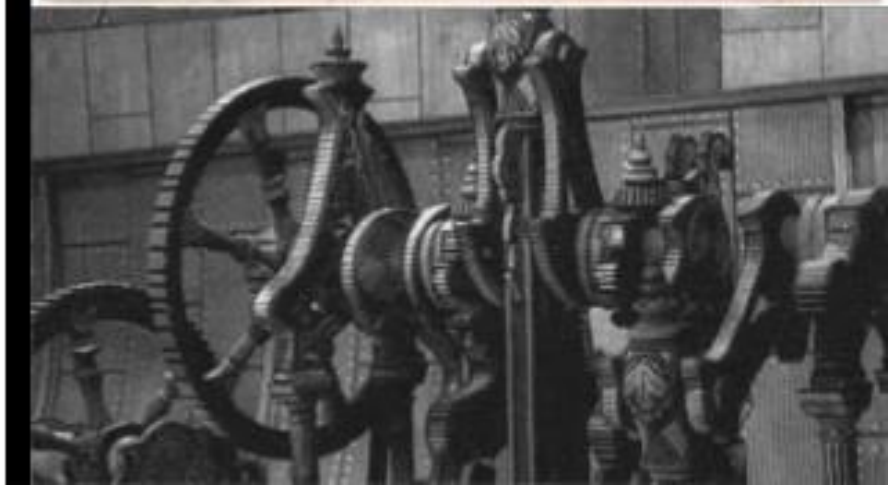
Bangladesh Council of Scientific and industrial Research (BCSIR)

First IR

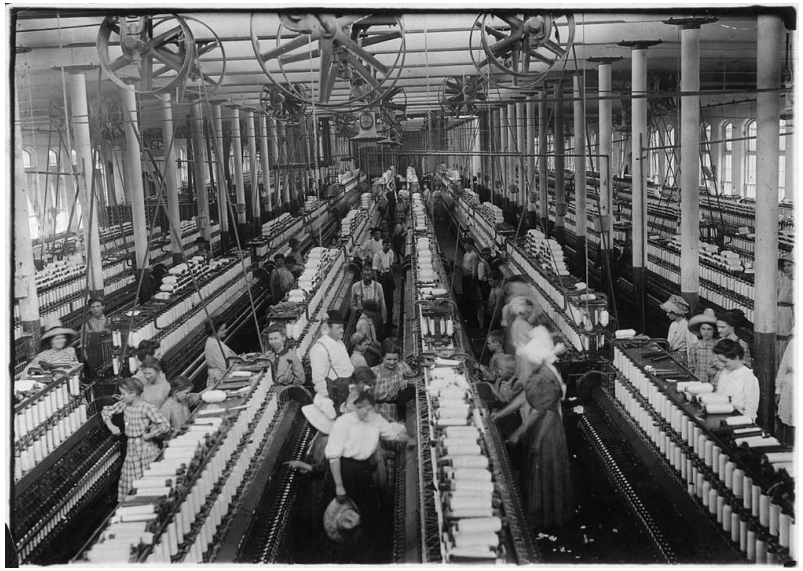
1765
1st INDUSTRIAL REVOLUTION

- The first industrial revolution, which REALLY was a revolution, and,
- invention of steam machines,
- the usage of water and steam power and all sorts of other machines,
- industrial transformation of society with trains,
- mechanization of manufacturing and loads of smog.

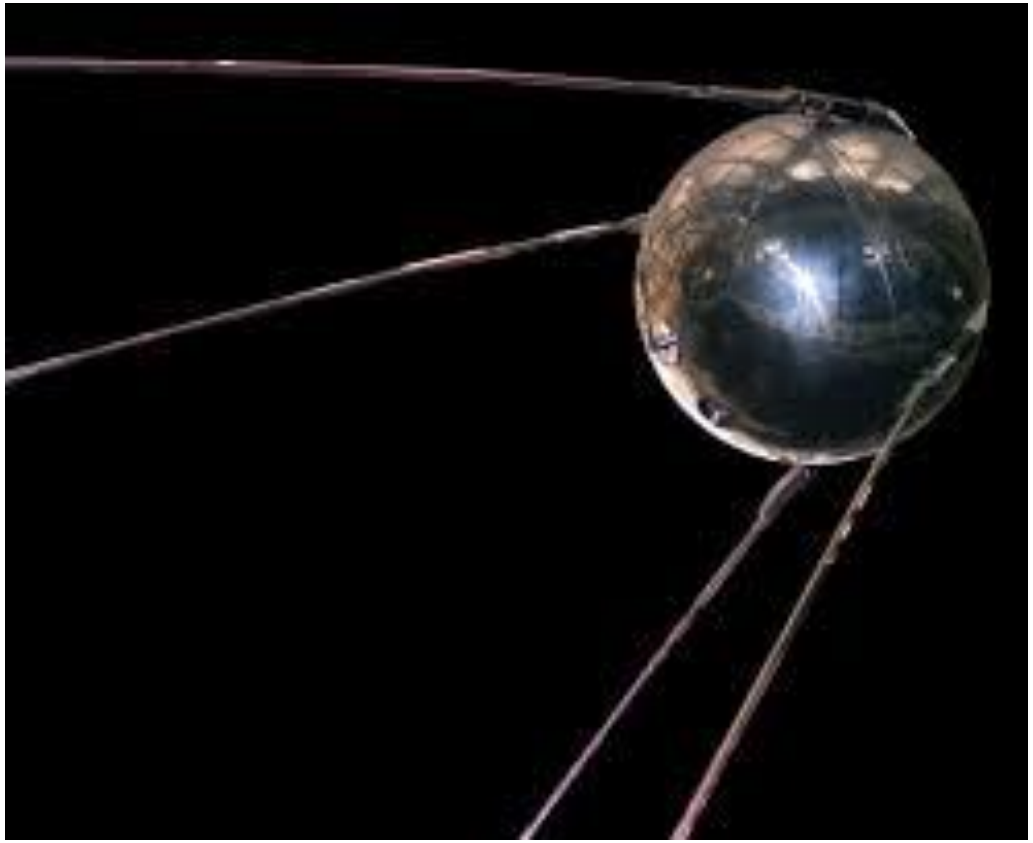




Second IR



36 sec to assemble a car



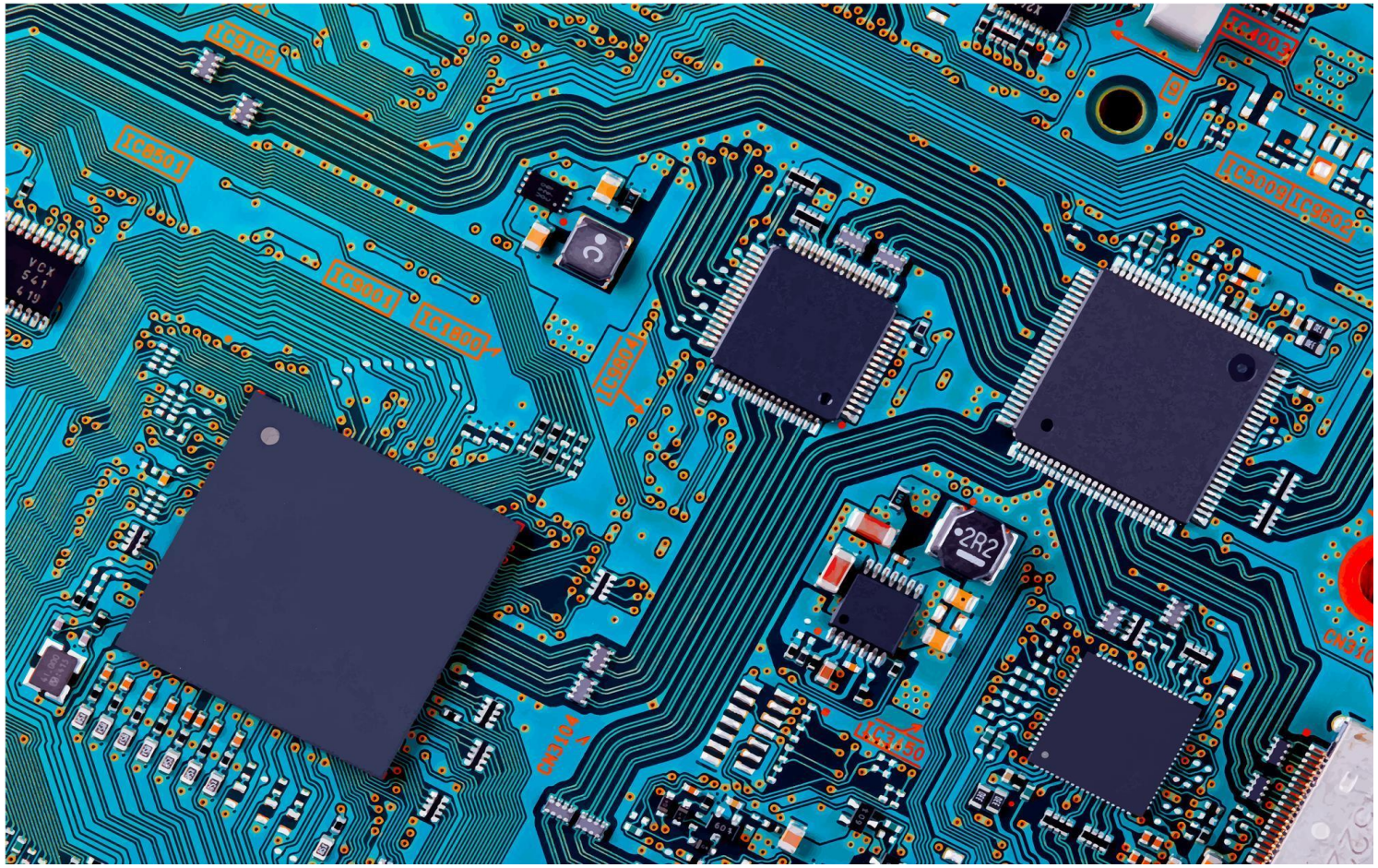
Space Age

Key Drivers of Technological and Medical Advances:

- War
- Space Race
- **Context of the Space Race**:
- Occurred during the Cold War between the United States and the Soviet Union
- Served as a non-violent demonstration of missile technology
- **Technological Impacts**:
- Advanced rocket technology
- Proved the capability to deliver nuclear bombs without actual conflict

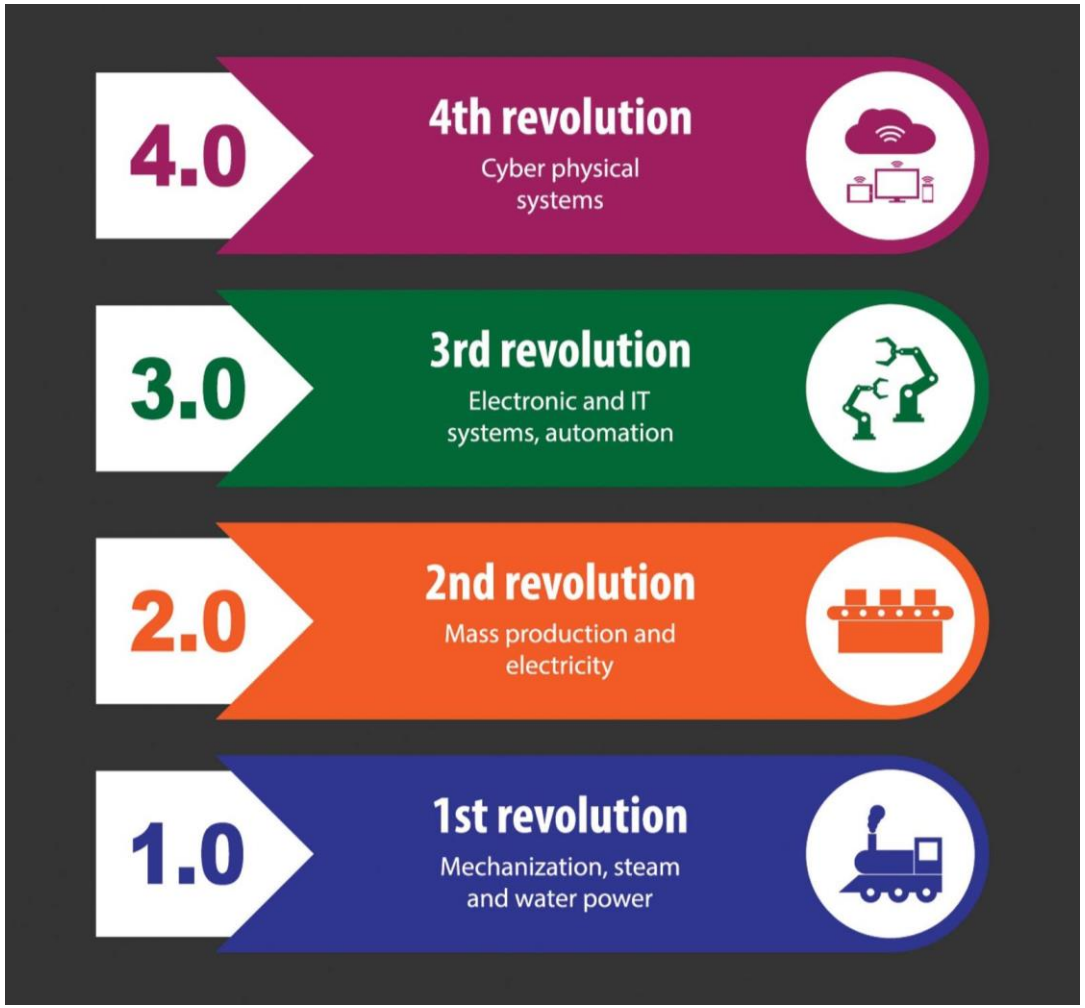
There are two events in human history that drive technology and medicine forward. War, and the Space Race. The Space Race was a diversion of wartime technology during the Cold War between the United States and the Soviet Union. Both were smart enough to not want to prove their capability of accurately launching nuclear missiles toward each other by actually launching nuclear missiles. Instead both sides set out to prove that our rocket technology (which "wink wink" could also be used to deliver nuclear bombs if we wanted to) was bigger and better than the other. The race to the moon drove forward tremendous advances in solid state electronics and micro circuitry, materials, communications, computer science, solar energy, robotics, artificial intelligence medicine. There is hardly a science, technology or industry that was not involved in some way by the space race. You can type in "Spin offs of space exploration" for a list of the thousands of products we use today traceable directly back to the space program. This is why space exploration continues today.

3rd IR- Microcomputer/Microchip



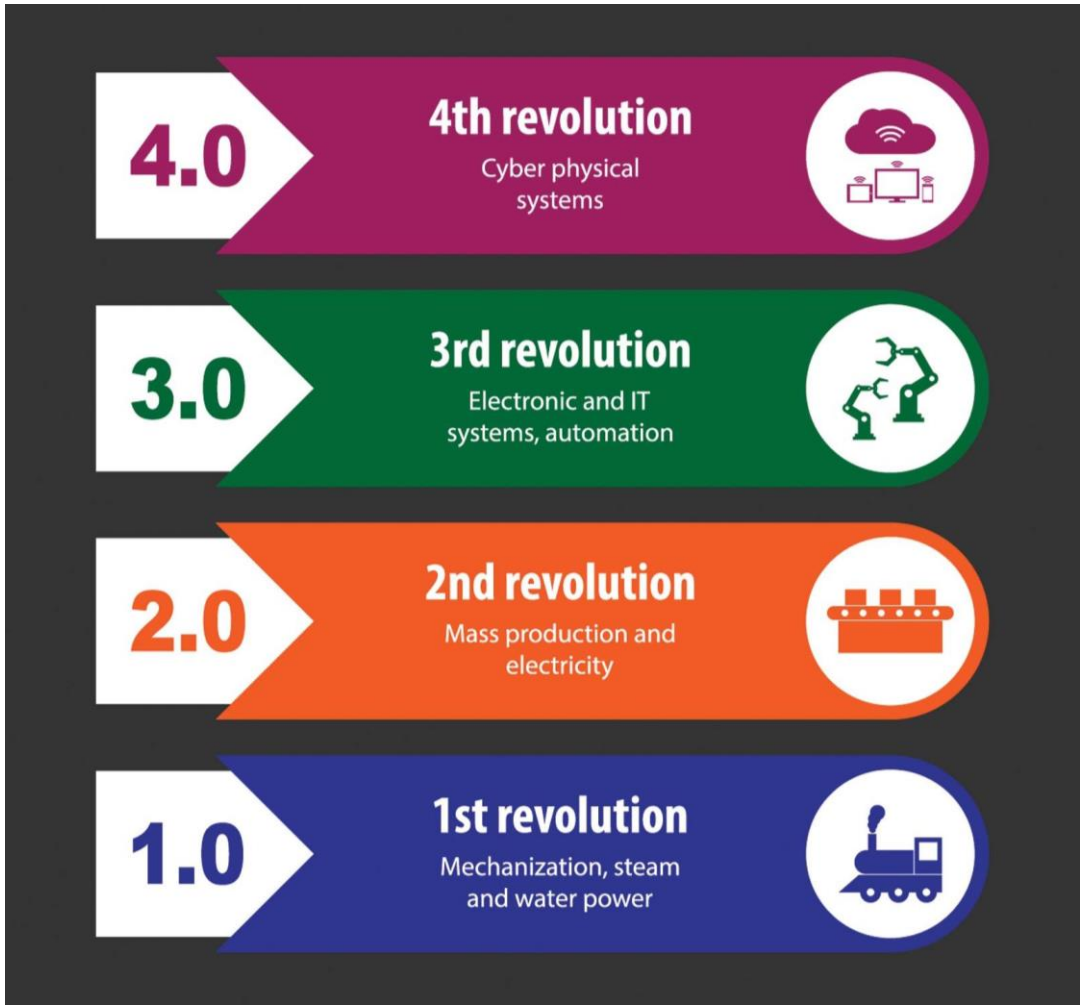
Incredible adventure story

- Imagine it's the late 1700s, and people mostly work on farms or in small workshops. Then, something amazing happens: inventors create machines that can do work faster and easier than people ever could. This is the First Industrial Revolution, and it starts with machines powered by water and steam. Factories pop up, and people move to cities to work.



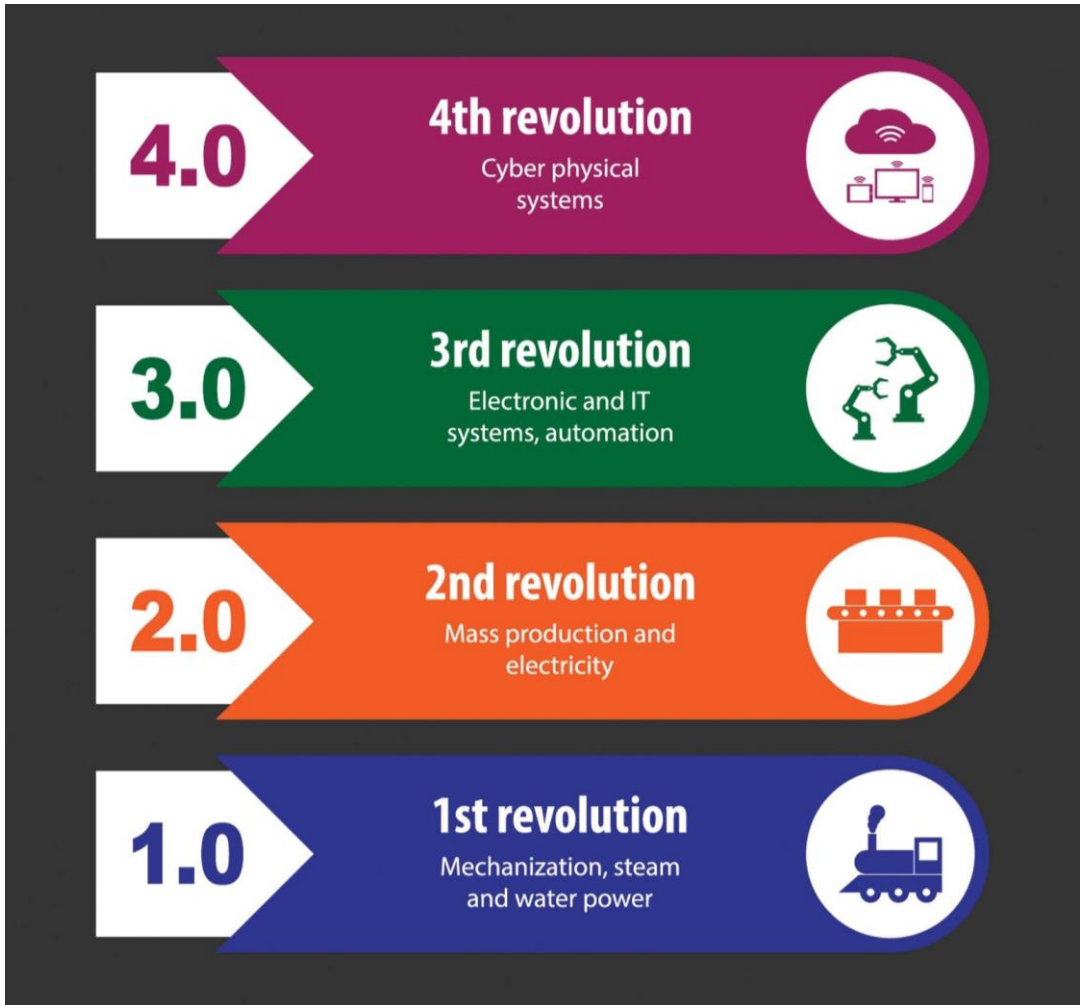
Incredible adventure story continues to 2nd IR

- Fast forward to the late 1800s and early 1900s, and we enter the Second Industrial Revolution. Now, electricity powers machines, and new inventions like the telephone and the automobile change how we live and connect with each other.



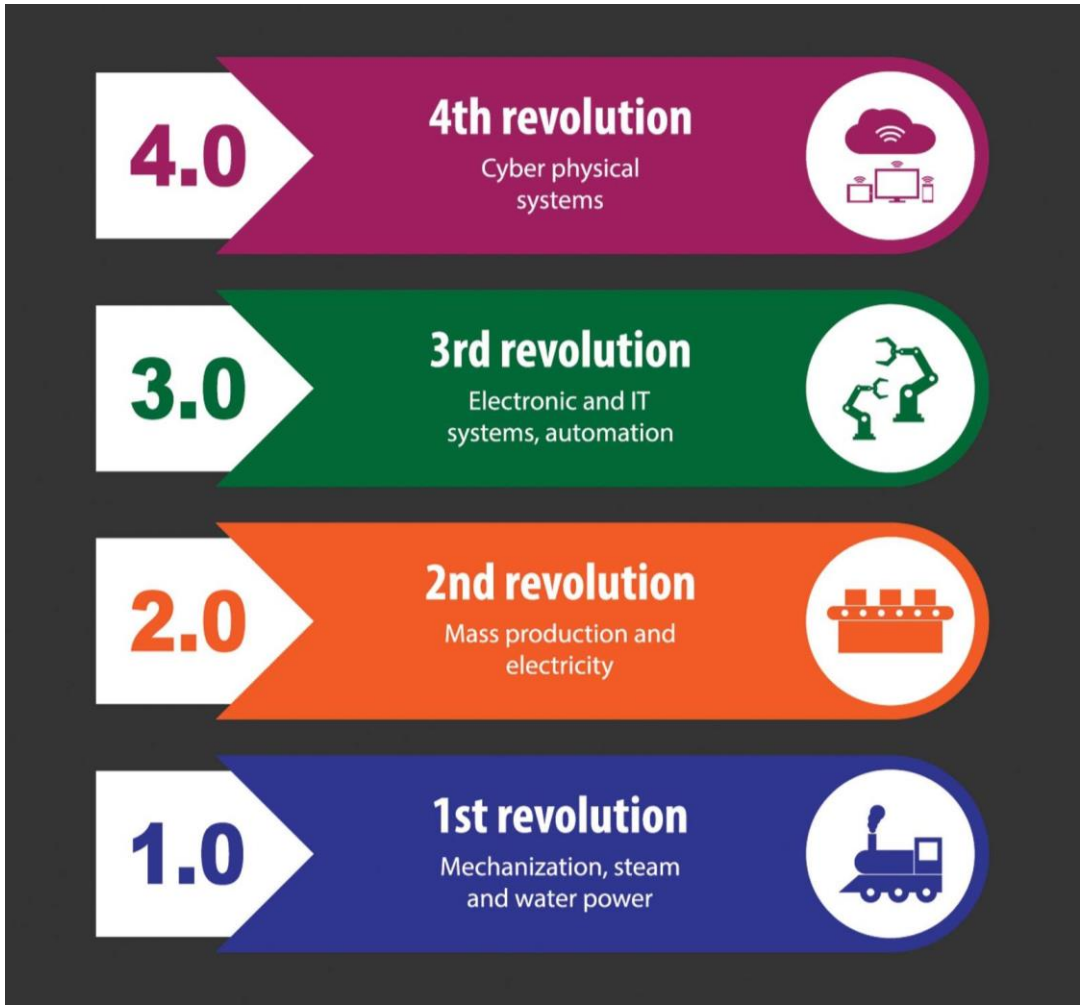
Incredible adventure story continues to 3rd IR

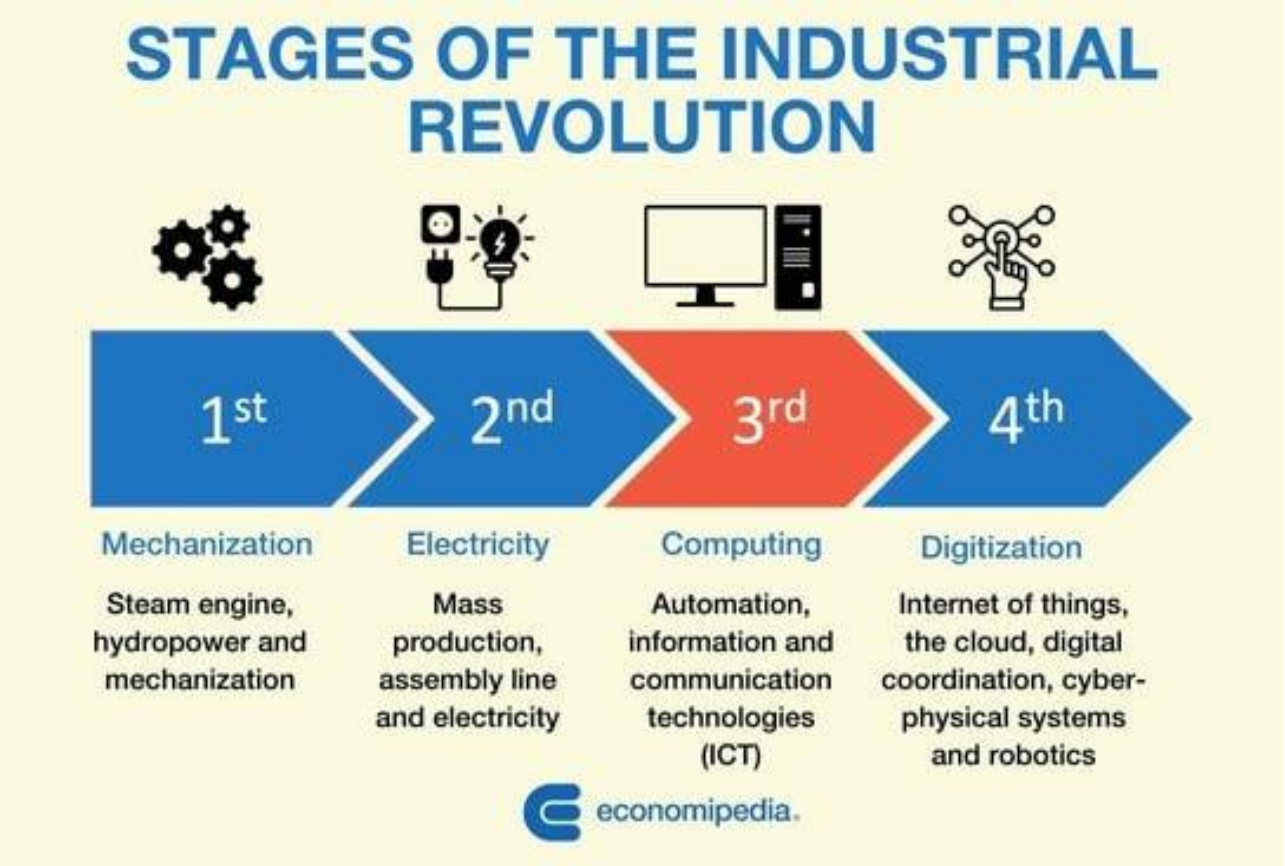
- Next, we jump to the mid-20th century for the Third Industrial Revolution, where computers and electronics come into play. Factories become more advanced with robots, and the internet starts to link people around the world.

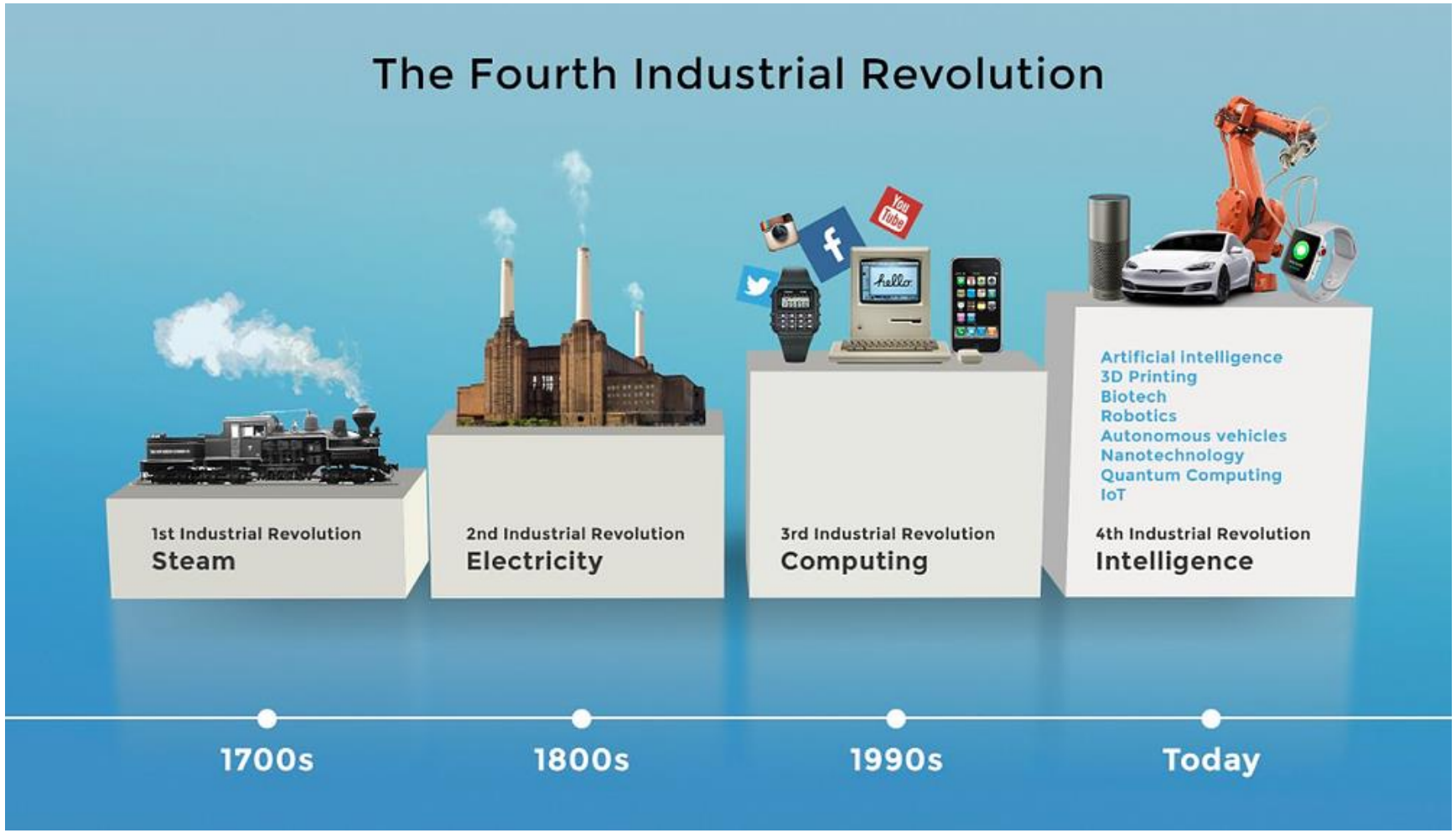


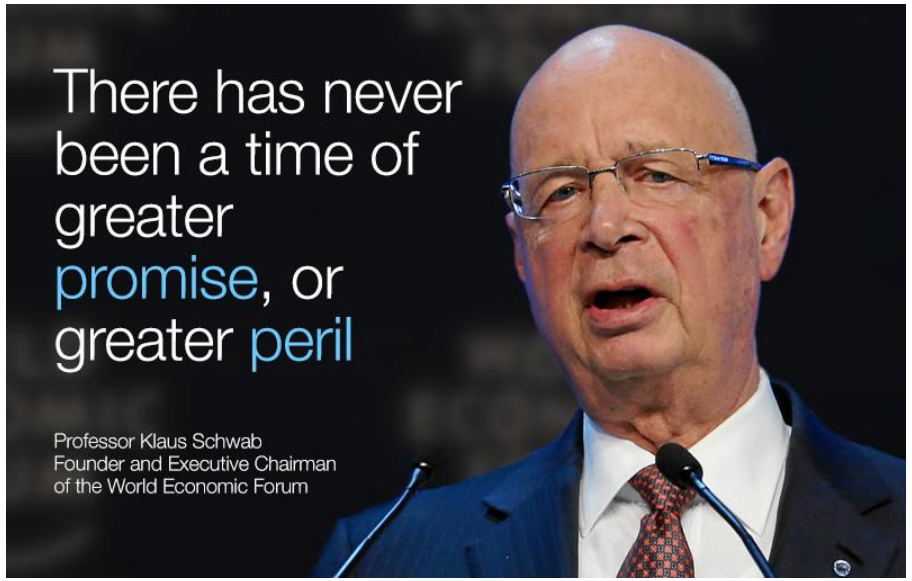
Incredible adventure story continues to 4th IR

- Finally, we reach the Fourth Industrial Revolution, where things get even more futuristic. Imagine robots that think, cars that drive themselves, and smart devices that can talk to each other. This revolution is all about blending digital technology with the physical world, using artificial intelligence, big data, and the Internet of Things to create a world that's more connected and efficient than ever before. Each revolution builds on the previous one, making our world more advanced and exciting.



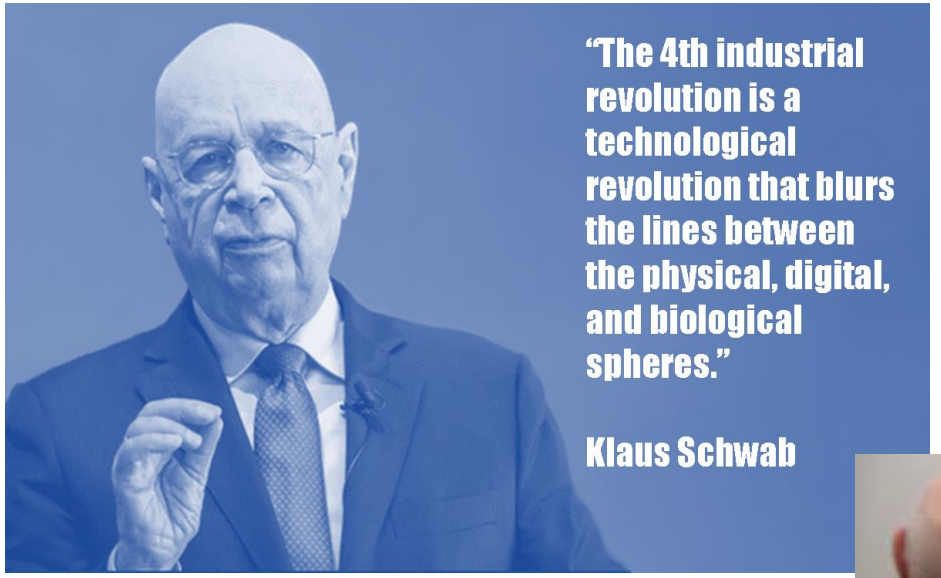

STAGES OF THE INDUSTRIAL REVOLUTION
1st
2nd
3rd
4th
Mechanization
Steam engine, hydropower and mechanization
Electricity
Mass production, assembly line and electricity
Computing
Automation, information and communication technologies (ICT)
Digitization
Internet of things, the cloud, digital coordination, cyber-physical systems and robotics
economipedia.


The Fourth Industrial Revolution
1st Industrial Revolution
Steam
2nd Industrial Revolution
Electricity
3rd Industrial Revolution
Computing
4th Industrial Revolution
Intelligence
Artificial Intelligence
3D Printing
Biotech
Robotics
Autonomous vehicles
Nanotechnology
Quantum Computing
IoT
1700s
1800s
1990s
Today


There has never been a time of greater promise, or greater peril
Professor Klaus Schwab
Founder and Executive Chairman of the World Economic Forum

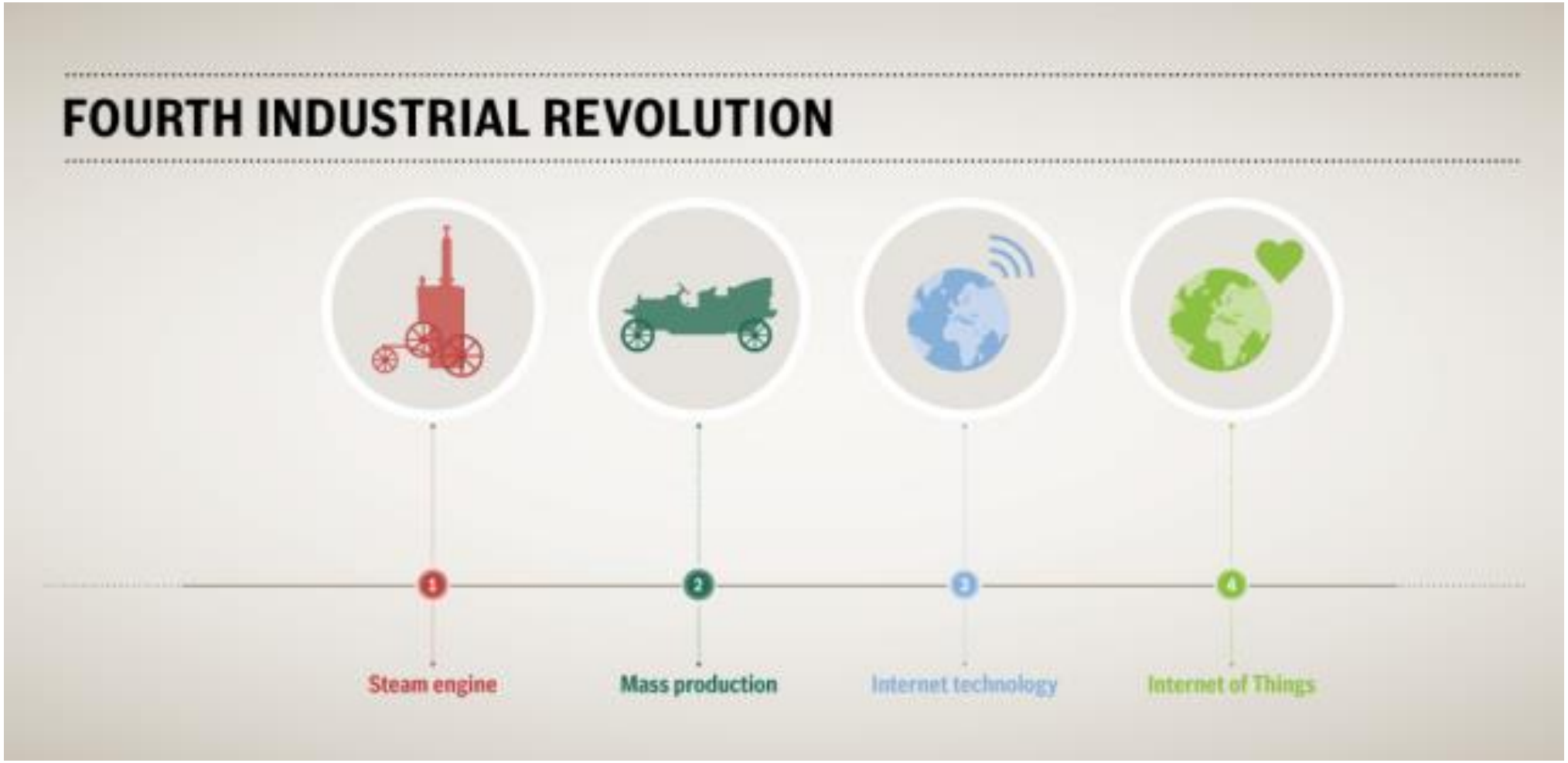

WORLD ECONOMIC FORUM


WORLD ECONOMIC FORUM

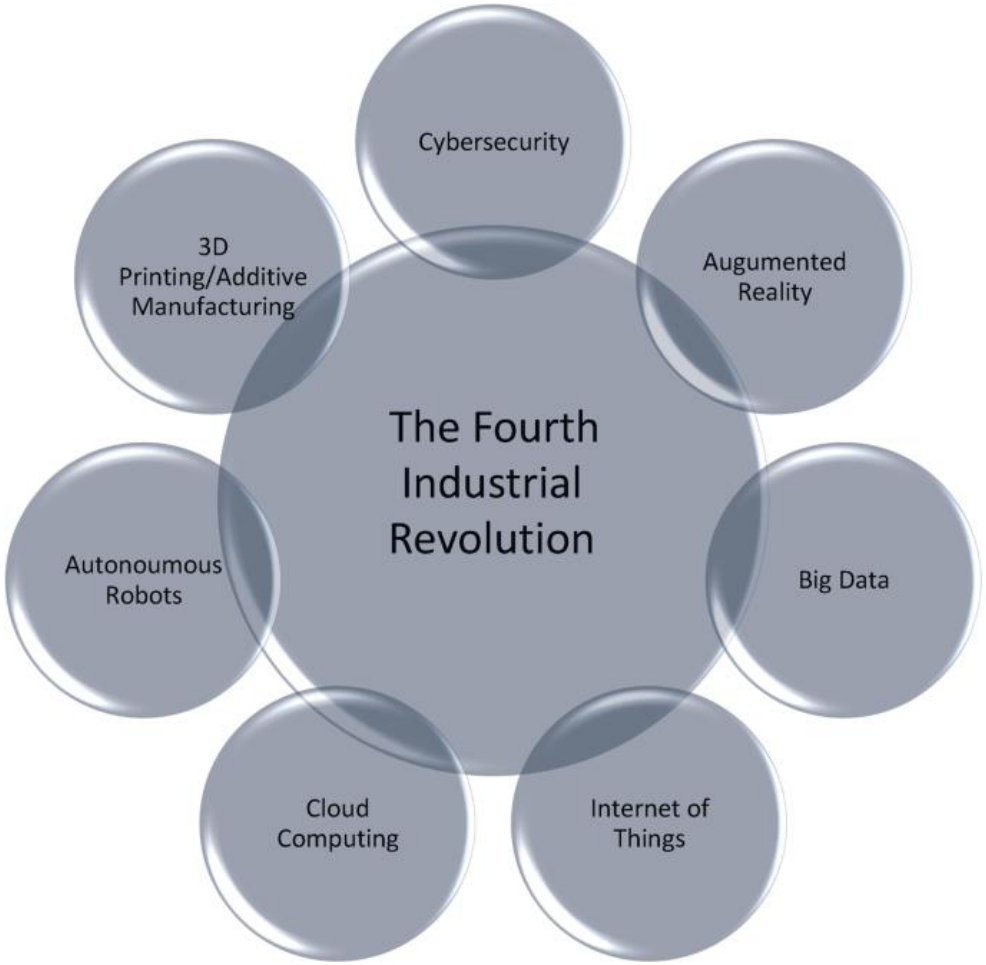

“The 4th industrial revolution is a technological revolution that blurs the lines between the physical, digital, and biological spheres.”
Klaus Schwab


WORLD ECONOMIC FORUM

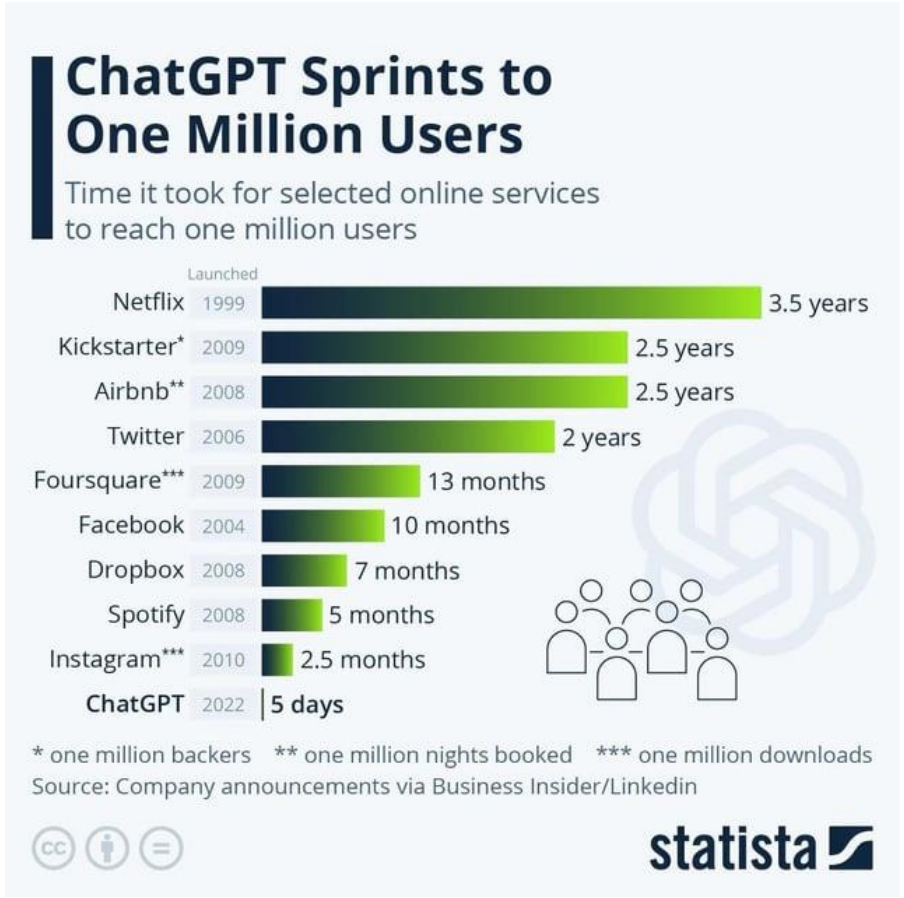

WORLD ECONOMIC FORUM
WORLD ECONOMIC FORUM

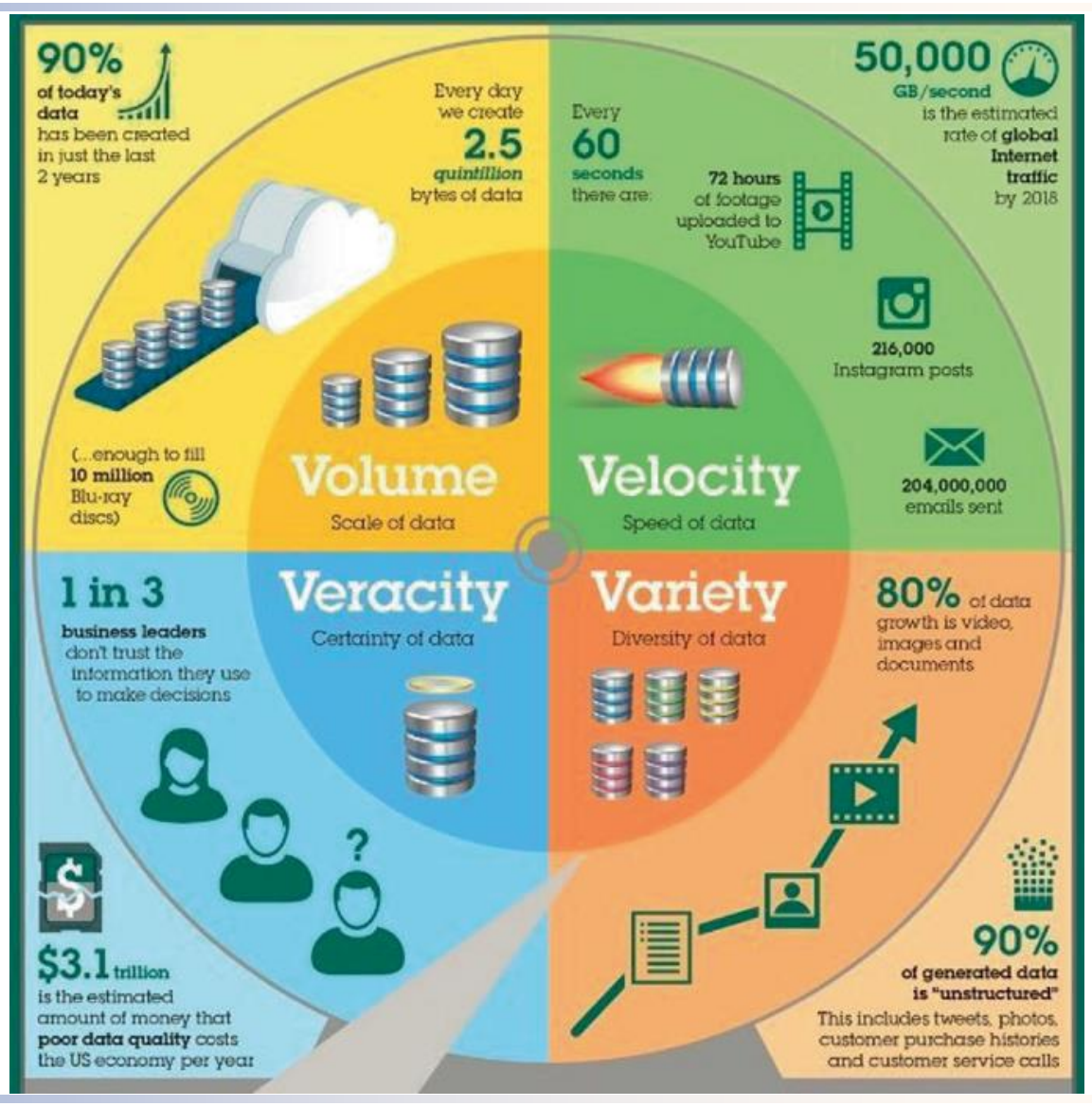

FOURTH INDUSTRIAL REVOLUTION
1
2
3
4
Steam engine
Mass production
Internet technology
Internet of Things

Components of 4th IR

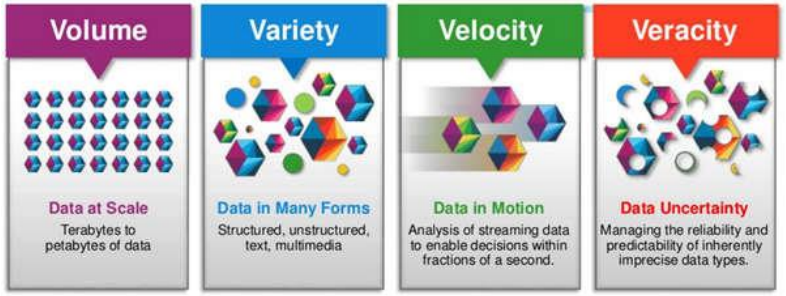


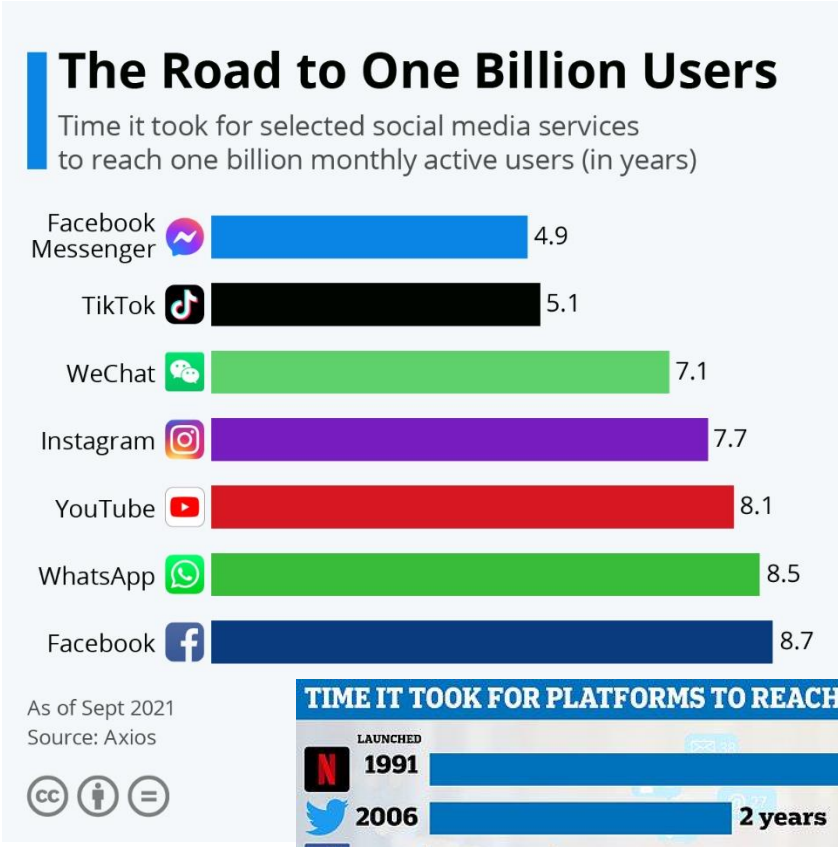
Characteristics of 4th IR

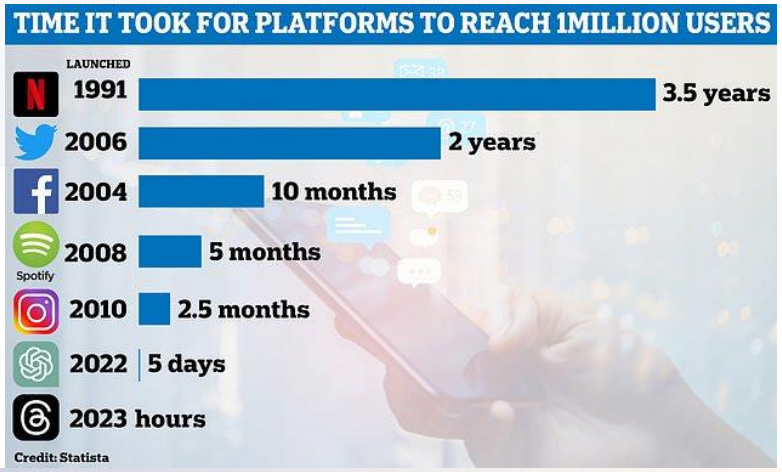




Characteristics of 4th IR







Characteristics of 4th IR

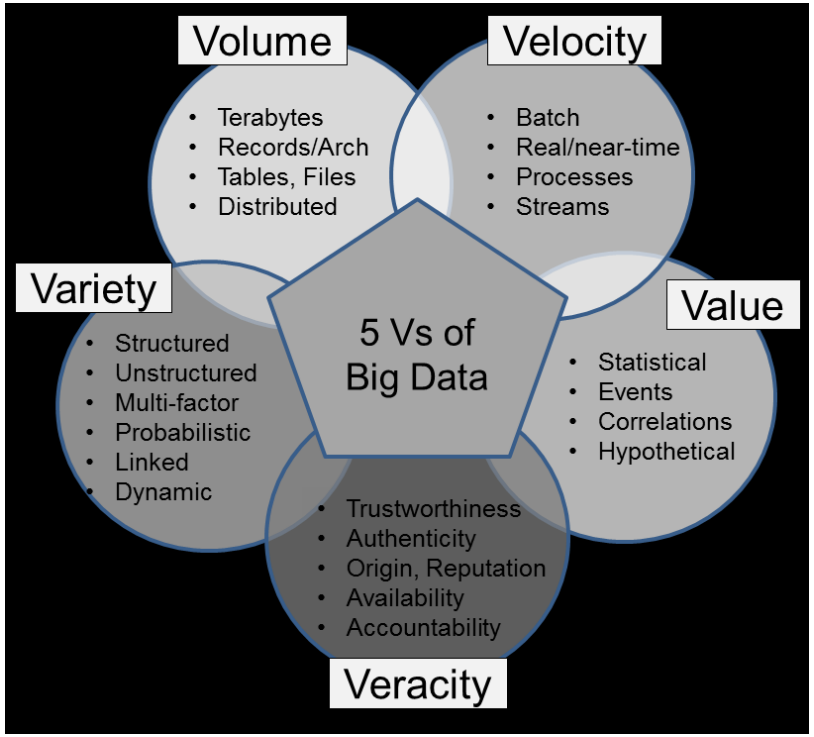
Variety of Data
+4 Billion videos
400 Million tweets
500 Million wearables
30 Billion pieces of content

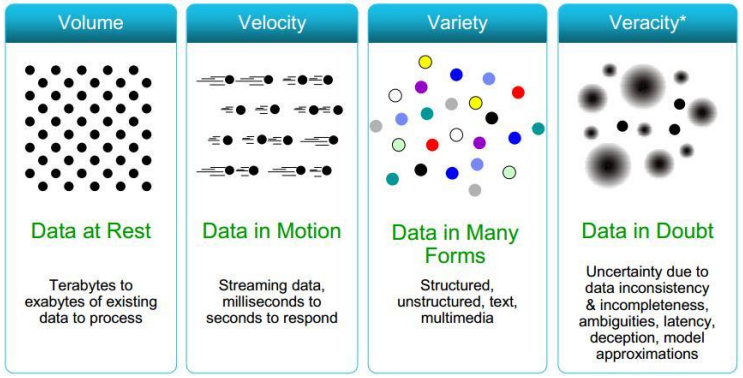
Velocity of Data
TBs of data from financial firms
20 Billion connections
Millions of weather sensors
100 sensors per car

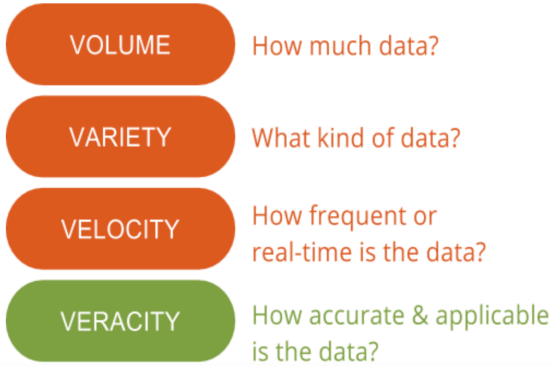
Big Data

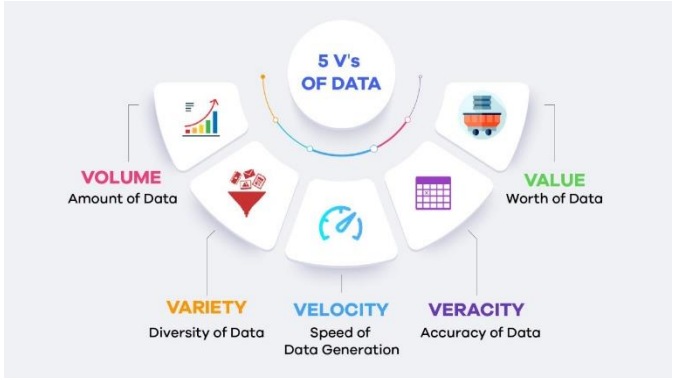
Volume of Data
2.5 EBs per day
average of 100 TBs per company
+40,000 EBs of ddata

Veracity of Data
33% don't trust the data
Trillions lost due to bad analytics





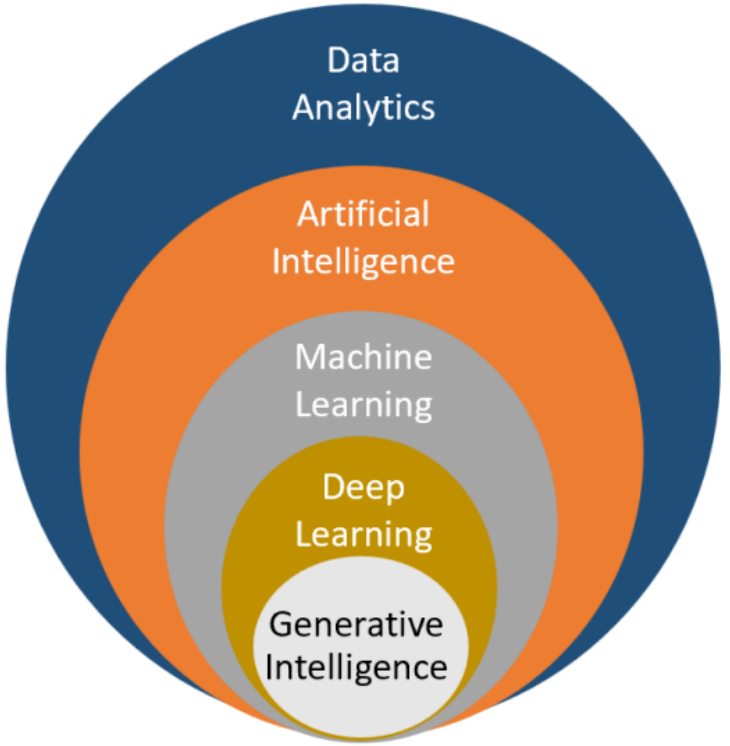




Artificial Intelligence and Machine Learning

- These technologies enable machines to learn from data, make decisions, and improve over time. They are used in a wide range of applications from autonomous vehicles to personalized medicine.

DL and GI – How it all fits tog

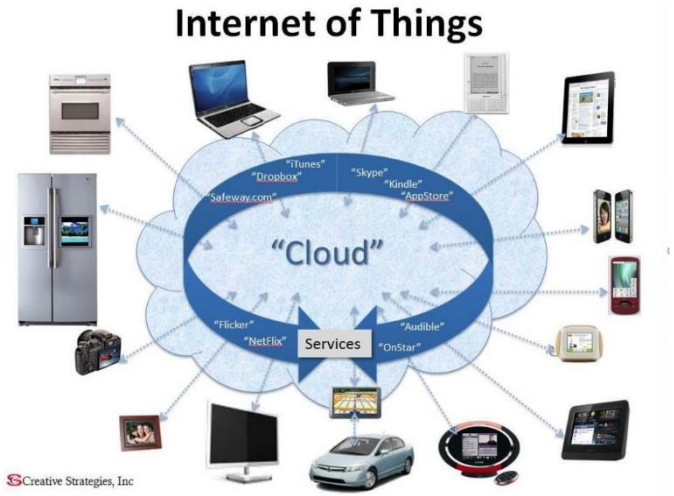


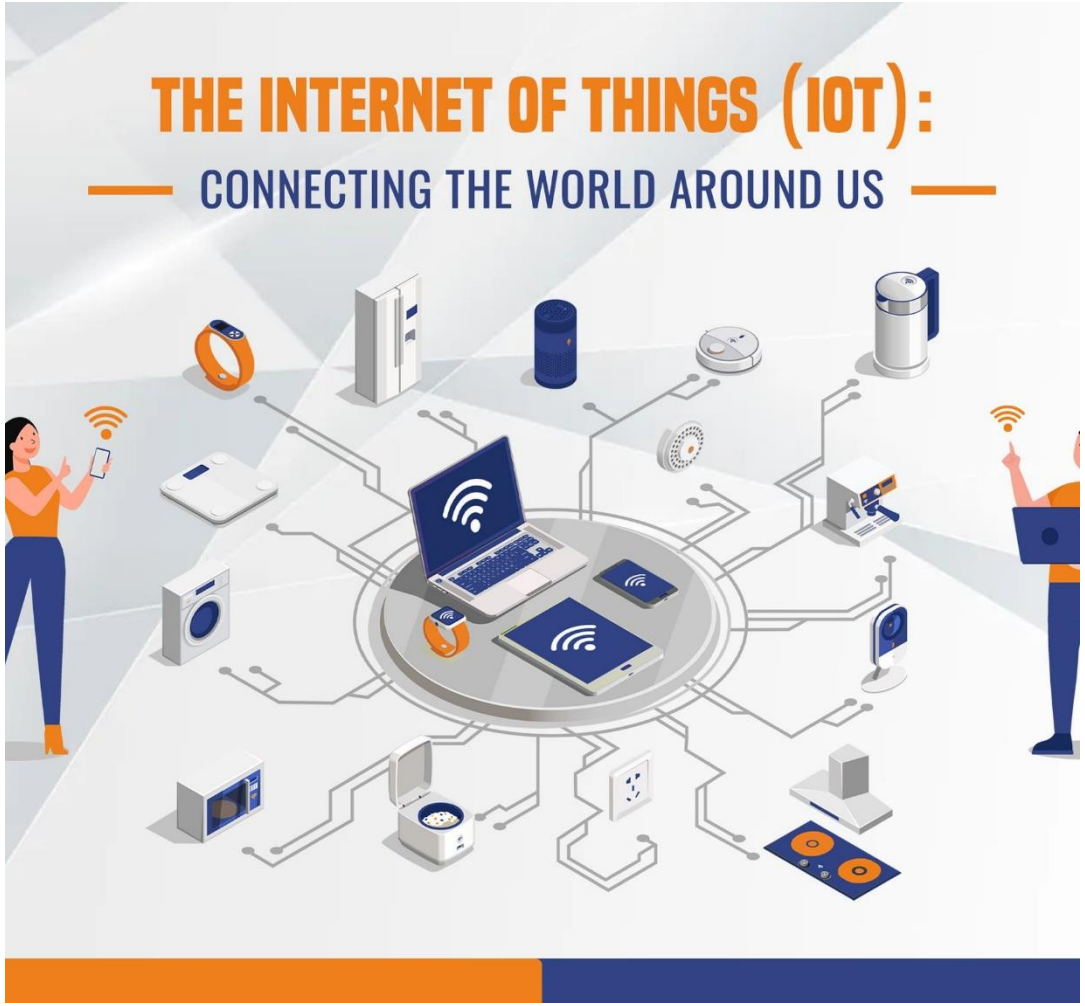
https://www.linkedin.com/pulse/how-does-ai-ml-dl-gi-fit-together-anang-b-singh

0231010

Internet of Things (IoT):

- This refers to the network of interconnected devices that can communicate and exchange data with each other. IoT is used in smart homes, wearable devices, industrial automation, and more.



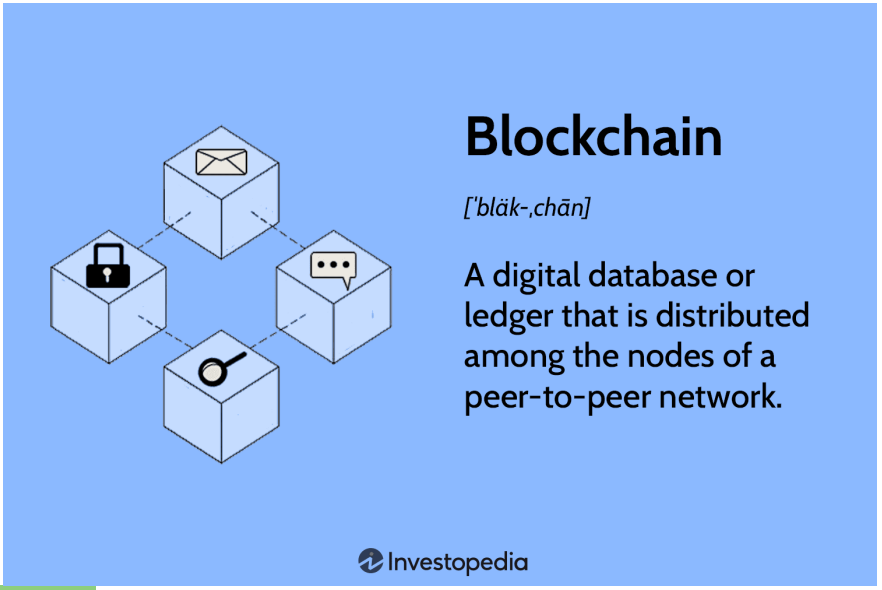


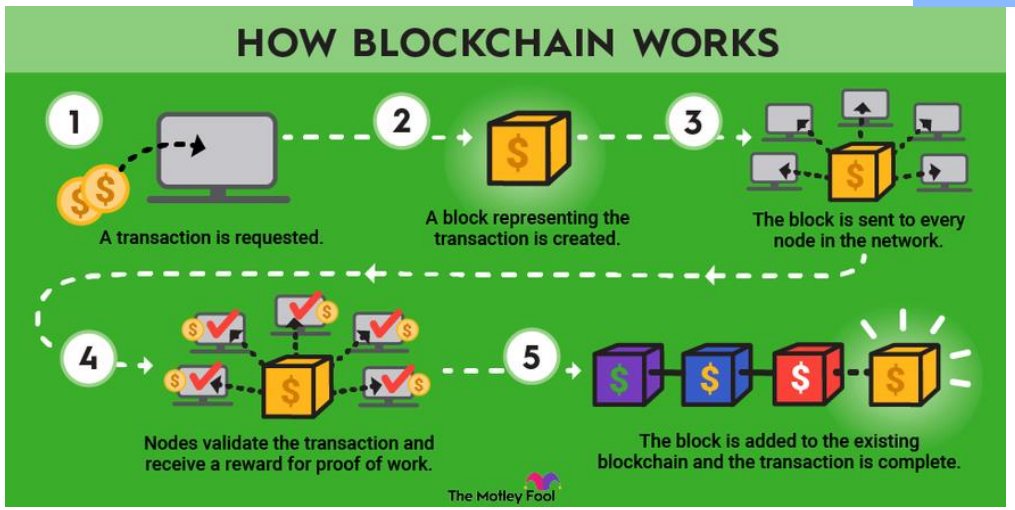
Big Data and Analytics:

- The vast amounts of data generated by digital devices are analyzed to uncover patterns, trends, and insights that can inform decision-making and drive innovation.

Blockchain

- A decentralized and secure way of recording transactions and managing data, blockchain is used in cryptocurrencies, supply chain management, and secure voting systems.



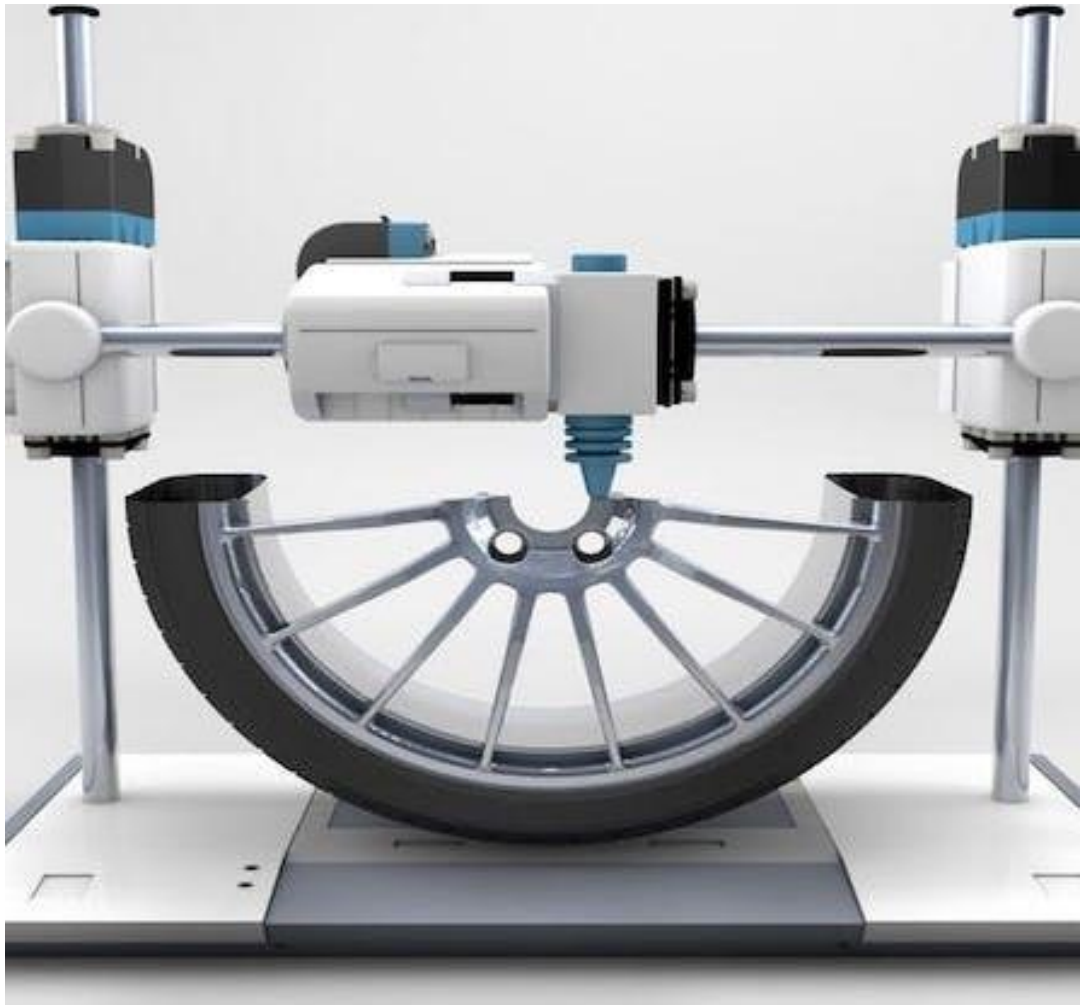


Robotics

- Advances in robotics are leading to more sophisticated and capable robots that can perform complex tasks in manufacturing, healthcare, and other sectors.

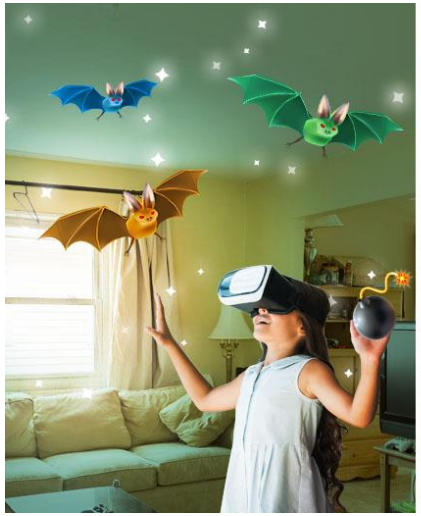
3D Printing (Additive Manufacturing)

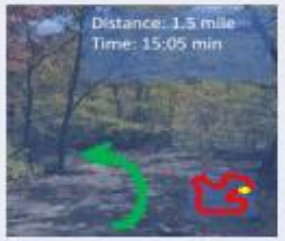
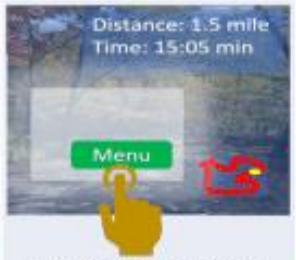
- This technology allows for the creation of complex objects by layering materials, which is used in industries like aerospace, automotive, and healthcare for customized manufacturing.



Augmented Reality (AR) and Virtual Reality (VR)

- These immersive technologies are used for training, simulation, entertainment, and enhancing user experiences in various fields.



		Extended Reality (XR)		
	Reality	Augmented Reality (AR)	Mixed Reality (MR)	Virtual Reality (VR)
Display	Naked eye/optical glasses	Translucent display	Translucent display	Occlusion display
Display example				
Example	 Real view of a trail	 Augmented virtual map and direction	 Interactive virtual contents	 Virtual gaming

Quantum Computing

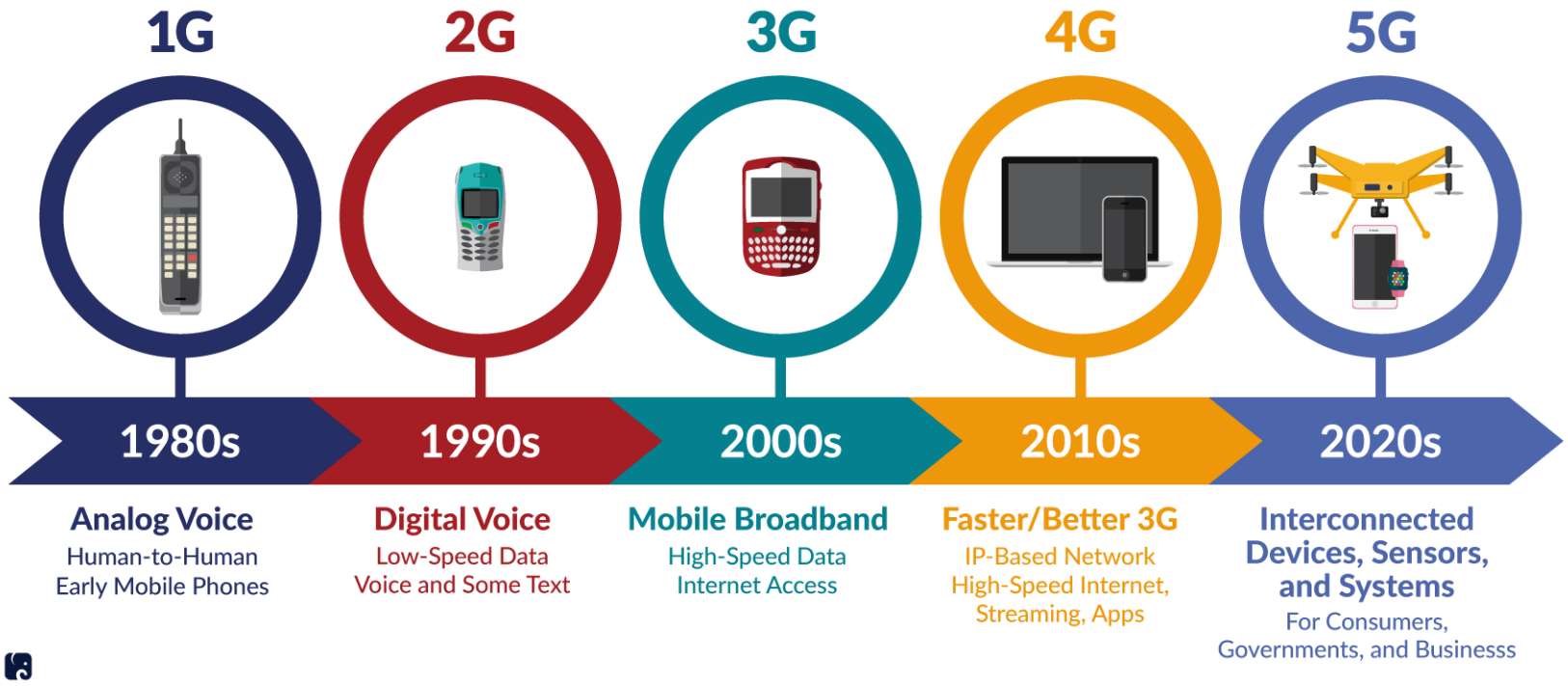
- Though still in early stages, quantum computing promises to solve complex problems much faster than classical computers by leveraging the principles of quantum mechanics. Let's say you're on a treasure hunt. There are 8 treasure chests, and only one has the treasure. A regular computer would check each chest one by one until it finds the treasure. This could take a while.

- A quantum computer, with its qubits in superposition, can check all the chests at once! Because of this, it can find the treasure much faster.

- **Classical Computer:** Uses bits (0 or 1), like regular coins (heads or tails).
- **Quantum Computer:** Uses qubits (0, 1, or both at the same time), like magic coins (heads, tails, or both).
- **Superposition:** A qubit can be in multiple states at once.
- **Entanglement:** Qubits can be connected in a special way, so the state of one affects the other, no matter the distance.

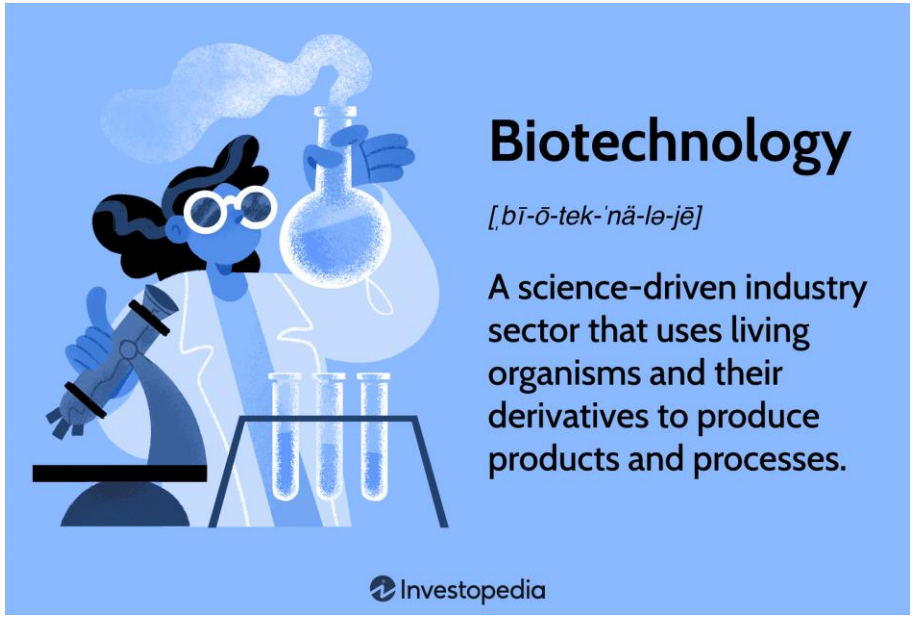
Advanced Wireless Technologies (5G and Beyond)

- The next generation of wireless communication technologies provides faster, more reliable connections, enabling advancements in IoT, smart cities, and autonomous vehicles.



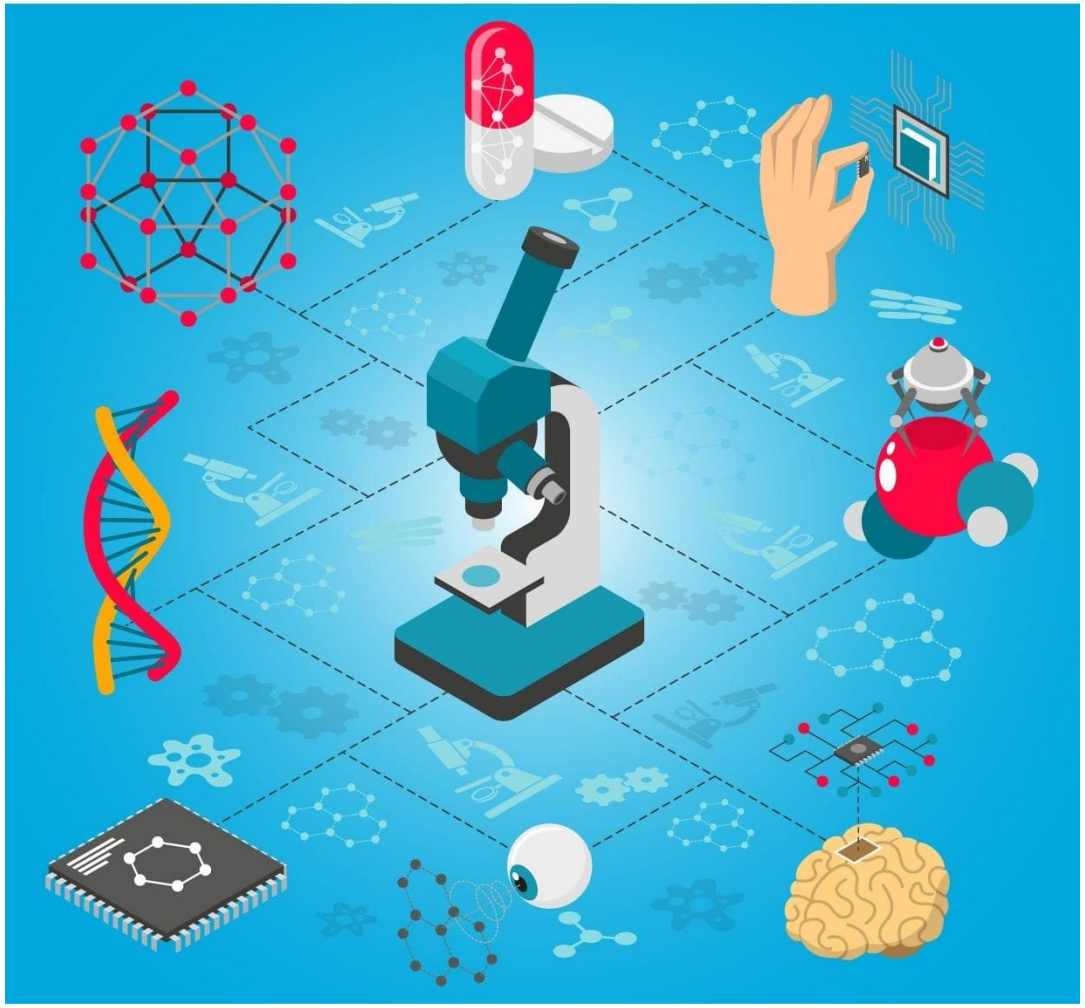
Biotechnology

- Innovations in genetic engineering, CRISPR, and personalized medicine are transforming healthcare, agriculture, and other fields



Nanotechnology

- The manipulation of matter at the atomic and molecular scale is leading to breakthroughs in materials science, medicine, and electronics



Cybersecurity

- As digital systems become more integral to all aspects of life, protecting data and infrastructure from cyber threats is increasingly critical

- From self-driving cars to drone-delivered online shopping, the Fourth Industrial Revolution is changing how we live, work, and communicate. But with more and more jobs being taken over by artificial intelligence, what do researchers/students today need to do to stay relevant for future challenges?

Chapter | PDF Available

A Deep Learning-Based Approach for Automatic Leather Classification in Industry 4.0

March 2021

March 2021

DOI:10.1007/978-3-030-68799-1_48

In book: Pattern Recognition. ICPR International Workshops and Challenges (pp.662-674)

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Automatic Leather Defect Detection Using Deep Learning

Apr 18, 2023 — In this paper, we are going to introduce an **automatic defect detection technique** by employing a deep learning method for leather defect ...

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Ai Driven Leather Production Optimization

By leveraging **AI** and machine learning, businesses can transform their leather production operations, driving efficiency, profitability, and sustainability.

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Leather Defect Detection Using Semantic Segmentation

by SR Khanal · 2022 · Cited by 7 — Then, a series of image processing will be carried out to detect defect detection which consist image pre-processing, training the **deep learning** model...

Open Access Review

A Systematic Review of Machine-Vision-Based Leather Surface Defect Inspection

by Zhiqiang Chen [1], Jiehang Deng [2], Qiuqin Zhu [1], Hailun Wang [1] and Yi Chen [1,3,*]

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(This article belongs to the Section Computer Science & Engineering)

ELSEVIER

Journal of Cleaner Production

Volume 457, 10 June 2024, 142464

Energy-saving and low-carbon leather production: AI-assisted chrome tanning process optimization

Long Zhang [c], Qingsu Cheng [b], Chunhua Wang [a c], Changping Huang [c], Wei Lin [a c]

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https://doi.org/10.1016/j.jclepro.2024.142464

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بِسْمِ اللهِ الرَّحْمٰنِ الرَّحِيْمِ “

In the name of Allah, the Most Gracious, the Most Merciful

Revolutionizing Flood Monitoring: A Web-Based Application for Near-Real-Time Observation Using Satellite Imagery

Slide Link

Md. Imam Sohel Hossain

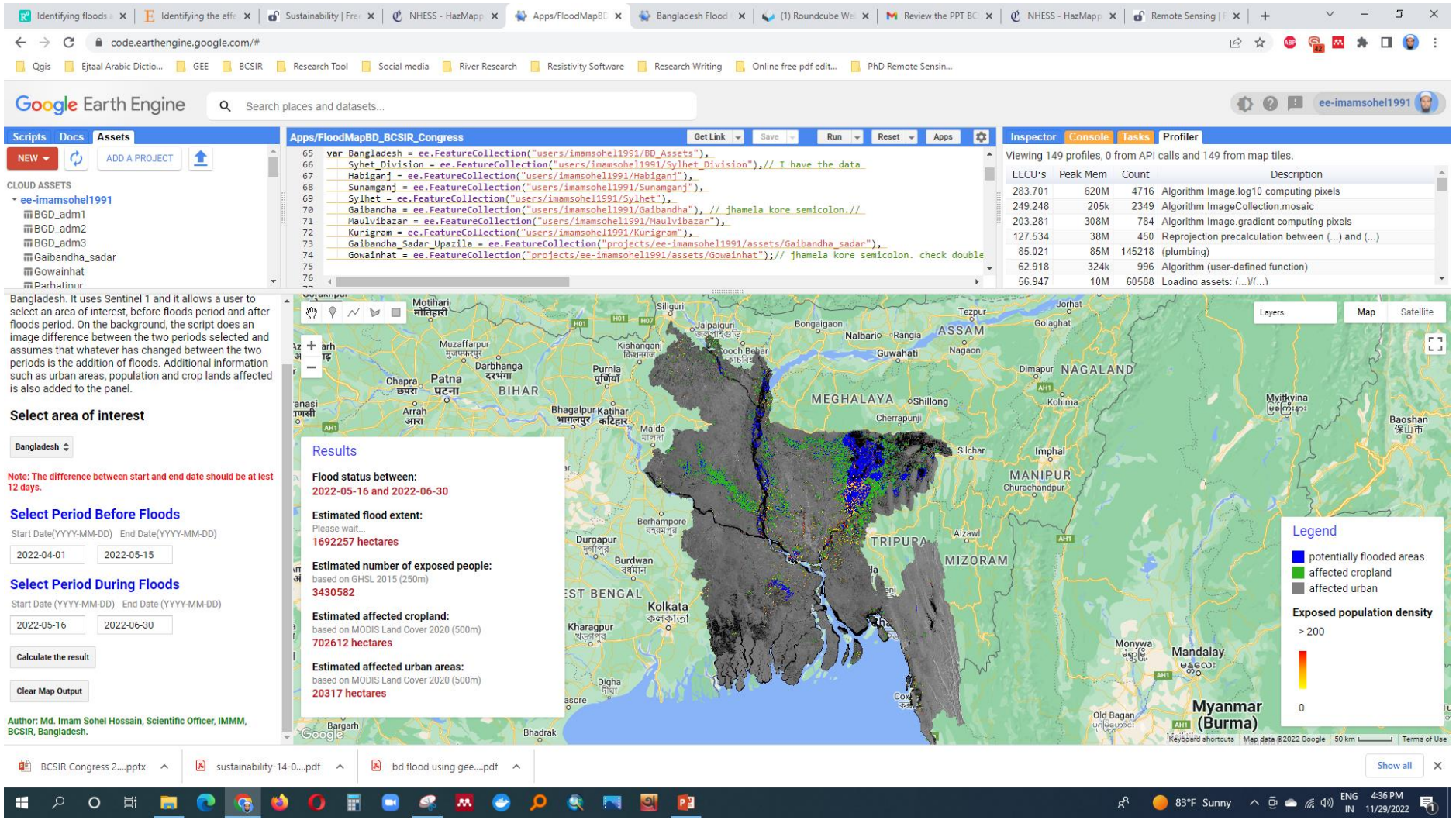
Senior Scientific Officer

Leather Research Institute

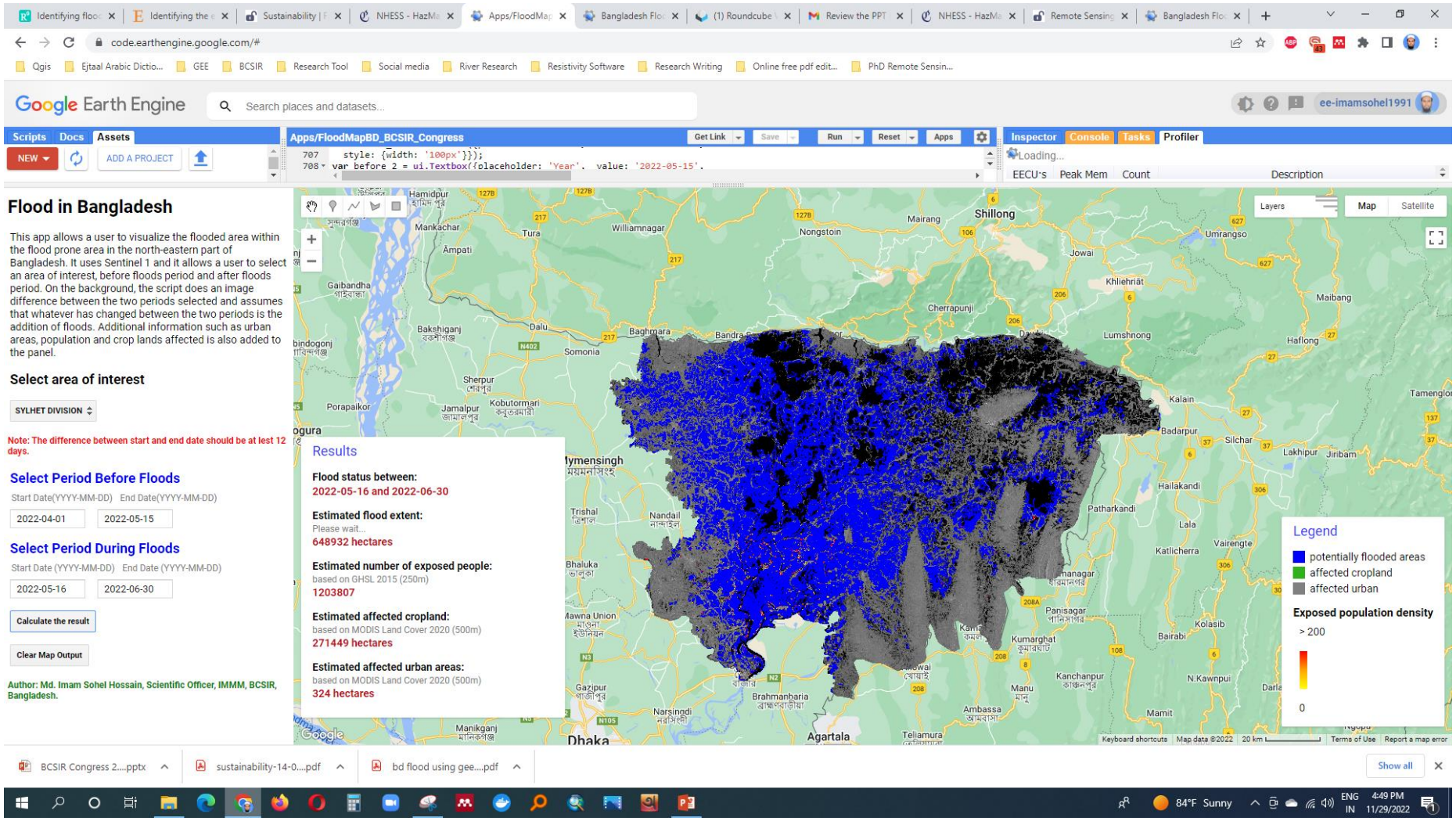
App Link

Bangladesh Council of Scientific and industrial Research (BCSIR)

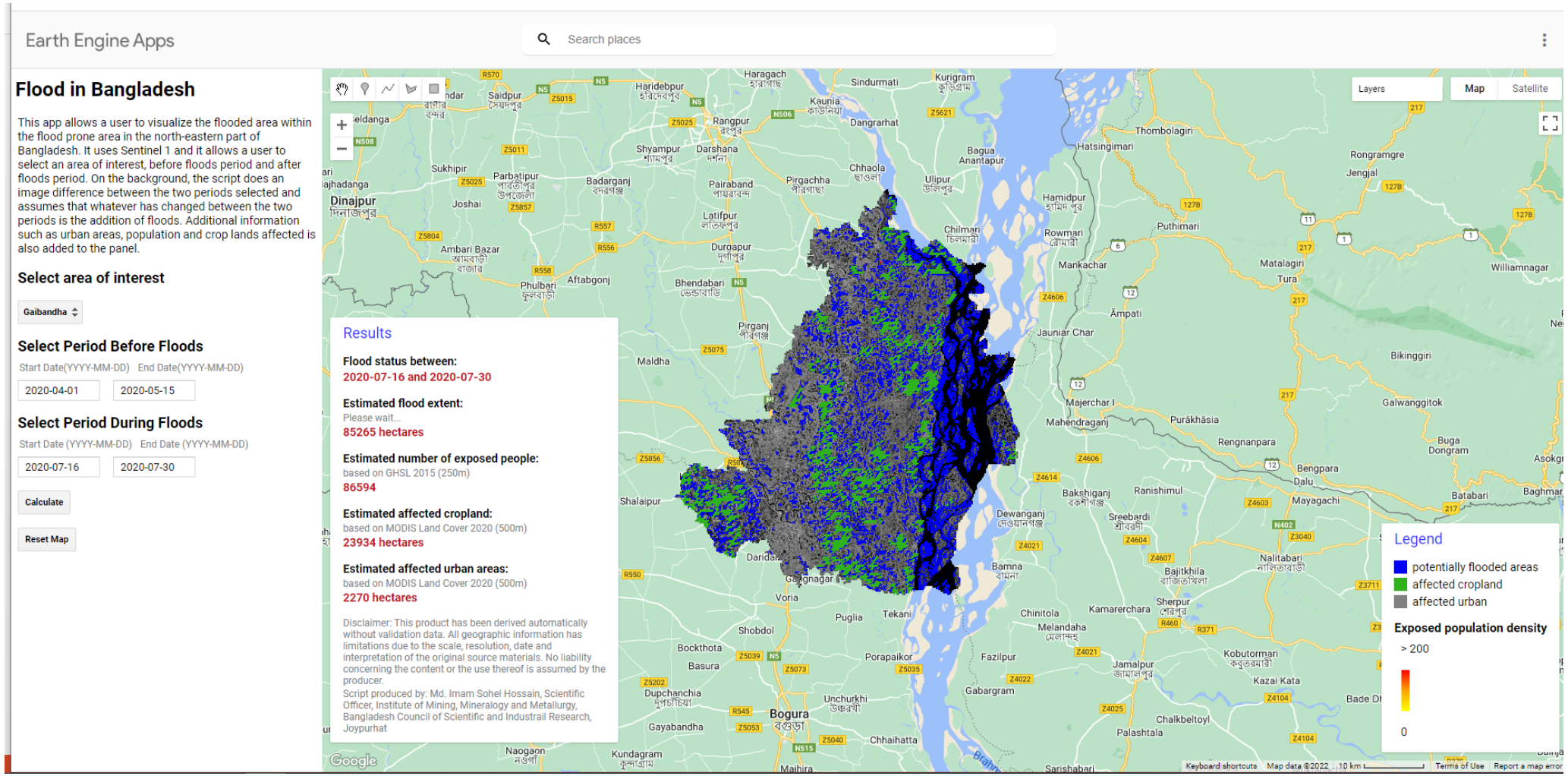
Findings-Regional Scale Flood Mapping and Estimation



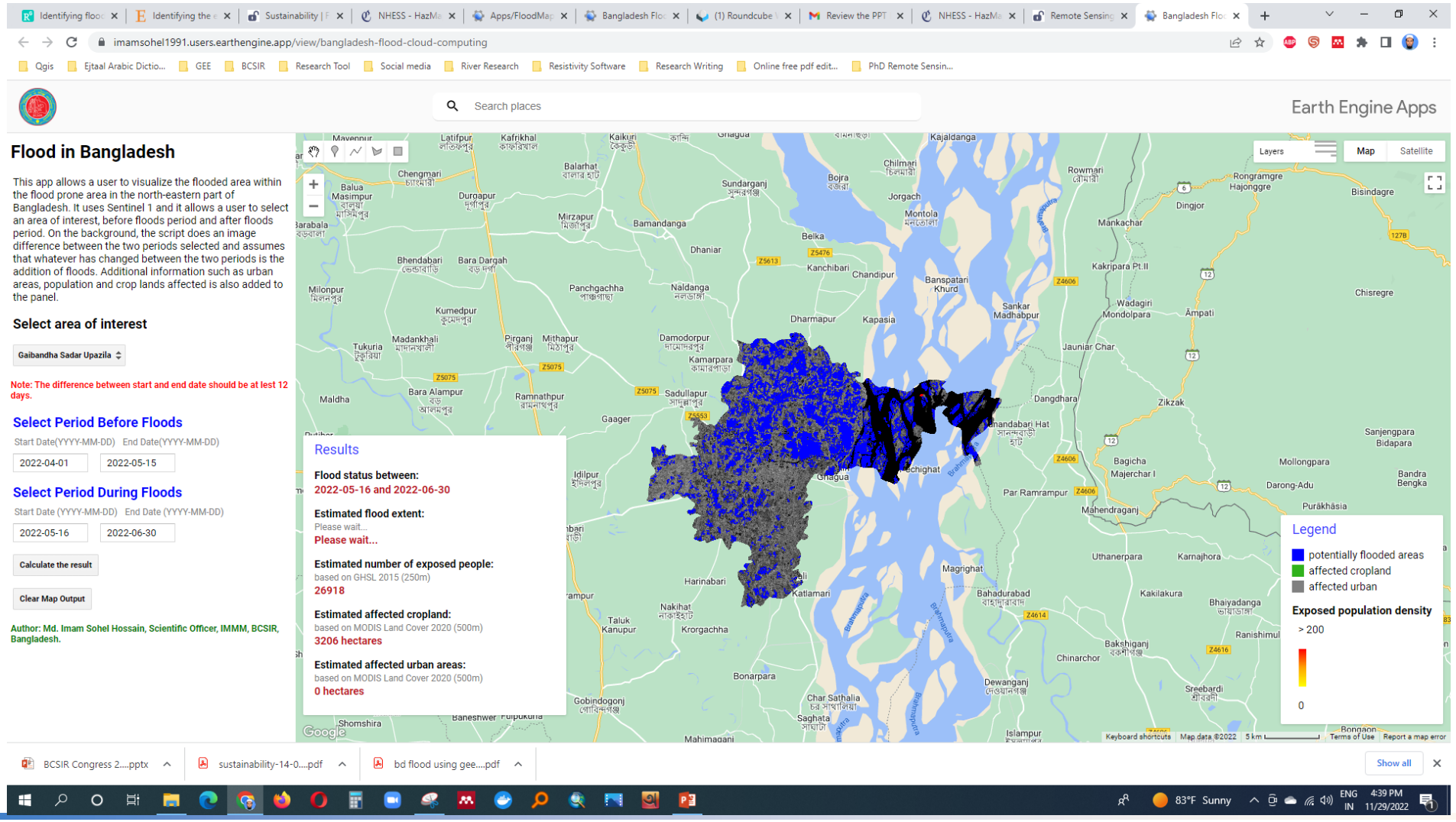
Findings-Divisional Scale



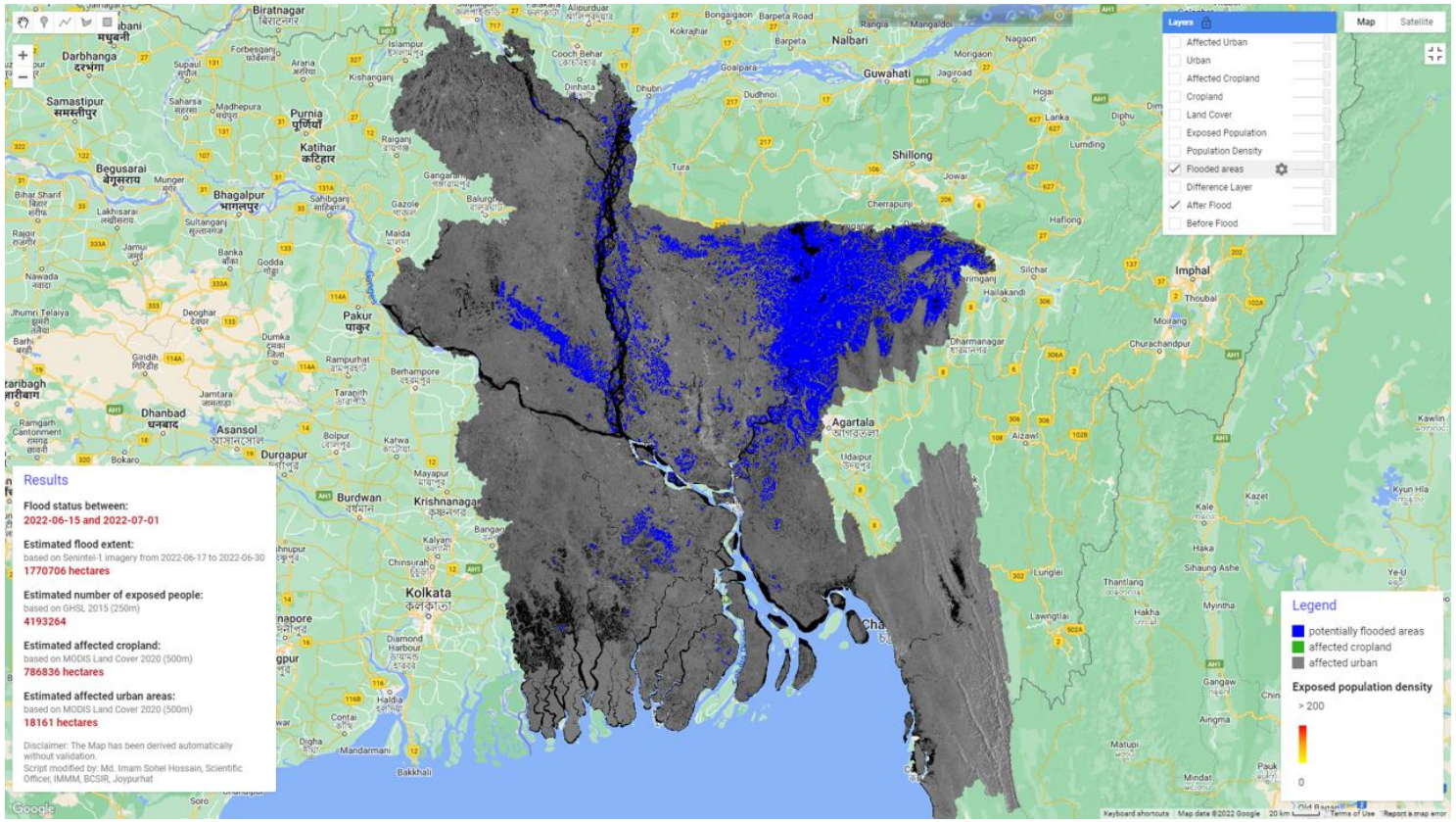
Findings-District Scale

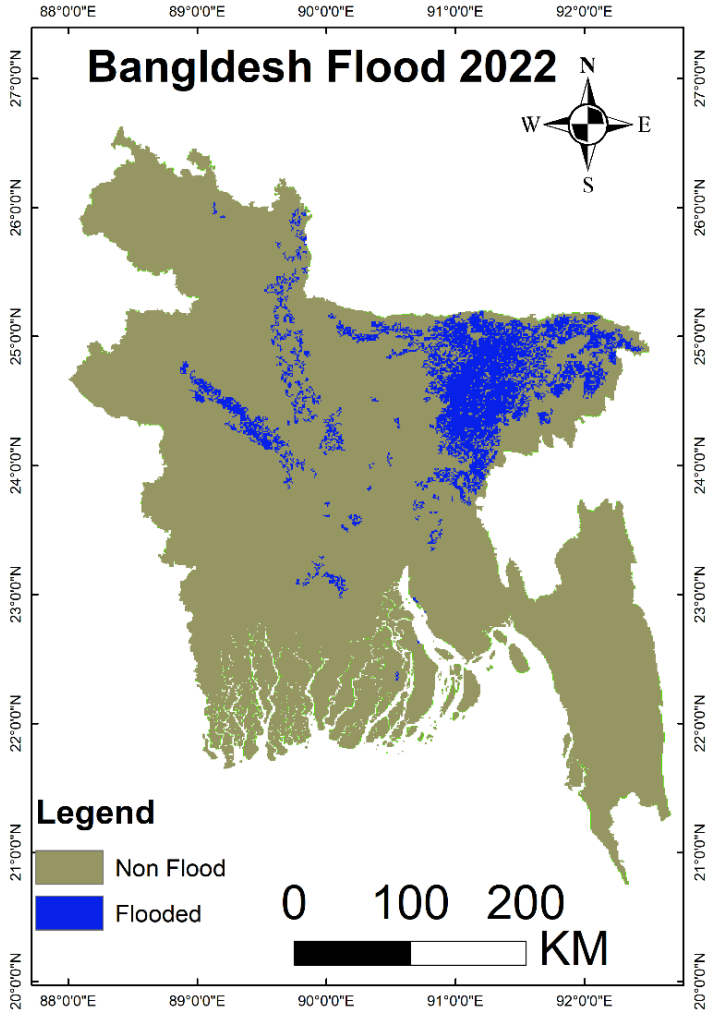


Findings-Subdistrict/Upazila Scale



Findings-Future Flood Mapping and Modelling





Conclusion

Revolutionizing Flood Monitoring using Cloud Computing

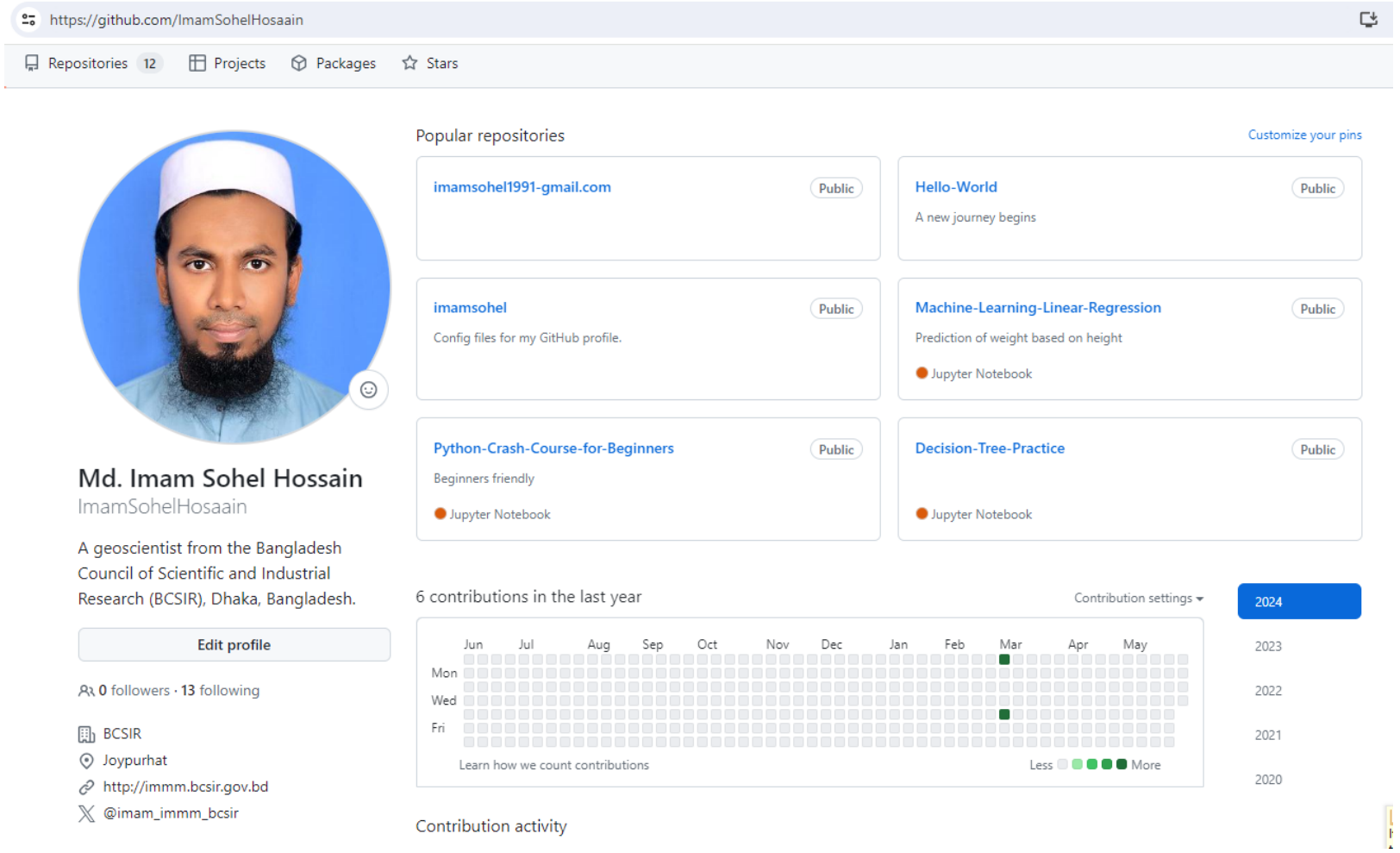
Md. Imam Sohel Hossain
Senior Scientific Officer, BCSIR

Thank You

Slide Link

App Link

Skill Development



Python

Python-Crash-Course-for-Beginners / Python_Crash_Course_Beginners_ipynb_txt.ipynb

ImamSohelHosaain Update Python_Crash_Course_Beginners_ipynb_txt.ipynb

Preview | Code | Blame 1528 lines (1528 loc) · 402 KB Code 55% faster with GitHub Copilot

Python Scripting for Beginners

Credit to Kevin Nebiolo, PhD and Digital Sreeni.

Contents

1. What is Python?
2. Where to go for help
3. Easiest Way to Start
4. Data Types and Structures
5. Program Flow
6. Modules Useful for Water Resources
7. Example

Part 1: Introduction to Python

Python

Python-Crash-Course-for-Beginners / Python_Crash_Course_Beginners_ipynb_txt.ipynb

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Thank You

Questions?

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