Smart Banking Internet of Things

Technology Explosion

Background

- Increase in population
- Sustainable resources and services, such as medicine, education, environment, and transportation.
- The smart city is a term that is derived from the adoption and application of mobile computing systems through practical data management networks amongst all components and layers of the city itself.
- IoT technologies have emerged as a solution for creating a working smart city

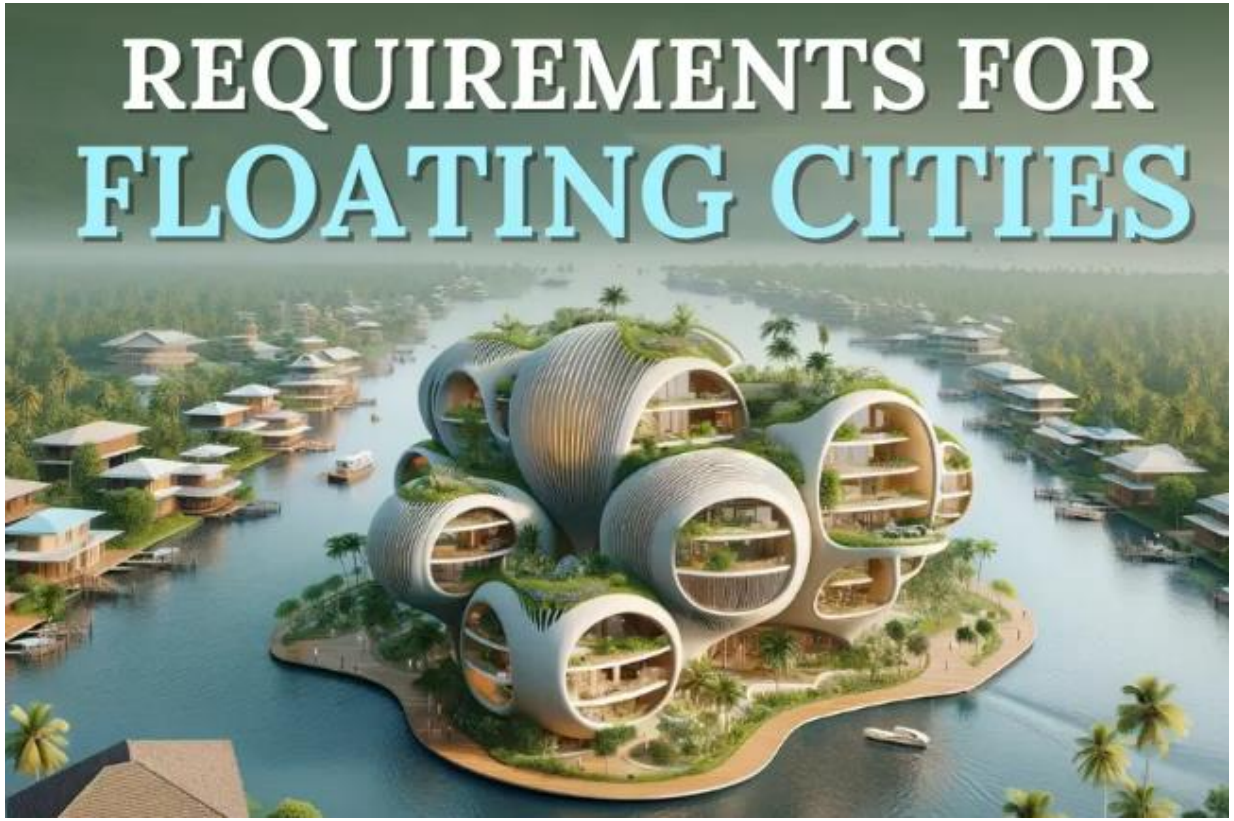
Some other definitions

- Tt is defined as the need for a connection between physical, social, business, and information communication technology (ICT) infrastructure to improve the smartness of the urban area

- It is defined as a modern city, which must benefit from ICT to improve the quality of life and quality in urban services for citizens

Alternate living solutions

- City planners, engineers, and researchers have been searching for these alternative living spaces for years



Smart city themes

- Cities are responsible for consuming 75% of worldwide energy production and generating 80% of CO2 emissions
- City model that has a good traffic flow with smart traffic lights and signals in a cost-effective manner
- Developing a model related to municipal and governmental cooperation

Smart city themes

- SMART PEOPLE (CITIZENS)
  - privacy and security concerns
  - connect and communicate with each other to exchange common and imperative online social experience
  - Smart people should not only interact with each other via services, but they should also provide data for these services.
    - For example, crowdsourcing weather application that combines automatic sensor readings from smartphones and manual input by people to assess data on existing and future weather event
  - People should be educated about laws and policies to use the environment of information processing.

Smart city themes

- SMART ECONOMY
  - Smart business and mobile commerce
  - Risk-based approach and management of shifting market situations within a business

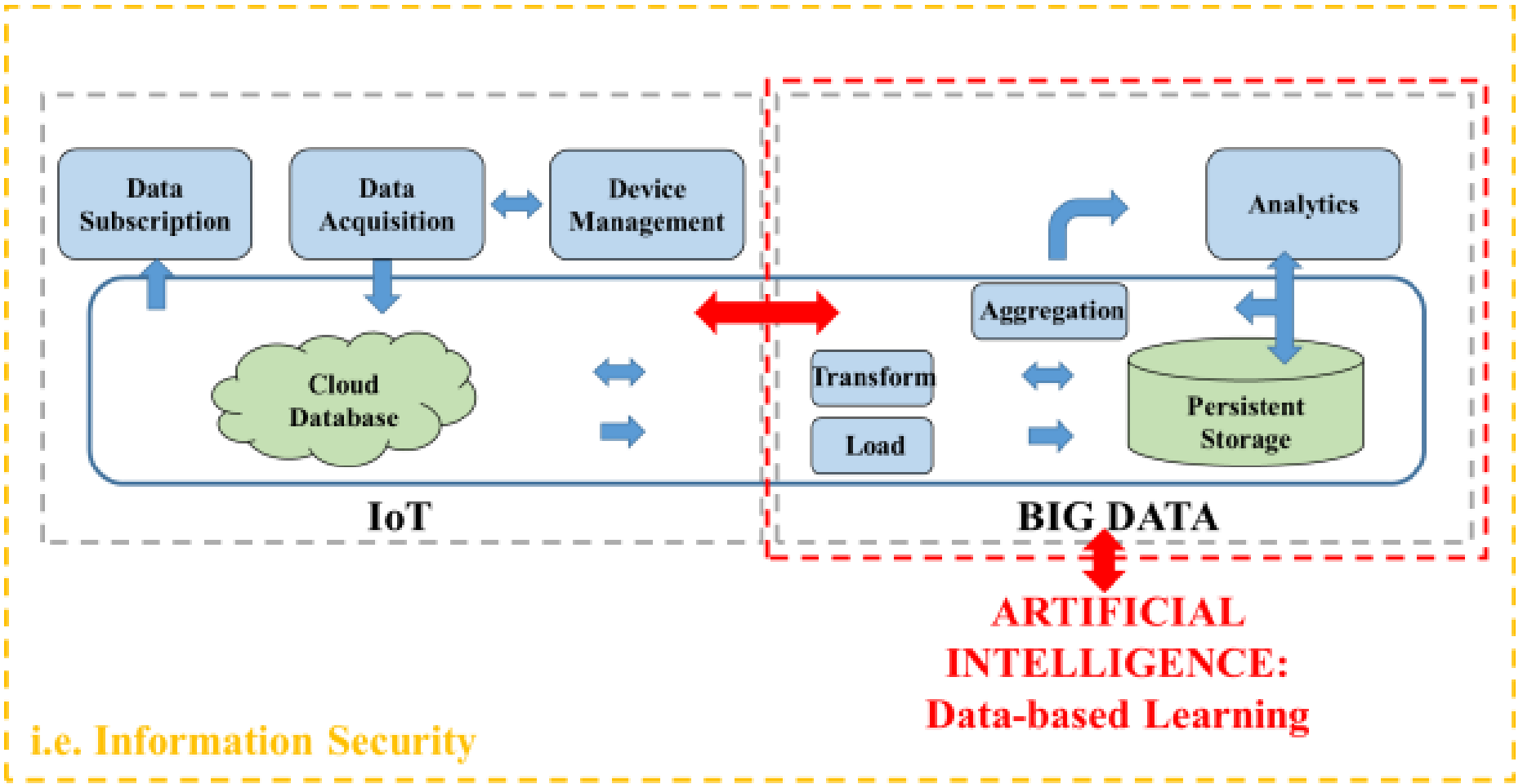
Smart city themes

- SMART GOVERNANCE
  - The successful government in smart cities depends on providing city services, channels, smart mobile services, and network integration to the citizens
  - Sustainable governance of amenities within smart cities should be supported by Cloud-based Information Systems (IS) services

Smart city themes

- SMART ENVIRONMENT (SUSTAINABLE RESOURCE MANAGEMENT)
- SMART LIVING (SMART BUILDING, QUALITY OF LIFE)

Smart city infrastructure



Use cases on IoT and Smart City

- IoT-Driven Automated Object Detection Algorithm for Urban Surveillance Systems in Smart Cities

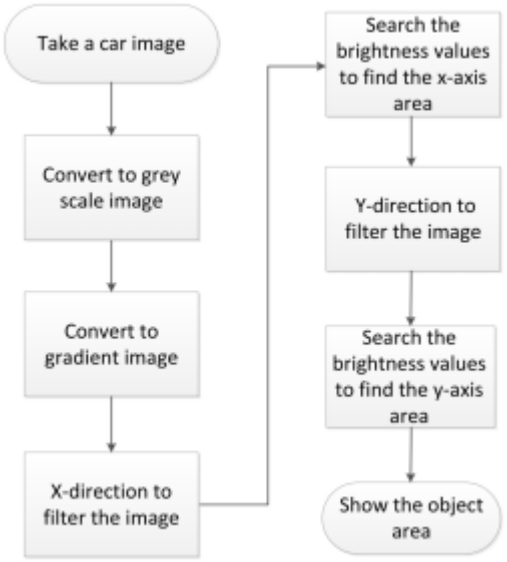
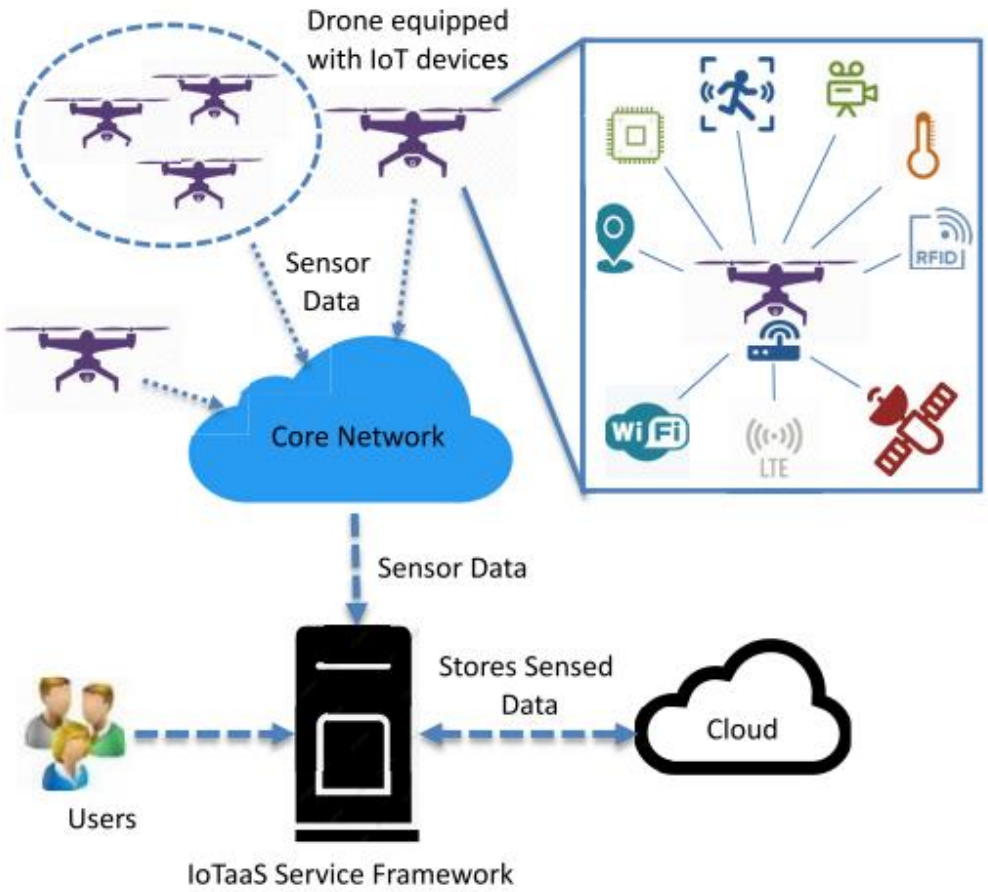


Fig. 26. Detected car-1.

Fig. 27. Detected car-2.

Fig. 28. Detected car-3.

Use cases on IoT and Smart City



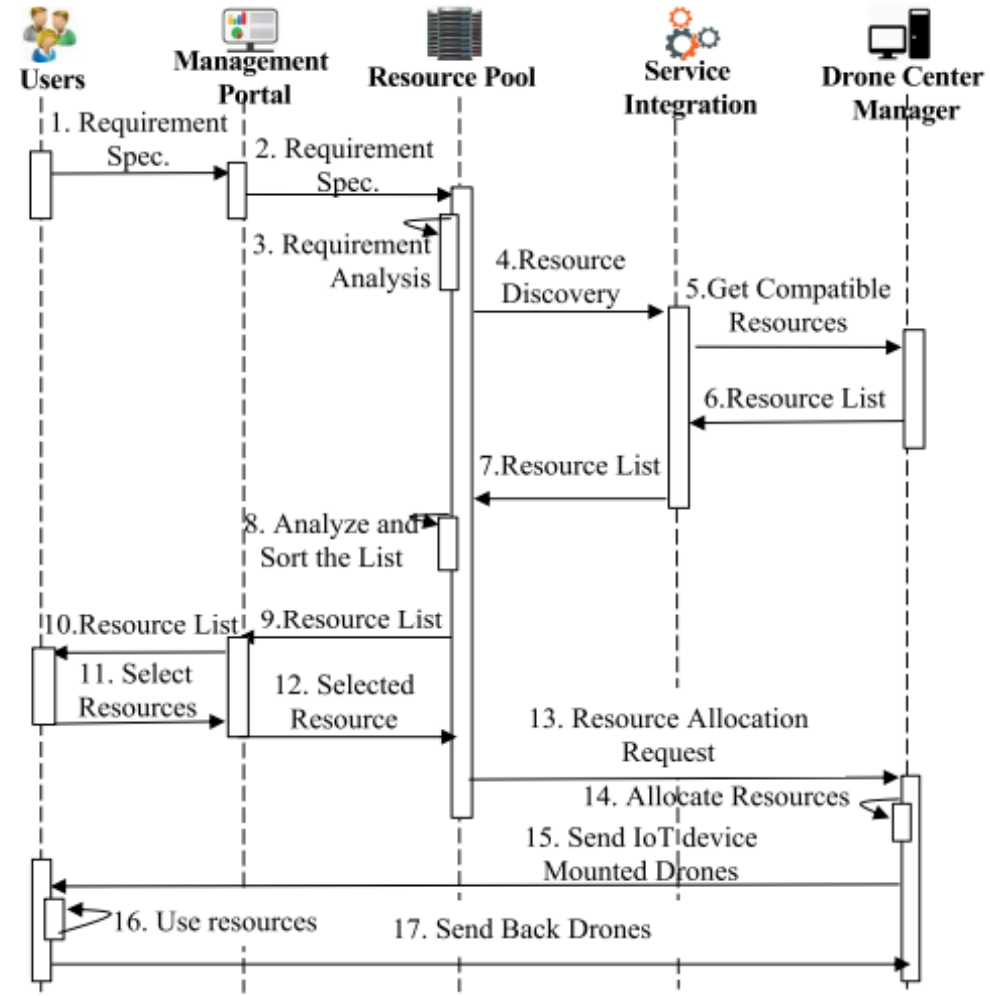
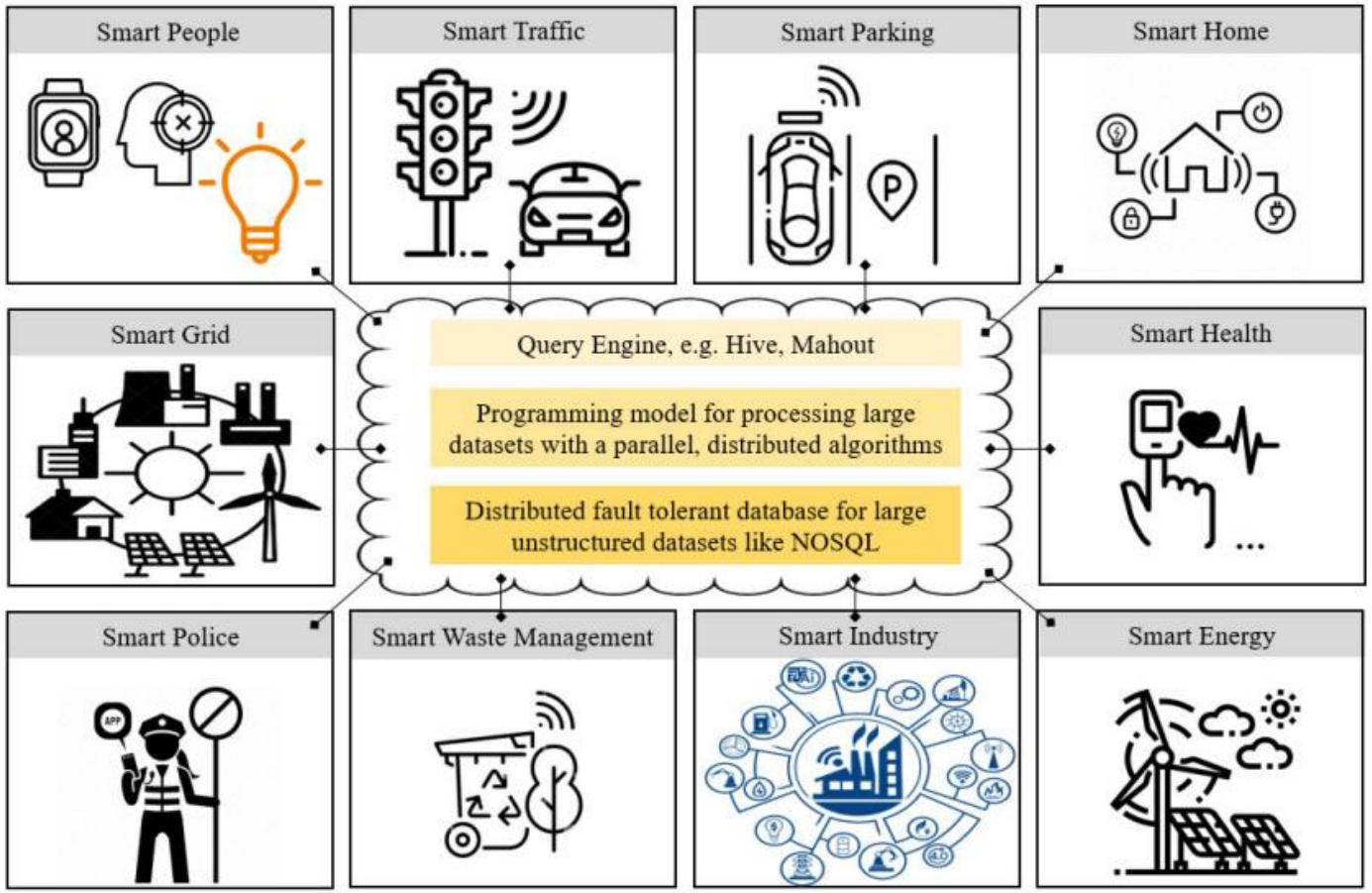


Fig. 5. Operation model of IoTaaS framework.

Use cases on IoT and Smart City



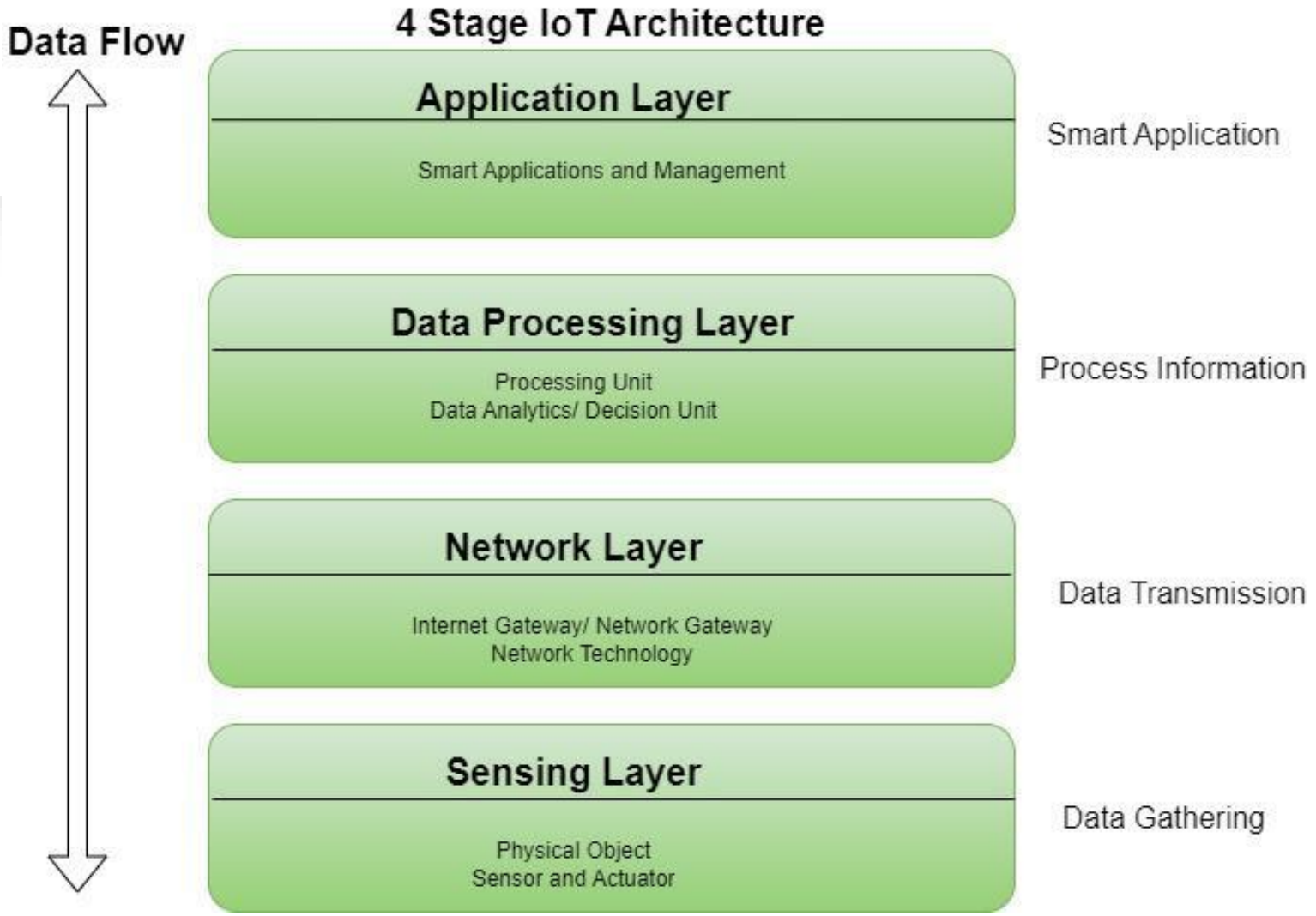
Cybersecurity in smart cities

- Some cyberattacks that can occur in a smart city are
  - **Controlling traffic lights:** attackers can manage city lights causing accidents; traffic signals have become susceptible to attacks because of wireless networks.
  - **Attacks against smart vehicles:** attackers can inject false routes or simulate other vehicles in the environment to cause collisions.
  - **Collapsing the power grid:** attackers can cause power outage in the city.
  - **Water supply:** attackers can modify the levels of chemical additives in the water and cause public health problems.
  - **Surveillance cameras:** attackers can spy on people and access to personal data.

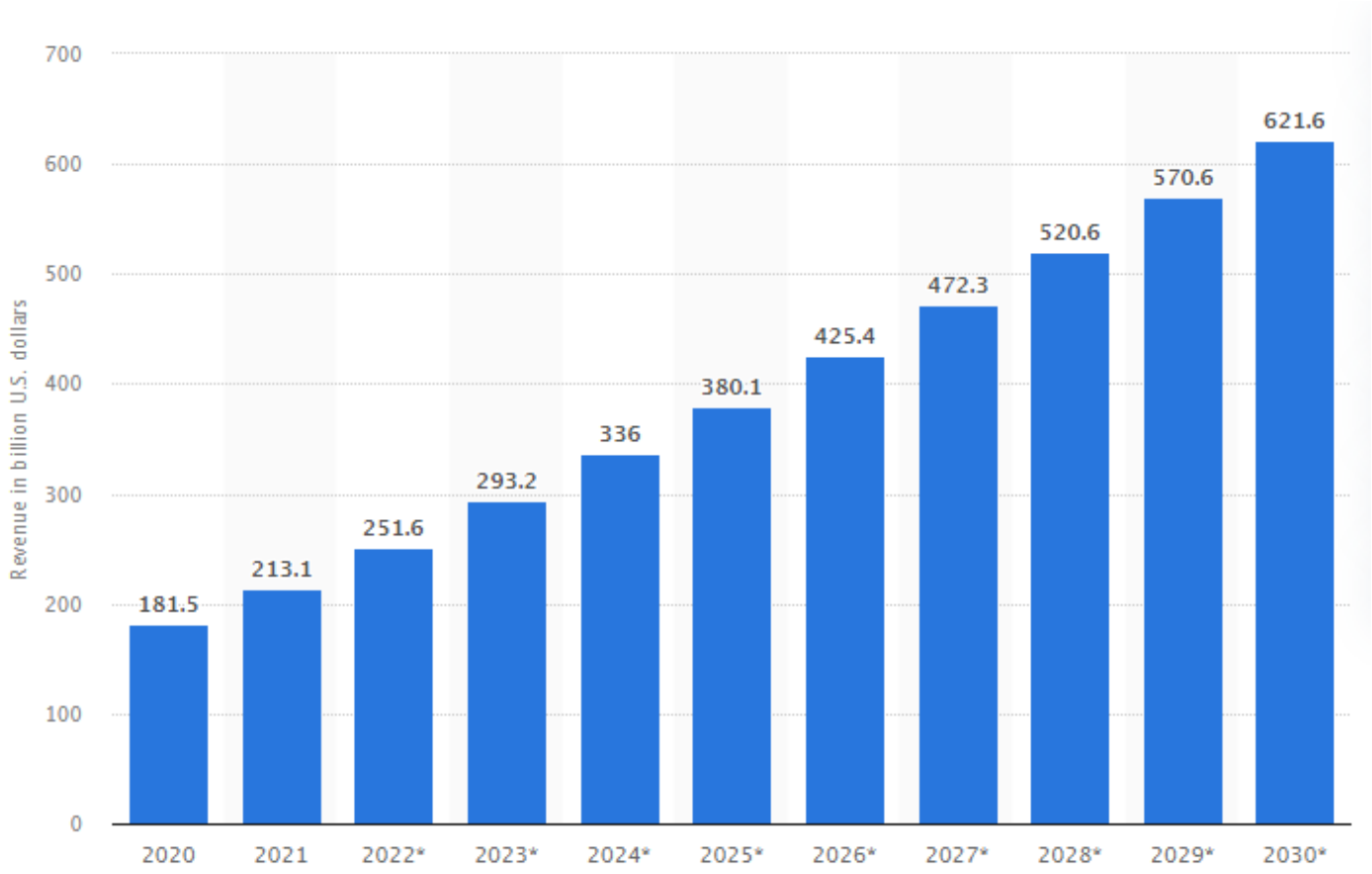
Use cases on Finance and Banking?

- What are the use cases of IoT + FinTech?

IoT Architecture

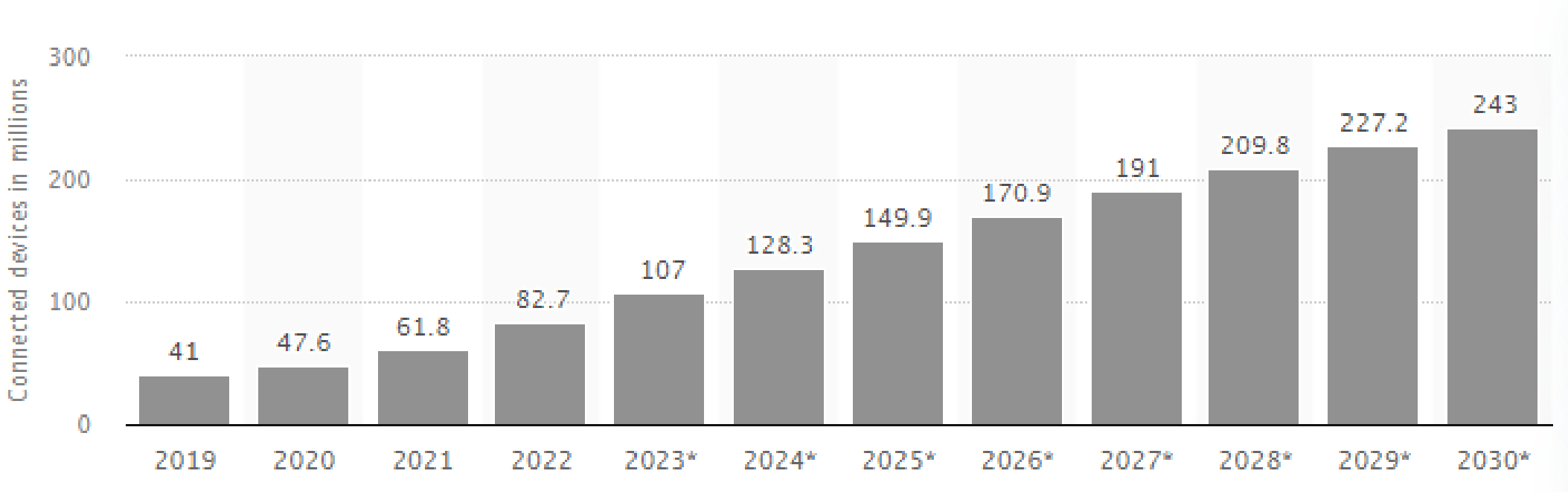


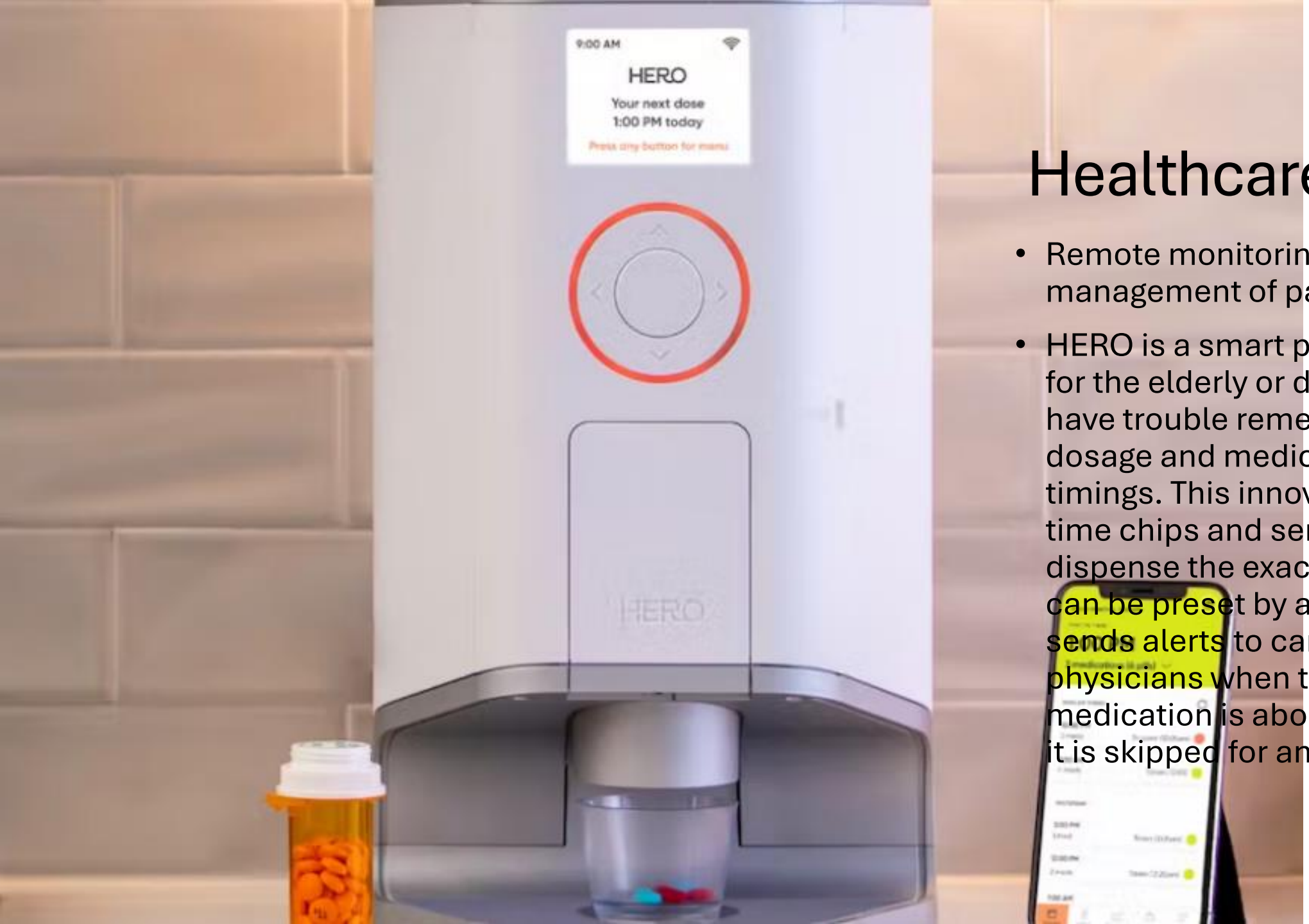
Internet of Things (IoT) total annual revenue worldwide from 2020 to 2030 in billion U.S. dollars)



Number of Internet of Things (IoT) connected devices worldwide from 2019 to 2030 (in millions)

Finance and Insurance





Healthcare

- Remote monitoring and management of patient health
- HERO is a smart pill dispenser for the elderly or disabled who have trouble remembering their dosage and medicagtion timings. This innovation uses time chips and sensors to dispense the exact dosage that can be preset by anyone. It also sends alerts to caregivers and physicians when the medication is about to finish, or it is skipped for any reason.

Wearables

Health and fitness metrics, such as steps taken, heart rate, and sleep patterns

Smart city


PROTECTONNECT
PROTECTONNECT
WATER LEAK ALERT
PROTECTONNECT
75 €

Automobile

- Automobile IoT devices are internet-connected devices that are installed in vehicles to enable them to send and receive data.

- Tesla
  - GPS trackers, battery sensors, smart cameras, and so much more, all tesla products are a walking endorsement of IoT.

Home automation Google Nest

Advantages of IoT Devices

- Efficiency and Productivity
- Real-time Monitoring
- Cost Savings
- Improved Quality of Life
- Data Collection and Insights
- Environmental Monitoring and Sustainability

Disadvantages of IoT Devices

- Security Concerns
- Privacy Issues
- Complexity
- Dependence on Internet Connectivity
- Reduced Human Intervention
- Shorter Device Lifespans
- Interoperability Issues
- Data Overload
- Increased Potential for Malfunction
- Ethical Concerns

Credit Risk

- Credit Risk Assessment using Internet of Things
  - How IoT Can Provide Real Time Credit Risk Data and Insights

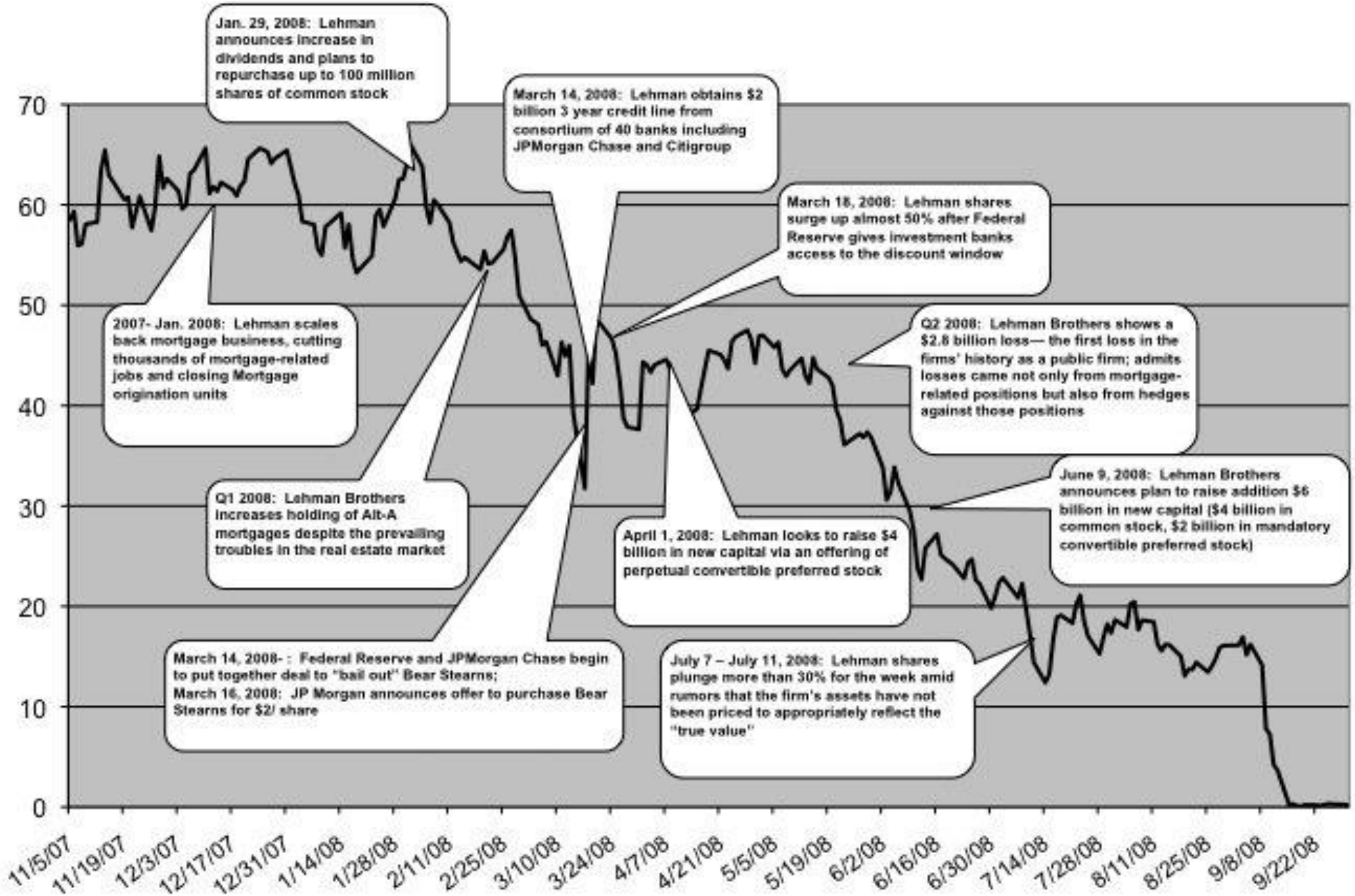
Credit Risk Crisis cases

- Lehman Brothers was a major global financial services firm, heavily involved in investment banking, trading, and real estate. Leading up to 2008, they made huge investments in mortgage-backed securities (MBS), which are financial products tied to home loans.

- On September 15, 2008, Lehman Brothers filed for bankruptcy, the largest in U.S. history. This event sent shockwaves through the global financial system, leading to widespread panic and a severe tightening of credit, further exacerbating the financial crisis.

Key Events

- **Housing Bubble:** In the early 2000s, there was a housing boom in the United States. Many banks, including Lehman Brothers, invested heavily in MBS, betting that housing prices would continue to rise.
- **Subprime Mortgages:** Many of these mortgages were given to borrowers with poor credit histories (subprime mortgages). When housing prices started to fall, many borrowers defaulted on their loans.
- **Financial Instability:** As defaults increased, the value of MBS plummeted. Lehman Brothers, with massive exposure to these toxic assets, faced enormous losses.
- **Liquidity Crisis:** By 2008, Lehman Brothers couldn't raise enough cash to cover its losses. Attempts to find a buyer or government bailout failed.


Jan. 29, 2008: Lehman announces increase in dividends and plans to repurchase up to 100 million shares of common stock
March 14, 2008: Lehman obtains $2 billion 3 year credit line from consortium of 40 banks including JPMorgan Chase and Citigroup
March 18, 2008: Lehman shares surge up almost 50% after Federal Reserve gives investment banks access to the discount window
2007- Jan. 2008: Lehman scales back mortgage business, cutting thousands of mortgage-related jobs and closing Mortgage origination units
Q2 2008: Lehman Brothers shows a $2.8 billion loss— the first loss in the firms' history as a public firm; admits losses came not only from mortgage-related positions but also from hedges against those positions
June 9, 2008: Lehman Brothers announces plan to raise addition $6 billion in new capital ($4 billion in common stock, $2 billion in mandatory convertible preferred stock)
Q1 2008: Lehman Brothers increases holding of Alt-A mortgages despite the prevailing troubles in the real estate market
April 1, 2008: Lehman looks to raise $4 billion in new capital via an offering of perpetual convertible preferred stock
March 14, 2008- : Federal Reserve and JPMorgan Chase begin to put together deal to "bail out" Bear Stearns;
March 16, 2008: JP Morgan announces offer to purchase Bear Stearns for $2/ share
July 7 – July 11, 2008: Lehman shares plunge more than 30% for the week amid rumors that the firm's assets have not been priced to appropriately reflect the "true value"
70
60
50
40
30
20
10
0
11/5/07
11/19/07
12/3/07
12/17/07
12/31/07
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7/28/08
8/11/08
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9/8/08
9/22/08

Lessons Learned

- **Risk Management:** The importance of proper risk management and not overly relying on risky financial products.
- **Transparency:** The need for transparency in financial institutions to understand the real value of their assets.
- **Regulation:** The role of regulatory oversight to prevent excessive risk-taking by financial institutions.

Greek Debt Crisis

- Greece is a member of the European Union and uses the euro as its currency. In the early 2000s, Greece experienced rapid economic growth and borrowed heavily from international lenders to fund public spending and infrastructure projects

Greek Debt Crisis

- **High Debt Levels**: By the late 2000s, Greece had accumulated a massive amount of debt, partly due to excessive government spending, tax evasion, and poor financial management.
- **Global Financial Crisis**: The global financial crisis of 2008 worsened Greece's situation, leading to reduced revenues and increasing debt levels.
- **Revelation of True Debt**: In 2009, it was revealed that Greece had been underreporting its debt and deficit levels. The actual figures were much worse than previously reported.

Lessons Learned

- **Fiscal Discipline:** The importance of maintaining accurate and transparent financial records and managing public finances responsibly.

- Economic Reforms: The need for structural economic reforms to ensure long-term financial stability.

- EU Solidarity and Rules: The crisis highlighted the need for better economic coordination and oversight within the Eurozone.

Icelandic Financial Crisis

- The Icelandic Financial Crisis, which unfolded in 2008, is an example of how rapid financial expansion and risky banking practices can lead to a national economic collapse.

- Iceland, a small country with a population of about 320,000 at the time, experienced rapid economic growth in the early 2000s. Its banks expanded aggressively, borrowing heavily from international markets to fund investments and loans.

Key Events

- **Bank Expansion:** Iceland's three largest banks—Glitnir, Landsbanki, and Kaupthing—grew rapidly, with assets far exceeding the country's GDP. They borrowed extensively from foreign markets.
- **Risky Investments:** The banks invested in high-risk ventures and offered high-interest online savings accounts to attract foreign deposits, particularly in the UK and the Netherlands.
- **Global Financial Crisis:** The 2008 global financial crisis led to a loss of confidence in financial institutions worldwide. Iceland's banks, heavily indebted and over-leveraged, were hit hard.

Credit Risk

- Credit risk is the possibility of a loss resulting from a borrower's failure to repay a loan or meet contractual obligations.

- Risk that financial institutions face

- Credit risk can also have significant impacts on
  - The economy, as it can lead to financial crises, credit crunches, and reduced lending activity.

Traditional Credit Risk Assessment Methods

- Student to explore this

Internet of Things (IoT)

- Internet of Things (IoT) can provide real-time credit risk data and insights that can help improve credit risk management and decision making.

Internet of Things (IoT)

- IoT is a network of physical devices, such as sensors, cameras, smartphones, vehicles, and appliances, that can collect and exchange data over the internet.

- IoT devices can communicate with each other and with cloud-based platforms that can store, process, and analyze the data.

- IoT can enable various applications and services that can enhance efficiency, convenience, security, and quality of life.

Internet of Things (IoT)

- IoT devices can monitor the borrower's income, expenses, assets, liabilities, cash flow, credit history, spending habits, location, health, and lifestyle.
- IoT can also provide data and insights on the collateral, such as the condition, value, and usage of the property, vehicle, or equipment that secures the loan.
- IoT can also provide data and insights on the macroeconomic and environmental factors that can affect the borrower's ability and willingness to repay, such as interest rates, inflation, unemployment, natural disasters, and pandemics.

A bank can use IoT devices

- Track the income and expenses of a small business owner who applies for a loan.
- The bank can also use IoT devices to monitor the inventory, sales, and customer satisfaction of the business.
- This can help the bank evaluate the business's profitability, cash flow, and growth potential, and offer a loan that matches the business's needs and capacity.

Car dealership

- IoT devices to monitor the condition, value, and usage of the car that serves as collateral for a loan.
- The dealership can also use IoT devices to track the location, speed, and driving behavior of the borrower.
- This can help the dealership assess the risk of damage, theft, or misuse of the car, and adjust the loan terms and conditions accordingly.

Insurance company

- To monitor the health and lifestyle of a borrower who applies for a health insurance policy.
- The insurance company can also use IoT devices to track the borrower's medical history, treatments, and outcomes.
- This can help the insurance company estimate the risk of illness, injury, or death of the borrower, and offer a policy that reflects the borrower's health status and needs.