

China Communications

Zhe Zhang



Chapter 5: The Internet of Things (IoT) and Smart Living

Overview of IoT

What is Internet of Things (IoT)

- The Internet of Things is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.
- It allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit.

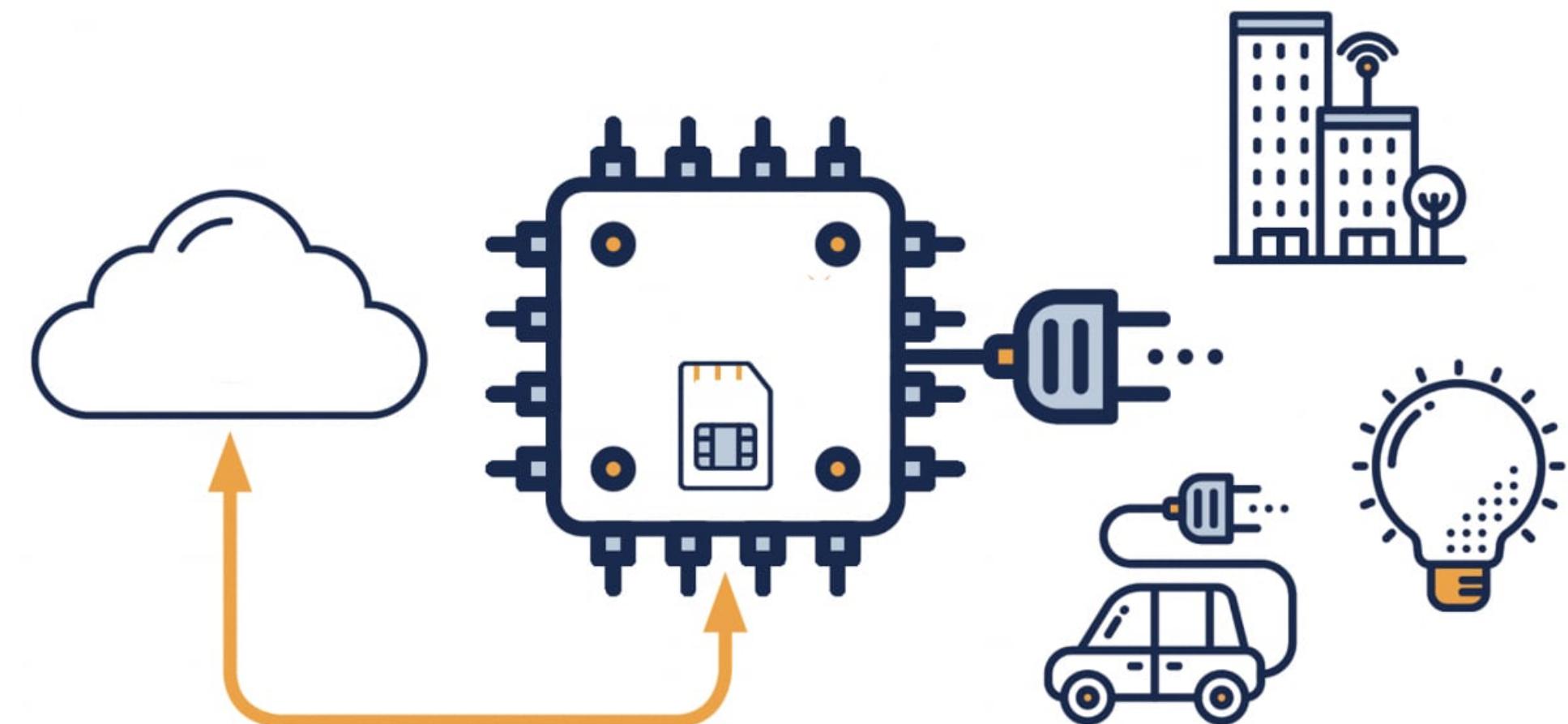


What is Internet of Things (IoT)

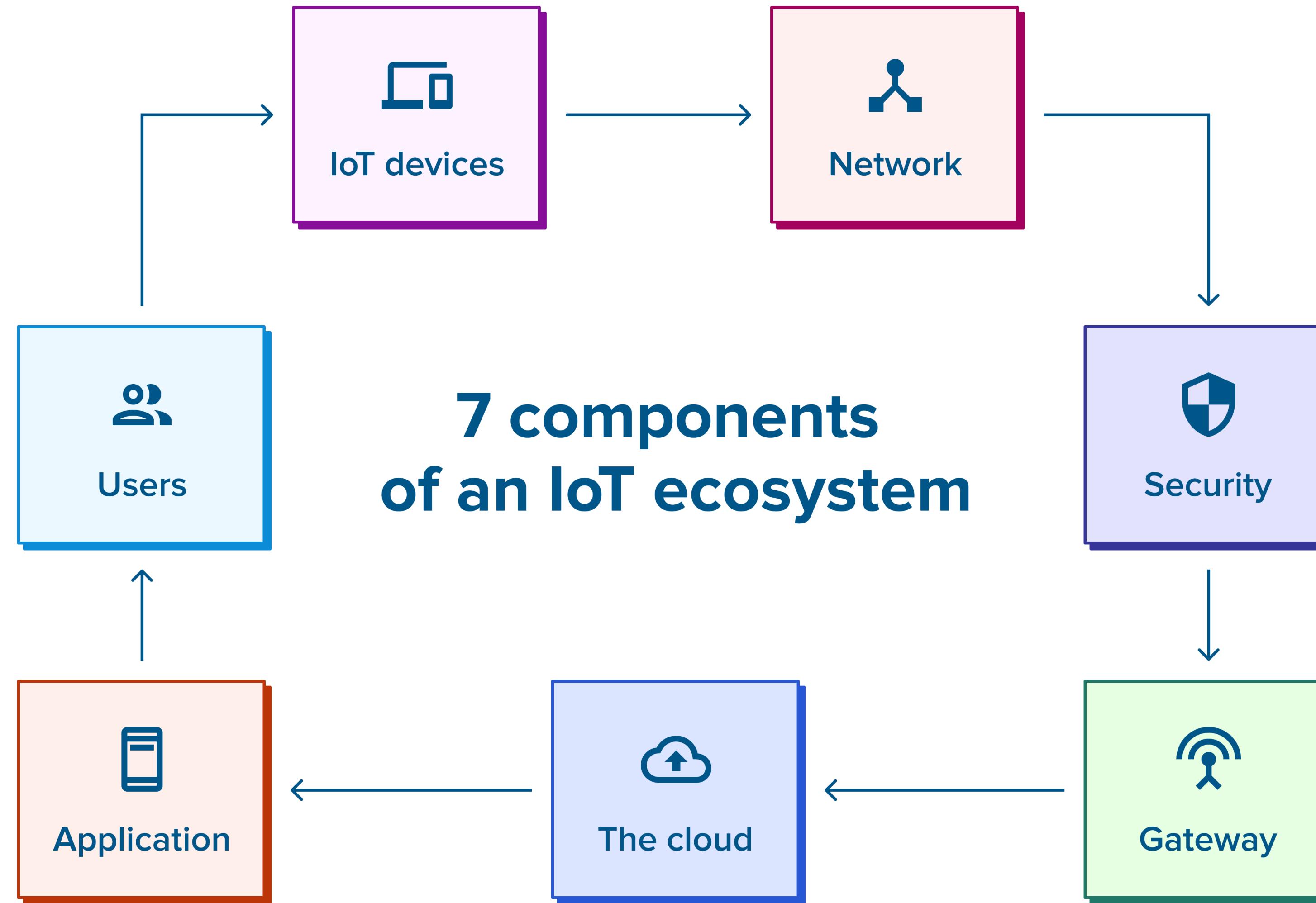
- **Things:** They can refer to a wide variety of devices, such as heart monitoring implants, biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors, etc.
- These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices.
- Can you name an IoT device you use or have seen?

Key Features of IoT

- Connectivity: Devices communicating via the internet.
- Data Collection: Sensors collecting information in real time.
- Automation: Reducing manual intervention.
- Scalability: Supporting millions of devices.

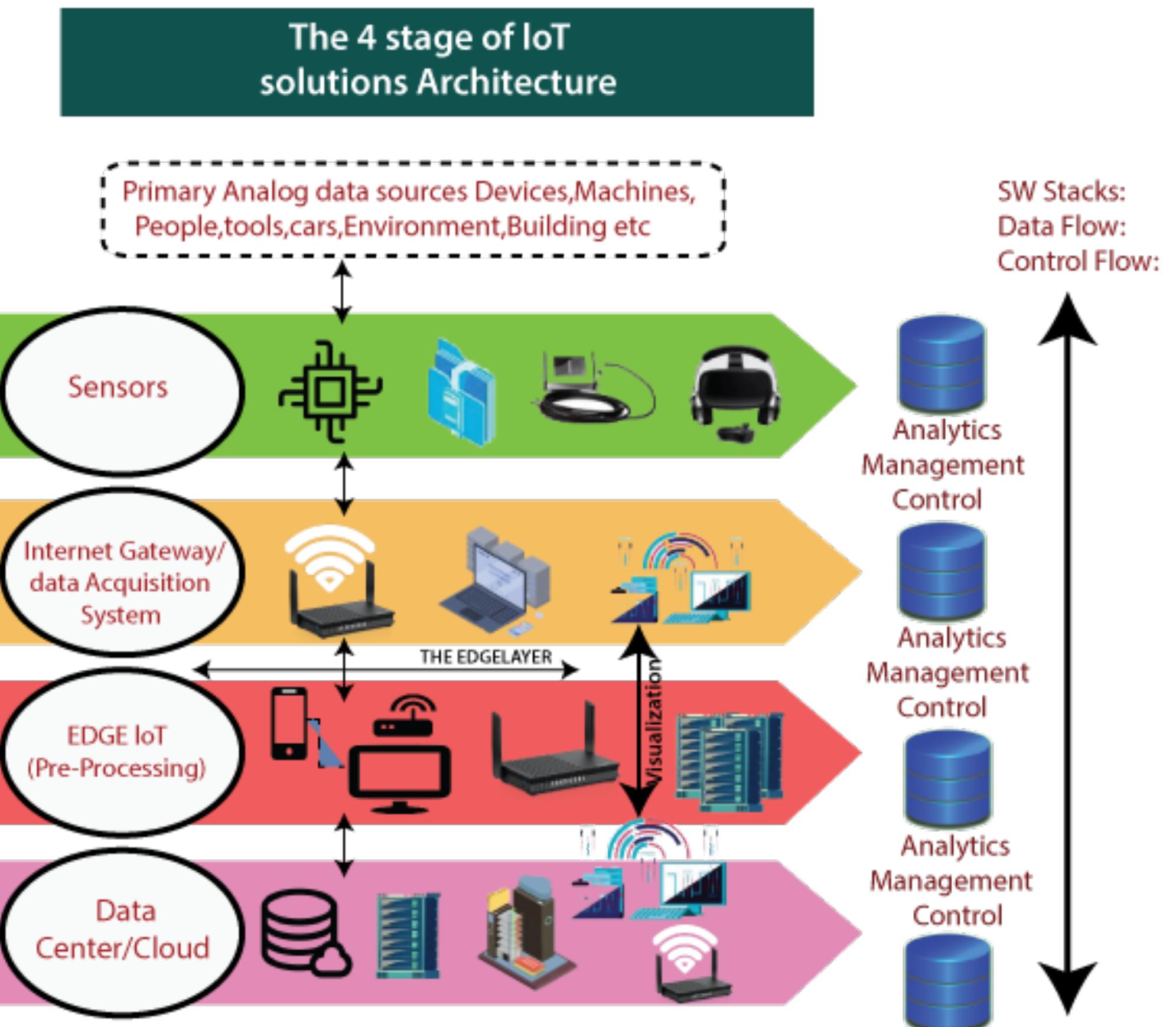


Components of IoT Ecosystem



How IoT Works

- Devices (e.g., sensors and actuators) collect data.
- Data is transmitted via communication protocols (e.g., Wi-Fi, Zigbee).
- Data is processed and analyzed in cloud or edge computing environments.
- Decisions trigger actions (e.g., turn on a light).



IoT Security Concerns

- Data Privacy: Risks of unauthorized access.
- Device Hacking: Smart home devices get hacked.
- Mitigation: Encryption, regular updates, and secure protocols.

IoT Challenges

- Interoperability: Devices using incompatible standards.
- Scalability: Managing billions of devices.
- Energy Efficiency: Optimizing power usage.

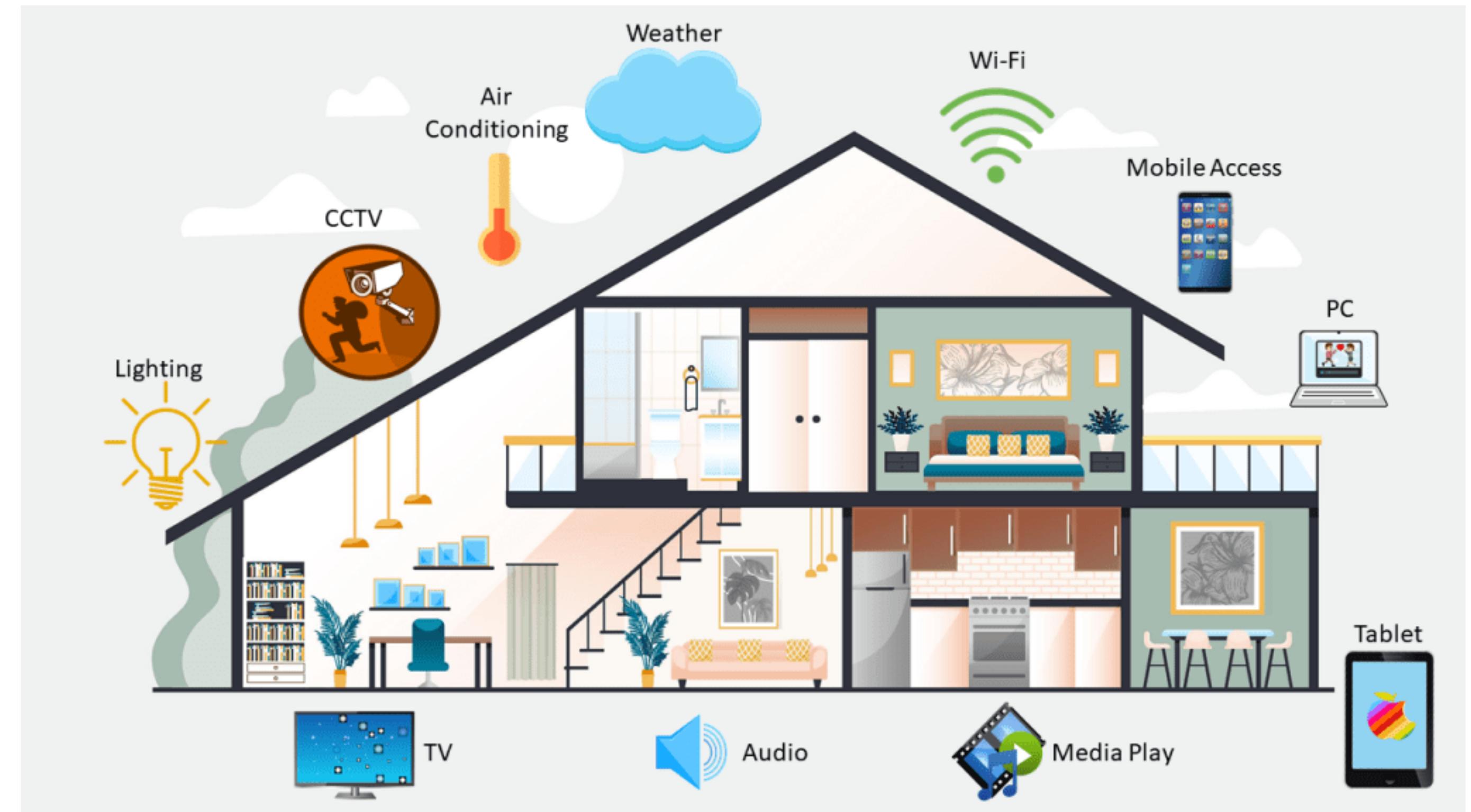
IoT Opportunities

- Economic Growth: IoT creating new industries and jobs.
- Improved Quality of Life: Personalized and efficient services.
- Environmental Impact: Reducing waste and optimizing resources.
- Discussion:
Which industry benefits most from IoT, and why?

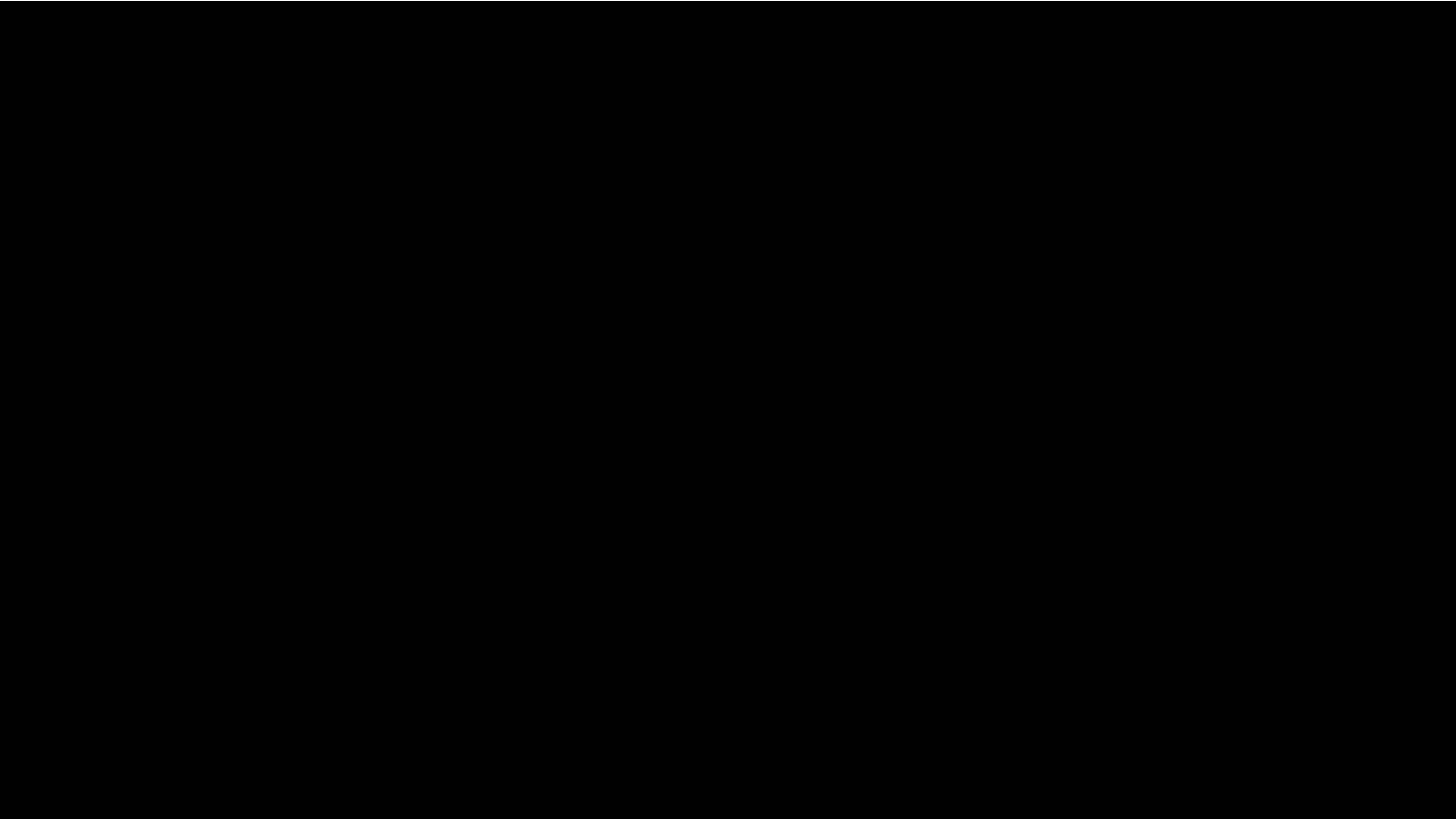
Smart Living

Smart Home

- Energy efficiency: Smart lighting
 - Smart lighting systems reducing household energy consumption by two-thirds
- Convenience: Voice-activated assistants, like Xiaodu, Siri, etc.
- Security: Smart cameras and locks.



Smart Home



Smart Home



Smart Industry

Industry 4.0

- **Industry 4.0:** The fourth industrial revolution, driven by IoT, AI, and robotics.
- Scenarios:
 - Manufacturing
 - Energy and Utilities
 - Logistics and Supply Chain
 - Mining



Smart Industry

- JD Automated Guided Vehicles (AGVs)



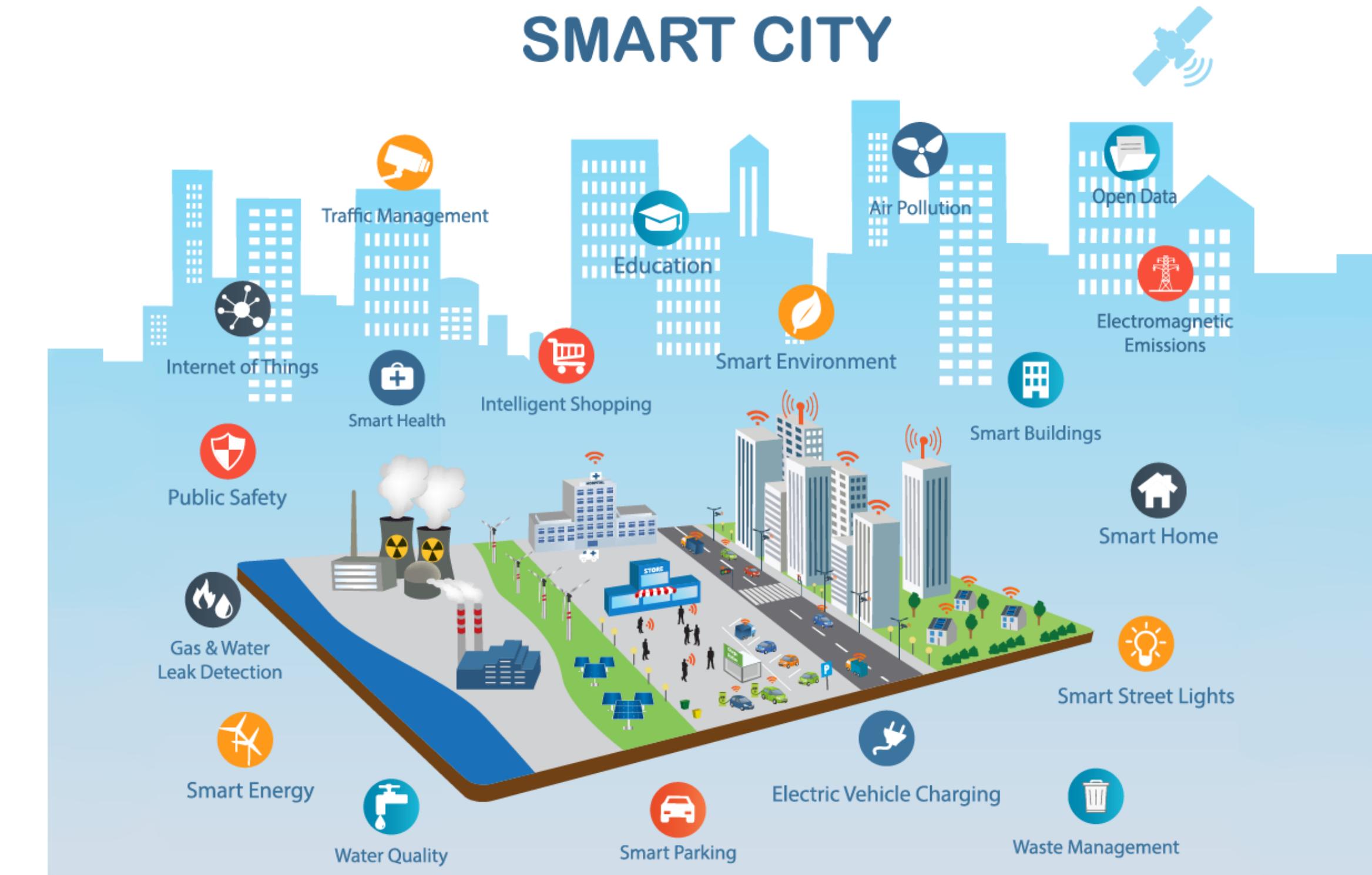
Smart Industry

- JD Automated Guided Vehicles (AGVs)



Smart City

- Traffic Management: Adaptive traffic lights reducing congestion.
- Waste Management: Smart bins notifying authorities when full.
- Public Safety: IoT sensors monitoring air quality and crowd density.



Smart City

Hangzhou City Brain (HCB)

- Hangzhou City Brain: A comprehensive smart city project.
 - Smart traffic
 - Smart public management
 - Smart transportation
 - Smart healthcare

Smart City

Hangzhou City Brain (HCB)

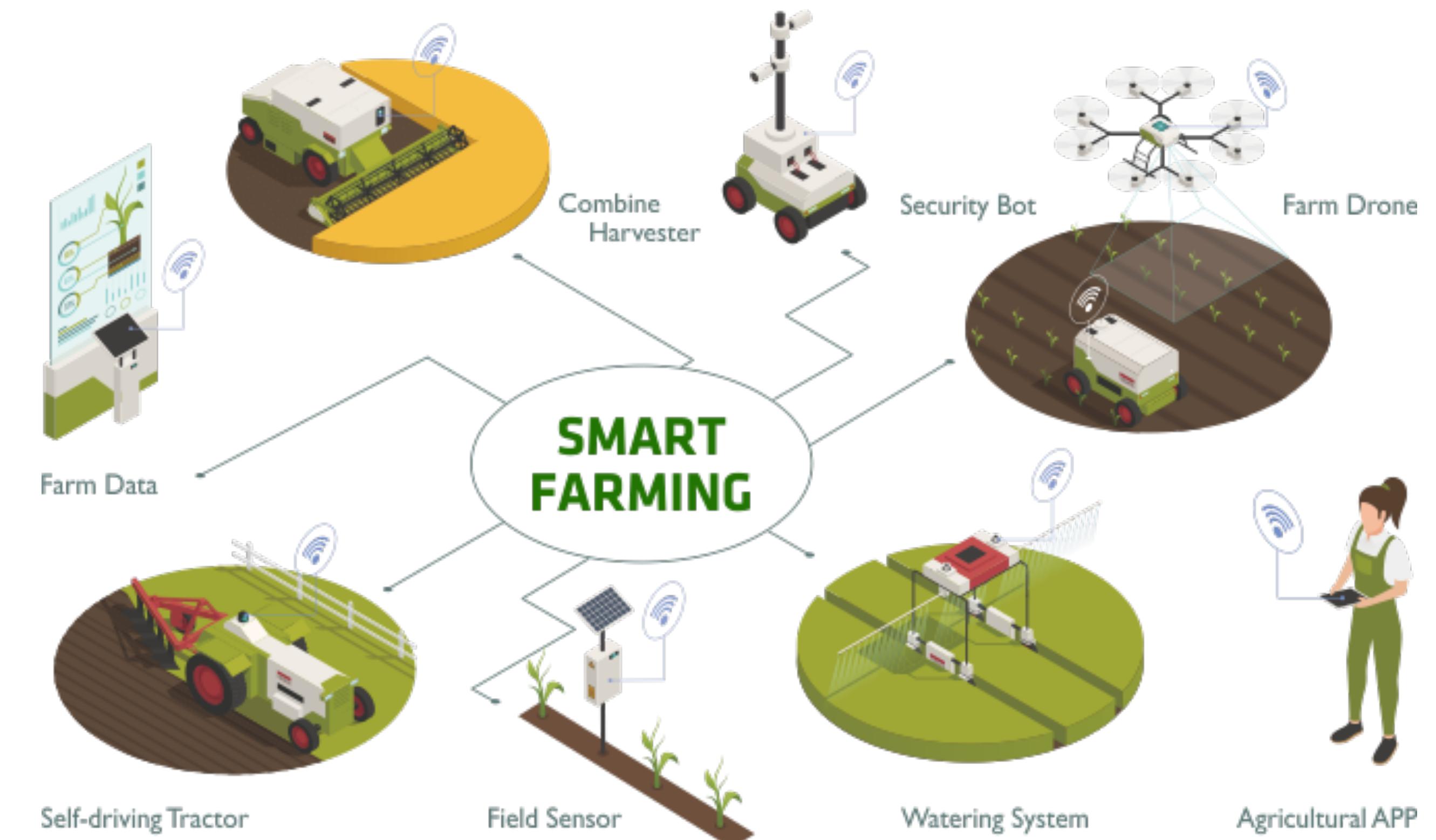


Smart City

- Question:
 - What problems in your city can IoT solve?

Smart Agriculture

- Precision Farming: Using soil moisture sensors to optimize irrigation.
- Crop Monitoring: Drones analyzing crop health.
- Livestock Tracking: IoT tags monitoring animal health.



Smart Agriculture

- DJI Agriculture Drone for spraying



Conclusion

- IoT is revolutionizing industries and daily life.
- Despite challenges, opportunities abound in innovation and quality of life improvements.
- What IoT application do you find most exciting?

Thank You