SAKARYA UNIVERSITY

Faculty of Computer and Information Sciences
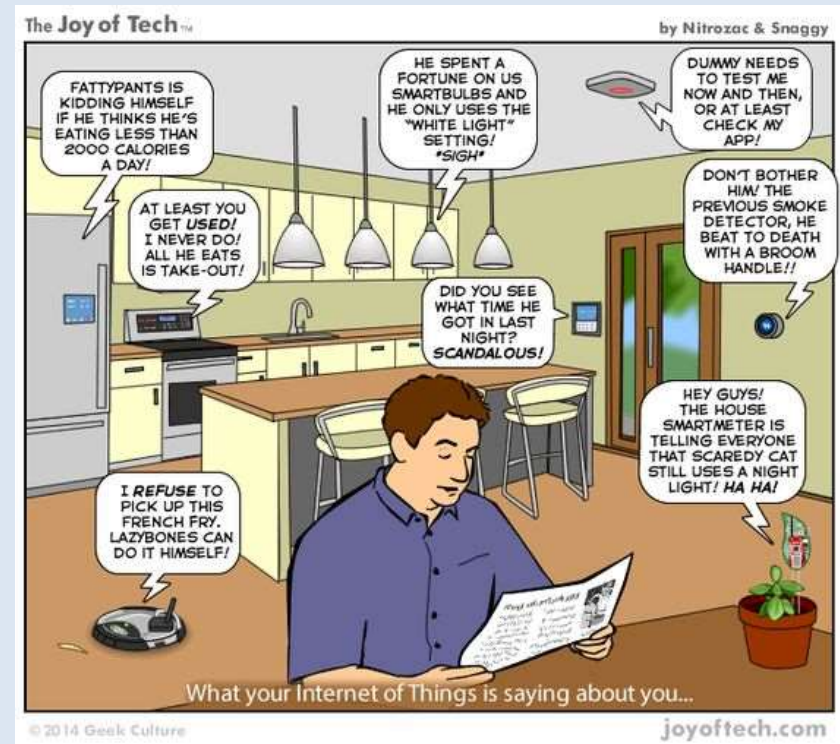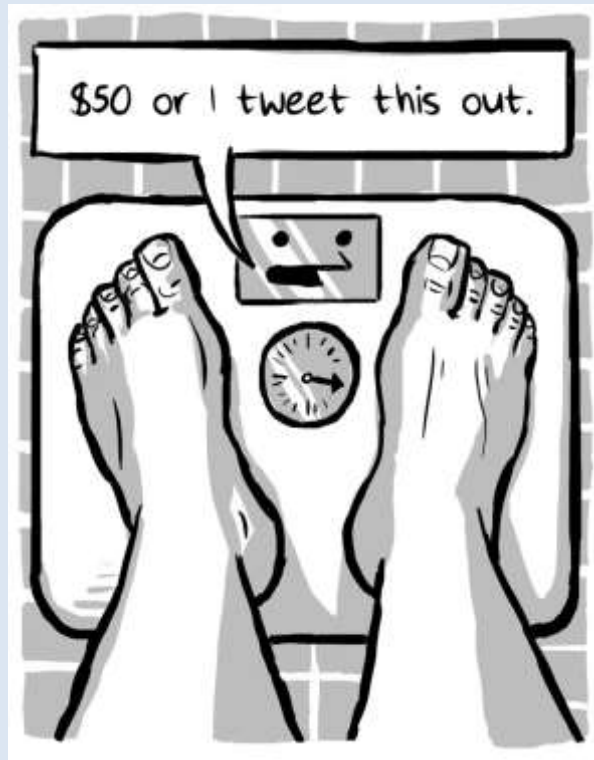
Department of Computer Engineering

INTERNET OF THINGS

➢ IoT is a global network that includes things that have sensing, communication, addressing, networking, and data processing capabilities.

➢ IoT is a network system that consists of smart devices that communicate with different protocols and has sensing capabilities.

IoT; aims to connection with everyone anytime, anywhere.

History of IoT

➢ The first application of IoT: the images of a coffee machine (which was used by 15 researchers in Cambridge University in 1991) sent to computer screen 3 times per minute to monitor it.

➢ Why is it accepted as IoT? Online and real time connection without internet

➢ The term of IoT was first coined by Kevin Ashton in 1999 in a presentation prepared for Procter & Gamble (P&G) company.

  ➢ Radio Frequency Identification (RFID) technology was planned to be used in P&G's supply.

➢ In 2005, International Telecommunication Union (ITU) published a report about IoT.

➢ In 2009, CEO of IBM, S. J. Palmisano, coined the term Smart Planet, which increased the popularity of IoT.

Pros and Cons

➤ **Pros**

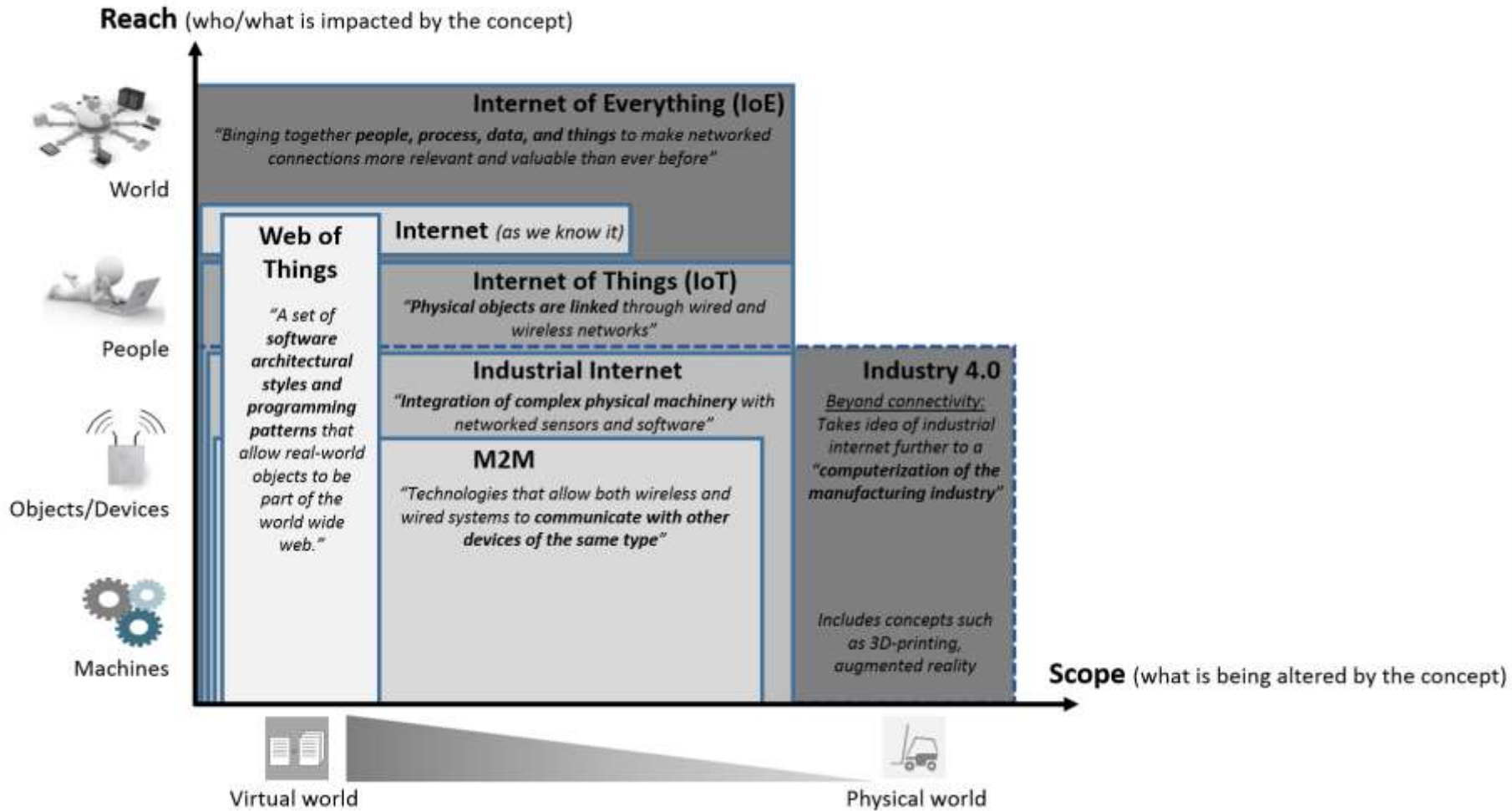 ➤ **Industry, health, Social life applications will improve human life.**

➤ **Cons**

  ➤ **over-reliance on technology,**

  ➤ **Privacy,**

  ➤ **job loss**
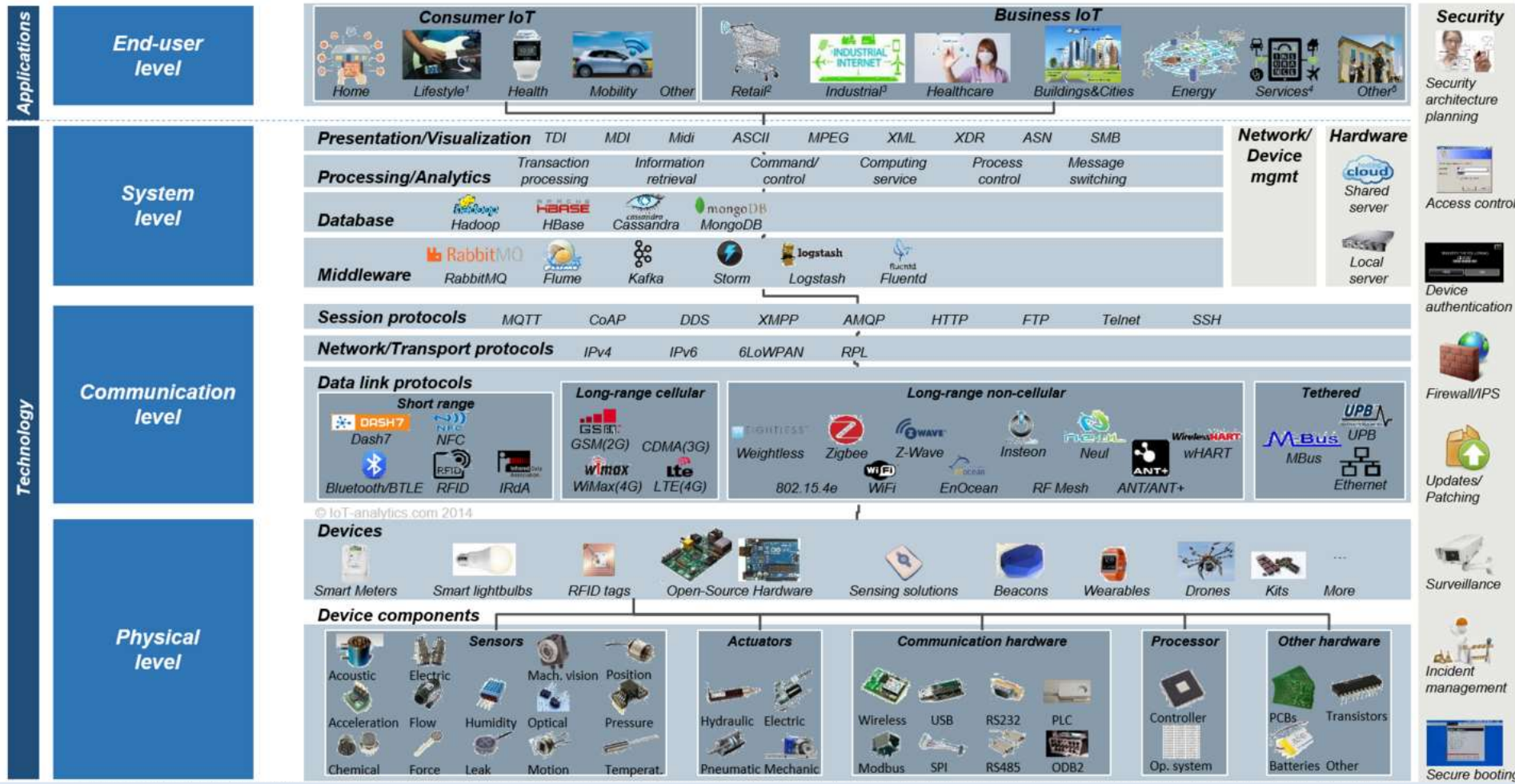
The Relationship Between IoT and Related Technologies

IoT Analytics – *Quantifying the connected world*

Concept disambiguation: IoT vs. IoE vs M2M vs others

Reach (who/what is impacted by the concept)

World
People
Objects/Devices
Machines

Internet of Everything (IoE)
"Binging together people, process, data, and things to make networked connections more relevant and valuable than ever before"

Web of Things
"A set of software architectural styles and programming patterns that allow real-world objects to be part of the world wide web."

Internet *(as we know it)*

Internet of Things (IoT)
"Physical objects are linked through wired and wireless networks"

Industrial Internet
"Integration of complex physical machinery with networked sensors and software"

M2M
"Technologies that allow both wireless and wired systems to communicate with other devices of the same type"

Industry 4.0
Beyond connectivity: *Takes idea of industrial internet further to a "computerization of the manufacturing industry"*

Includes concepts such as 3D-printing, augmented reality

Scope (what is being altered by the concept)

Virtual world

Physical world

Sources: Wikipedia, McKinsey, IoT Analytics

Internet of Things – Technology architecture
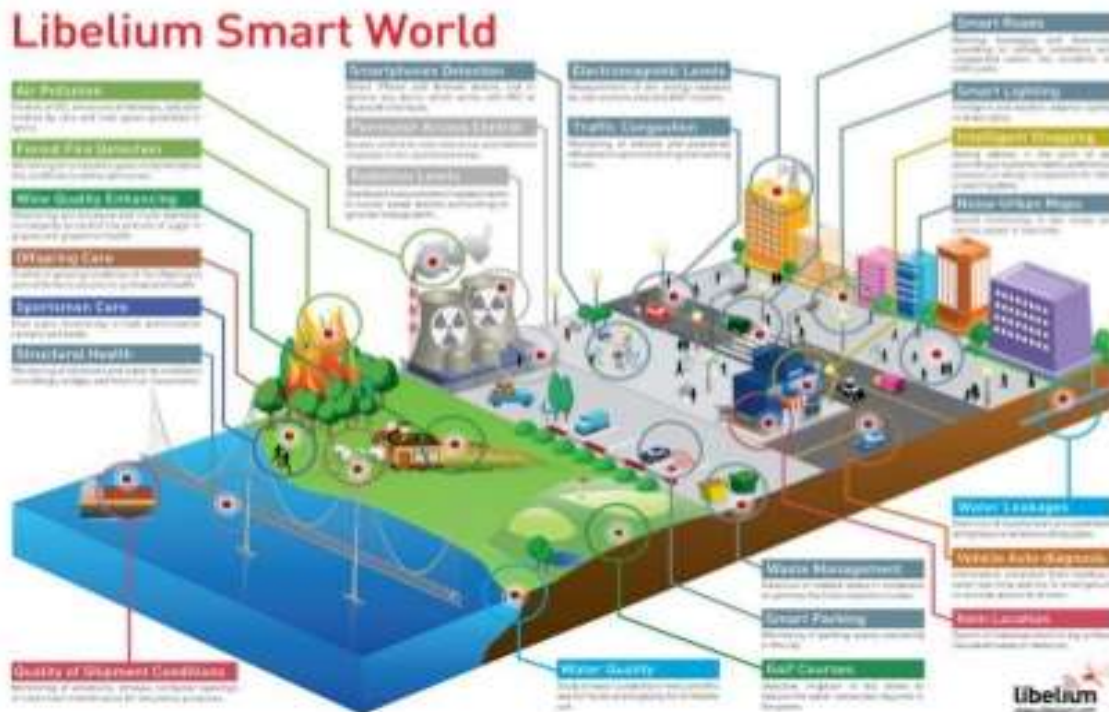
Applications of IoT

The Future is Now
- Perspectives of a Smart City

Libelium Smart World

Sensors for

- Air pollution
- Fire detection
- Water quality
- Smart parking
- Traffic congestion
- Waste management
- Golf course conditions

... sensor city

Jury Konga
eGovFutures Group

17

Applications of IoT

❑ Smart house and buildings

➢ Security,

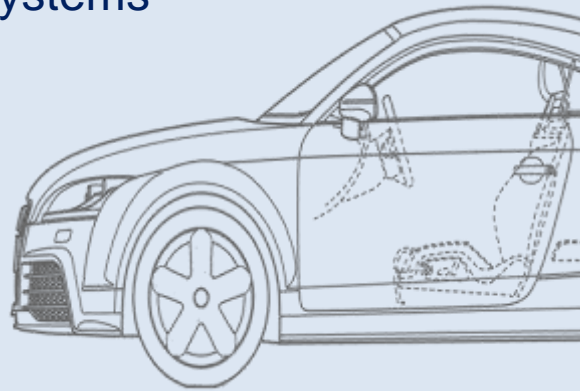➢ Energy efficiency,

➢ Door, light, temperature, etc. control.

Source: Raymond James research.
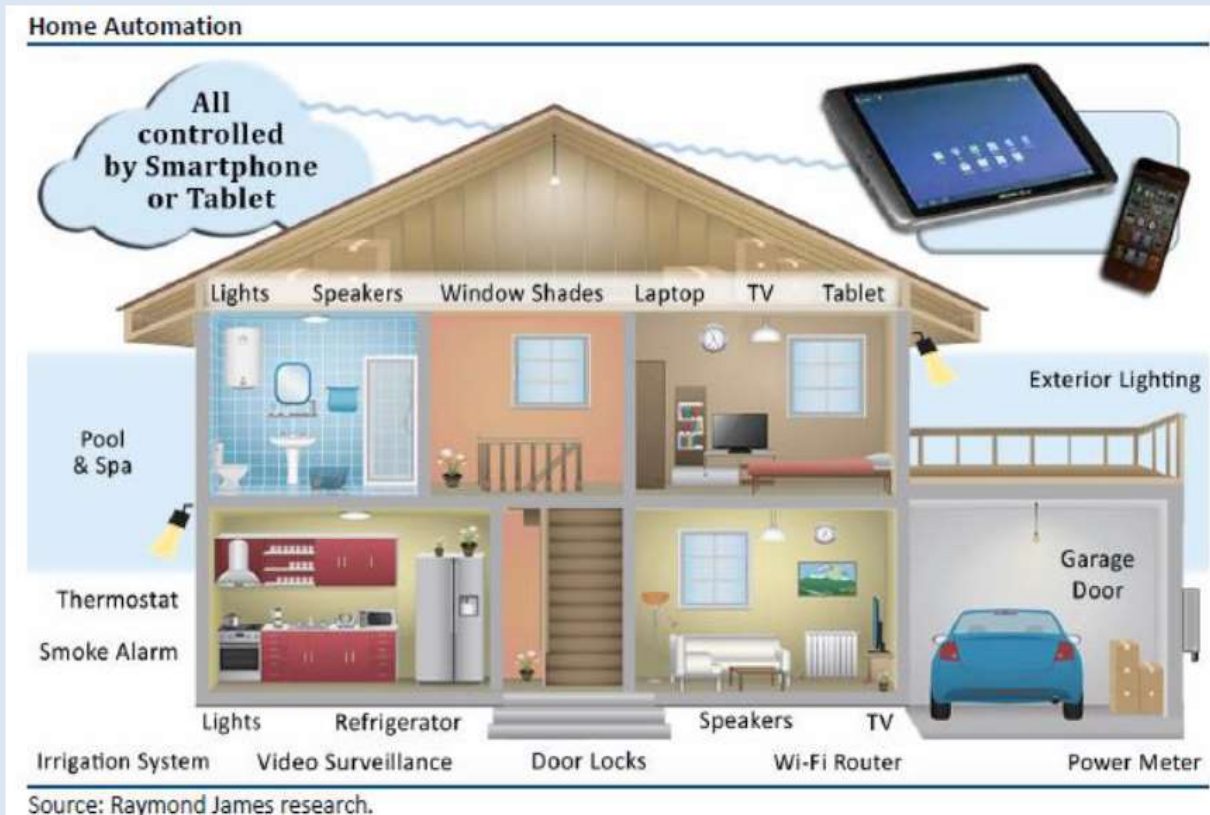
Applications of IoT
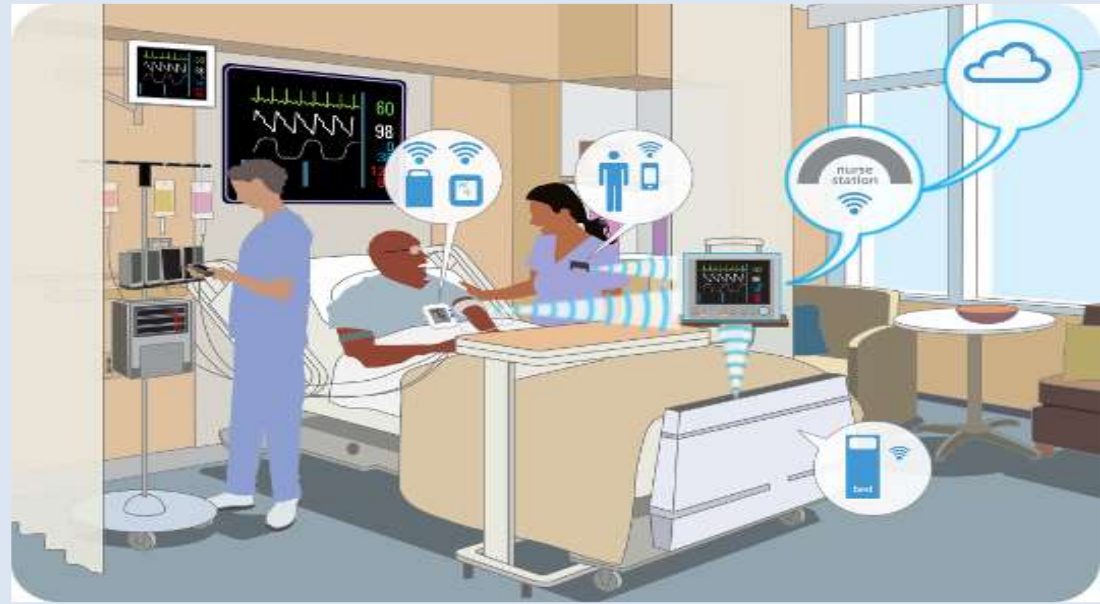
❑ Automobile and Transportation Systems
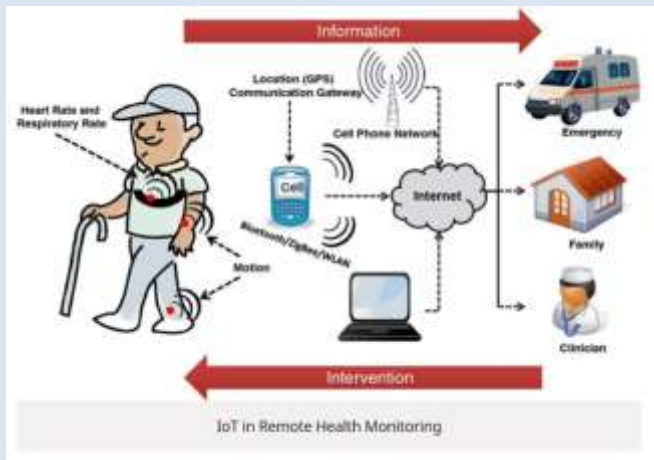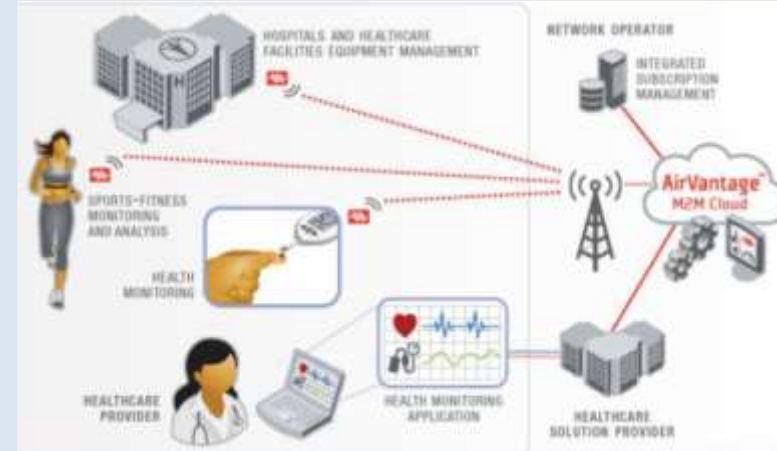
- ➢ Safety,
- ➢ Fuel control,
- ➢ Route optimization,
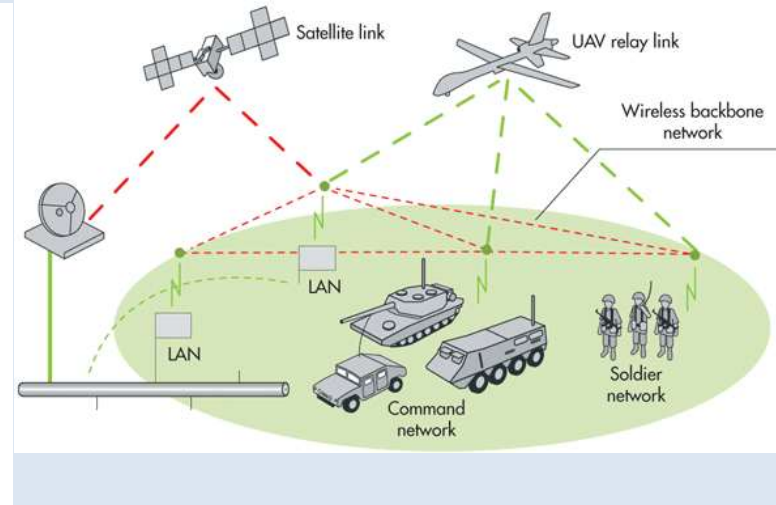- ➢ Collision avoidance.

Applications of IoT

❑ Healthcare

  ➢ Remote patient monitoring,

  ➢ Medicine tracking,

  ➢ Hospital asset tracking/monitoring,

  ➢ Wearable technologies.

IoT in Remote Health Monitoring
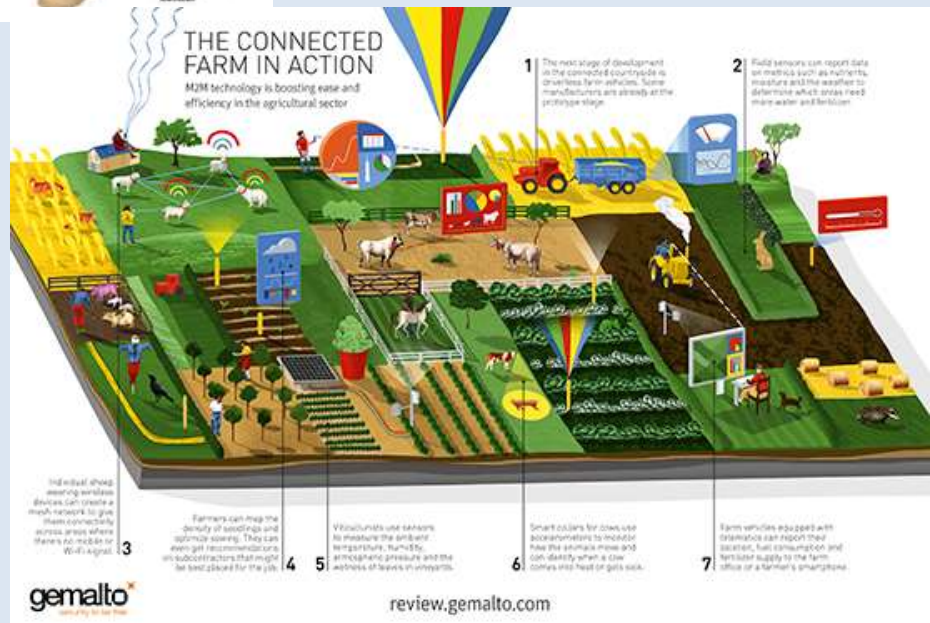
Applications of IoT

☐ Military applications

- ➢ Border surveillance,
- ➢ Target detection,
- ➢ Attack detection,
- ➢ Logistics.

☐ Agriculture applications

- ➢ Livestock monitoring/tracking,
- ➢ Farm/harvest tracking,

Applications of IoT

❑ Smart things/devices

Smart Cargo robots

Challenges in IoT

➢ Technology,

➢ Lack of standardization,

➢ Security,

    ➢ Unreliable web interfaces (SQL injection, XSS)

    ➢ Denial of Service (DoS)

    ➢ Physical theft and alter

➢ Privacy,

➢ Big data management,

➢ Interoperability,

➢ Firmware and OS update,