INTERNET OF THINGS (IoT)

PRESENTED BY:
Wafaa Rizin Ameer
INTRODUCTION

- IoT: All about physical items talking to each other
- The term coined by Kevin Ashton in 1999
- Composed by two words and concepts:
  - “Internet”: “The worldwide network of interconnected computer networks, based on a standard communication protocol, the Internet suite (TCP/IP)”
  - “Thing”: “an object not precisely identifiable”
- “Internet of Things” means “a worldwide network of interconnected objects uniquely addressable, based on standard communication protocols”.
More than RFID!

I'm here, Mummy N 51.30.24 W 0.08.19

Blood pressure too high

Accident ahead

You lost me here

Ground needs water
INTRODUCTION

- Any object will have a unique way of identification in the coming future.
- The capacity of addressing each other and verifying their identities
- Objects will be able to exchange information
- Object knows its common properties such as creation, recycling, transformation, ownership change, or use for different purposes
INTRODUCTION

• Current Internet is a collection of uniform devices
• IoT will exhibit a much higher level of heterogeneity
  – objects of totally different in terms of functionality, technology and application fields can communicate
WHAT IS THE IoT?

- A new dimension added to world of information and communication technologies (ICTs):
  - Anytime connectivity
  - Any place connectivity
  - For anyone
  - Connectivity for anything
Any TIME connection

- On the move
- Outdoors and indoors
  - Night
  - Daytime

Any PLACE connection

- On the move
- Outdoors
- Indoors (away from the PC)
- At the PC

Any THING connection

- Between PCs
- Human to Human (H2H), not using a PC
- Human to Thing (H2T), using generic equipment
- Thing to Thing (T2T)
WHAT IS THE IoT?

• Connections will multiply and create an entirely new dynamic network of networks
TECHNOLOGY

• Depends on dynamic technical innovation like wireless sensors
• Four kinds of technology basically used.
  – RFID (Radio-frequency identification)
  – Sensor technologies
  – Embedded intelligence
  – Nanotechnology
TECHNOLOGY

• RFID
  – Item identification
  – Uses radio waves to identify items
  – Gives information about their location and status

• Sensor technologies
  – Data collection
  – For example, sensors in an electronic jacket collect changes in external temperature and parameters of jacket adjusted accordingly
TECHNOLOGY

• Embedded intelligence
  – Information processing
  – Distribute processing power to the edges of network
  – Empower things and devices independent decisions

• Nanotechnology
  – Miniaturization
WIDER TECHNOLOGICAL TRENDS

• For the years to come, four distinct macrotrends that will shape the future of IT
  - “exaflood” or “data deluge”: explosion of the amount of data collected and exchanged
  - The energy required to operate the intelligent devices will dramatically decrease
  - Miniaturisation of devices
  - Autonomic resources
PROBLEMS AND CONCERNS

• Technological standardization
  – Standardization is essential for mass deployment and diffusion of any technology

• Protection of data and privacy
  – Sensors and smart tags can track users’ movements, habits and ongoing preferences
ARCHITECTURE

- There can be more than one architecture for Internet of Things
- The one explained here is standardised open architecture: the EPCglobal Network
  - widely accepted and has gained the biggest support from IT companies
ARCHITECTURE

- Includes content providers (producers) and content users (consumers) that utilise the Internet of Things and share benefits.
- New services and business innovation will be enabled by an enhanced Internet of Things infrastructure.
- Companies, public institutions and people will access data for their own benefits and financial as well as nonfinancial benefit.
ARCHITECTURE

• Key goals for Internet of Things architecture to achieve are:
  _ An open, scalable, flexible and secure infrastructure
  _ A usercentric, customisable ‘Web of Things’
  • Interaction possibilities for the benefit of society
  _ New dynamic business concepts
  • flexible billing and incentive
  _ Capabilities to promote information sharing
ARCHITECTURE

• Includes the following components:
  
  – *Extended static data support*: There is a need to support all things that carry a unique ID
  
  – *Integration of dynamic data*: A need to sense environmental conditions as well as the status of devices
ARCHITECTURE

• *Support for nonIP devices*: NonIP devices offer only limited capability.
  - Can be integrated in IoT through gateways

• *Integration of an actuator interface*: Actuators execute decisions either rendered by humans or software agents on their behalf
ARCHITECTURE

• Optional integration of software agents: For automated decision making
• Data synchronisation for offline support
APPLICATIONS
Pallet Communicates with Gate

Logistics:
- Speed up process
- Minimize errors

Classical RFID application
Clothes Communicate with Display

Value for end consumers! (RFID)

- Virtual shop assistant
- Context recognition

→ value for end consumers!
Packaged Food Communicates with Microwave Oven
Cooperating Smart Everyday Things?

When the tooth brush talks to the bathroom mirror
Real-World Awareness

Intuitive way of interaction
- access content and services by touching objects
- NFC (Near Field Communication)

Power [7 days]: 5.4 kWh
CO₂: 3.1 kg; Cost: 1.25 $
Use Case: Locating Lost Objects

- Locate lost or misplaced personal items
  - wallets, keys, sports bags,...

- Opportunistic use of mobile phones and their infrastructure
Allergy Checker

Barcode ETH Allergy Check

Options Back

Barcode ETH Allergy Check

Options Back

Barcode ETH Allergy Check

Options Back

Barcode ETH Allergy Check

Options Back

Barcode ETH Allergy Check

Options Back

Barcode ETH Allergy Check

Options Back

Barcode ETH Allergy Check

Options Back

Barcode ETH Allergy Check

Options Back
Communicating Products

- Weapon or credit card that only works in the hand of its owner
FUTURE

• Standardization
• Technologies necessary expected to enter the stage of practical use
• Used in monitoring buildings, environmental monitoring, home automation, personalization, localisation, positioning
CONCLUSION

• The Internet of Things is a movement towards using realtime data to become more intelligent in the decisions we make
• Our physical things will become connected in our virtual world
• But it may arise privacy concerns
QUESTIONS???

Any questions?

May I have a copy of your presentation?
Show is over
YOU MAY NOW RELAX!