IoT wireless connections…

…and IoT devices in healthcare 😷

Agenda and goals 🥅

1️⃣ What is IoT

2️⃣ Devices and protocols

3️⃣ WiFi & Bluetooth (+Challenges)

4️⃣ System architectures

5️⃣ Application arenas

🧘 Healthcare and Data Analysis

6️⃣ Security Issues

7️⃣ Conclusions

What is IoT ?

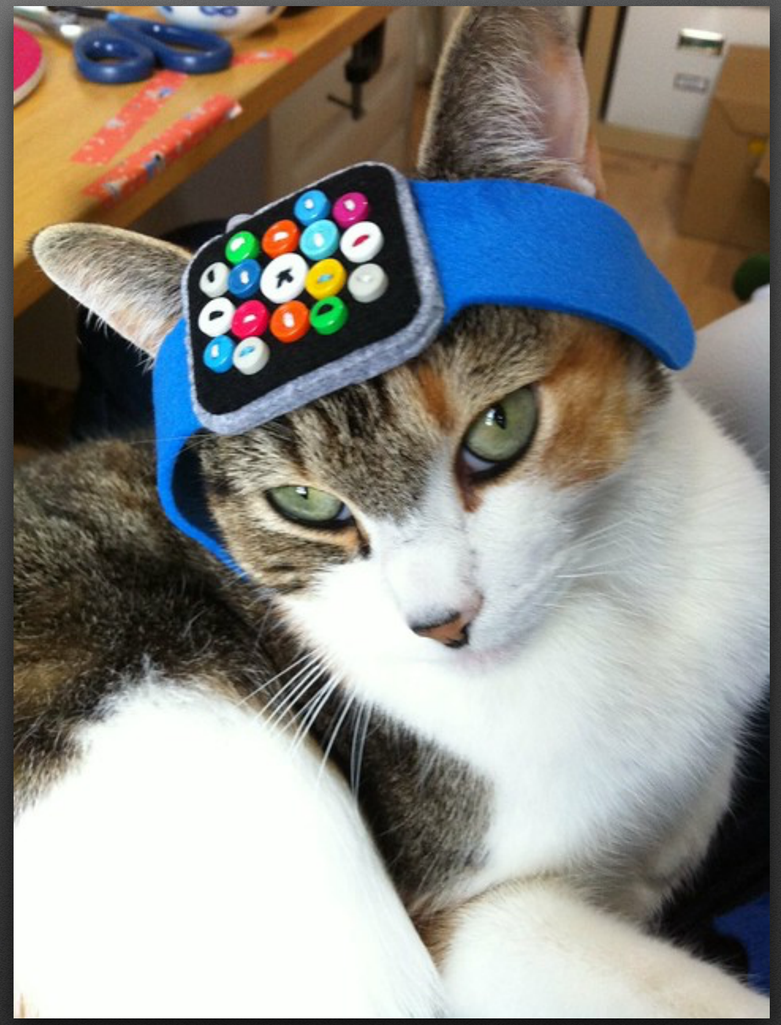
1️⃣ Network of dedicated physical objects …

2️⃣ Contains embedded technology (various sensors)

- To act, to sense, to comunicate, to analyze …

3️⃣ Ecosystem with various objects, communications, apps and data analysis

4️⃣ Vast potential in **healthcare** (for both patients and 🏥s)



Devices and protocols ⌚

1. Apple Watch (for a vast number of measures)
2. Smart inhalers
3. Remote patient monitors
4. Connected glucometers

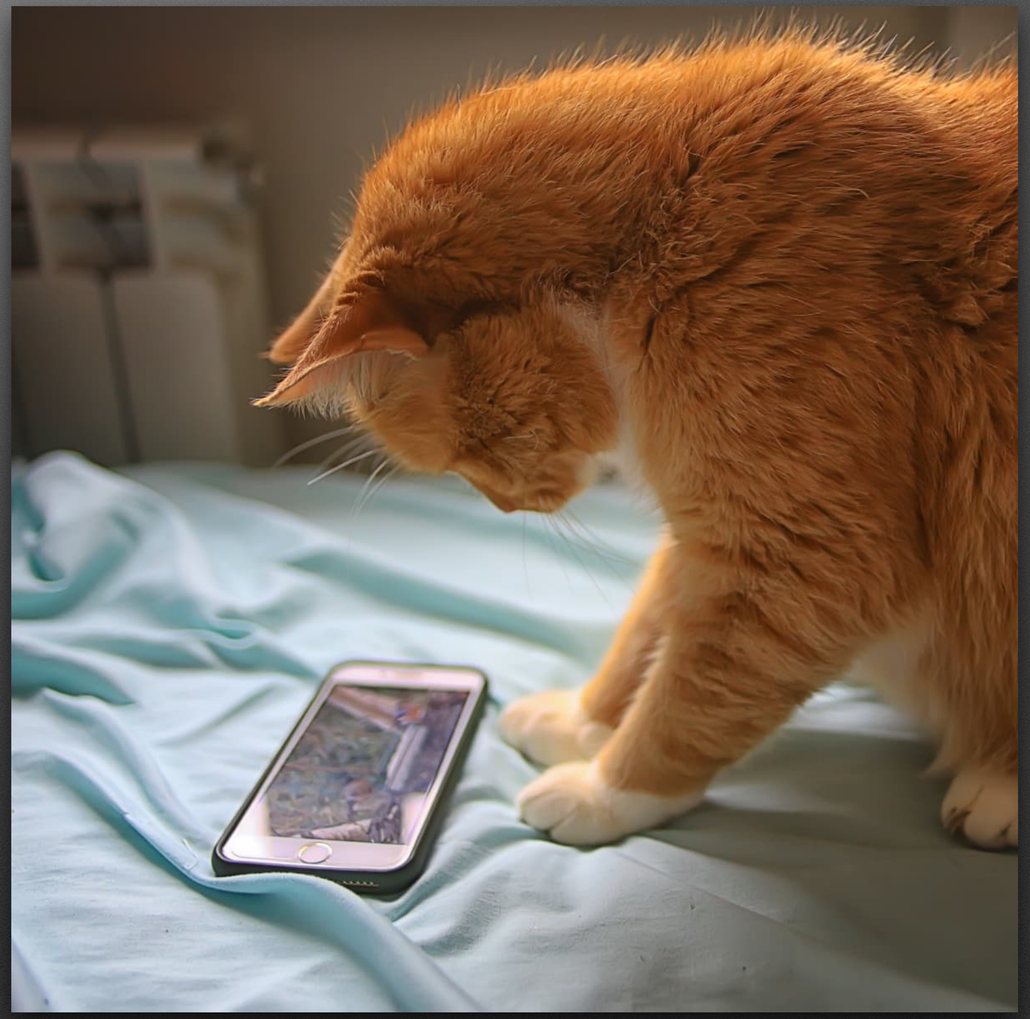
1. WiFi, based on IEEE 802.11 standard
2. Bluetooth, named after the king of Denmark

WiFi & Bluetooth 🛜

- WiFi
  - 1️⃣ natively integrated with the TCP/IP stack
  - 2️⃣ ISM 2.4-GHz band
  - 3️⃣ 5 GHz is mainly used in enterprise applications
  - 4️⃣ 802.11: spectrum divided into channels
  - 5️⃣ 802.11: passive/active scanning
  - 6️⃣ Fingerprinting 👆
- Bluetooth
  - 1️⃣ Less than 10 m diameter
  - 3️⃣ No infrastructure
  - 2️⃣ 2.4-2.5 GHz ISM radio band, up to 3 Mbps
  - 4️⃣ Time Division Multiplexing (TDM): 625 µsec slot

WiFi & Bluetooth Challenges 😥

1. Power Consumption
2. Range & Scalability
3. Interoperability
4. Interferences
5. Active Attacks
6. Denial-of-Service (DoS) Attacks
7. Man-in-the-Middle (MitM) Attacks
8. Botnet Formation
9. Data Privacy Concerns
10. Lack of Standardization



System architectures 🏛️

1️⃣ Network Layer

2️⃣ Perception Layer

3️⃣ Data Processing Layer

[…]

4️⃣ Centralized

5️⃣ Decentralized

Application arenas

1. Complementary roles (WiFi and bluetooth)
2. Improving user experience
3. Smart Buildings (homes, hospitals, offices, etc)
4. Connected Healthcare
5. Industrial Automation
6. Asset Tracking:
    - WiFi can track assets across buildings or warehouses, while Bluetooth can be used for high-precision indoor tracking or locating specific tools within a production area)

Healthcare 😷

1. Remote Patient Monitoring
2. Large Data Transfer
3. Cloud Connectivity
4. Chronic Disease Management
5. Telemedicine
6. Security is Paramount

Data analysis in healthcare 📊

1. Real-time Insights
2. Predictive Analytics
3. Chronic Disease Management
4. Clinical Research and Development

- Importance of Wireless Connections:

1. Convenience and Comfort
2. Scalability and Flexibility
3. Remote Access and Monitoring

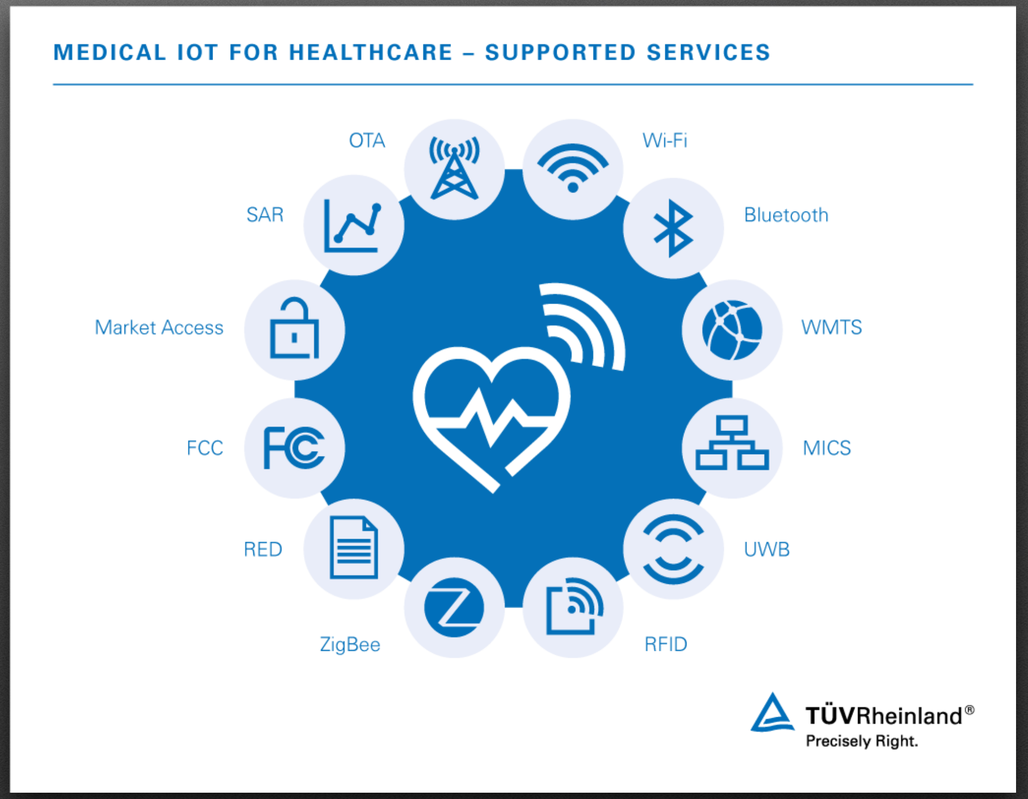
Security issues 🚨

1. Increased Attack Surface (proliferation of devices)
2. Most devices are vulnerable
3. Healthcare data sensitivity
4. Insecure Network Connections
5. Limited Updates and Patching
6. Disrupted Care Delivery

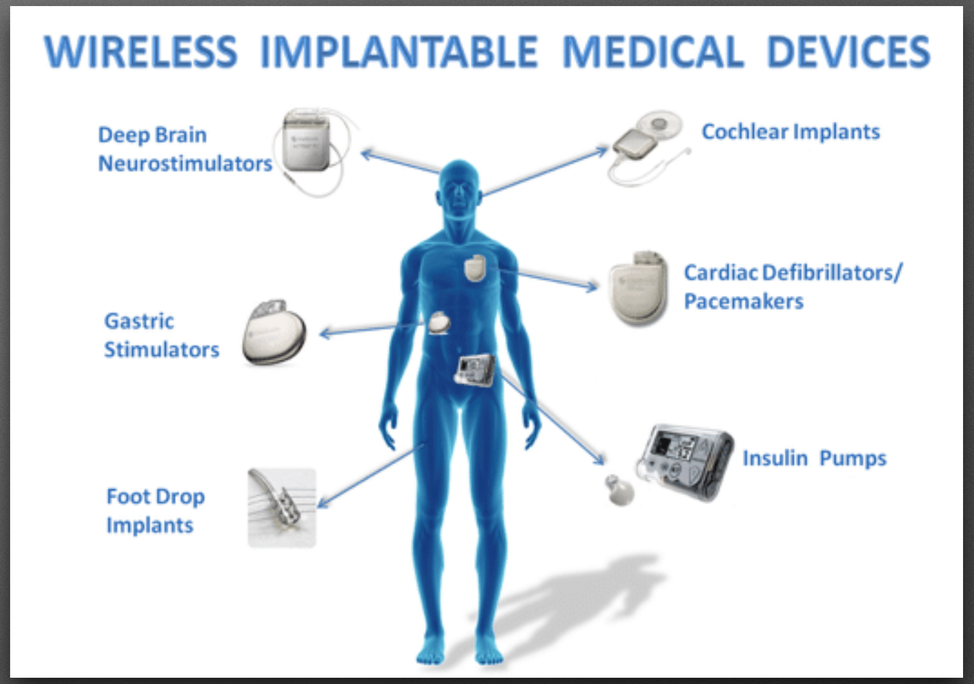
Conclusions

Wireless connections like WiFi and Bluetooth will play an even greater and vital role in the future of transformation of healthcare through IoT.

1. Enhanced Patient Care
2. Chronic Disease Management
3. Remote Patient Monitoring
4. Data-driven Insights and Approach




Current
2:29
130
45
12AM
6
12PM
6
Heart Rate
76 BPM
79 BPM, 1m ago


WIRELESS IMPLANTABLE MEDICAL DEVICES
Deep Brain Neurostimulators
Cochlear Implants
Cardiac Defibrillators/ Pacemakers
Gastric Stimulators
Insulin Pumps
Foot Drop Implants


273 ml / 23h44
11.5 ml/h
VI: 228 ml
STOP

🥰

Thanks for the attention!

❓👊❓

Time for questions!