# Outlines

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- Why Adopting IoT in Healthcare

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- Getting Started with IoMT
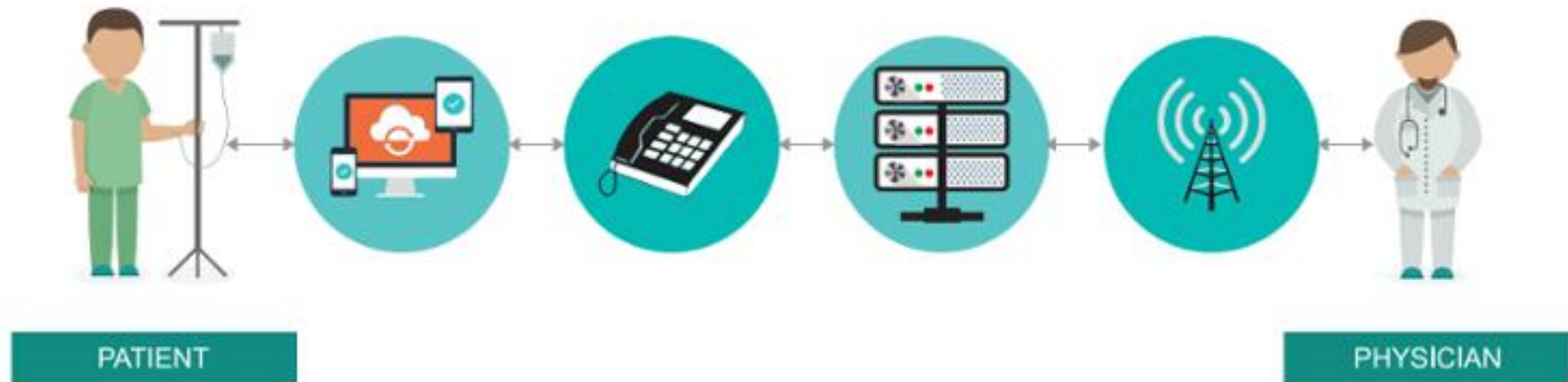
What is IoMT ?

The Internet of Medical Things (IoMT) is the collection of medical devices and applications that **connect to healthcare IT systems** through online computer networks. Medical devices equipped with Wi-Fi allow the machine-to-machine communication that is the basis of IoMT.
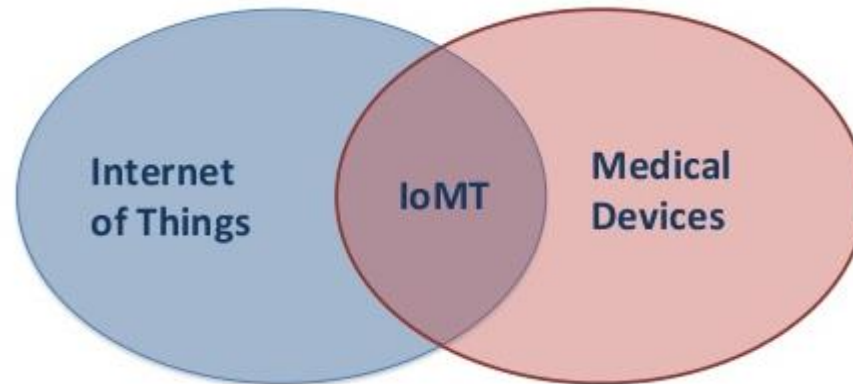
IoMT devices link to cloud platforms, on which captured data can be stored and analyzed. IoMT is also known as **healthcare IoT.**
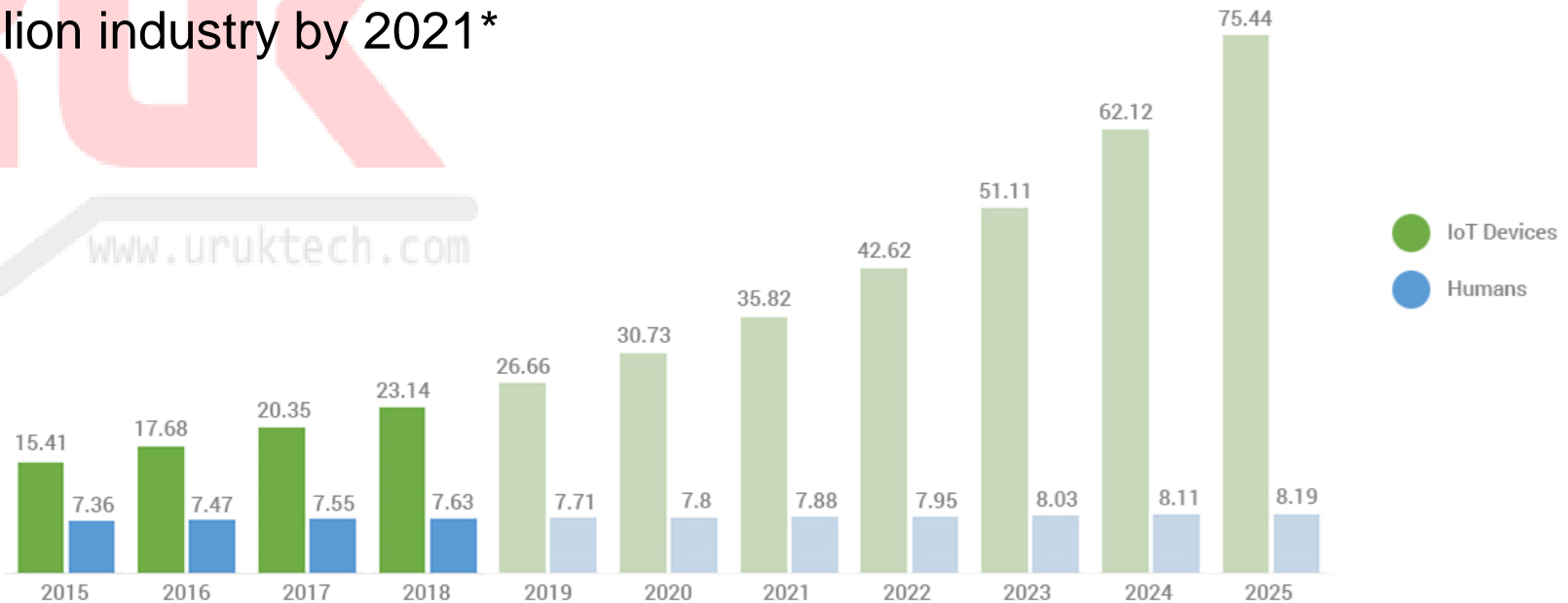
What is IoMT ?

      IoMT devices have been conceptualized in **various forms** of smart wearable devices, home use medical devices, point-of-care kits, and mobile healthcare applications, and are able to communicate with **medical experts in remote** locations.

PATIENT

PHYSICIAN

What is IoMT ?

The impact of IoT on medicine will be perhaps the most **important**, and **personal**, effect.

By 2020, **40% of IoT-related technology will be health-related**, more than any other category,

making up to $136.8 billion industry by 2021*

IoT Devices Outnumber Humans on Earth

* Allied Market Research Report 2016

What is IoMT ?

Healthcare remains the **fastest to adopt technological changes** to revolutionize the diagnosis and treatment of the body. When we talk about the Internet of Things (IoT), it offers a multitude of benefits such as improving the effectiveness and quality of services by deploying it in medical devices.

60%

healthcare organizations have introduced IoT devices into their facilities

73%

healthcare organizations use IoT for maintenance and monitoring

87%

healthcare organizations plan to implement IoT technology by 2019

64%

use of IoT in the healthcare industry is patient monitors

89%

of healthcare organizations have suffered from IOT related security breach

Telemedicine Vs. IoMT

- Telemedicine is the use of **medical information exchanged** from one site to another via **electronic communications** to improve, maintain or assist patients' health status.

- Videoconferencing, transmission of still images, e-health including patient portals, remote monitoring of vital signs, continuing medical education, and nursing call centers are all considered part of telemedicine and telehealth.

Why Adopting IoT in Healthcare?

- Cutting Cost through Remote Health Monitoring

- Patient Monitoring

- Collecting and Understanding Medical Data
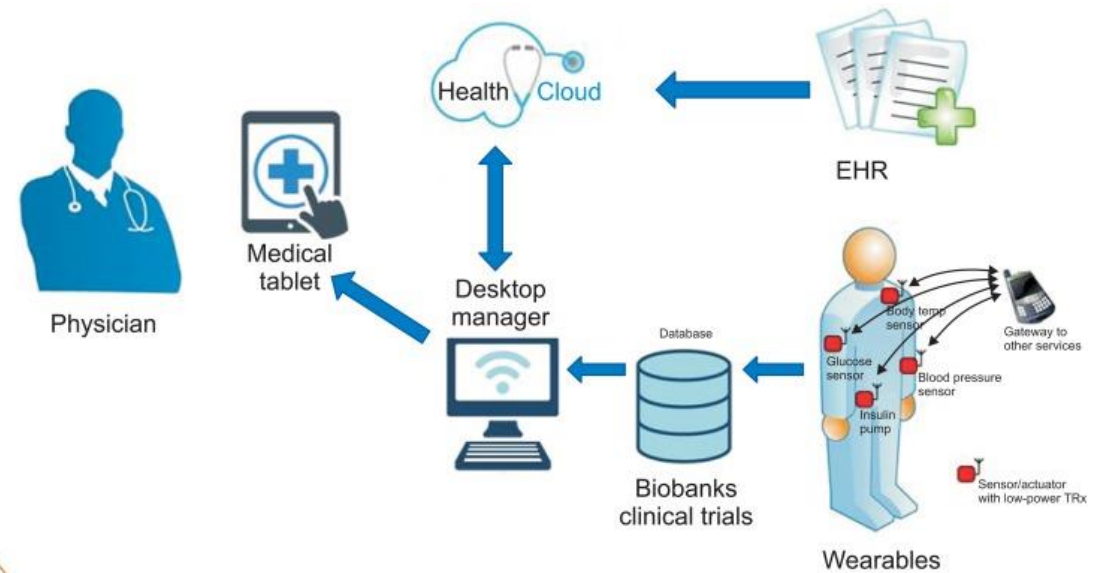
IoMT Examples
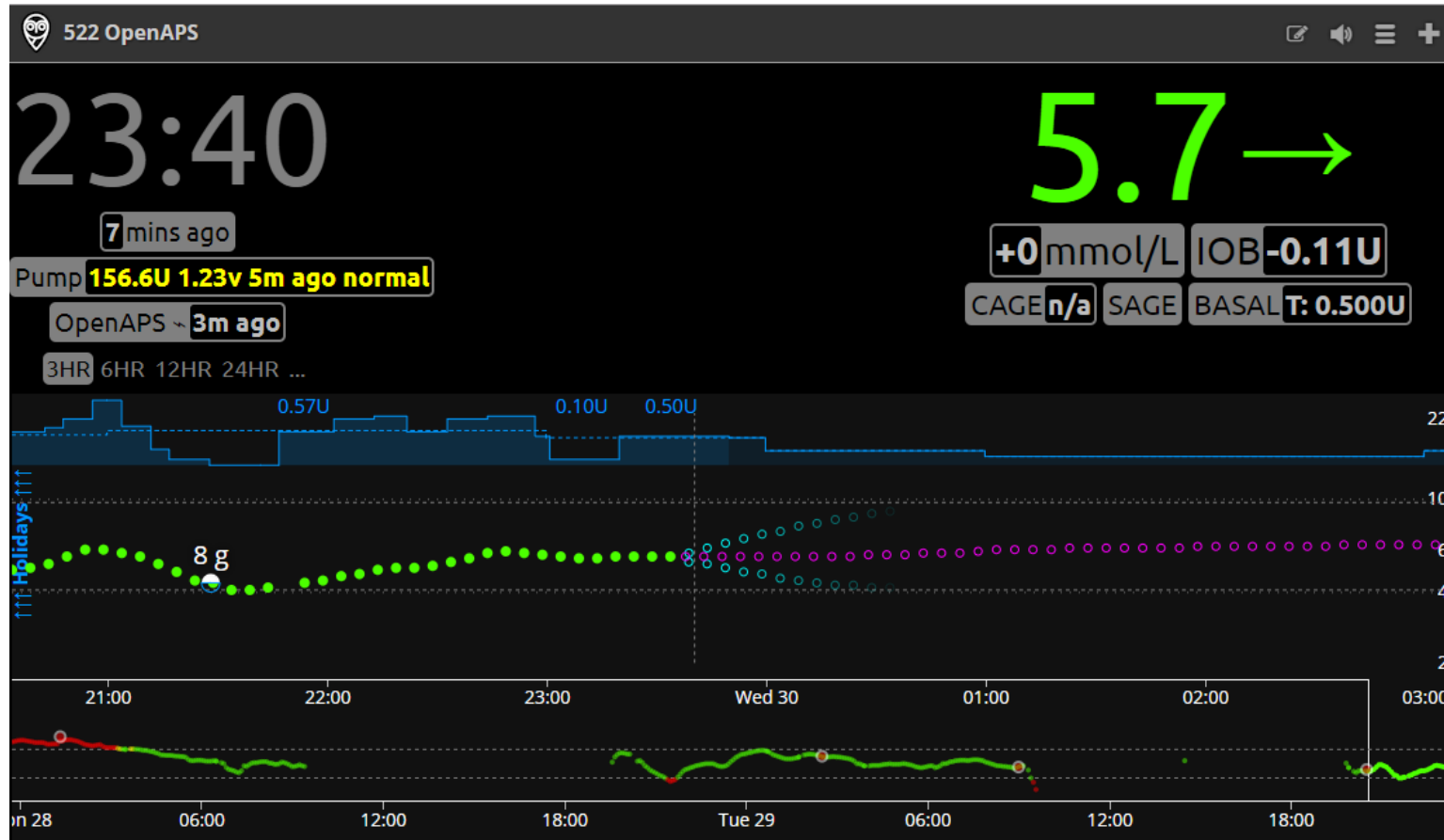
IoMT Examples

OpenAPS – closed-loop insulin delivery

- One of the most fascinating areas in IoMT is the open source initiative OpenAPS, which stands for open artificial pancreas system.

- Dana Lewis and her husband Scott Leibrand have hacked Dana's CGM (continuous glucose monitor) and her insulin pump.

- As of summer 2016, when Dana presented at OSCon in Austin, 59 people were using the open source software and hacking their own equipment.

Continuous glucose monitor, Battery, Raspberry Pi, Insulin pump, Carelink USB, @DanaMLewis #OpenAPS

IoMT Examples
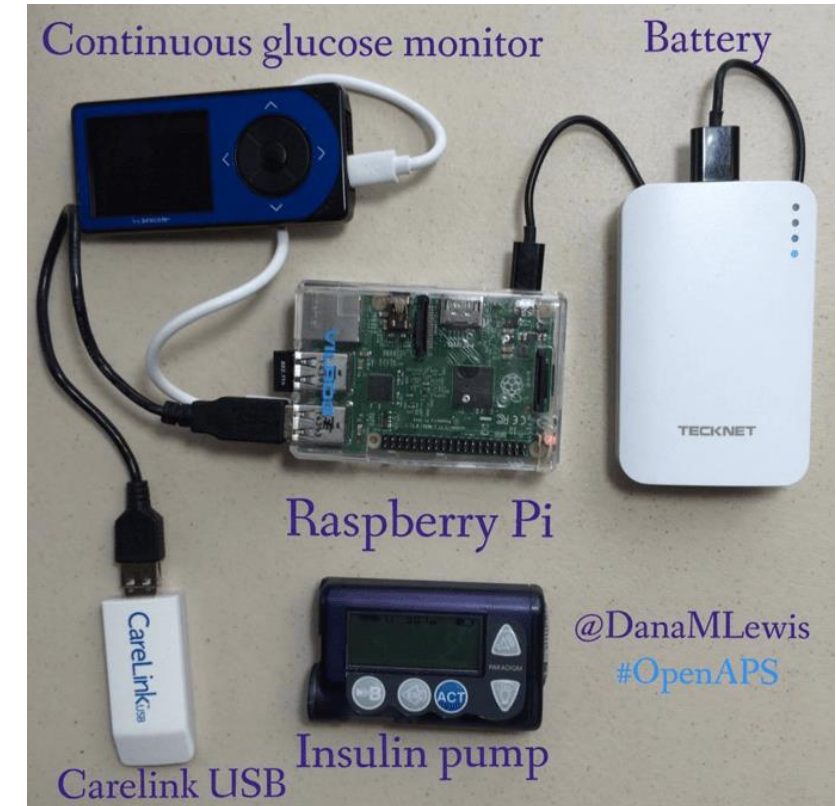
OpenAPS – closed-loop insulin delivery

CoaguChek® INRange system
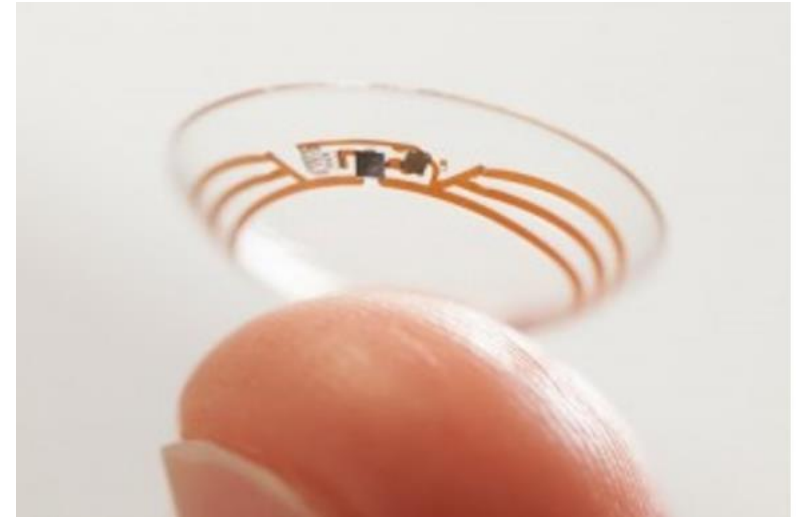
IoMT Examples

CoaguChek® INRange system

- In 2016, Roche launched a Bluetooth-enabled coagulation system that allows patients to check how quickly their blood clots.

- This is the first device of its kind for anticoagulated patients, with self-testing shown to help patients stay within their therapeutic range and lower the risk of stroke or bleeding.

- Being able to transmit results to healthcare providers means fewer visits to the clinic.

IoMT Examples
Connected Contact Lenses

- Alcon (part of **Novartis**) has licensed **Google's smart lens** technology which involves non-invasive sensors embedded within contact lenses.

- The lenses may eventually be able to measure glucose levels of diabetes patients via their tears and then store the information in a mobile device.

- Novartis is also hoping to develop the smart lens to help those with presbyopia, helping to restore the eye's focus.

IoMT Examples

- Students at the Furtwangen University (HFU) in Germany have developed what they call the IoT Wheelchair, aimed at helping patients who live in remote areas where it's difficult to reach a local hospital or doctor but still may need fast and urgent care.

- The system works through sensors that measure vital parameters and send data about a patient's pulse rate and oxygen saturation, blood pressure, state control -- including motion and position -- body temperature, and GPS position control to the ThingWorx platform

IoMT Examples

Other Areas

- Remote patient monitoring for people with chronic or long-term conditions,

- Tracking patient medication orders and location of patients admitted to hospitals

- A patient's wearable mHealth (mobile health) devices,

- Hospital beds fitted with sensors that measure the patient's vital signs

- Personal emergency response systems that provide fall detection, emergency assistance, and navigation back to the residence.
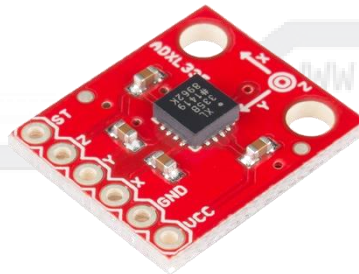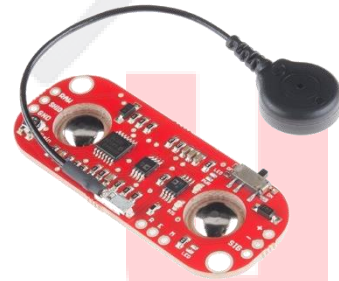
Getting Started with IoMT

Edge, Gateway and Connectivity

Development Tools

Applications and Analytics
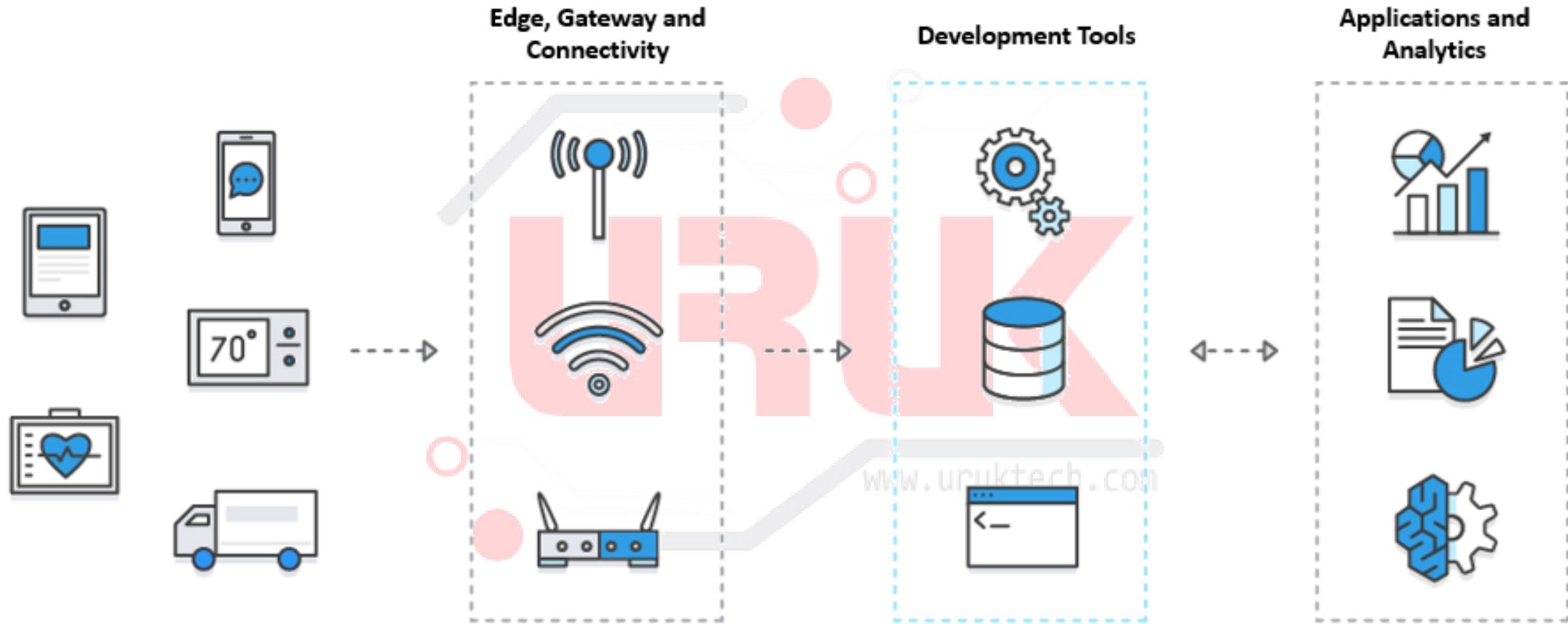
Getting Started with IoMT
Medical Sensors

Getting Started with IoMT

Processors/MCUs

Getting Started with IoMT

Cloud

Cloud computing is the **delivery of computing services** like servers, storages and more over the Internet. It is a technology that puts your entire computing infrastructure both hardware and software, applications, etc online.

Getting Started with IoMT

IoT Platform

ThingWorx
A PTC Business

Azure IoT Hub

carriots®
www.uruktech.com

ThingSpeak

Watson IoT

ubidots

ThingsBoard

Getting Started with IoMT

IoT Protocols

There are several IoT protocols that are widely used in IoT with different features. We will describe the most important IoT protocols, that enable to exchange data between different IoT devices and between IoT devices and IoT cloud platforms.

IoT protocols can be grouped into two different categories:

❑ IoT data protocols

❑ IoT network protocols

Thank you …

Q&A