Introduction

INTERNET OF THINGS

World where all the *devices* and *appliances* are *connected* to a *network* & are *used collaboratively* to achieve *complex tasks* that require a high degree of intelligence

Internet of Things is an *interaction between* the *physical* and *digital worlds using sensors* and actuators

Things means Devices

The **Internet of Things** (**IoT**) is the network of physical objects—devices, vehicles, buildings and other items embedded with electronics, software, sensors, and network connectivity—that enables these objects to collect and exchange data.

Why do we need IoT

Real time monitoring of health parameters of a patient. Once data is on cloud storage, it can accessed through internet for better management and timely action from hospital.

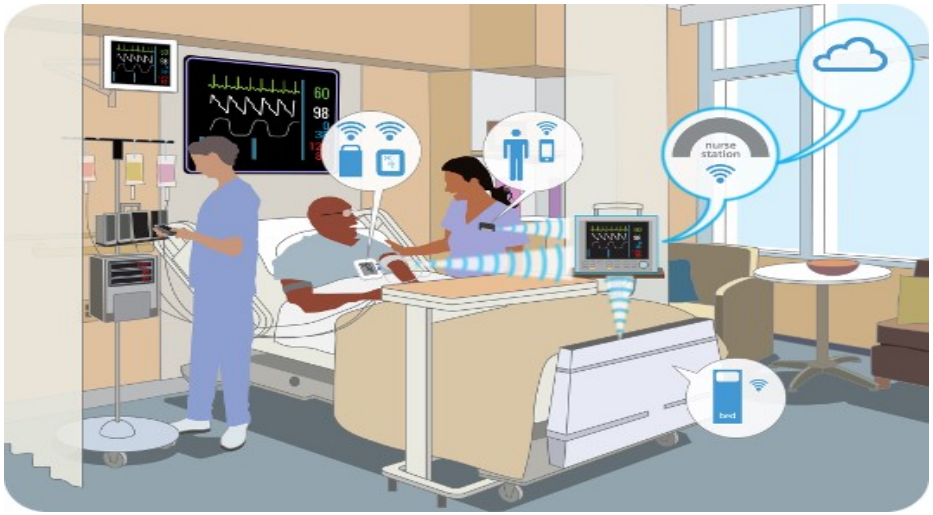
Why do we need IoT

While patient is on the way to hospital, monitoring of his health parameters may enable the Doctors and other hospital staff to take necessary arrangements.

Many ‘Things’ sharing the data

Wearable Tech

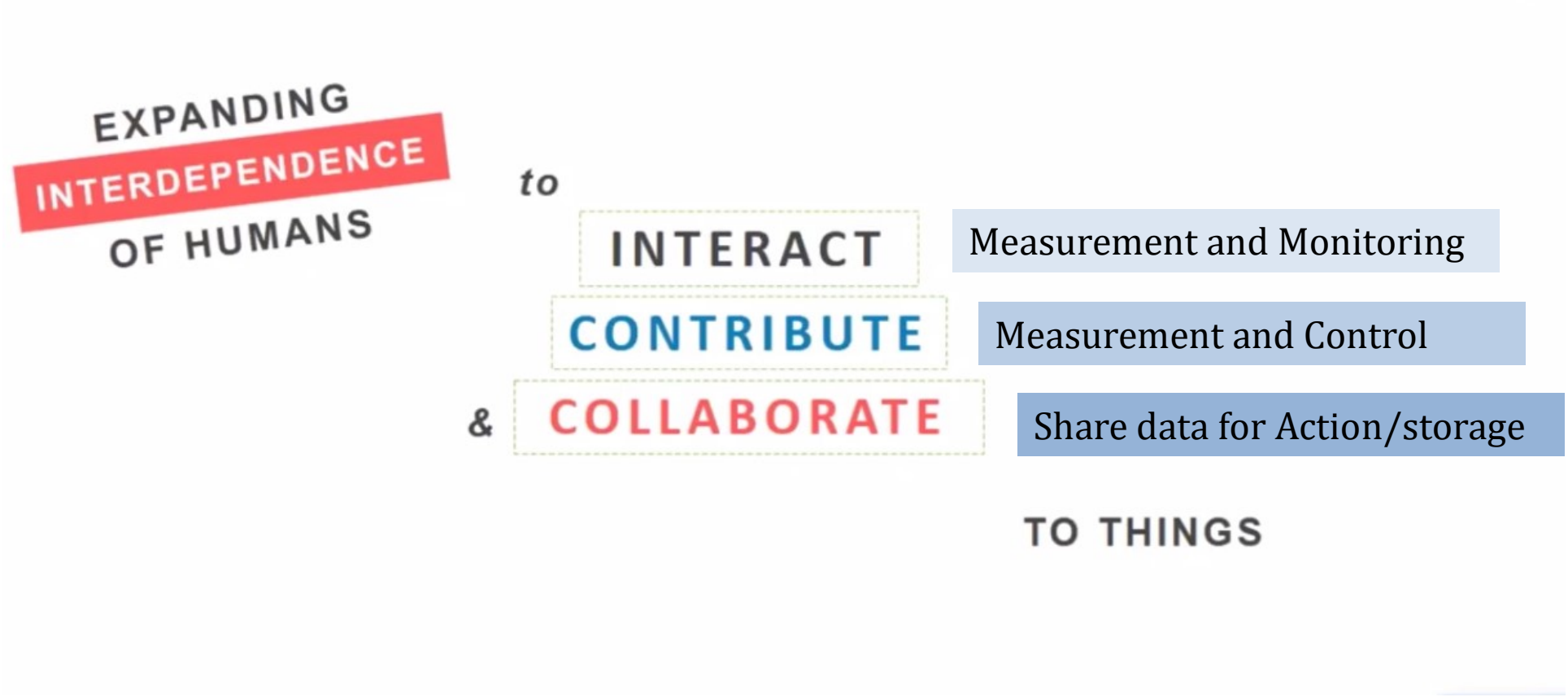
Smart Appliances



Healthcare

CISCO says: Internet of Everything

IoT: 3 basic features

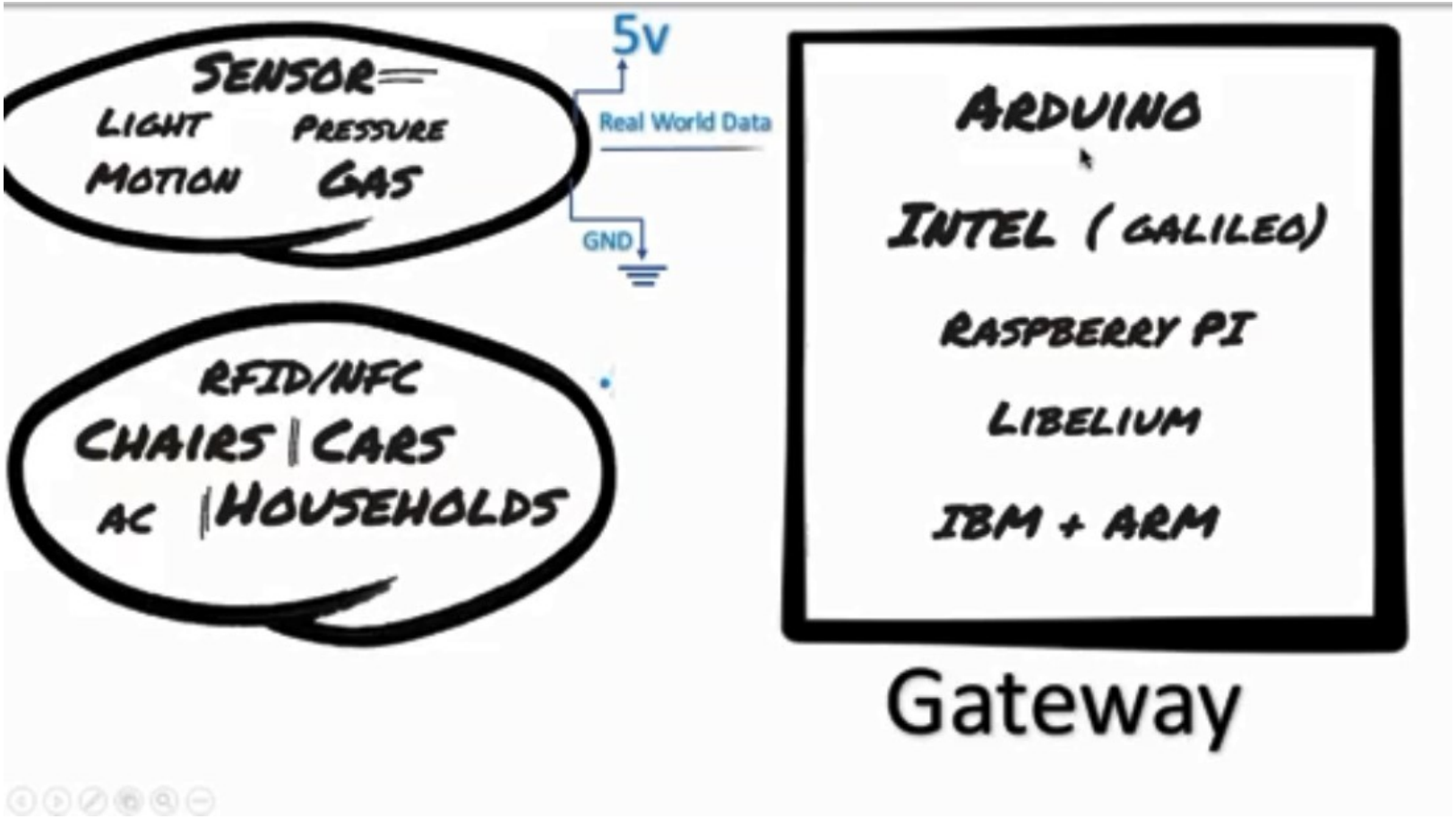


IoT is about reaching from Human dependence to ‘collaborative’ machines

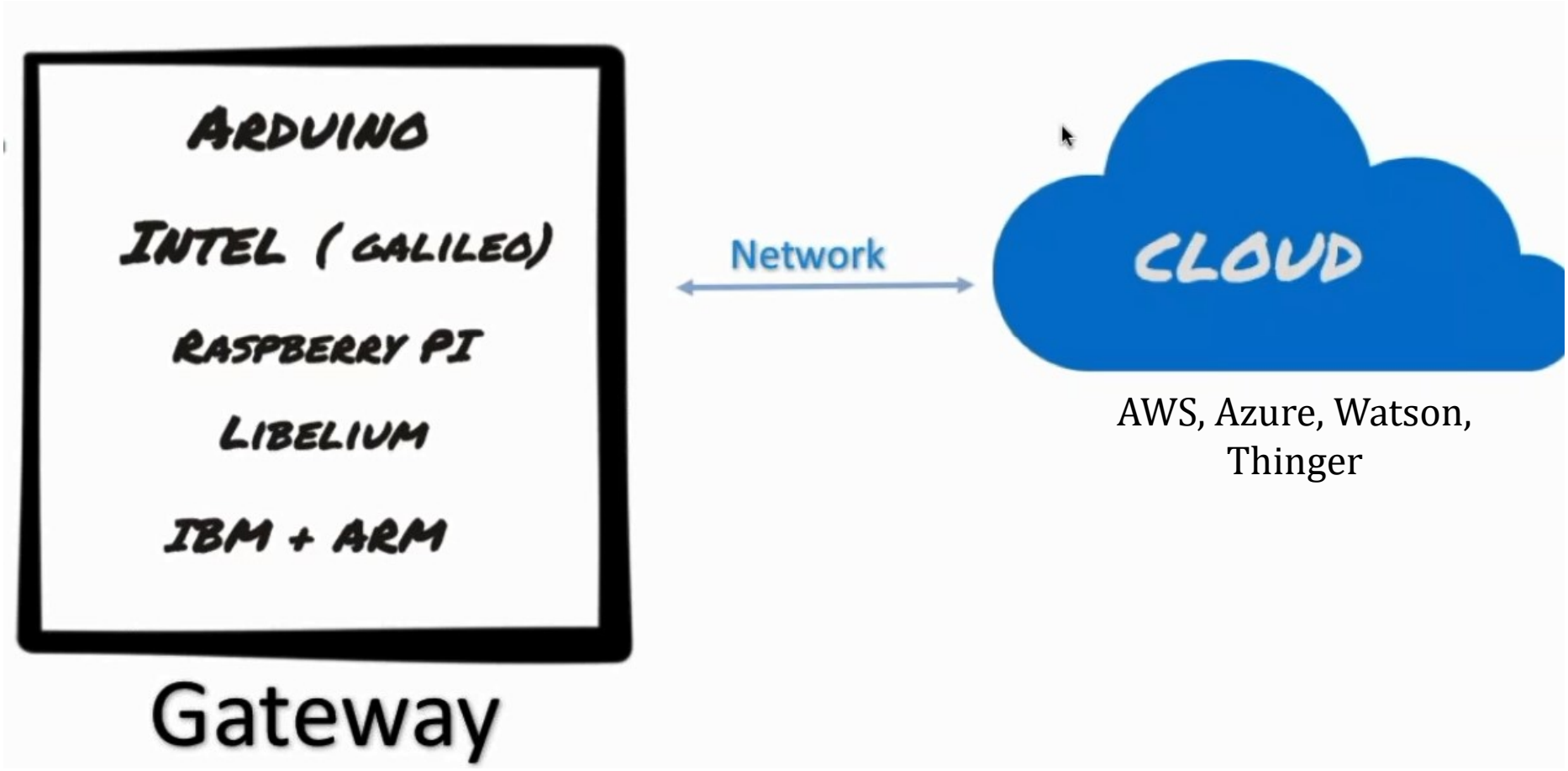
Benefits of IoT

- Efficient resource utilization
- Minimizing human efforts
- Big data analysis and AI
- Improved security
- Saves time

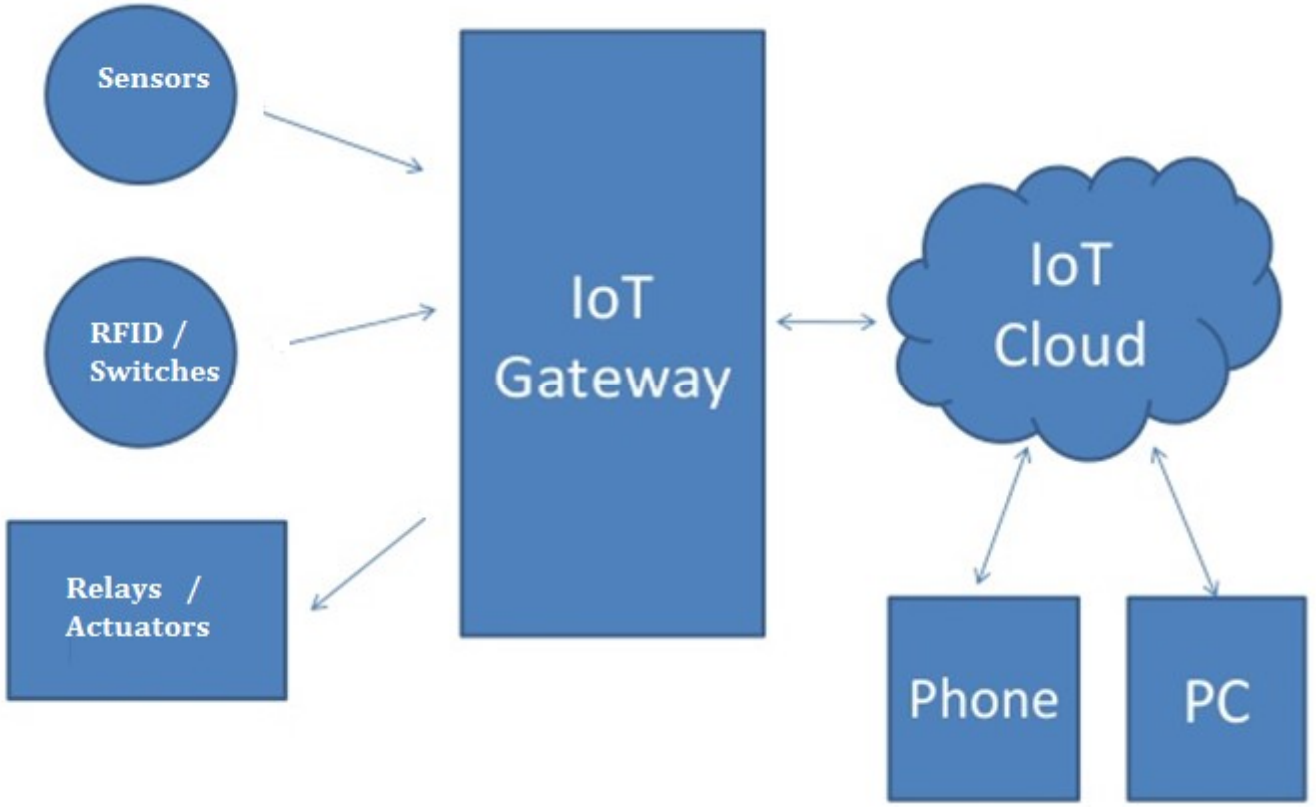
IoT Ecosystem



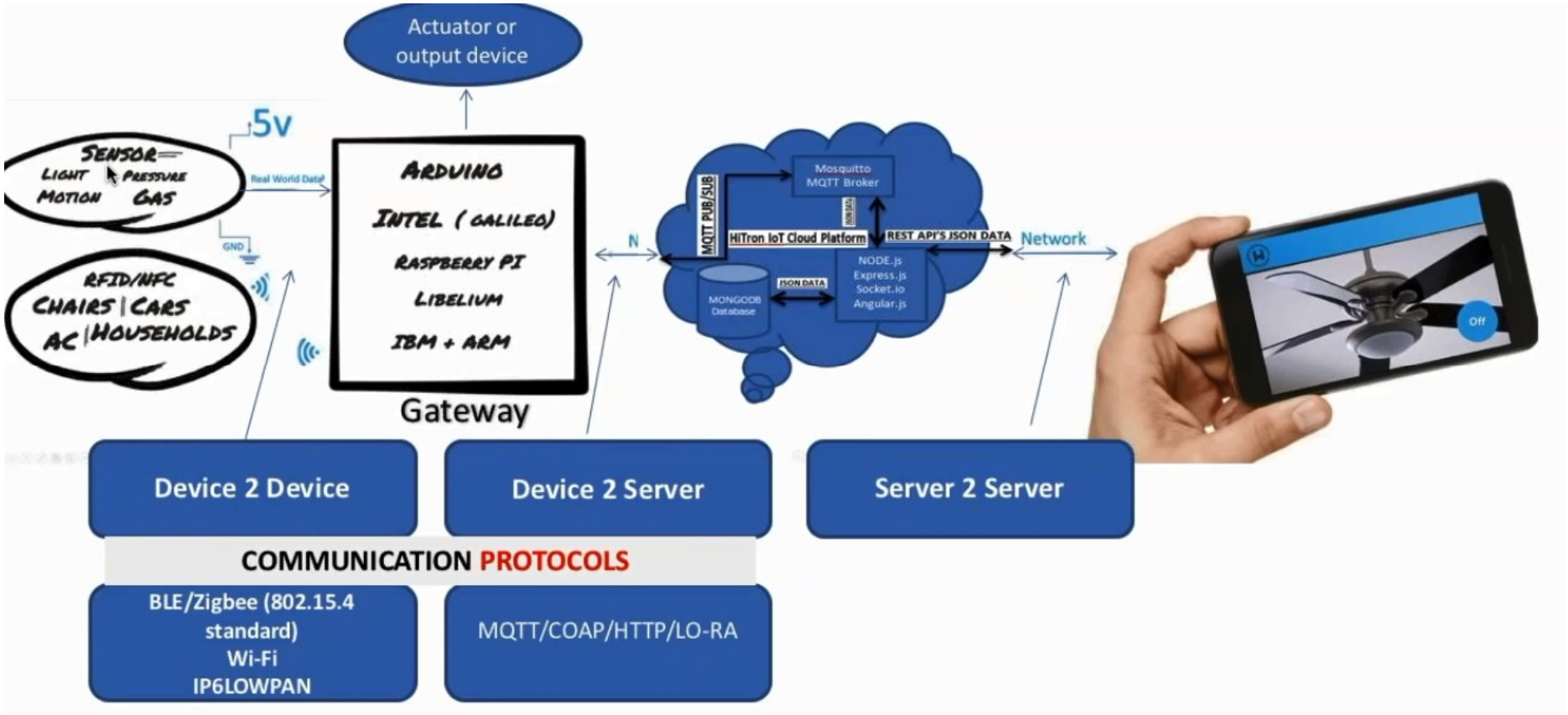
IoT Ecosystem



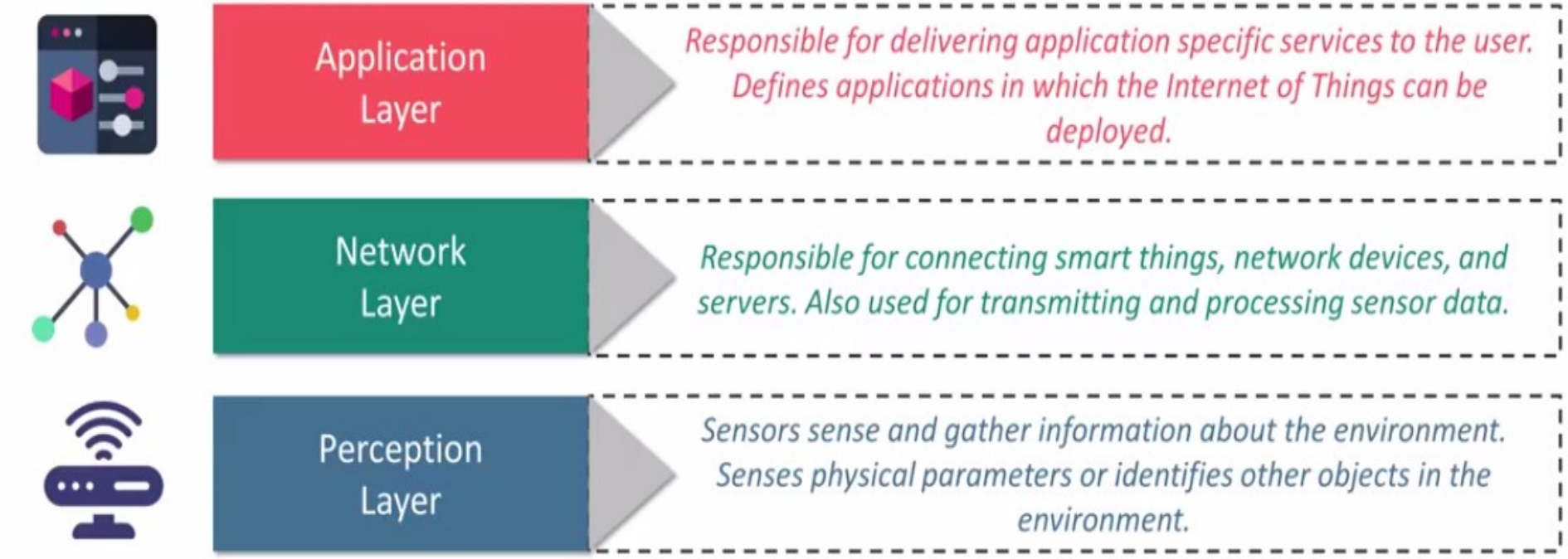
Basic IoT Architecture



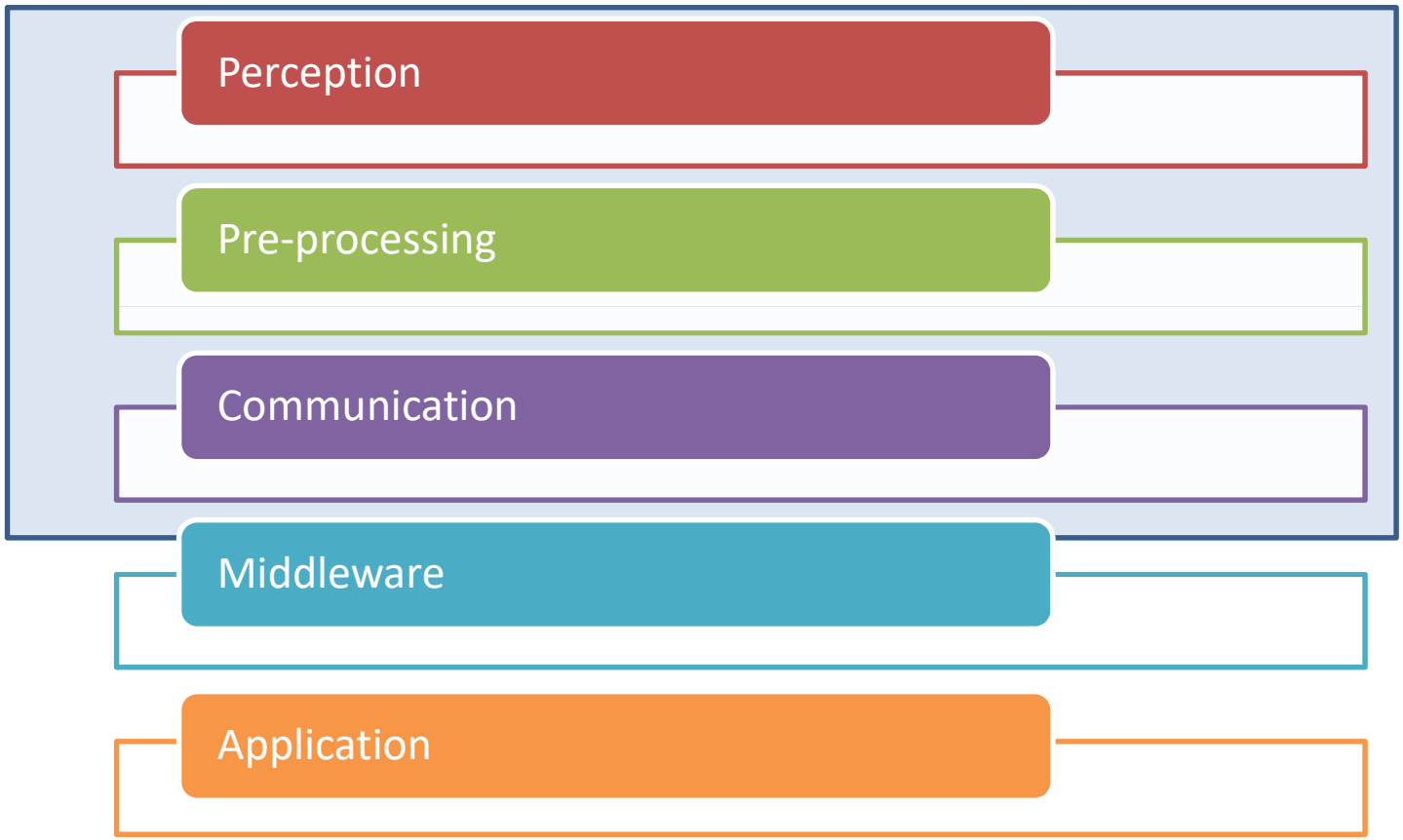
IoT Ecosystem



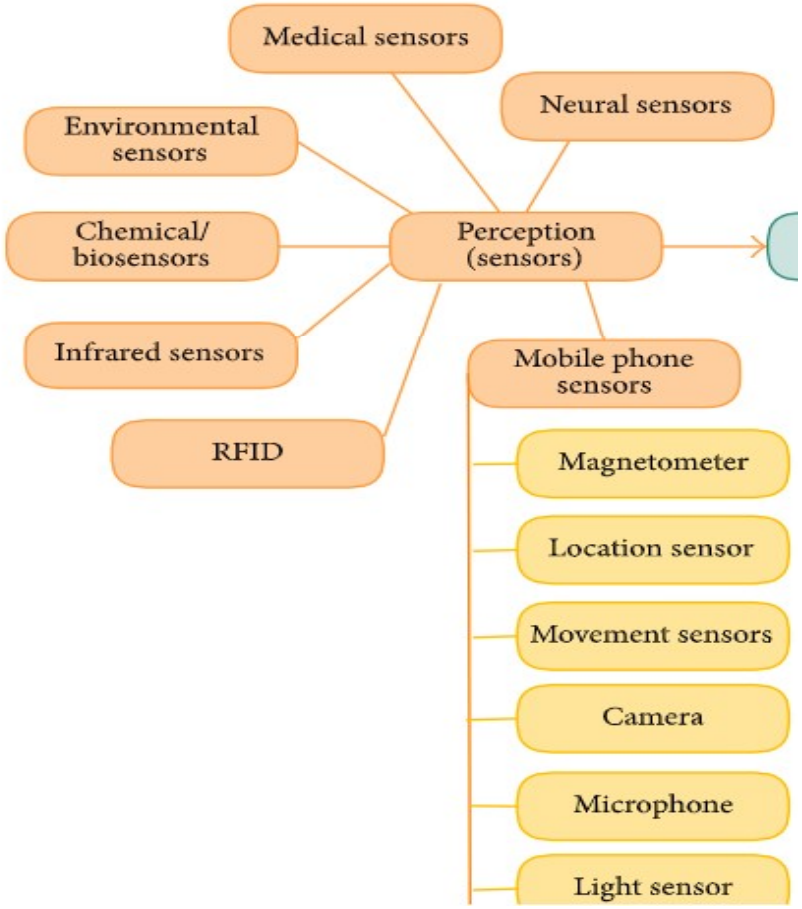
IoT Open Systems Interconnection model (OSI model)



IoT Taxonomy (Terminology)



Perception Layer



This layer consists of all the sensors, their interfacing and management of the data received from various sensors

Pre-processing

This layer consists of data processing from various sensors, before it is shared to the Gateway stage. Pre – processing helps to uniform the data in a specific format.

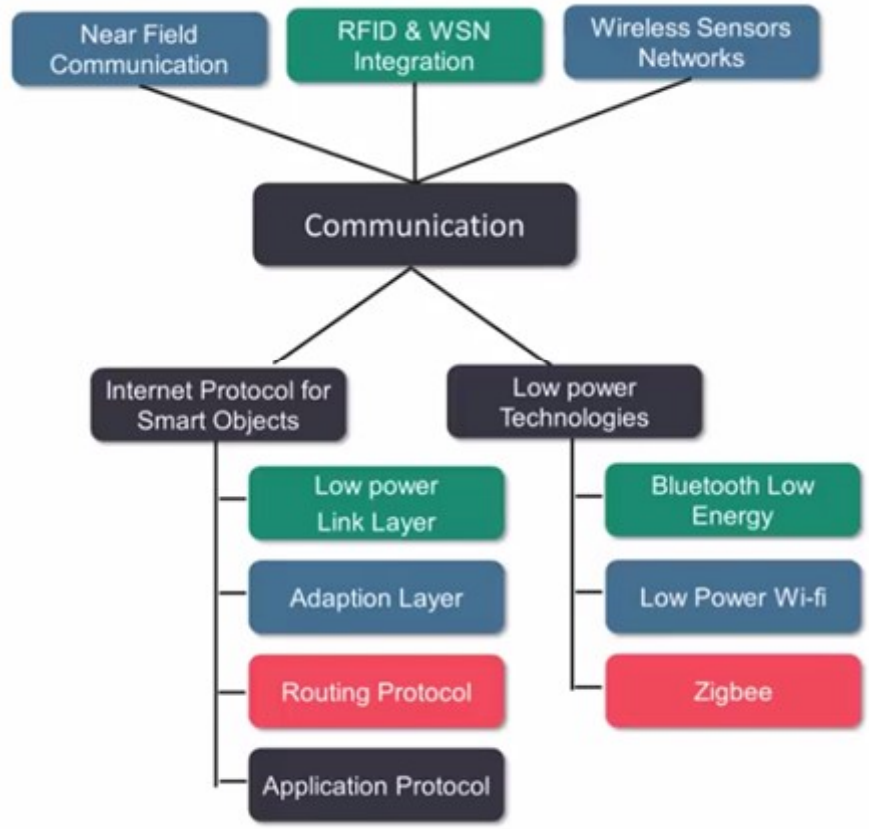
Limitations of processing everything in Cloud

- *Mobility*: Smart devices are mobile & changing network conditions makes communication difficult
- *Reliable & real-time actuation*: Latency sensitive applications need real-time responses.
- *Scalability*: Multiple devices increases the latency

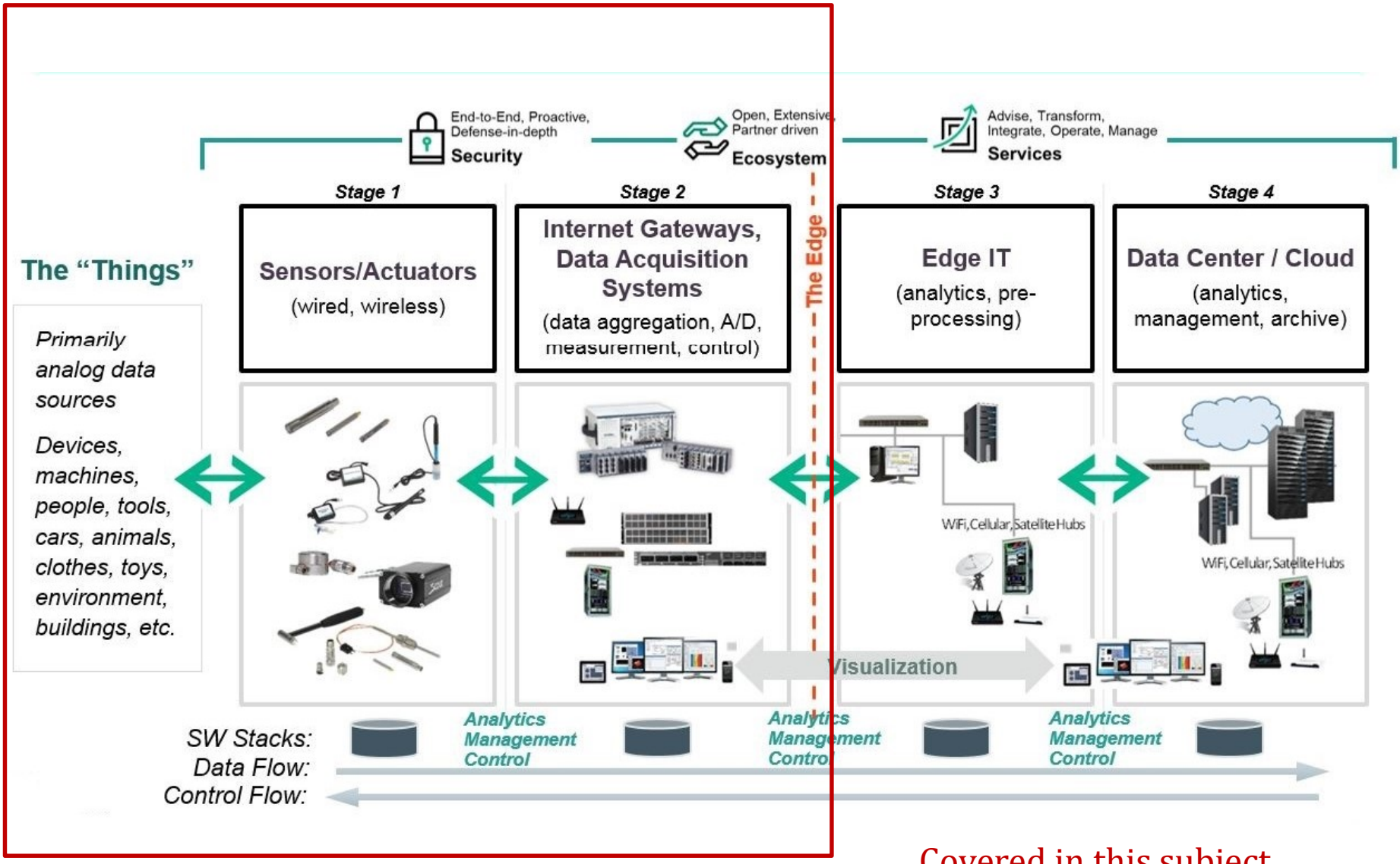
Communication

Communication challenges which needs to be addressed:

- *Addressing & Identification*: Each smart device needs to be identified with a unique address in the network
- *Low Power Communication*: Communication between devices needs to be low power consuming
- Routing protocol with low memory requirement & efficient communication protocol
- High speed & Lossless communication

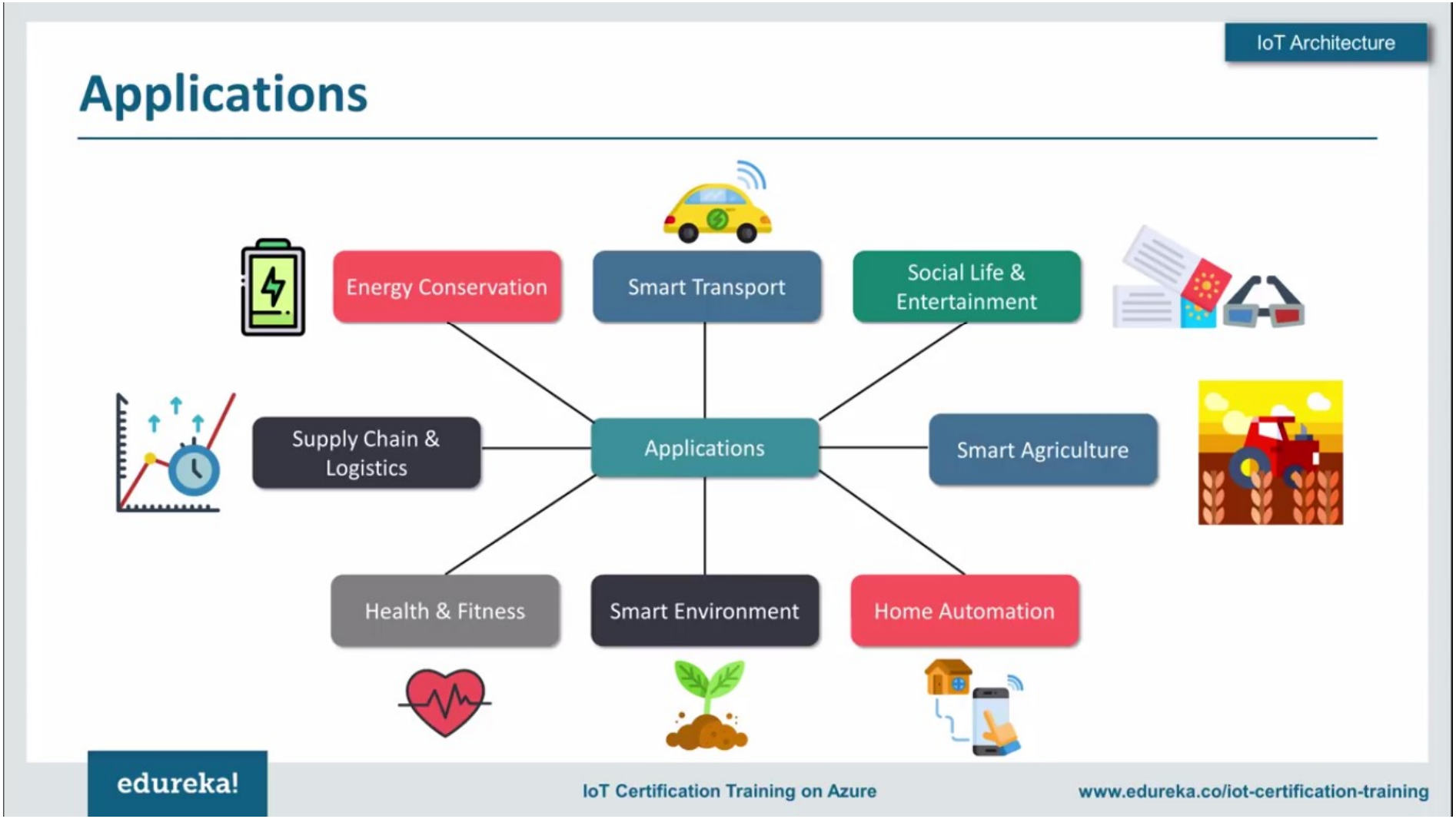


IoT : A 4-stage system

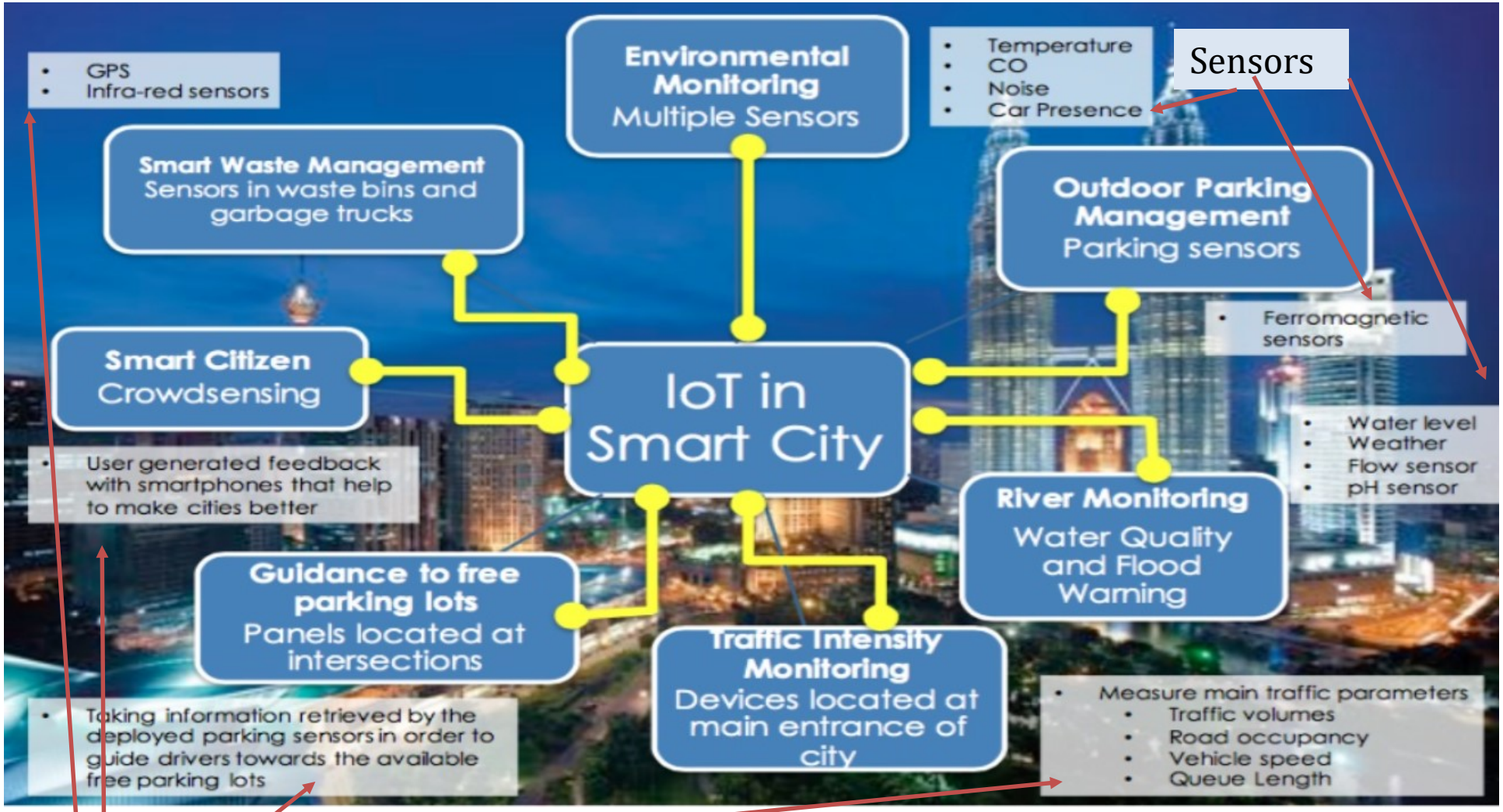


Covered in this subject

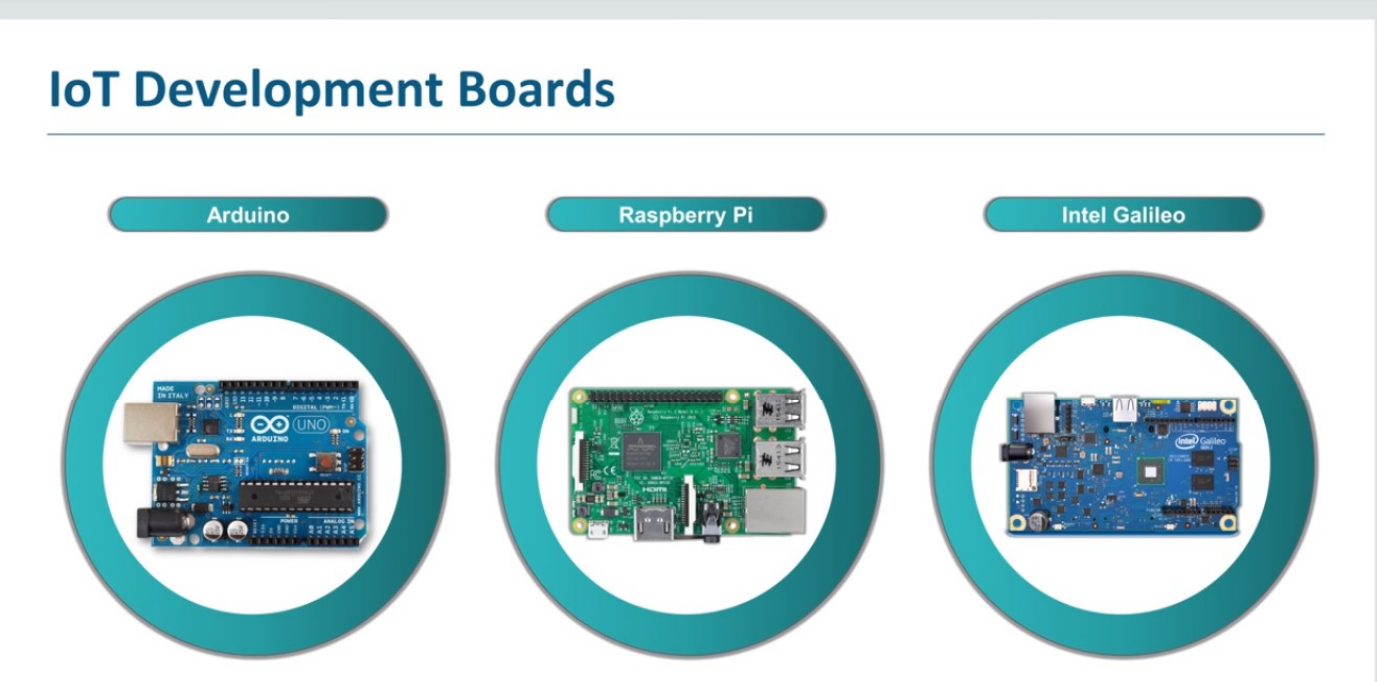
Applications



IoT case study: Smart City



Development Boards



Arduino UNO, Rasberry Pi
Node MCU, Arduino MKR100
ESP320
STM8, STM32
Intel Galileo
Beagle Bone…….and many others

Reference

- IBM
- CISCO
- Edureka Videos
- https://www.youtube.com/watch?v=LlhmzVL5bm8
- https://www.youtube.com/watch?v=17HMbyNaDjM&list=PL9ooVrP1hQOGccfBbP5tJWZ1hv5sIUWJl&index=13
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