Sistem Tertanam+ IoT

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Outlines

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2.2 Where is IoT?

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JUN
JUL
AUG
SEP
HARVEST
FACTORY
SHOP
DB

- *The concept of connecting devices together is not new. In 1982, a Coke machine at Carnegie Mellon University became the first appliance connected to the Internet. It could keep track of inventory and whether drinks were cold. Since then, connectedness has greatly expanded, in the areas of ubiquitous computing, machine-to-machine (M2M) communications, and device-to-device (D2D) communications.*
- *But the term IoT was invented by British entrepreneur Kevin Ashton in 1999, in a presentation he made to Procter & Gamble. As that time, he was the cofounder and executive director of the Auto-ID Center at MIT, and the vision of IoT was based on radio-frequency identification, or RFID (radio-frequency identification).*
- *IoT has evolved since, and became increasingly popular in recent years, due to the convergence of several enabling technologies, such as microcontrollers, sensors, wireless communications, embedded systems, and micro-electromechanical systems (MEMS)*

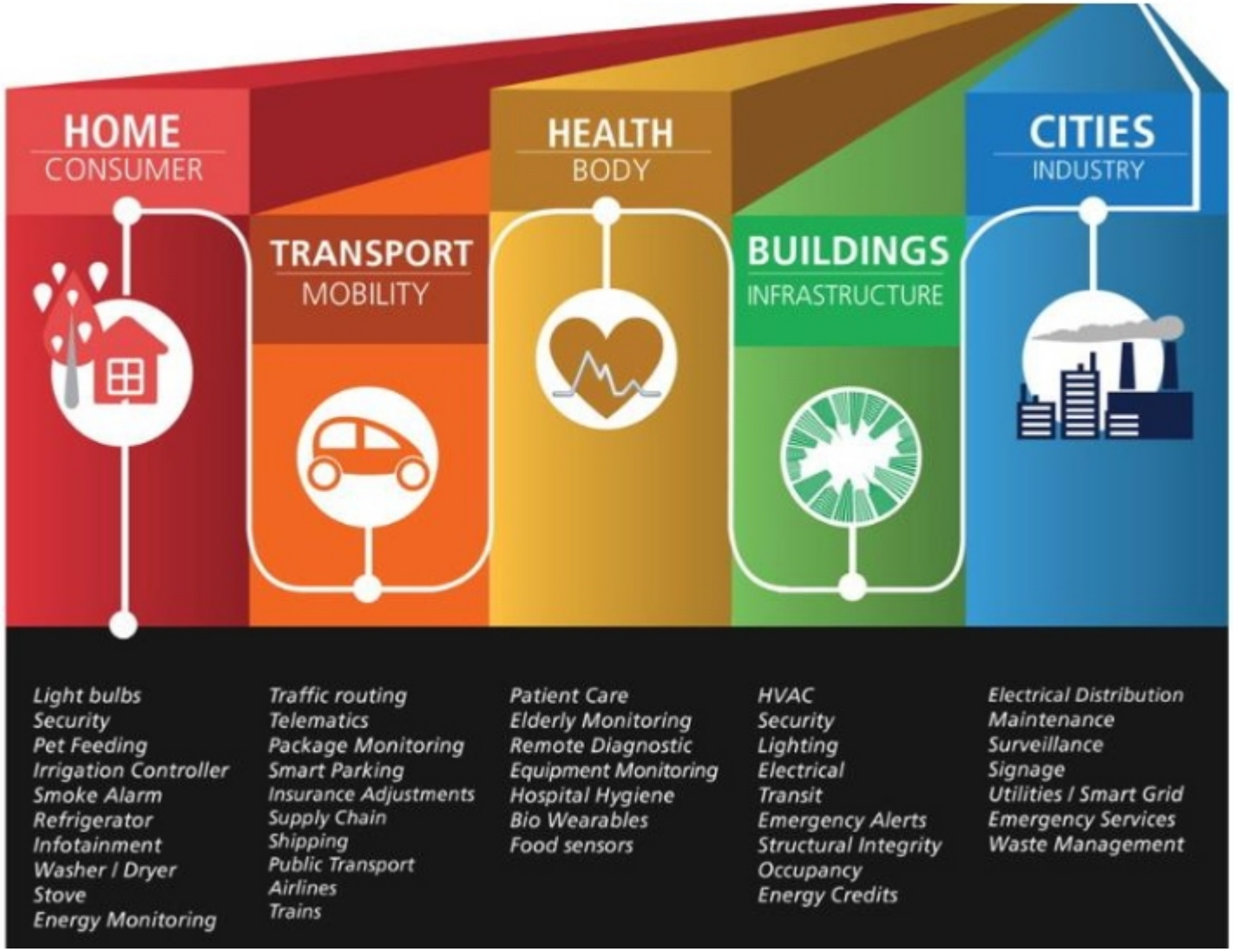
What is IoT?

- *IoT is a new revolution (Fourth Industrial Revolution) in the capabilities of the our world that are connected to the internet.*
- *The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.*
- *IoT allows objects to be sensed and controlled remotely across existing network infrastructure.*

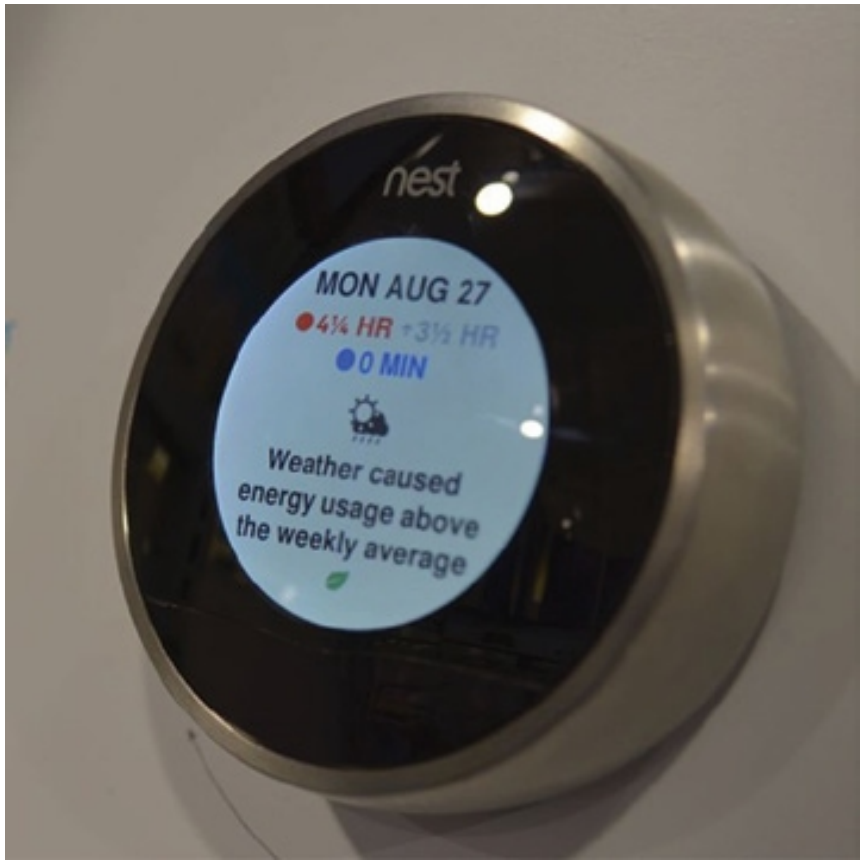
What is the Internet of Things

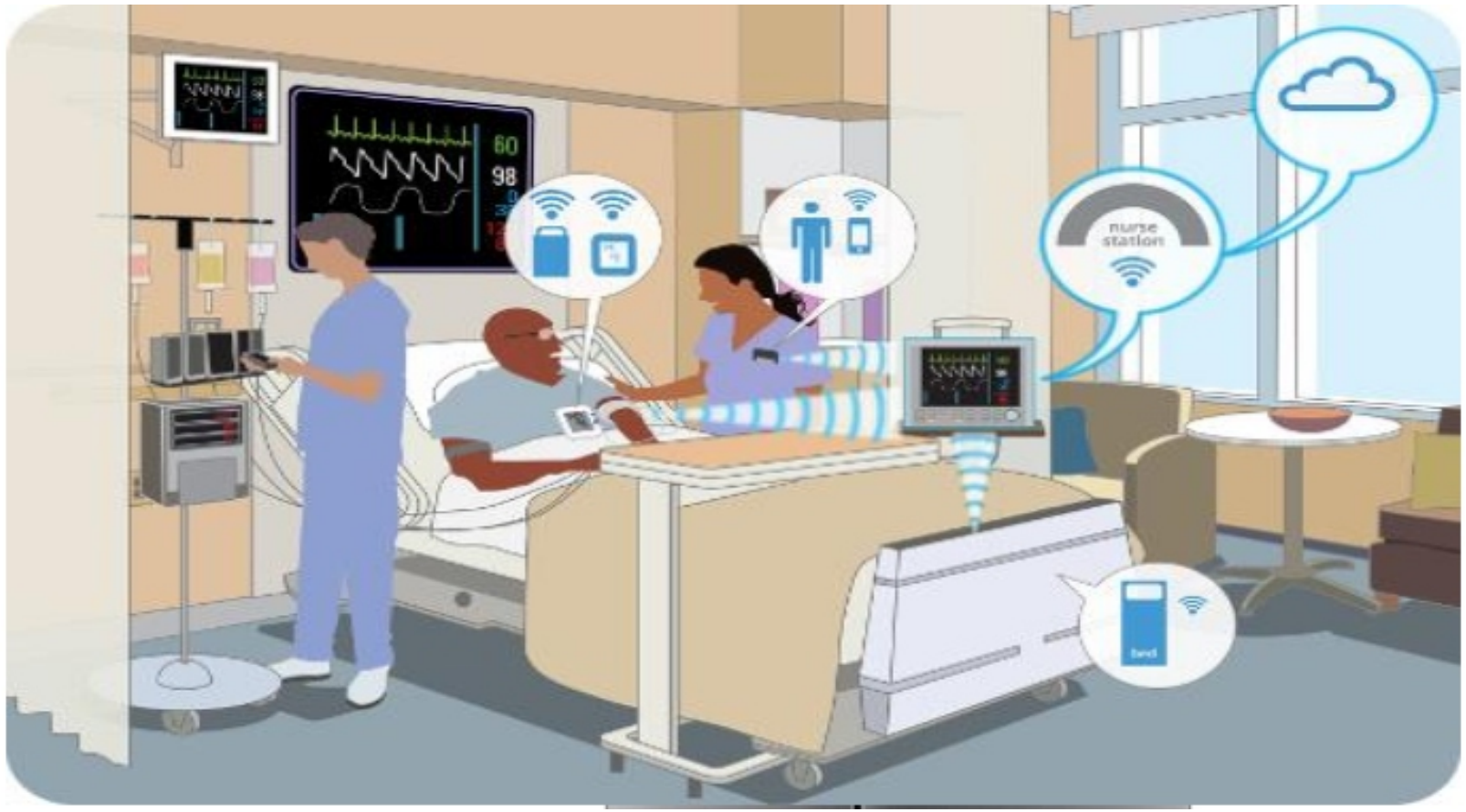
Image from http://www.cchc.cl/informacion-a-la-comunidad/industria-de-la-construccion/personaje/

Where is IoT?

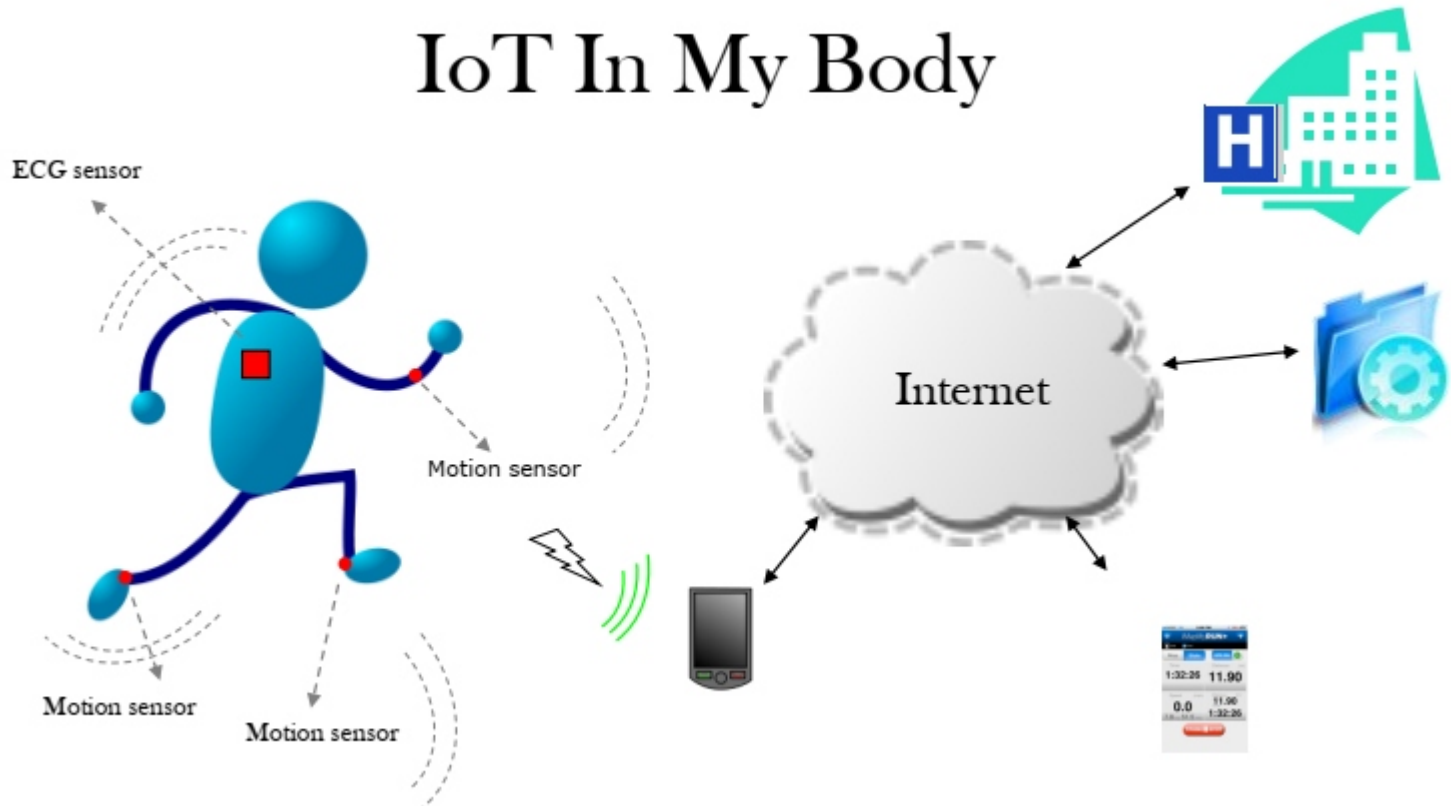

HOME
CONSUMER
TRANSPORT
MOBILITY
HEALTH
BODY
BUILDINGS
INFRASTRUCTURE
CITIES
INDUSTRY
Light bulbs
Security
Pet Feeding
Irrigation Controller
Smoke Alarm
Refrigerator
Infotainment
Washer / Dryer
Stove
Energy Monitoring
Traffic routing
Telematics
Package Monitoring
Smart Parking
Insurance Adjustments
Supply Chain
Shipping
Public Transport
Airlines
Trains
Patient Care
Elderly Monitoring
Remote Diagnostic
Equipment Monitoring
Hospital Hygiene
Bio Wearables
Food sensors
HVAC
Security
Lighting
Electrical
Transit
Emergency Alerts
Structural Integrity
Occupancy
Energy Credits
Electrical Distribution
Maintenance
Surveillance
Signage
Utilities / Smart Grid
Emergency Services
Waste Management


Landis+Gyr E450
12.7
28.0.
kWh
G3-PLC
10002053


nest
MON AUG 27
4¼ HR
3½ HR
0 MIN
Weather caused energy usage above the weekly average


60
98
nurse station

IoT In My Body



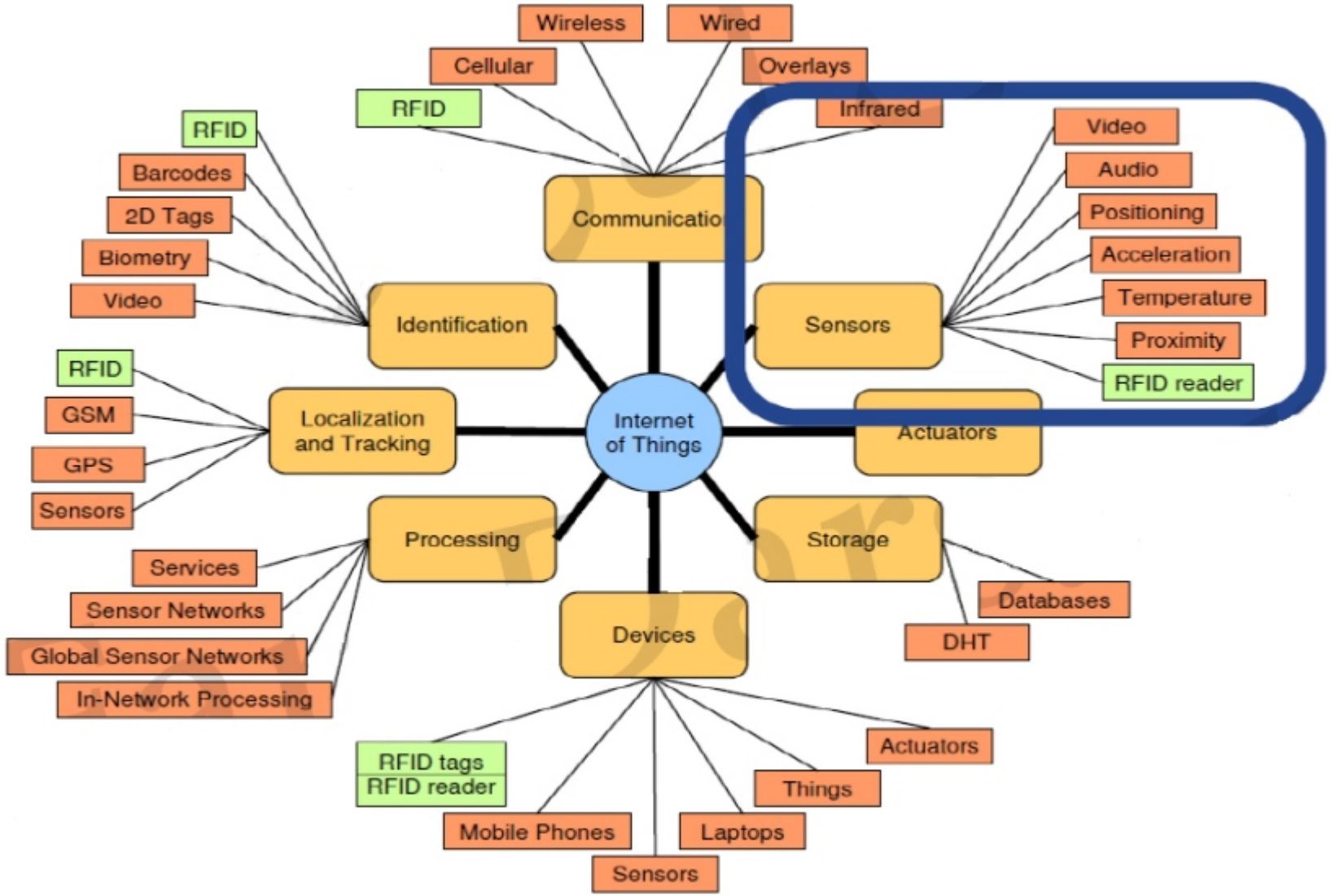
Why IoT?

- Humans tend to get too much information in a short time;
- Humans tend to control objects remotely;
- Humans tend to make objects automated;
- Humans tend to do their work earlier;
- Decrease hardware prices over time;
- Decrease hardware dimensions over time;
- Decrease hardware weights over time;
- Improve internet access;
- Development of wireless technology
- Increase data bandwidth, the computing power and speed, cheap access to information.

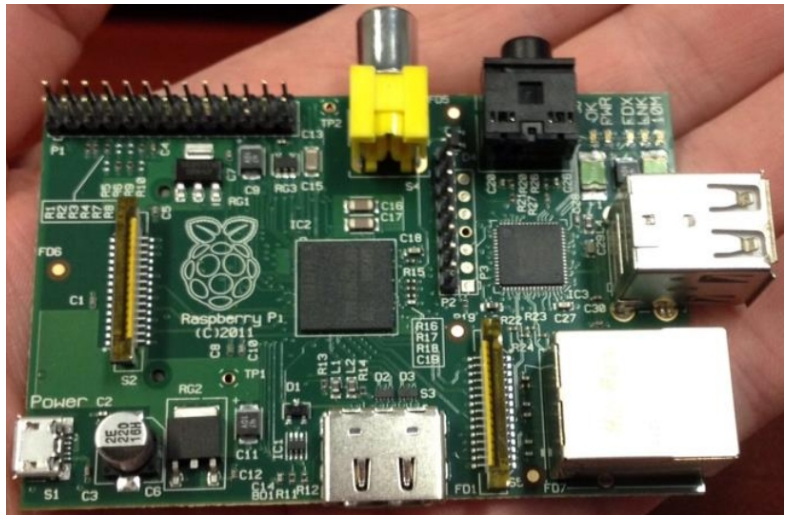
How Does it Work?

2.4

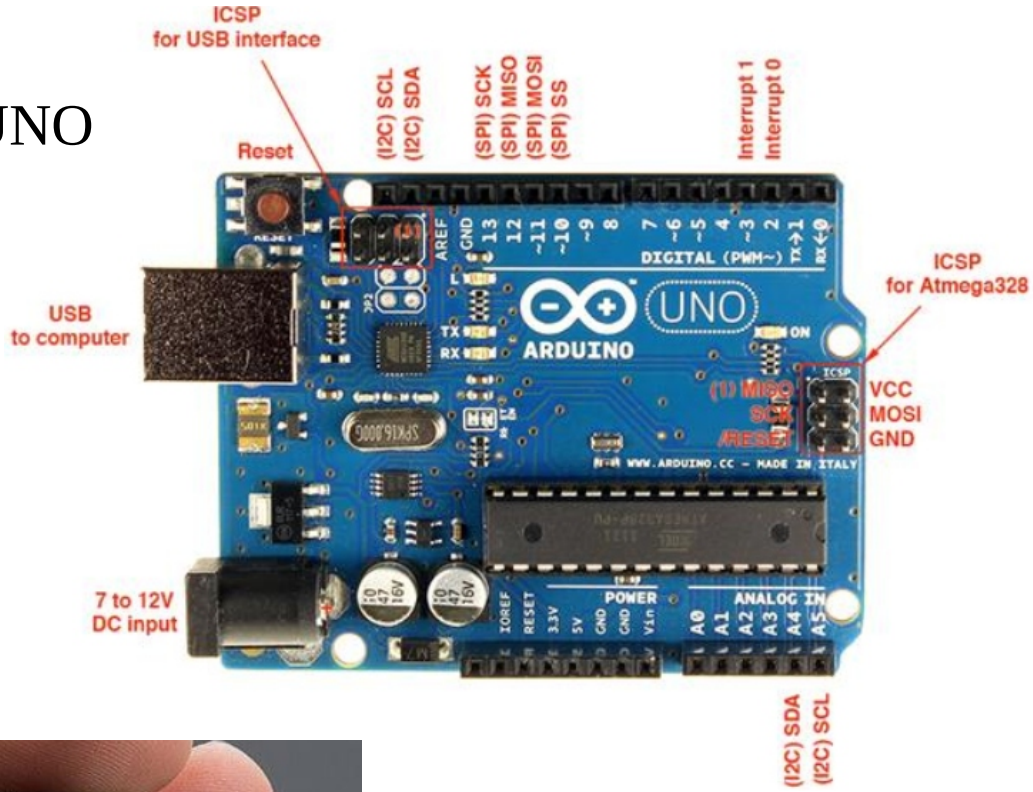
- ***First**, each "thing" on the Internet of Things must have a unique identity. Thanks to internet Protocol Version 6 (IPv6) address, the 128-bit next-generation Internet Protocol (IP) address can provide 2128 different addresses—that is about 6.7 × 1023 addresses per square meter. We should be able to assign a unique ID to every physical object on the planet.*
- ***Second**, each "thing" must be able to communicate. There are number of modern wireless technologies which make communications possible, such as WiFi, Bluetooth Low Energy, Near-field communication (NFC), RFID, as well as ZigBee, Z-Wave, and 6LoWPAN (IPv6 over Low power Wireless Personal Area Networks), etc.*
- ***Third**, each "thing" needs to have sensors so that we can get information about it. Sensors can be temperature, humidity, light, motion, pressure, infrared, ultrasound sensors, etc. The new sensors are increasingly getting smaller, cheaper, and more durable.*
- ***Fourth**, each "thing" needs to have a microcontroller (or microprocessor) to manage the sensors and communications, and to perform the tasks. There are many microcontrollers exist that could be used for IoT.*
- ***Finally**, we will need cloud services to store, analyze, and display data so that we can see what's going on and take action via phone apps. There are already a lot of big companies working on this, such as IBM's IBM Watson, Google's Google Cloud Platform, Microsoft's Azure, and Oracle's Oracle Cloud etc..*


Internet of Things
Communicatio
Wireless
Wired
Cellular
Overlays
RFID
Infrared
Identification
RFID
Barcodes
2D Tags
Biometry
Video
Sensors
Video
Audio
Positioning
Acceleration
Temperature
Proximity
RFID reader
Localization and Tracking
RFID
GSM
GPS
Sensors
Actuators
Processing
Services
Sensor Networks
Global Sensor Networks
In-Network Processing
Storage
Databases
DHT
Devices
RFID tags
RFID reader
Mobile Phones
Sensors
Laptops
Things
Actuators

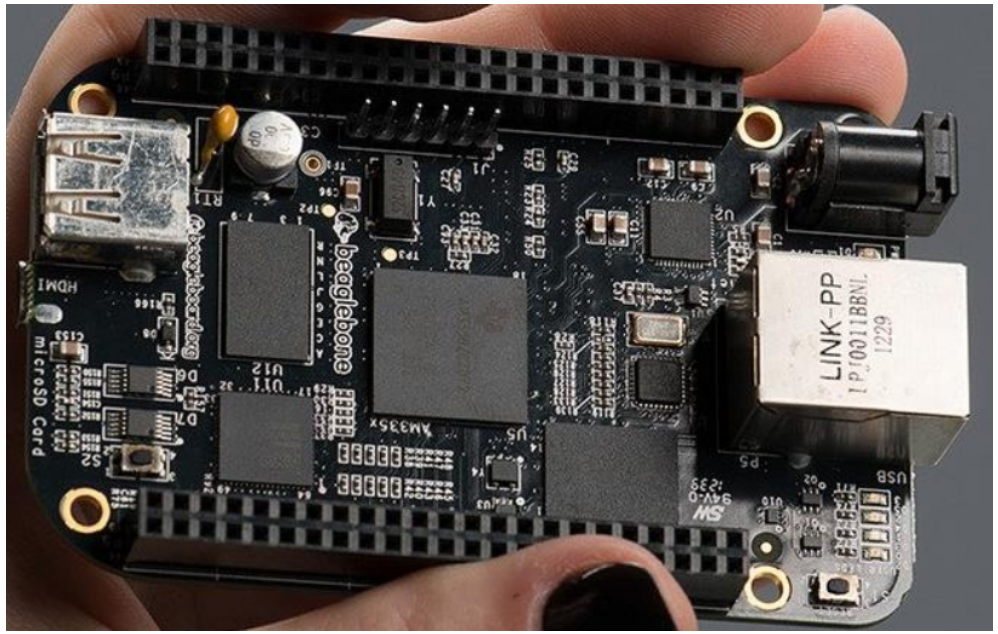
Raspberry Pi



Arduino UNO



Beaglebone Black



Good for sensors

Arduino
$25
ATmega328

ChipKIT
$30
PIC

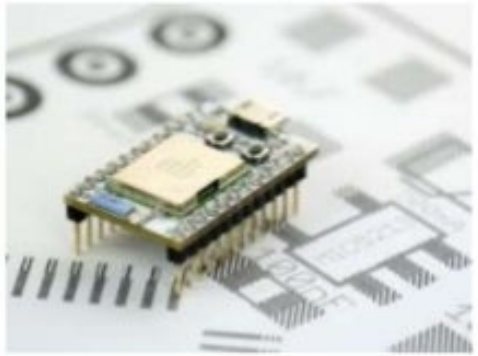
LaunchPad
$4
MSP430

Source: Polytechnic of Bucharest

Good for some sensors and processing

STM32
$30
ARM Cortex M0,
M3, M4

Particle
$35
ARM
WiFi Internet



Espruino
$30
ARM
Javascript

Source: Polytechnic of Bucharest

Good for processing and network

Raspberry Pi
$35
900 MHz ARM, GPU
1 GB RAM

Compute Module

Intel® Galileo
$50
400 MHz Quark x86
256 MB RAM

Intel® Edison
$70

1 GHz Dual Core Atom x86
1 GB RAM
WiFi
BLE
4 GB Flash

Source: Polytechnic of Bucharest

Good for processing and network

Beaglebone Black
$45
1 GHz ARM, GPU
512 MB RAM
4 GB Flash

UDOO Neo
$50
i.MX 6 Solo ARM, GPU
ARM M4
512 MB or 1 GB RAM

Parallella
$99
1 GHz Dual Core Zynq ARM
16 or 64 Epiphany CPUs

Source: Polytechnic of Bucharest

The Digital Mine

- *Digital mining helps to supervise factors affecting mine safety and production which include mine geology, mine pressure, hydrology, gas, fire, dust, transportation, etc., through local fiber network, GPRS/CDMA, microwave communication network, RFID devices and any other data transmission method.*
- *Using IoT technologies and the digital mine, one can realize transparent operation on the surface and in underground mines at all times and in all the mining areas and all the climatic conditions.*

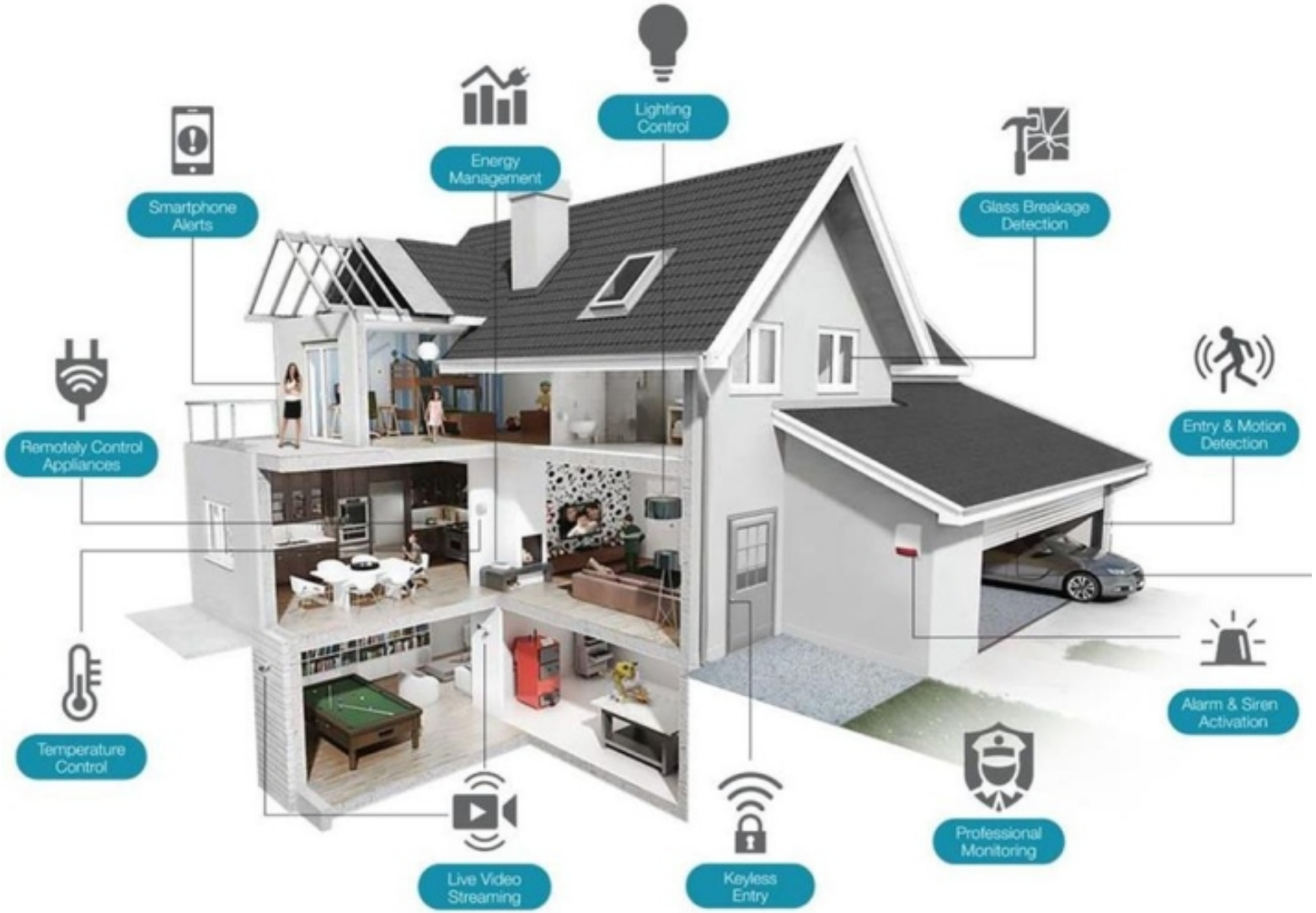
Applications

- Monitoring and Tracking of Underground Miners
- Monitoring of Gases
- Water Inrush and Waterlogged Area Monitoring
- Condition Monitoring of Mine Machinery
- Strata Monitoring of Underground Mines
- Mine Fire Detection and Early-Warning System
- Monitoring of Conveyor Belt and Coal Production
- Monitoring of Mine Ventilation
- Monitoring of Stowing Practices in Underground Mines

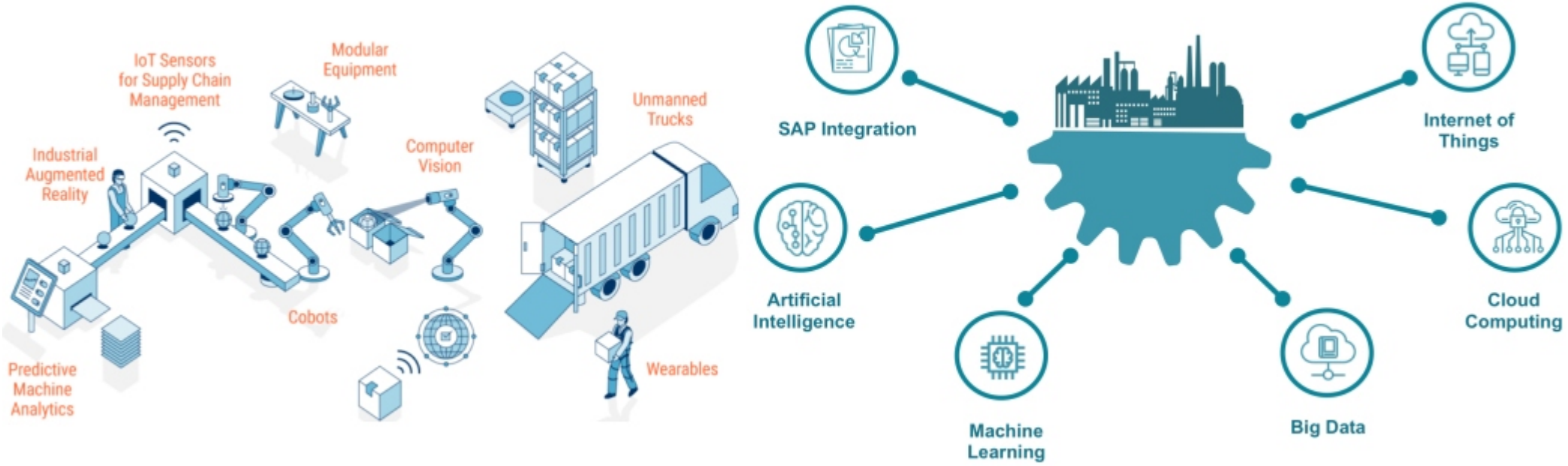
Anything can be part of the IoT

- Smart Home
- Smart Factory
- Smart City
- Smart Economy

Smart Home


Smartphone Alerts
Energy Management
Lighting Control
Glass Breakage Detection
Remotely Control Appliances
Entry & Motion Detection
Temperature Control
Alarm & Siren Activation
Live Video Streaming
Keyless Entry
Professional Monitoring

Smart Factory




SMART CITY
BUILDING TOMORROW'S CITIES
H

Smart Economy

Industrial revolution
technologies in building smart cities
leads to having smart economy