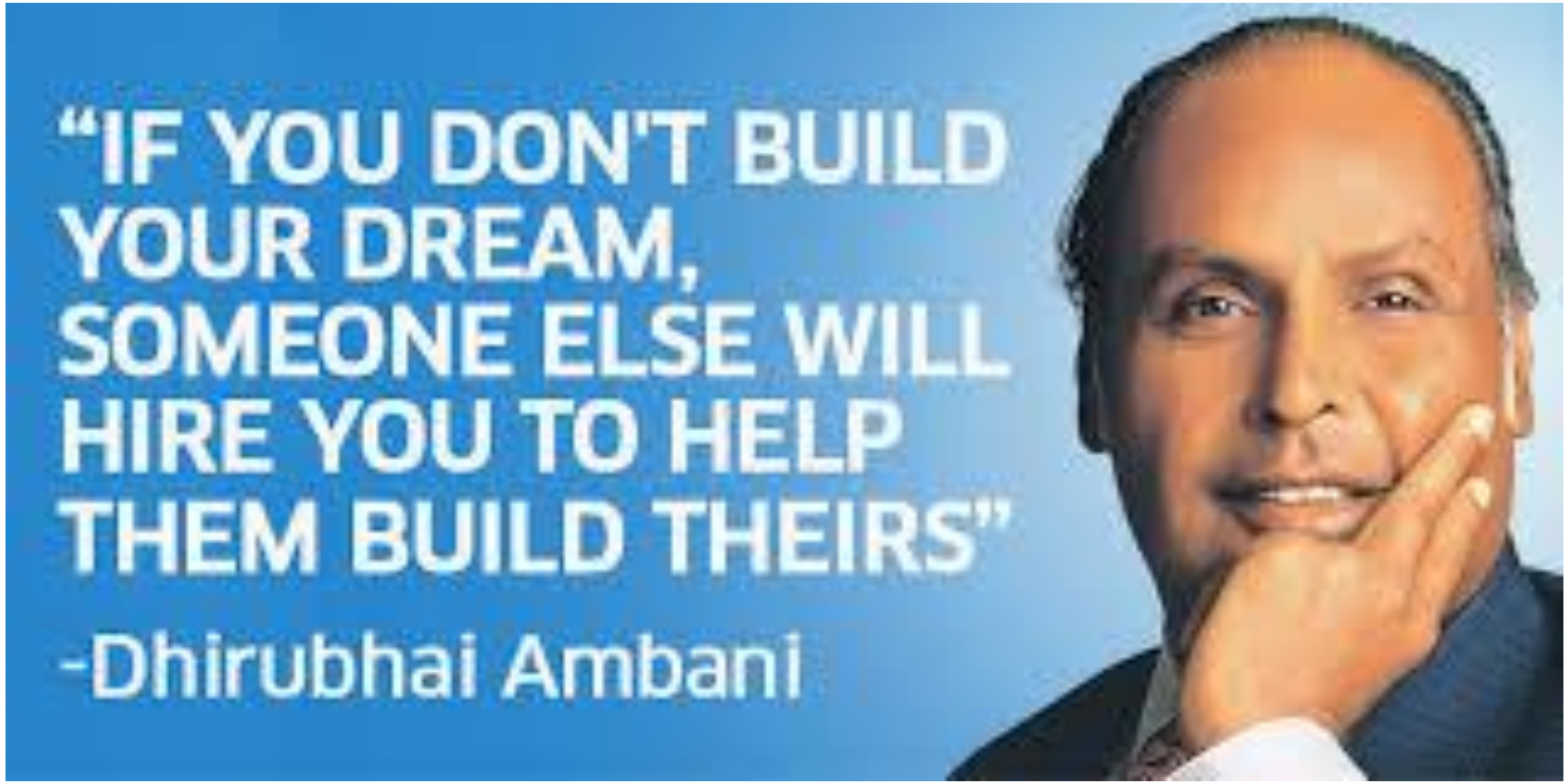
COMPONENTS OF IOT

CH 17 AUTOMATED ASSEMBLY SYSTEMS

Sections:

1. Fundamentals of Automated Assembly Systems
2. Quantitative Analysis of Assembly Systems


"IF YOU DON'T BUILD YOUR DREAM, SOMEONE ELSE WILL HIRE YOU TO HELP THEM BUILD THEIRS"
-Dhirubhai Ambani

INTERNET OF THINGS|

A Place Where Machines talk to Machines

COMPUTING

Using computers to accomplish tasks that are usually time consuming or not possible by humans

COMPUTING

Uses

- Business
- Education
- Entertainment
- Home
- Medical

The most commonly used feature in all of this is **Communication** ie. **Networks**

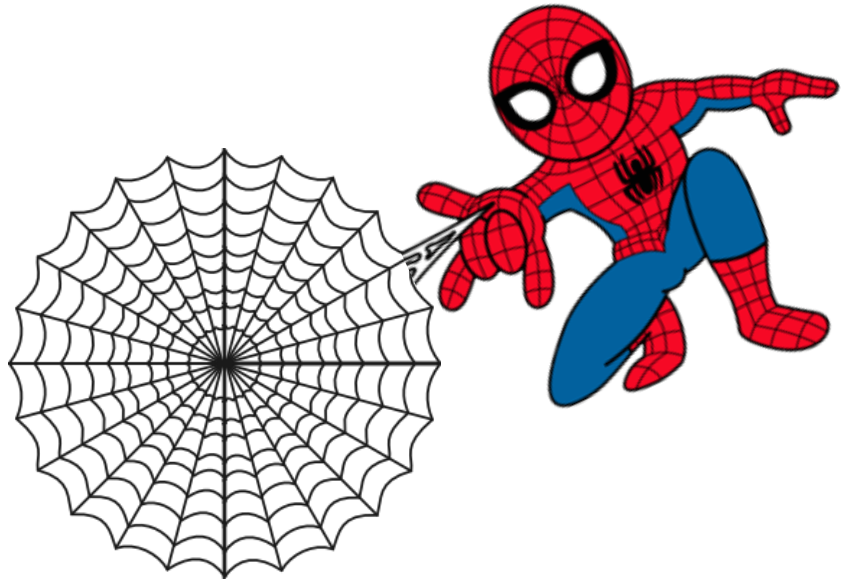
NETWORKS

The term networks/web is derived from the spiders web

The web is nothing but a series of interconnected computers

These interconnected computers are

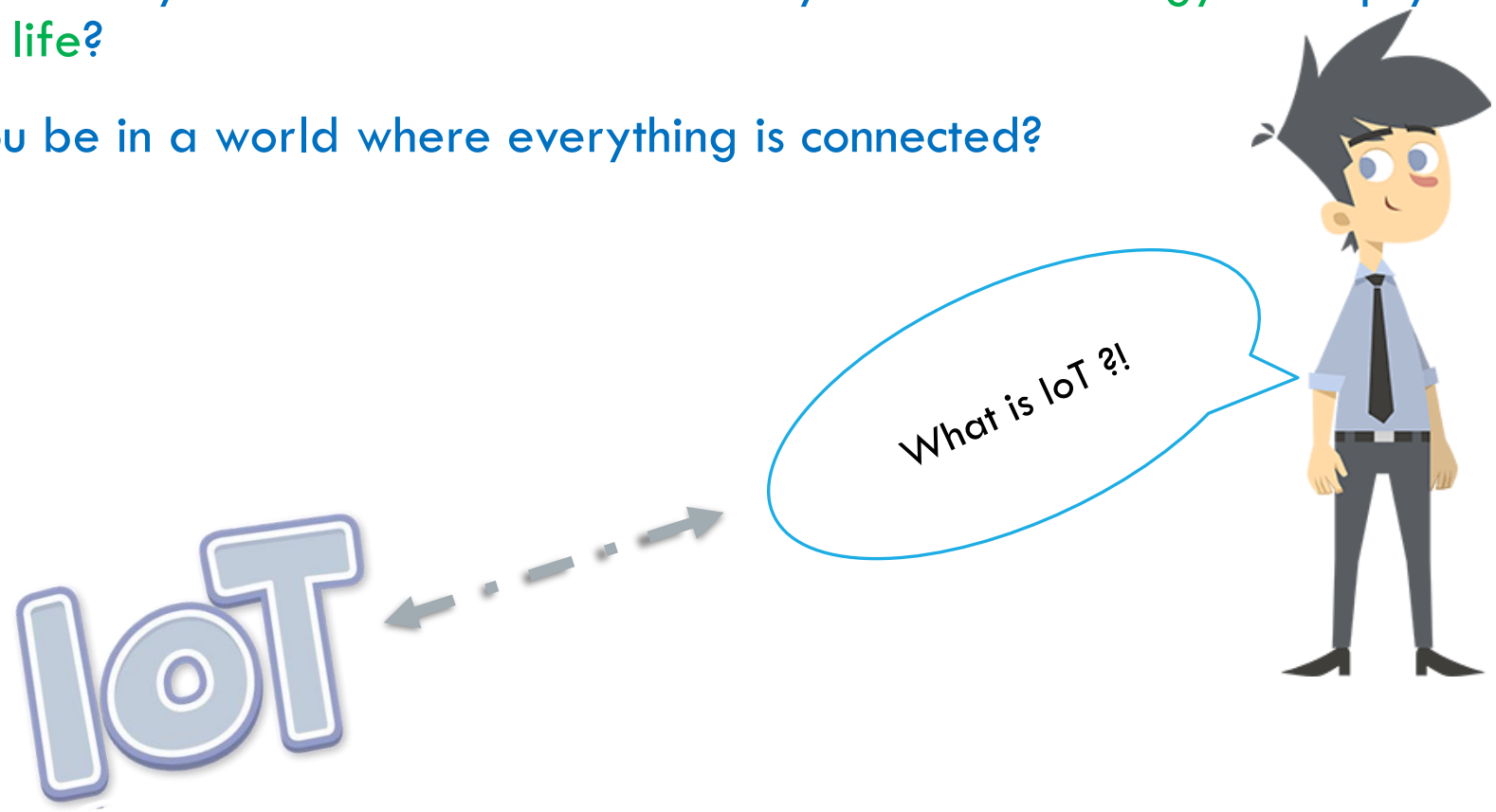
Also called as networks



WHAT IS IOT?

Imagine yourself ten years from now!! How would you like technology to help your every walk of life?

How would you be in a world where everything is connected?



THE INTERNET OF THINGS

- The term Internet of Things was first used by Kevin Ashton in 1999.
- Refers to uniquely identifiable objects (things) and their **virtual representations** in an Internet-like structure

INTRODUCTION

IoT – Internet of Things.

- Internet – communication through network (wire, wireless, satellite, etc.)
- Things – electronic devices (mobile, computer, sensor devices, etc.)

INTRODUCTION

Any time, Any place

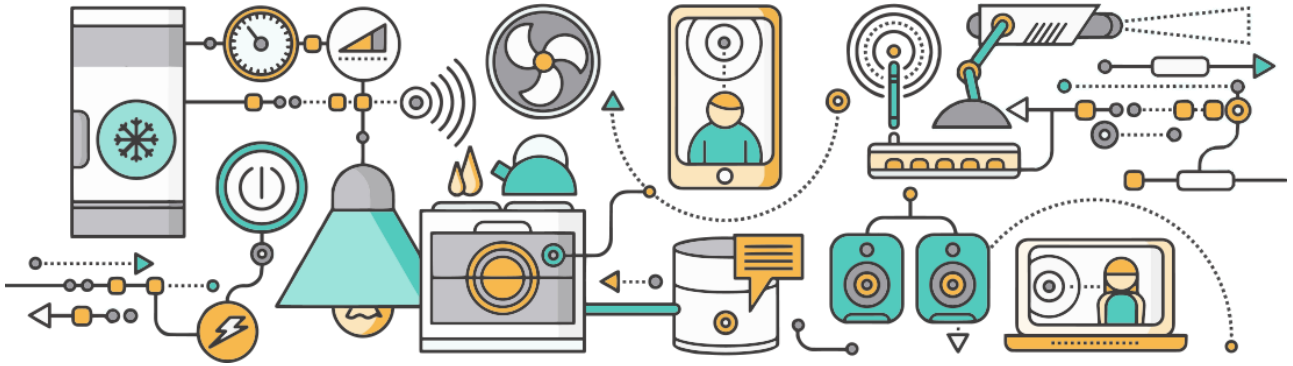
Connectivity for Everyone

Connectivity for Anything

IOT – INTERNET OF THINGS

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people

They are provided with unique identifiers (IP Addresses) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.



Examples:

Traffic Informat

Old Ma

Download from
Dreamstime.com
64333178
Wisconsinart | Dreamstime.com

AMBULANCE

Accidents time traf

CONCEPTS

CONCEPTS

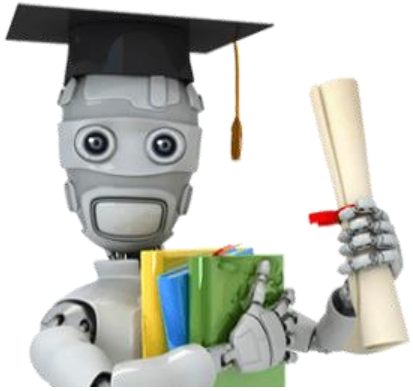
- Smart Sensor – Sensor + interfacing circuit

Capable of

- ❖ logic functions,
- ❖ Two-way communication,
- ❖ making decisions.

CONCEPTS

- Artificial Intelligence
- Machine Learning Algorithms - Predictive Modeling,
- Data Analytics



Provides the ability to learn without being explicitly programmed.

AI-ARTIFICIAL INTELLIGENCE

Old Machine – Do what I told(Do same work)

But AI – Smart Sensors

Ex: Light

AI-ARTIFICIAL INTELLIGENCE

Any system that exhibits behavior

that could be interpreted as human

intelligent

Sophia

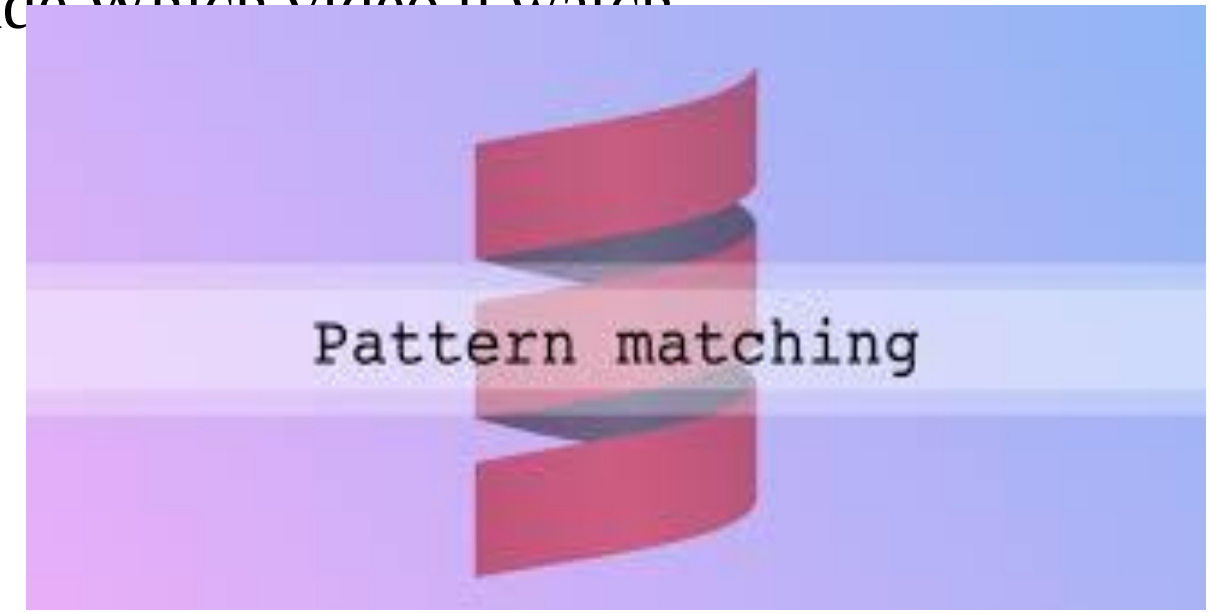
– Citizenship **(Saudi Arabia)**

AI

Everything is controlled by Computers..

Google can decide Which website u watch

YouTube can decide Which video u watch



Ex. 1. **Mobile can decide to**

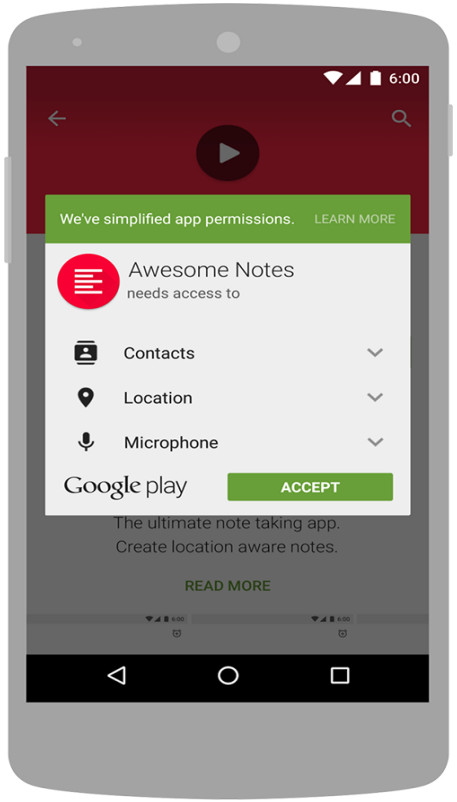
Change your contact number .

2. AMAZON

(cancer-pain relief)

3. Crime Prevention

That information cannot delete



Machines are good at forming symbolic connections…

You cannot call these symbolic connections as real intelligence

- John Sorrell, 1980

STRONG AI & WEAK AI

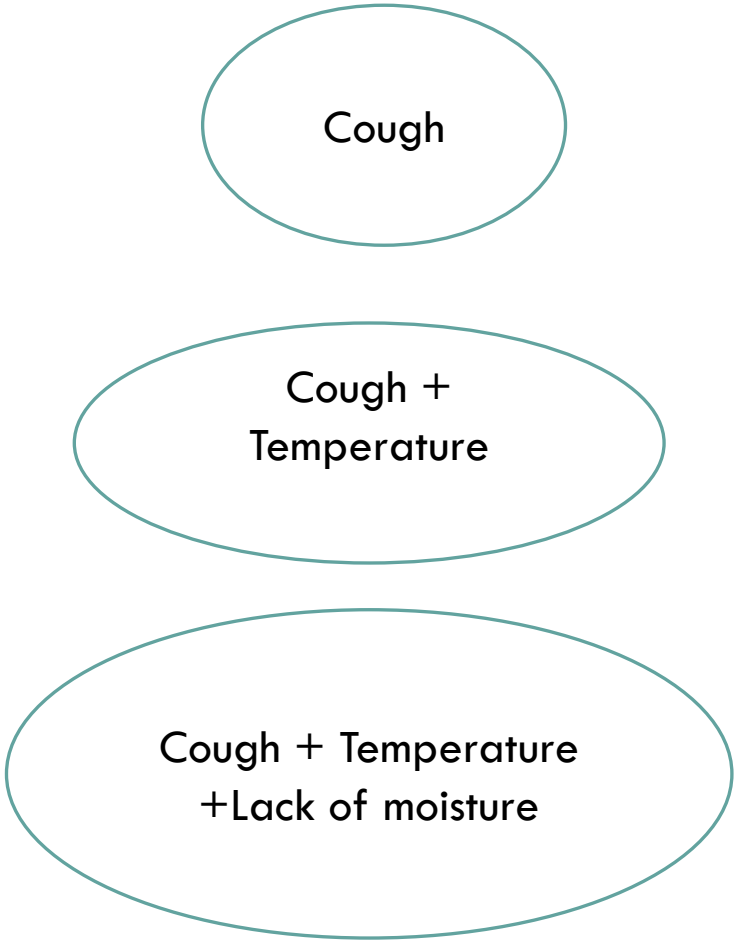
Strong AI

Machines displays all the person- like behaviour

Weak AI

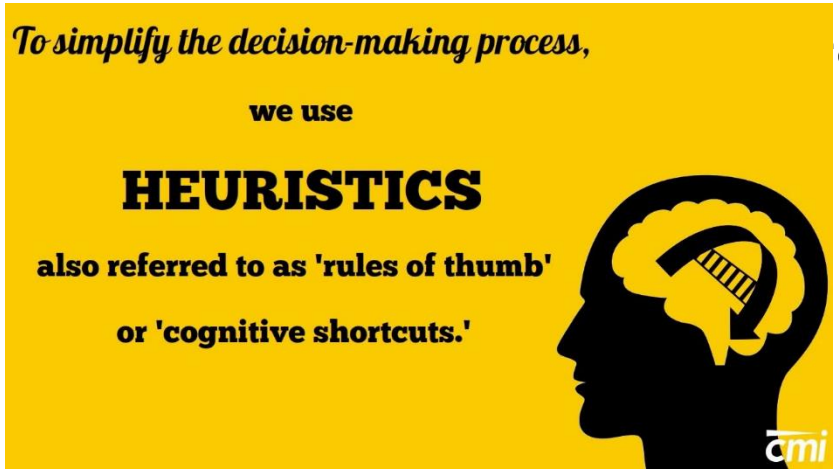
- Machine is confined to a very narrow task
- Small personal assistant – Siri, Ok Google, Cortana

EXPERT SYSTEM



Expert Systems Disappeared in Late 90s…

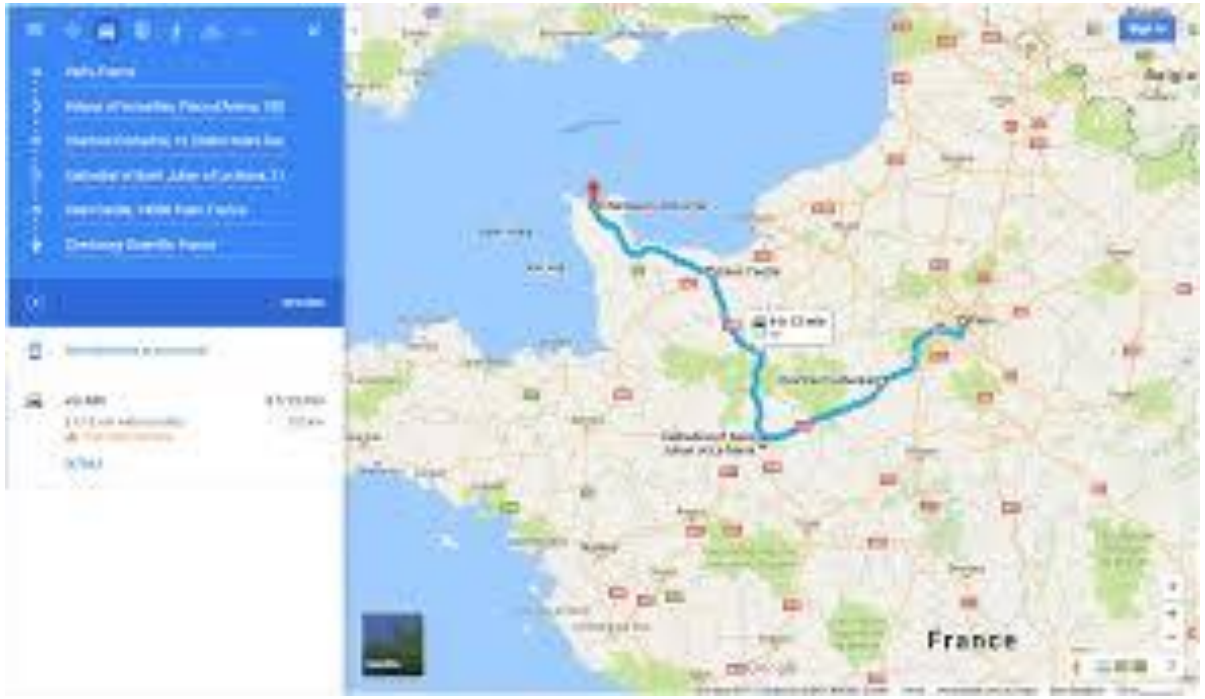
Then Came Heuristics….



arch space

Google Map is an example

You give start and the end points and then it explores possibilities ..



Symbolic Systems with Heuristics

- Driving Directions
- Logistics
- Video Games
- Commercial Reality – Real Estate Recommendation

Machine Learning

Algorithms that can learn from observational data, and can make predictions based on it

Case Study:

E-Commerce- Different Discounts

Make My Trip- Show different Rooms for different Peoples

Finding a pattern is a great deal

Bias:

-> Doctor don't do operation (based on MI)

-> Gambling

Data is an ever present and growing part of our life....

Humanity is produced a Tera byte of new data , per person , every year.

Huge part of it is transient data, that is not yet stored

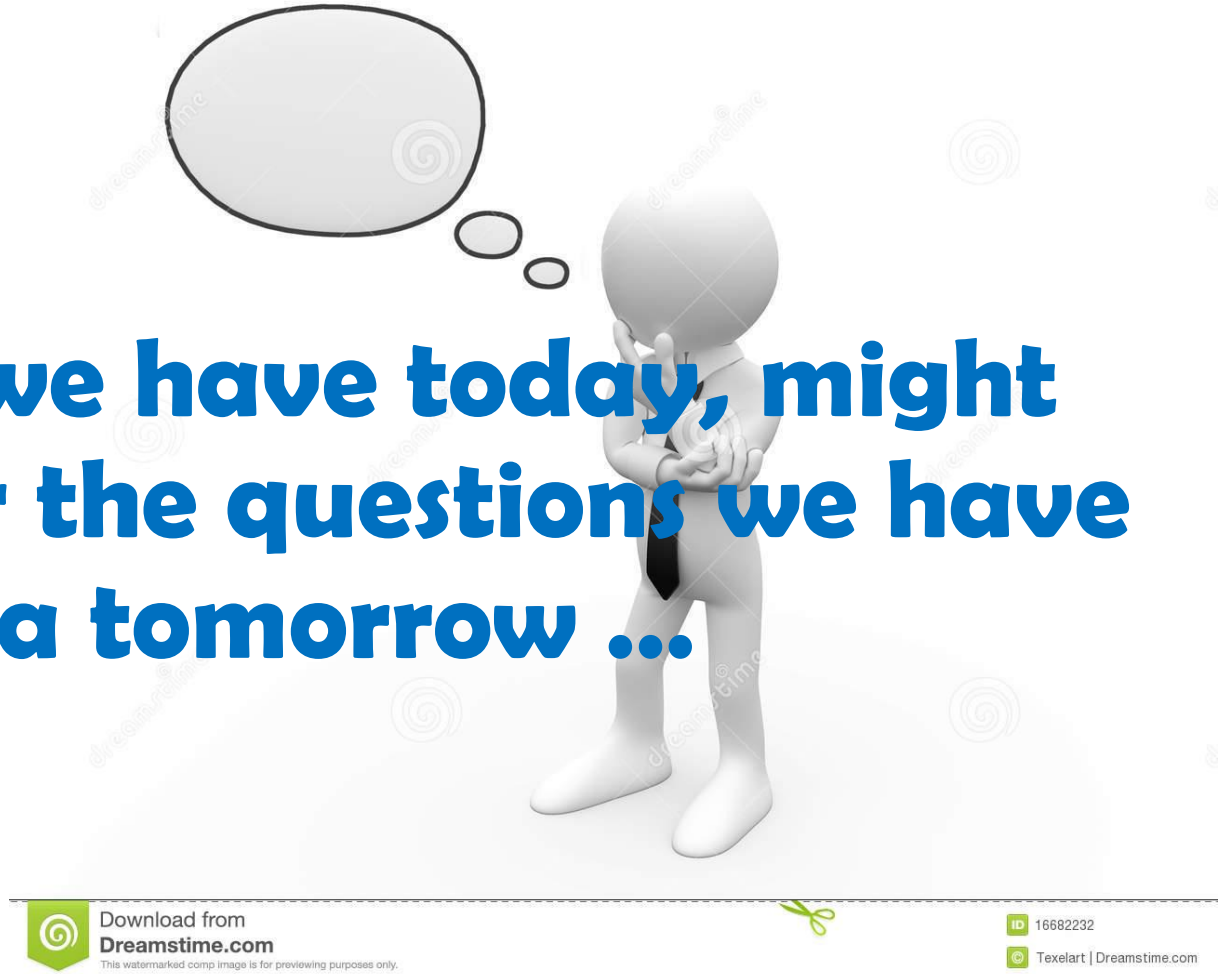
Even Induvial Datasets are Huge

Nasa earth orbiters

Streams in data at the rate of Gigabytes per second per device

Traditional methods do not work on these scales .....

The ideas we have today, might not answer the questions we have for the data tomorrow …



New question arise, as more data is being collected …

- That means , we need new ways to analyze data to gain insight..

DATA ANALYSIS

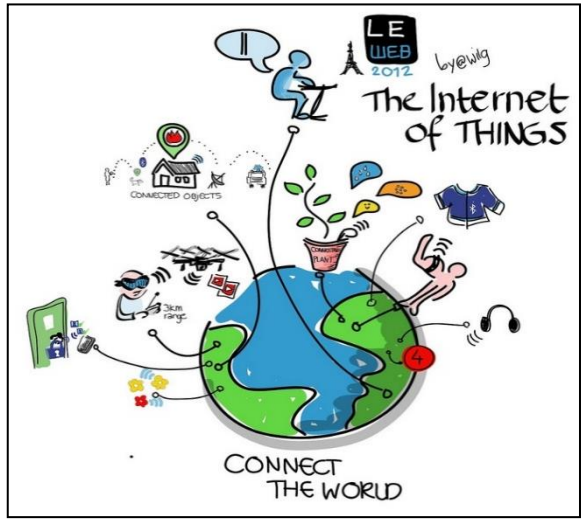
The combination of applied mathematics and computer science

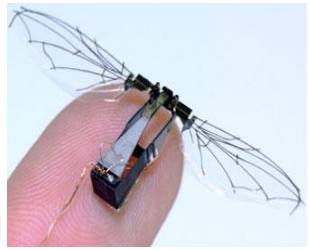
Data is organized , Analysed and put to use, Every Day…

Walmart, Amazon, Flipkart, Google Fit, etc.

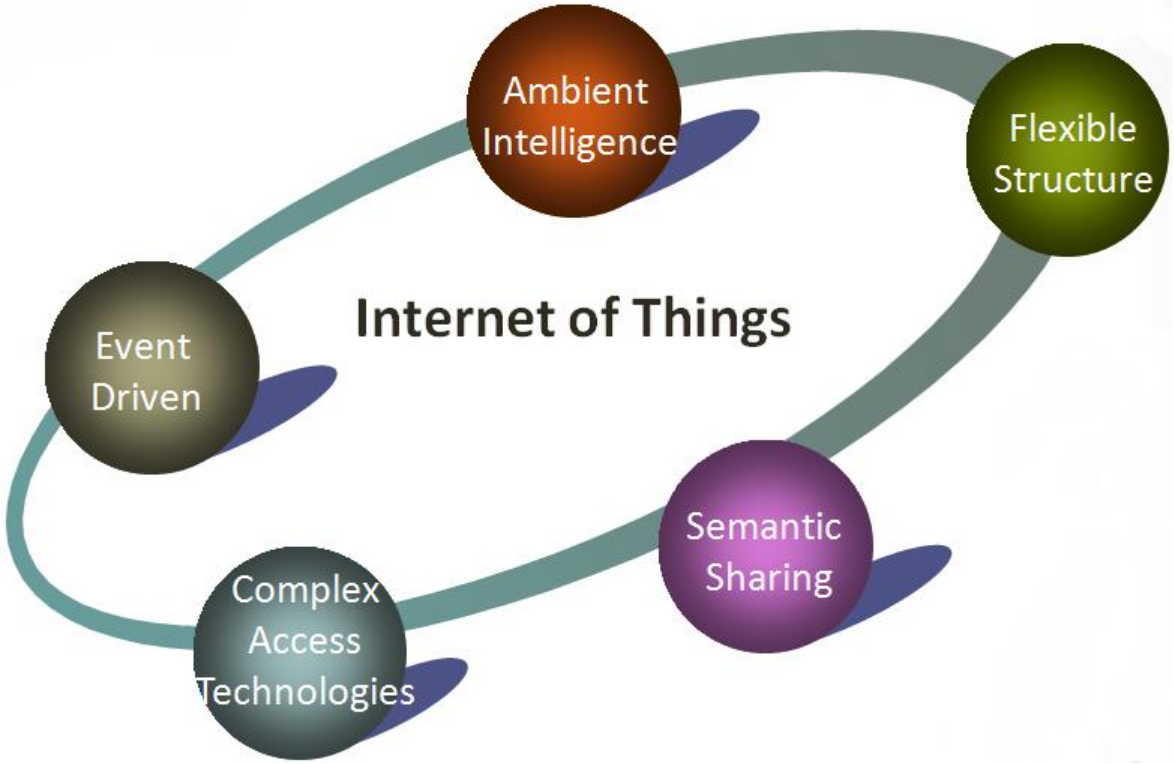
ESSENTIAL TECHNOLOGIES-IOT

- RFID Technology
  - Barcode e QR Code
- Sensor Technology
  - Sensors and smartphones
- Wireless Communication
- Energy Harvesting Technologies
- Cloud Computing
- Advanced Internet Protocol (IPv6)





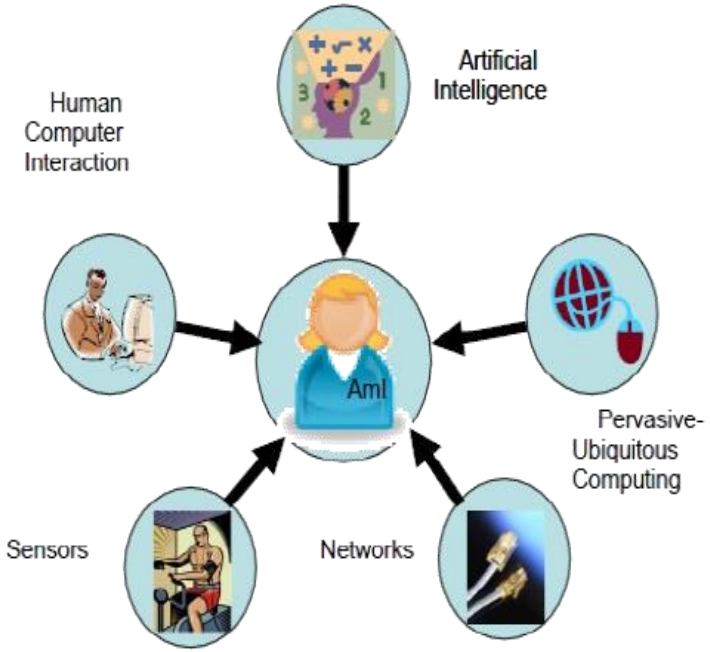
CHARACTERISTICS



INTELLIGENCE

- Digital environment - Brings intelligence to the living environments.
- Makes environments sensitive.

Adapts according to the user's needs.



FLEXIBLE STRUCTURE

Concentrates on modeling and simulating flexible

Elastic / Viscous / Viscoelastic

SEMANTIC SHARING

Sharing of unambiguous data.

Data + Interpretation

COMPLEX ACCESS TECHNOLOGY

Semi-open or closed loops access of technology.

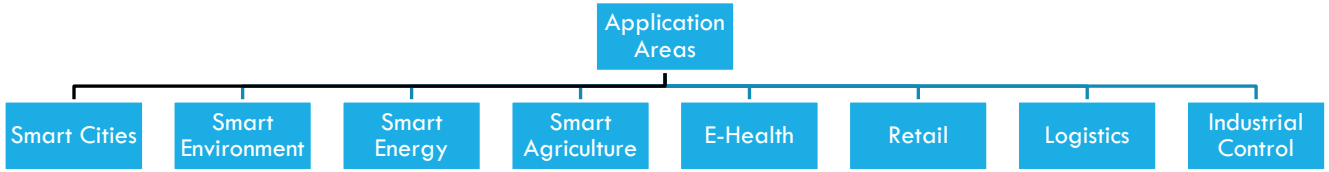
Huge number of different links and interactions between

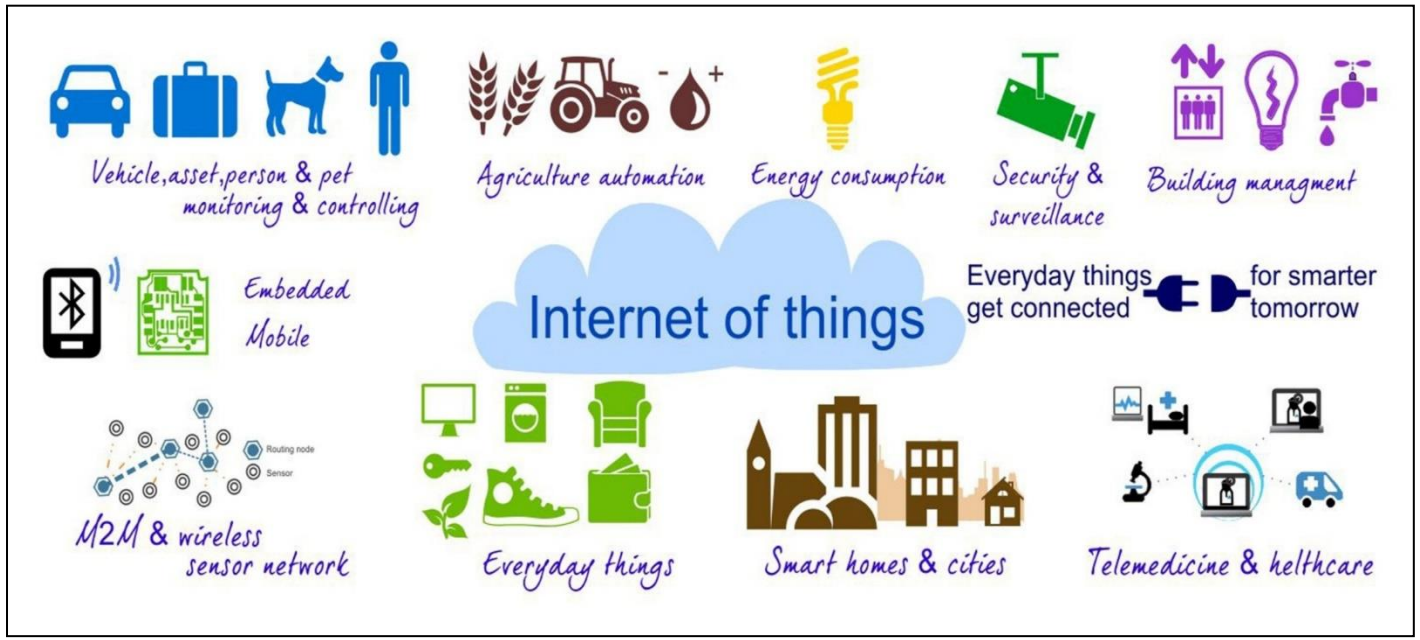
IOT ELEMENTS

- Object ID and address
- Gathering data
- Connect heterogeneous object
- Processing units and software applications
- Identity-related, Information Aggregation, Collaborative-Aware and Ubiquitous Services
- Extract knowledge smartly by different machines

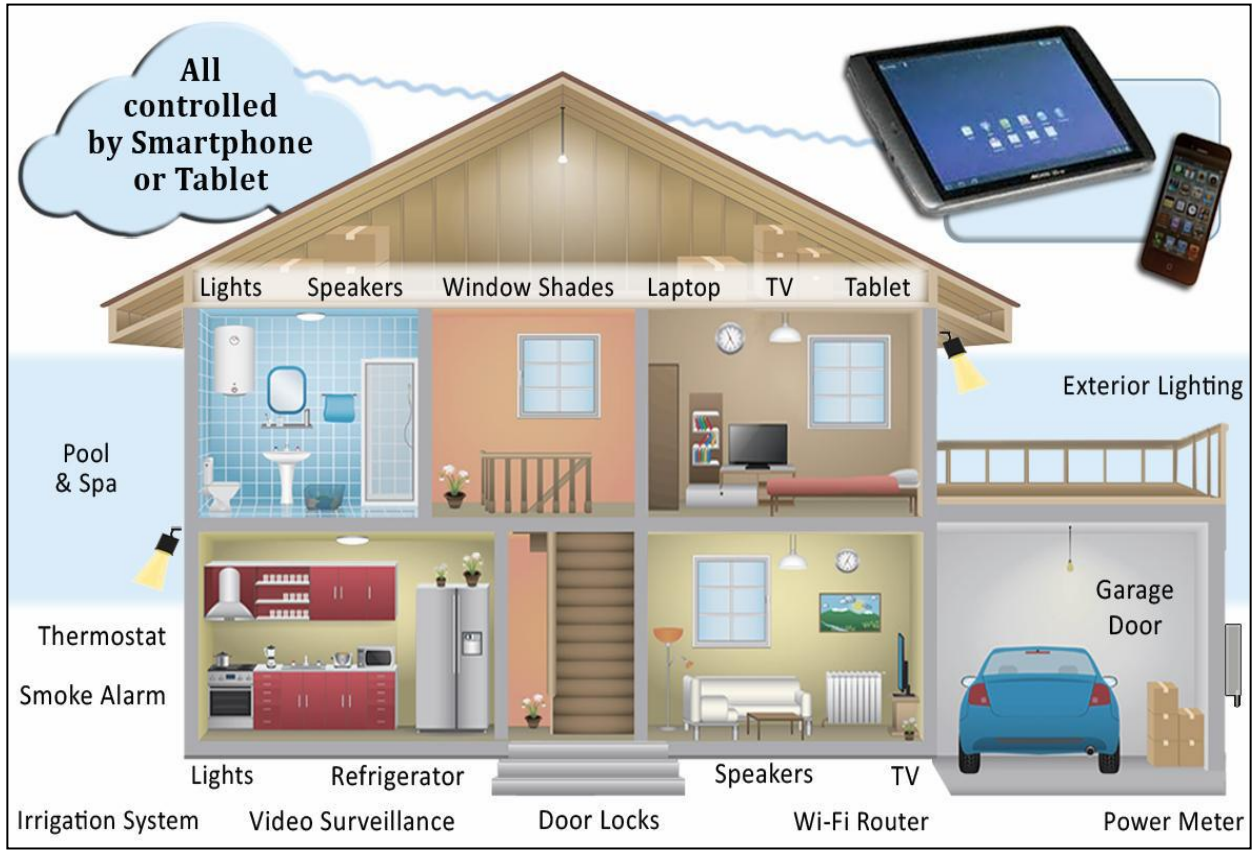
Ala A1-Fugaha et. al.

APPLICATIONS

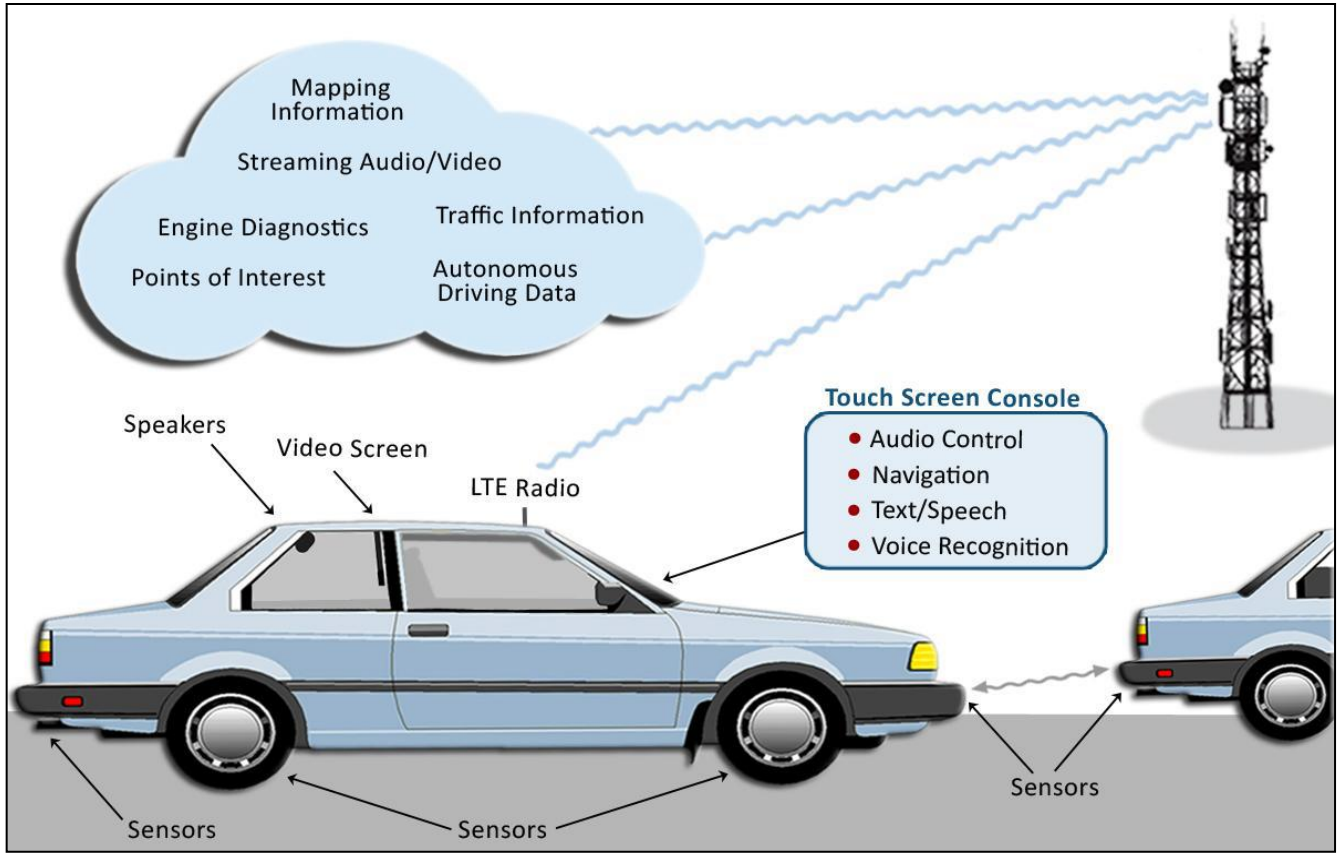

Application Areas
Smart Cities
Smart Environment
Smart Energy
Smart Agriculture
E-Health
Retail
Logistics
Industrial Control


Vehicle,asset,person & pet monitoring & controlling
Agriculture automation
Energy consumption
Security & surveillance
Building managment
Embedded
Mobile
Internet of things
Everyday things get connected
for smarter tomorrow
Routing node
Sensor
M2M & wireless sensor network
Everyday things
Smart homes & cities
Telemedicine & helthcare

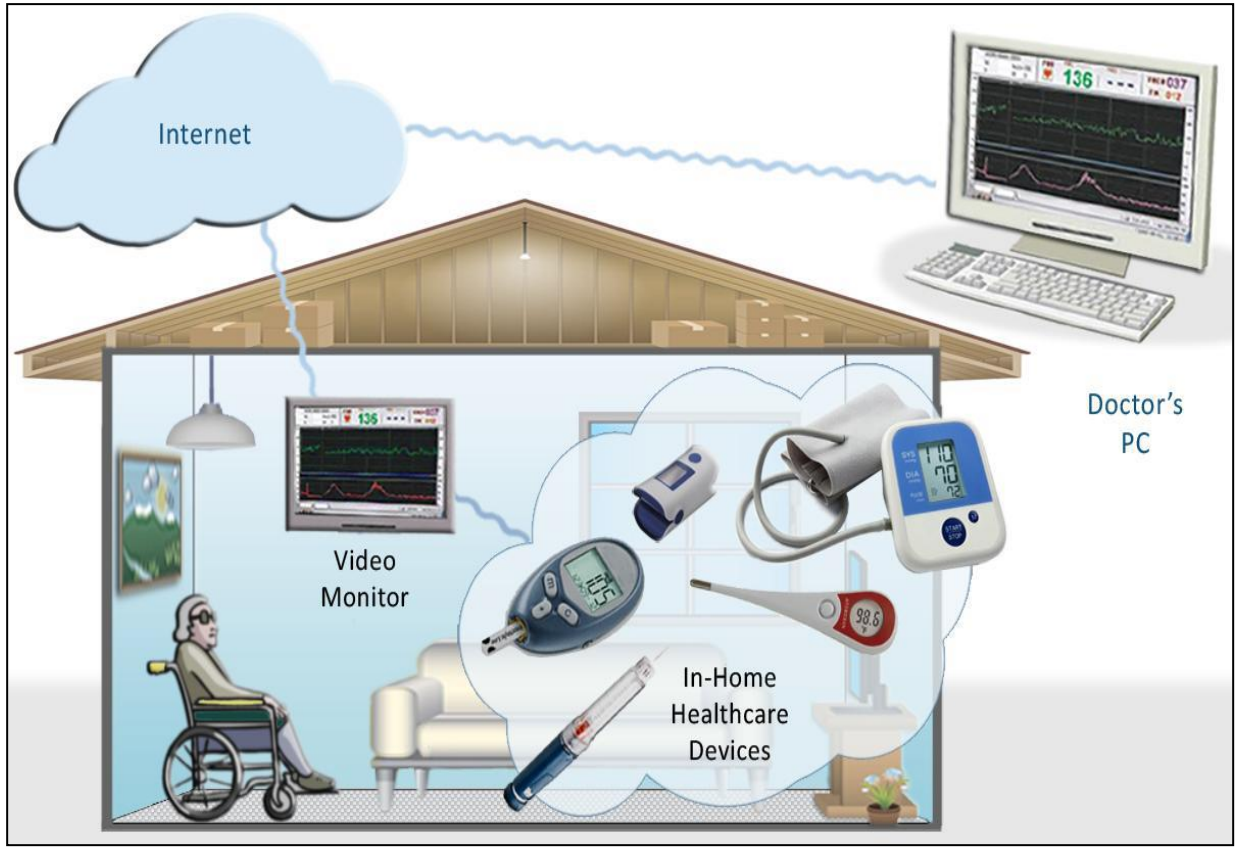
Smart Home


All controlled by Smartphone or Tablet
Lights
Speakers
Window Shades
Laptop
TV
Tablet
Exterior Lighting
Pool & Spa
Thermostat
Smoke Alarm
Garage Door
Lights
Refrigerator
Speakers
TV
Irrigation System
Video Surveillance
Door Locks
Wi-Fi Router
Power Meter

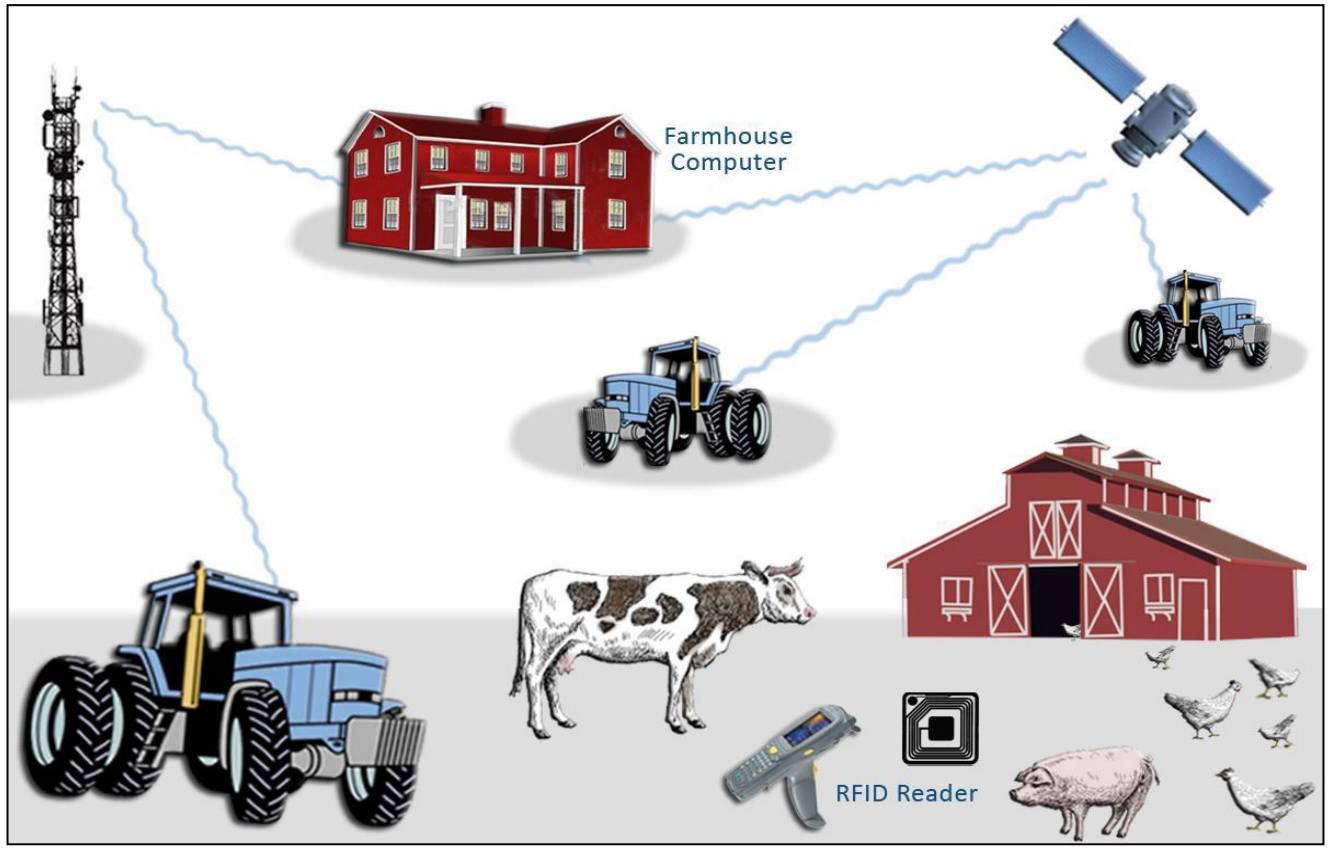
Smart Cars


Mapping Information
Streaming Audio/Video
Engine Diagnostics
Traffic Information
Points of Interest
Autonomous Driving Data
Touch Screen Console
Audio Control
Navigation
Text/Speech
Voice Recognition
Speakers
Video Screen
LTE Radio
Sensors
Sensors
Sensors

E-Healthcare



Smart Farms



SCENARIO: SHOPPING

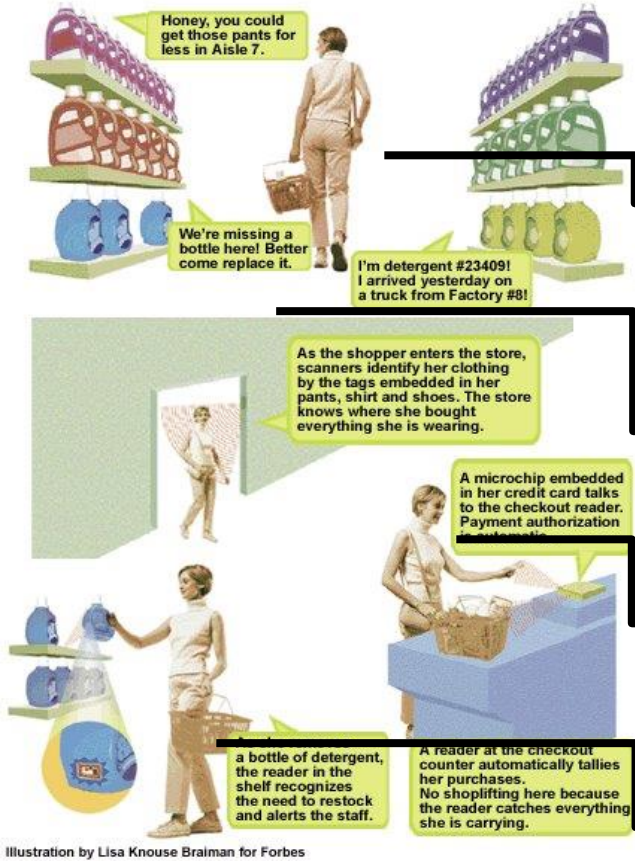


Illustration by Lisa Knouse Braiman for Forbes

(2) When shopping in the ~~market, the goods will~~ introduce themselves.

(1) When entering the doors, ~~scanners will identify the~~ tags on her clothing.

(4) When paying for the goods, the microchip of the credit card will communicate with checkout reader.

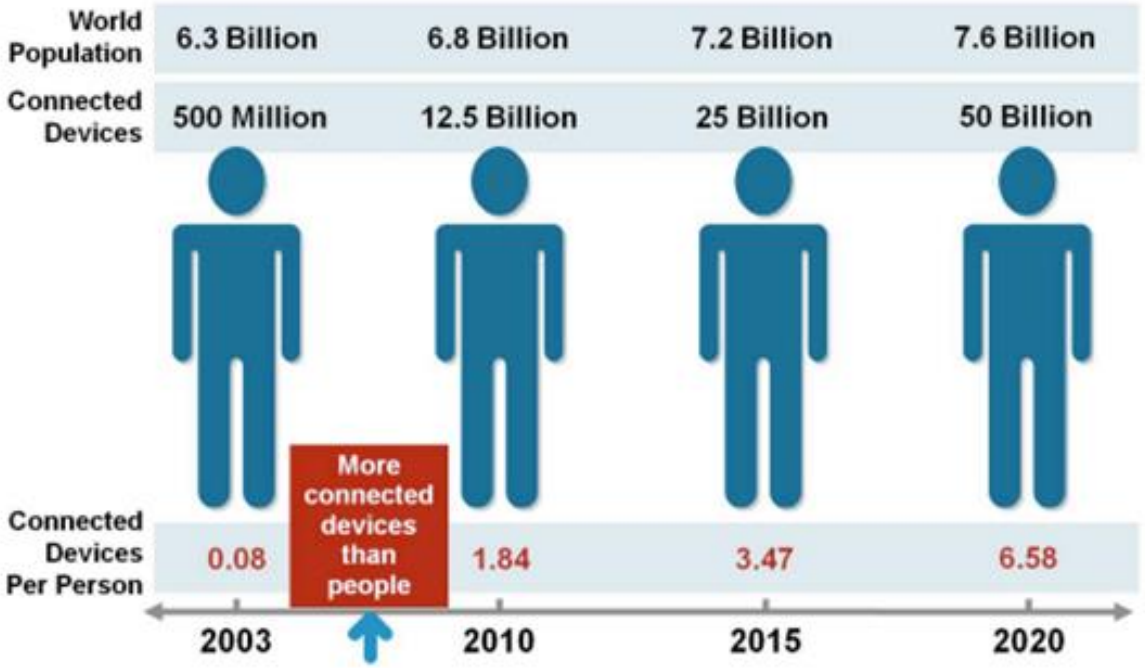
(3) When moving the goods, ~~the reader will tell the staff~~ to put a new one.

SMART JAR

45% SAVINGS
Features
Intelligent Inspired Intuitive
Real-time Nutrition
Recipes
Consumption Tracking
Freshness Alerts
Fitness Sync
Zero Touch Shopping

BPA-Free
LED Light Ring
Detachable Base
Load Cell
Bluetooth LE & Sensors
Wireless Charging

INTERNET USAGE AND POPULATION STATISTICS



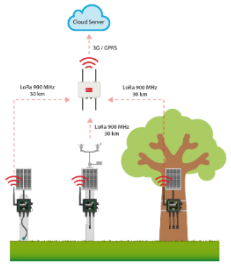
Source: Cisco IBSG, April 2011

COMPONENTS OF IOT

A thing, in the Internet of Things

- can be a person with a BP monitor implant
- a farm animal with a biochip transponder
- an automobile that has built-in sensors to alert the driver when tire pressure is low
- any other natural or man-made object

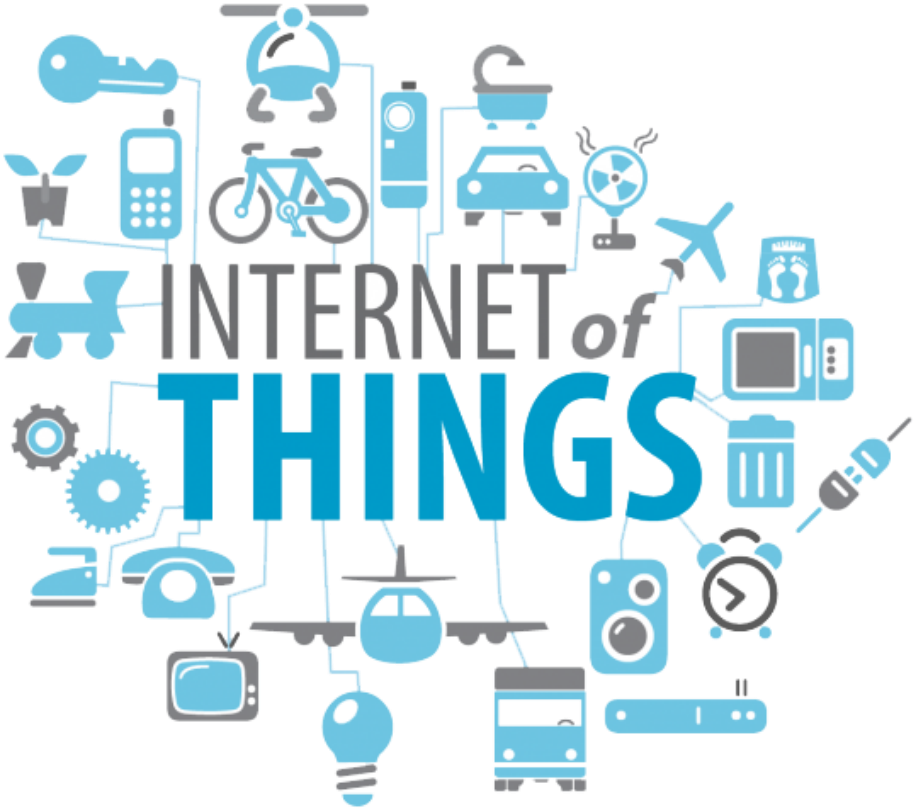
that can be assigned an IP address and provided with the ability to transfer data over a network



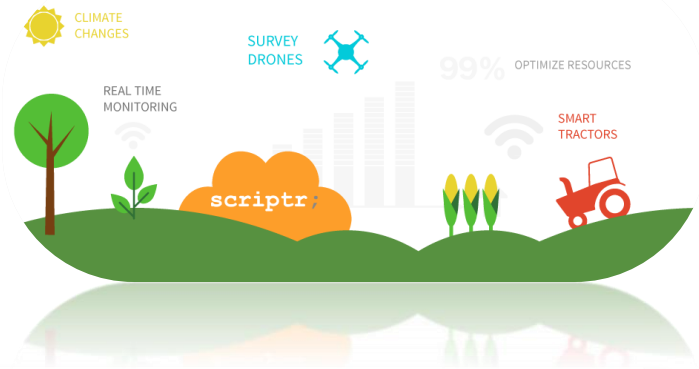
COMPONENTS OF IOT

IoT is a combination of

- Sensors
- Networks
- Standards
- Intelligent Analysis
- Intelligent Actions

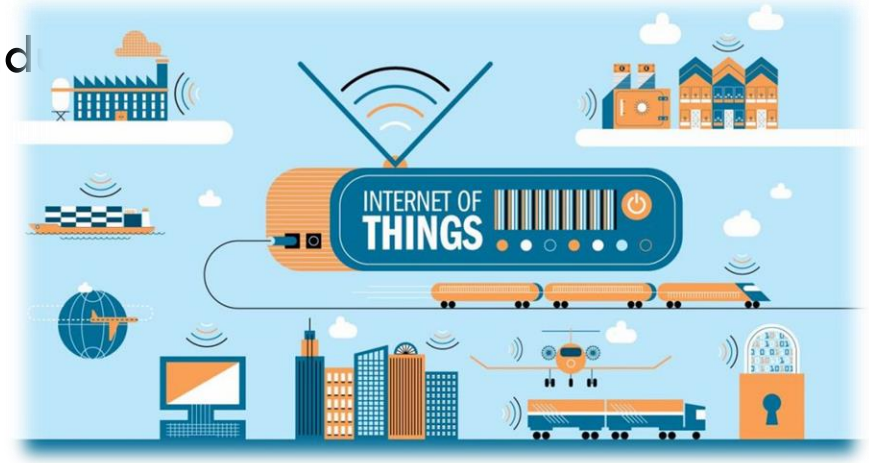


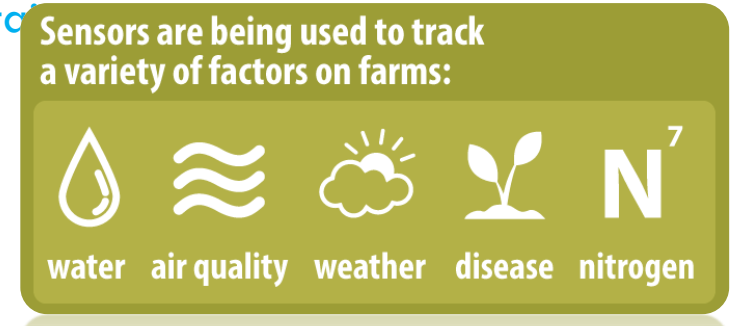
APPLICATIONS OF IOT

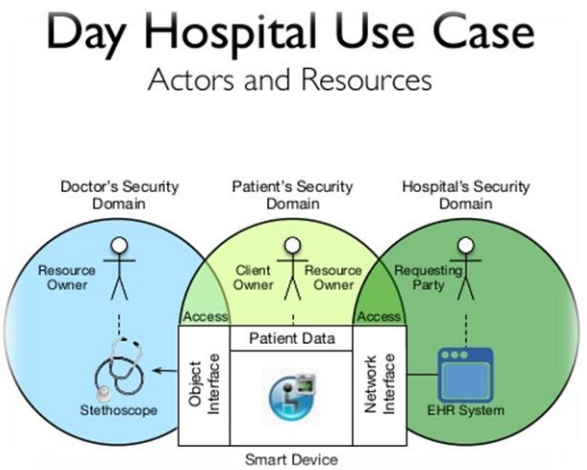


IoT is used and will be used in almost every ind

- Academic
- Transport
- Logistics
- Healthcare & Tracking
- Agriculture
- Fitness
- Smart Cities
- Ambient Living
- Entertai

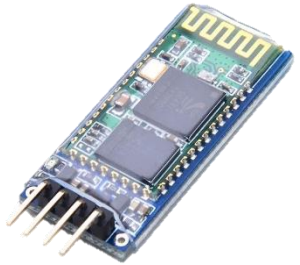






COMMUNICATION TECHNOLOGIES

Signals collected by sensors can be transferred over networks

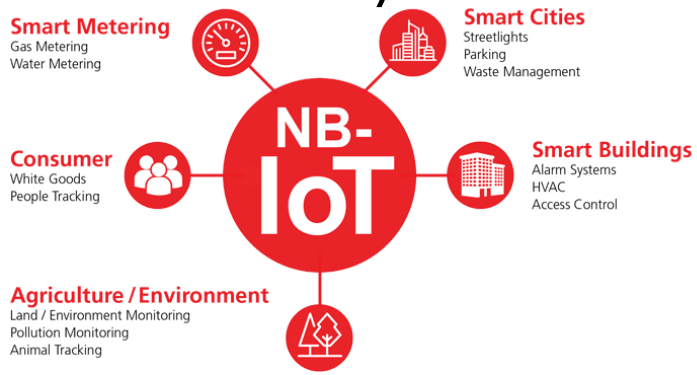


Different components of a typical network includes

- Routers
- Bridges in different topologies including LAN, MAN, PAN, BAN and WAN.

Connecting the different parts of networks to the sensors can be done by different technologies including

- Wi-Fi, Bluetooth
- Low Power Wi-Fi
- Ethernet
- Long Term Evolution (LTE) (Cellular IoT)
- Li-Fi

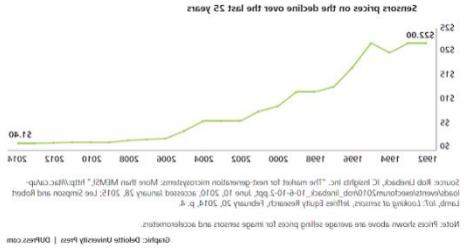


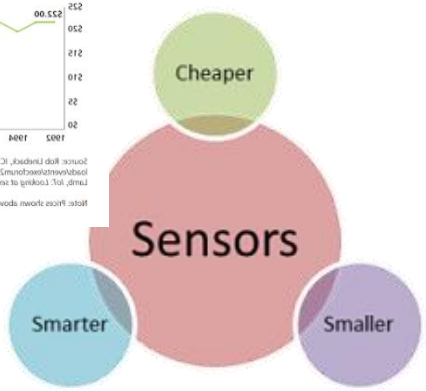
TYPES OF SENSORS

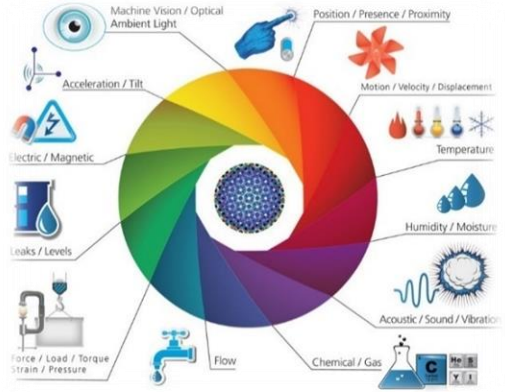
Types of Sensors: Active Sensors & Passive Sensors

The selection of sensors greatly impacted by many factors, including:

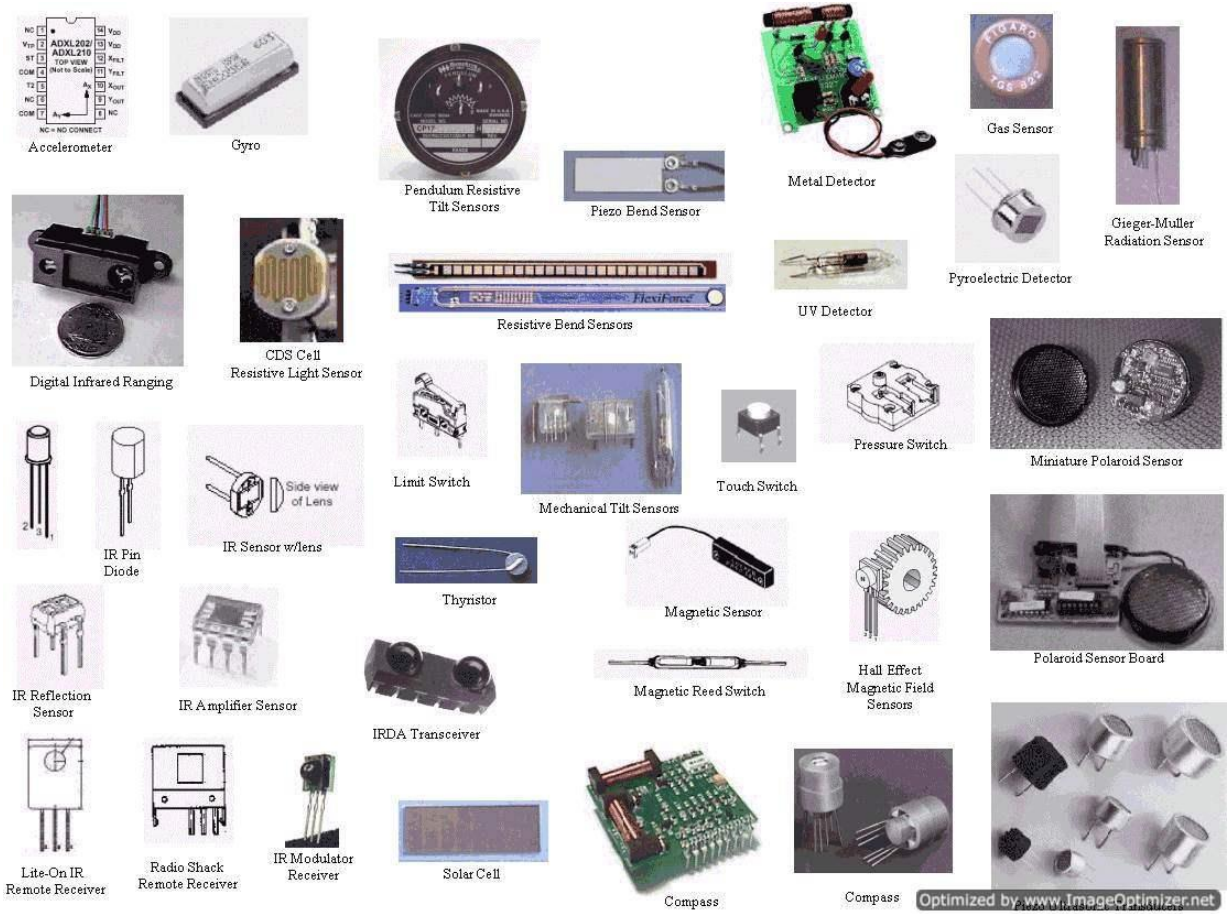
- Purpose (Temperature, Motion, Bio…etc.)
- Accuracy
- Reliability
- Range
- Resolution
- Level of Intelligence (dealing with noise and interference)







TYPES OF SENSORS



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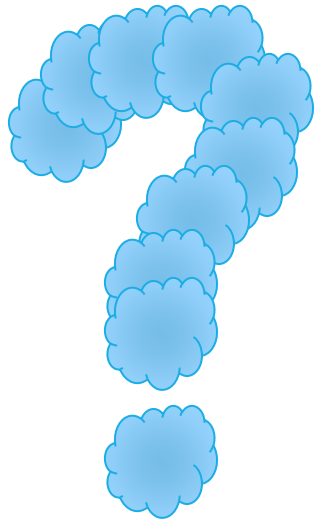
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