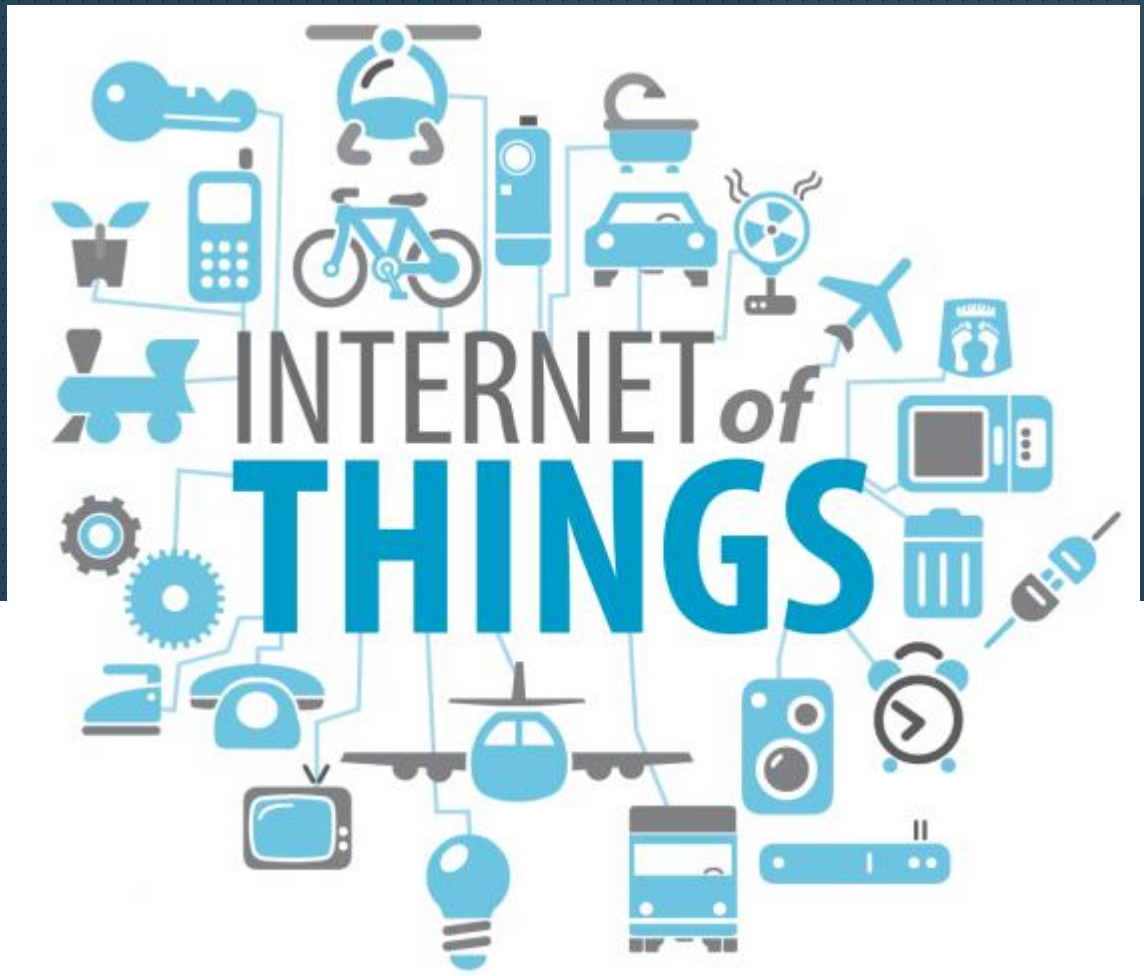
Introduction to IoT



What is IoT

Network of Physical Objects

- Internet of Things (IoT) comprises things that have unique identities and are connected to the Internet
- The focus on IoT is in the configuration, control and networking via the Internet of devices or “Things” that are traditionally not associated with the internet
  - Eg: pump, utility meter, car engine
- IoT is a new revolution in the capabilities of the endpoints that are connected to the internet

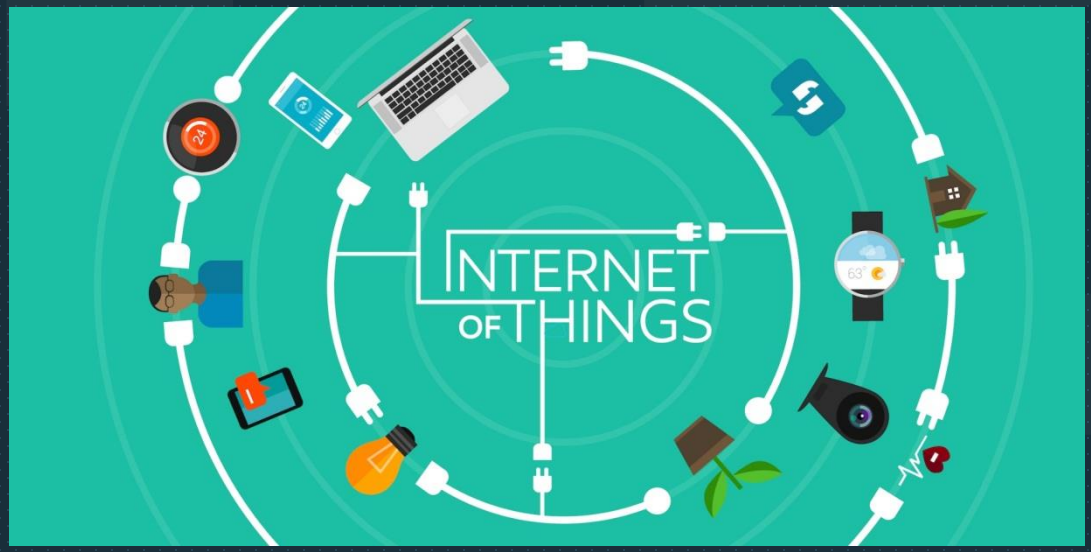
What is IoT

Network of Physical Objects

- The Scope of IoT is not limited to just connecting things (device, appliances, machines) to the Internet
- IoT allows these things to communicate and exchange data (control& information)
- Processing on these data will provide us various applications towards a common user or machine goal

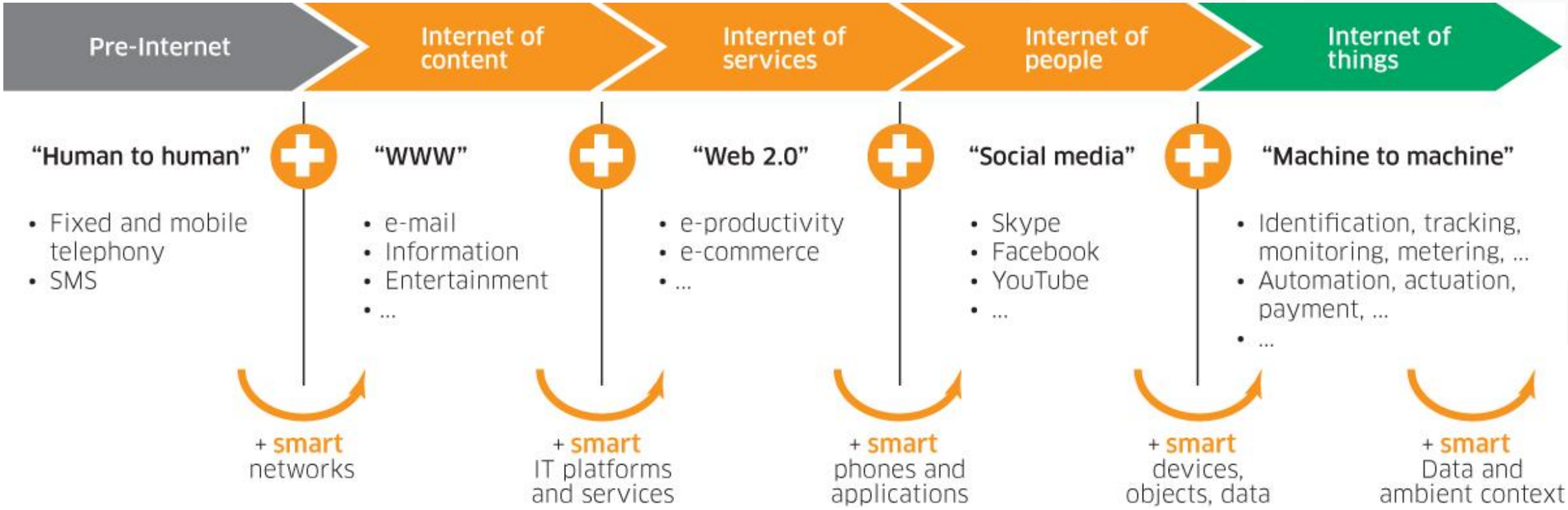
Idea: Move from Internet of People → Internet of Things

- Internet appears everywhere in the world
- It is primarily connection between people



- Internet of Things is a plan to connect things also using the same medium

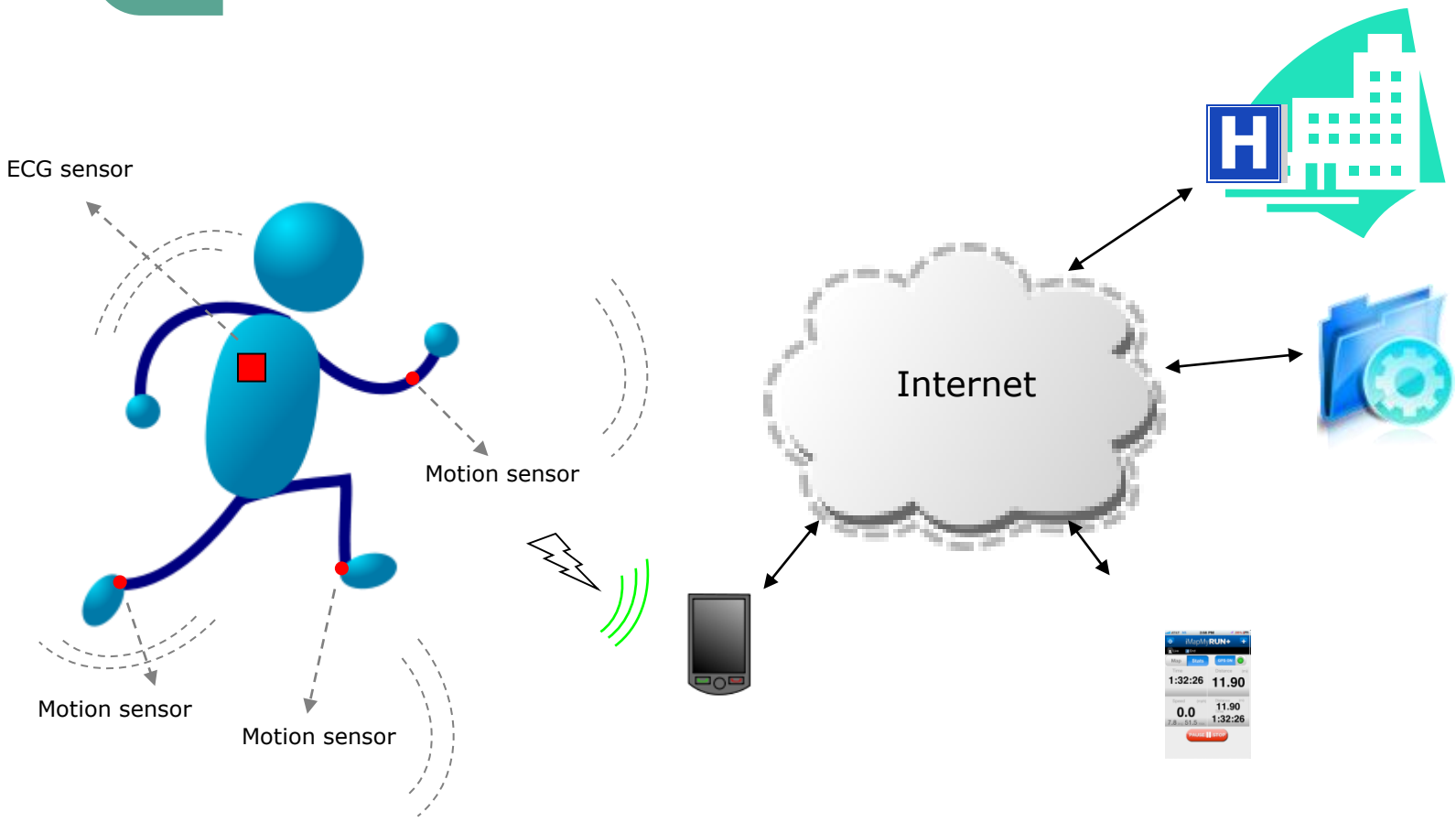
Internet of Things - Evolution



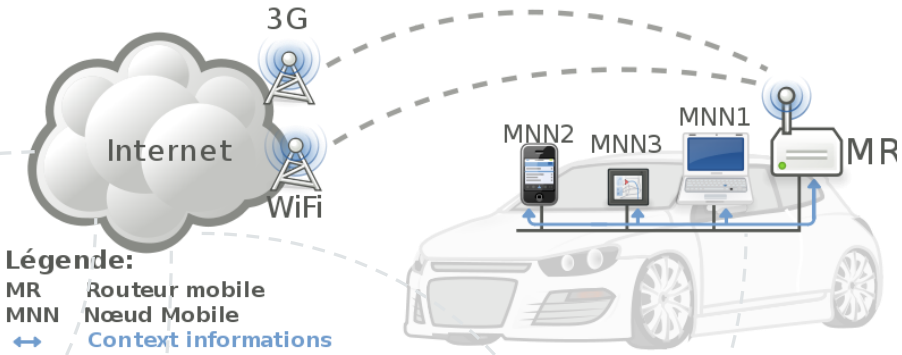
Difference between M2M and IoT

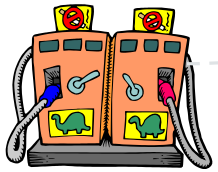
M2M	IoT
Point-to-point communication usually embedded within hardware at the customer site	Devices communicate using IP Networks, incorporating with varying communication protocols
Many devices use cellular or wired networks	Data delivery is relayed through a middle layer hosted in the cloud
Devices do not necessarily rely on an Internet connection	In the majority of cases, devices require an active Internet connection
Limited integration options, as devices must have corresponding communication standards	Unlimited integration options, but requires a solution that can manage all of the communications

IOT: People connecting with Things



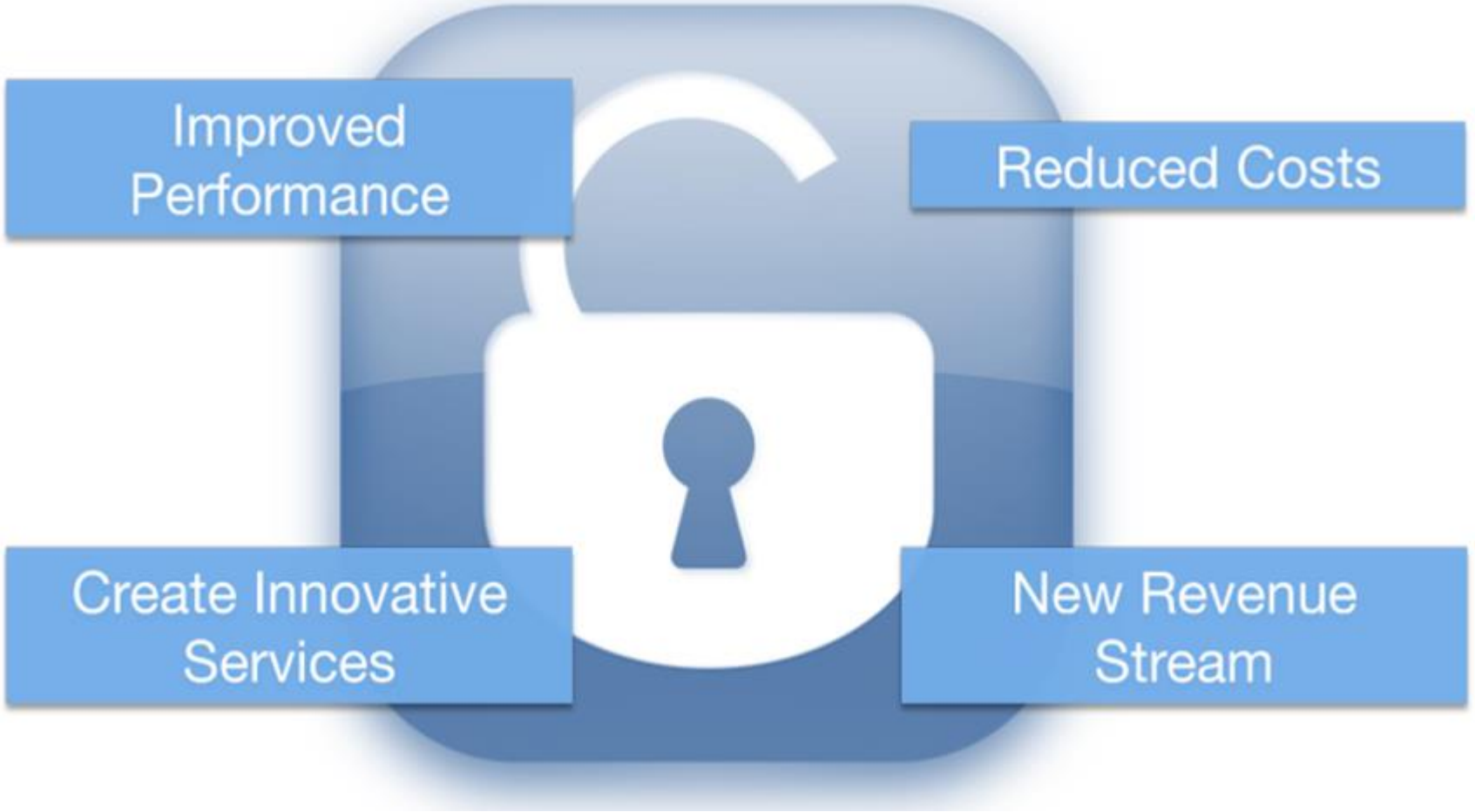
IoT: Things connecting with Things





- Complex and heterogeneous resources and networks

Unlocking the Massive potential of IoT



Looming Opportunity

Consumer
- Smart home control (lighting, security, comfort)
- Optimized energy use
- Maintenance

Retail
- Product tracking
- Inventory control
- Focused marketing

Medical
- Wearable devices
- Implanted devices
- Telehealth services

Military
- Resource allocation
- Threat analysis
- Troop monitoring

Industrial
- SmartMeters
- Wear-out sensing
- Manufacturing control
- Climate control

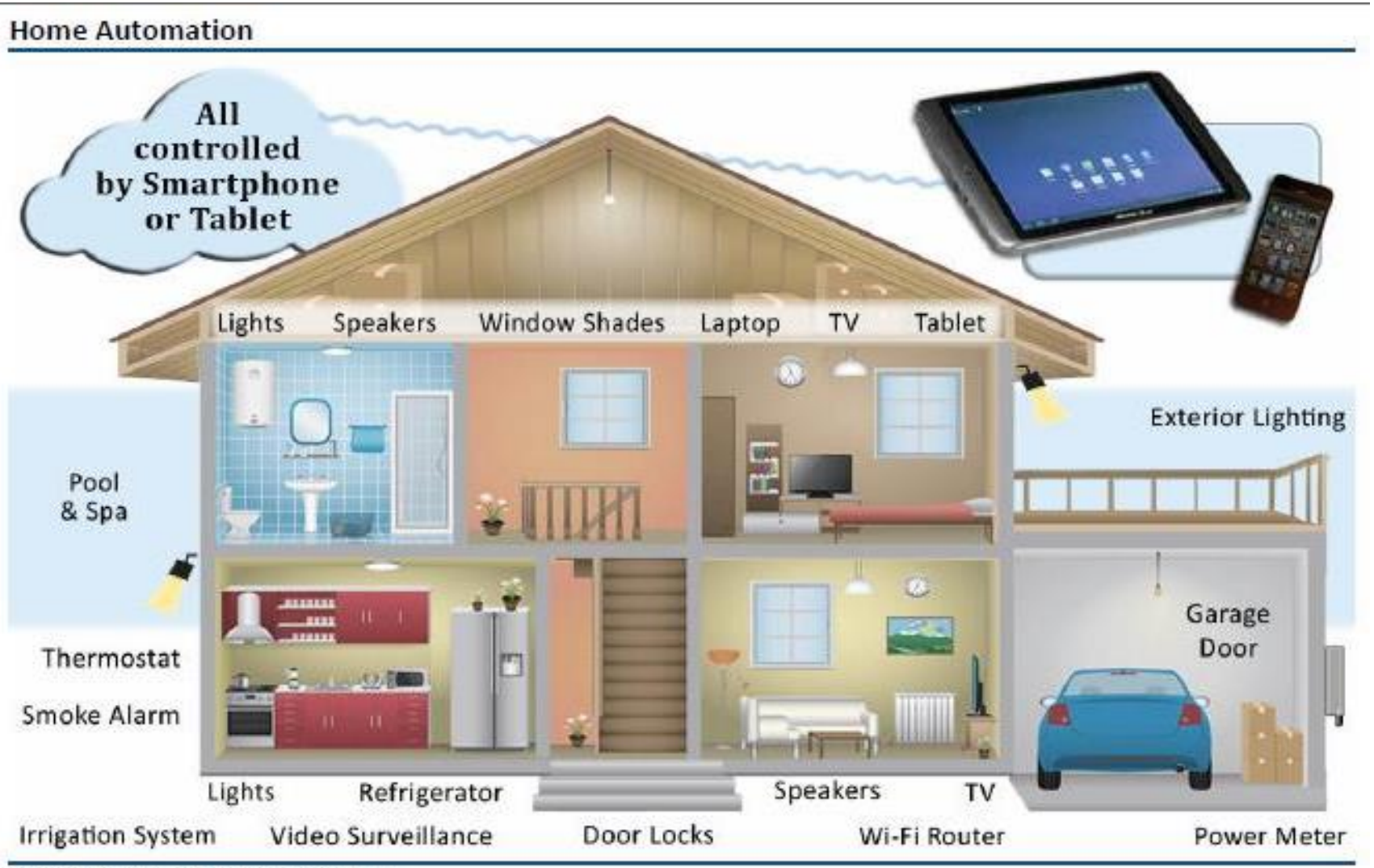
Automotive
- Parking
- Traffic flow
- Anti-theft location

Environmental
- Species tracking
- Weather prediction
- Resource management

Agriculture
- Crop management
- Soil analysis

Applications of IoT

IoT Applications : Intelligent Home



Source: Raymond James research.

Smart Egg Tray

Egg Minder syncs with your smartphone to tell you how many eggs you've got at home (up to 14 eggs) and when they're going bad.

http://www.quirky.com/shop/619

Smart Washing Machine

Smart Aqualtis is the first Indesit Company washing machine designed to be integrated in 'Smart' ecosystems, covering a wide range of use cases.

http://zigbee.org/Products/ByStandard/AllStandards.aspx

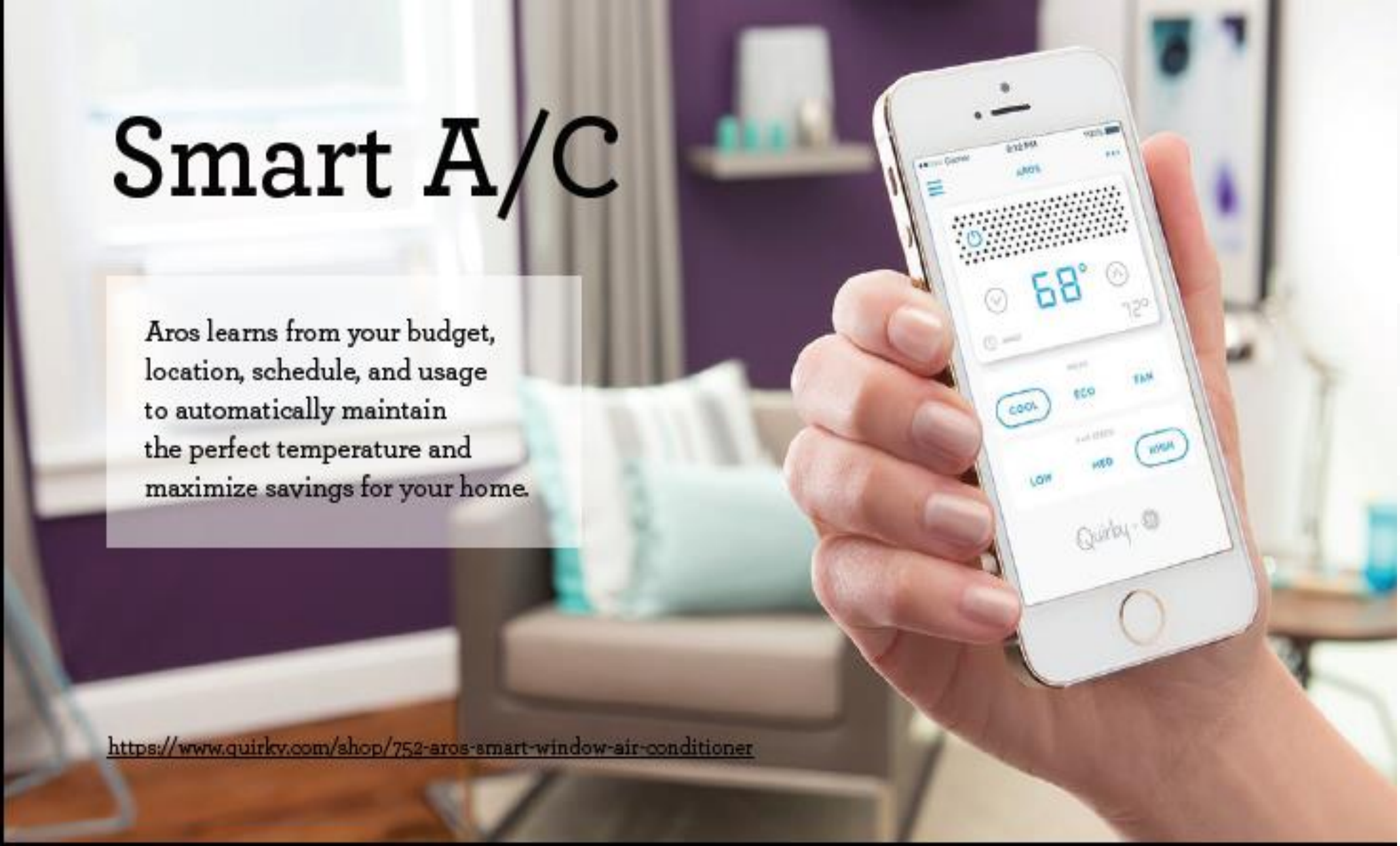
Smart Lighting

Control your bulbs one at a time or altogether. Find just the right shade of white. Pick that perfect tone to match the moment. Or recreate any color from a photo.

http://meethue.com/

Smart A/C

Aros learns from your budget, location, schedule, and usage to automatically maintain the perfect temperature and maximize savings for your home.



https://www.quirky.com/shop/752-aros-smart-window-air-conditioner

Smart Sleep System

Visualize your sleep cycles, understand what wakes you up, and compare nights. From the palm of your hand you can control your personalized wake-up, and fall-asleep programs.

http://www.withings.com/us/withings-aura.html

Smart Weather Station

The Netatmo Weather Station allows you to use indoor temperature, relative humidity and CO2 readings to live in a healthier home.

http://www.netatmo.com/en-US/product/weather-station/

Smart Slow Cooker

Enjoy remote access to all your slow cooker's functions, no matter where you are.

http://www.belkin.com/us/Products/home-automation/c/wemo-home-automation/

Smart Garbage Cans

BigBelly alerts when it needs to be emptied so smarter collection decisions can be made.

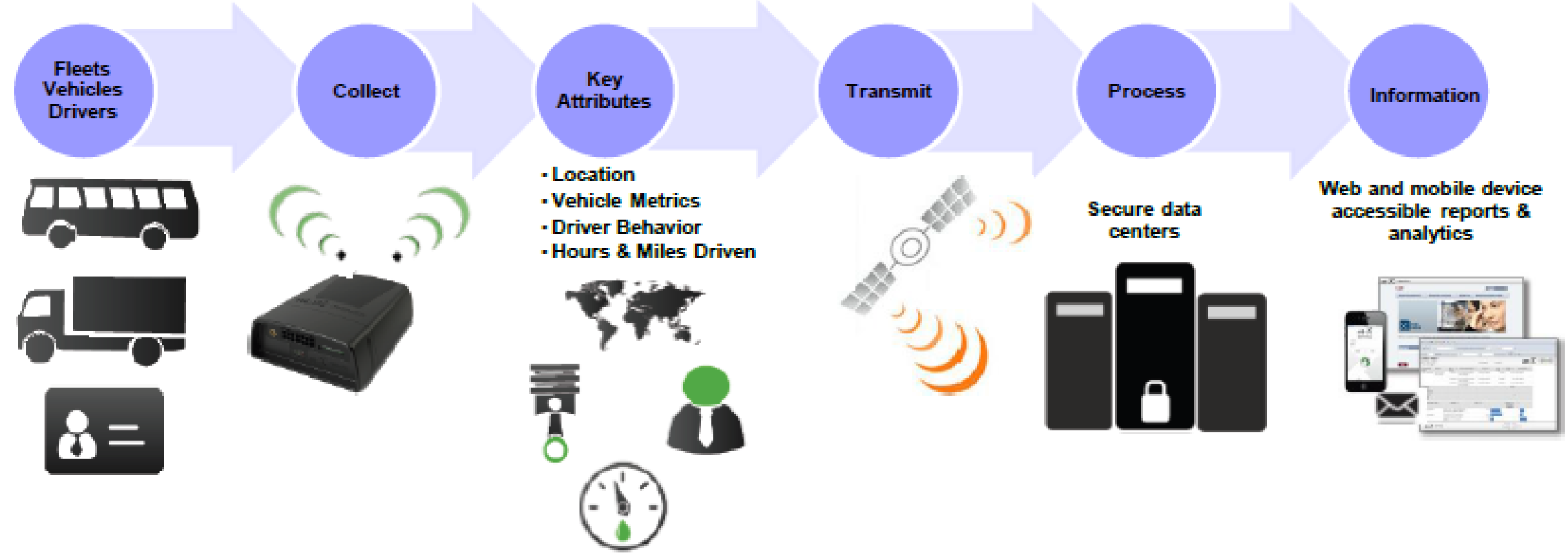
http://www.bigbelly.com/solutions/stations/smartbelly/

Smart Gardening

Bitponics gives data on plants and conditions surrounding them for better gardening.

http://www.bitponics.com/

IoT Applications : Transportation



Source: Raymond James research.

Supply Chain Management

- Logistic
- Product Design
- Warehouse
- Manufacturing

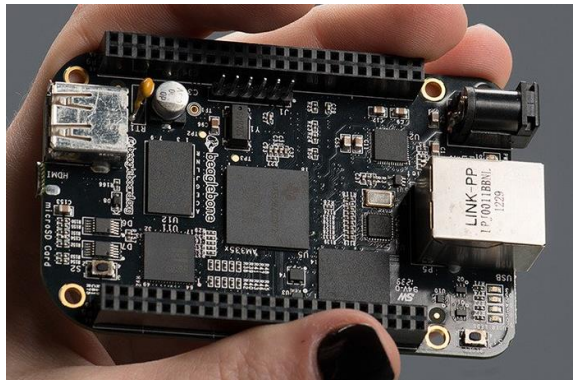
IoT Architecture

IoT Technologies

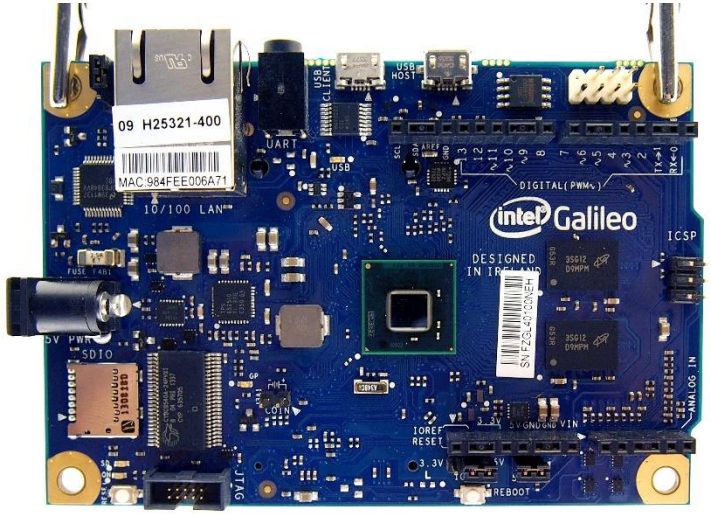
IoT Technologies

- Hardware (Device)
- Communication Technology
- Protocols for IoT
- Software (IDE)
- Cloud Platforms

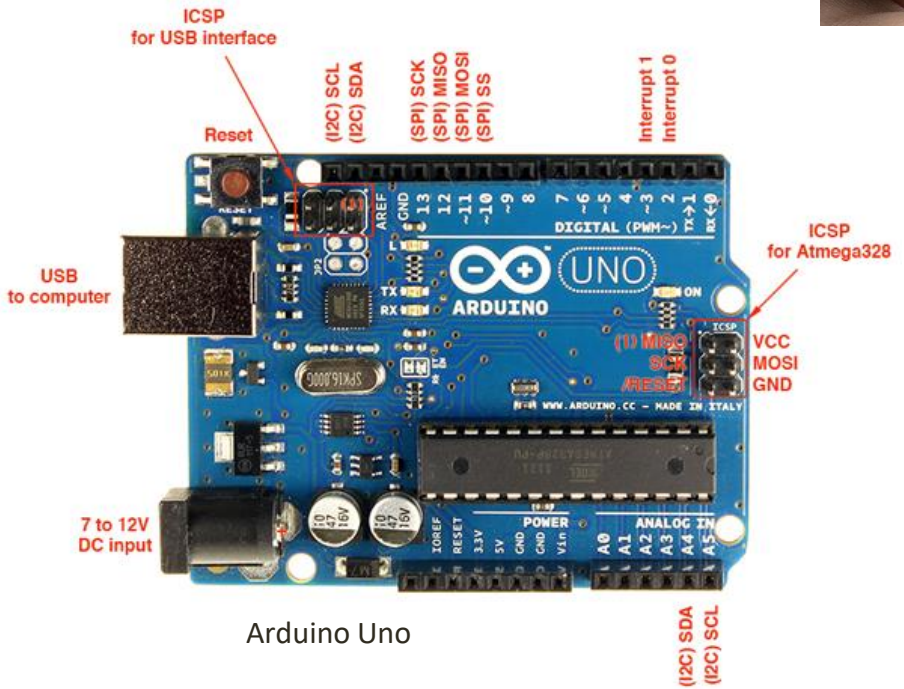
Implementing Smart Objects



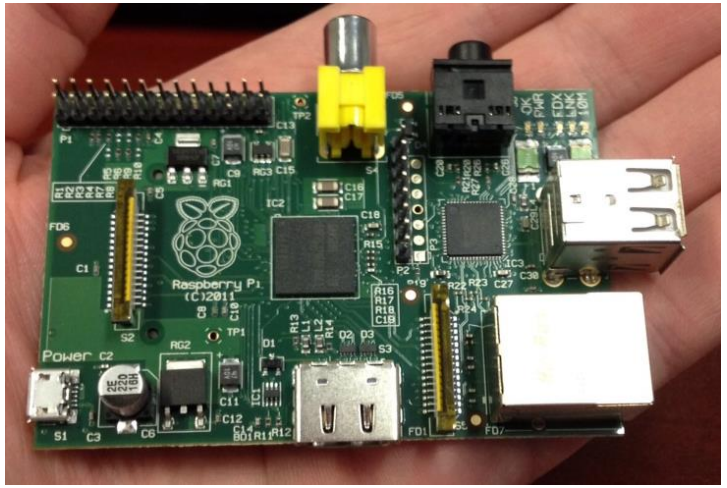
Beaglebone black



Intel Galileo

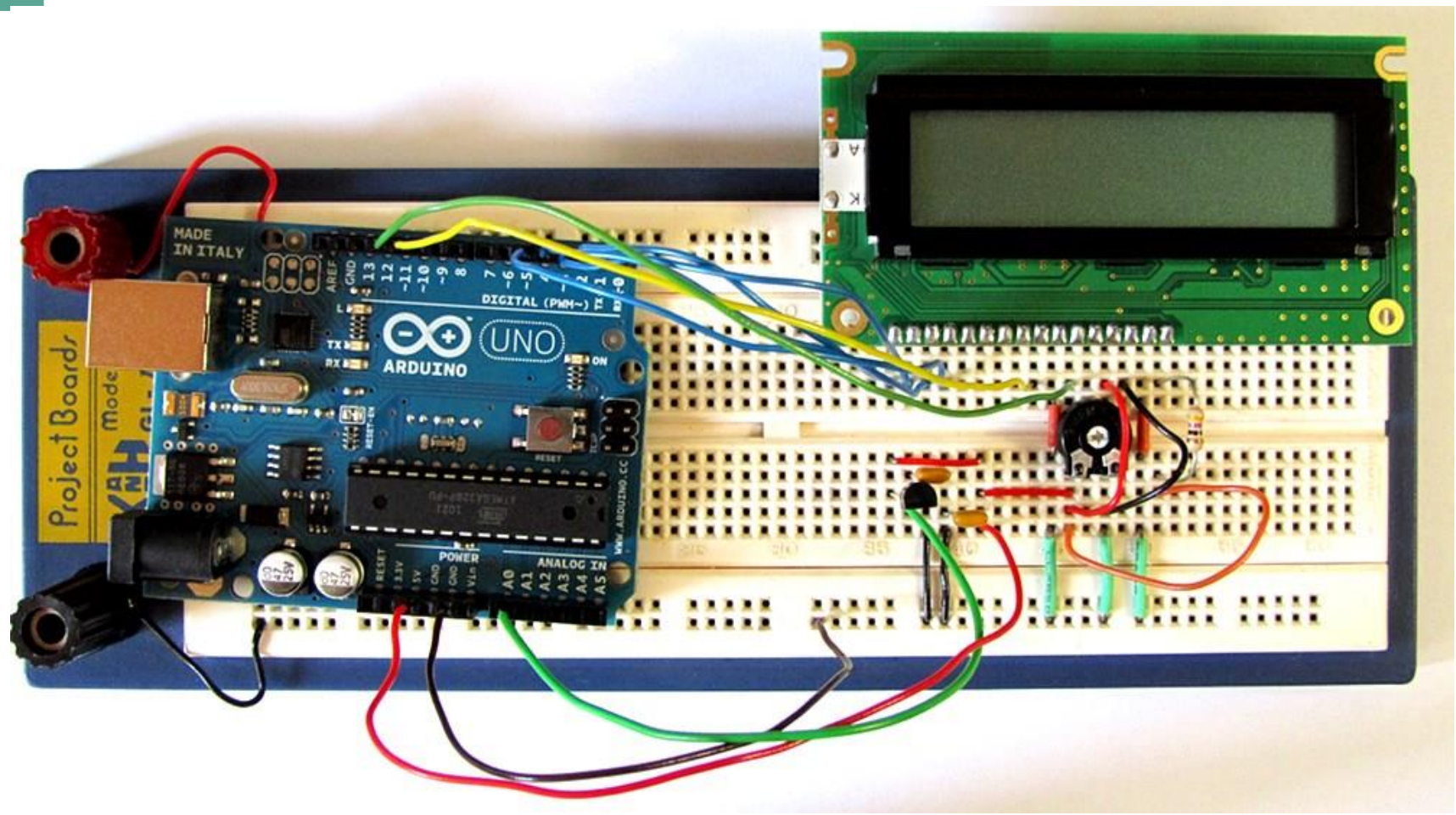


Arduino Uno

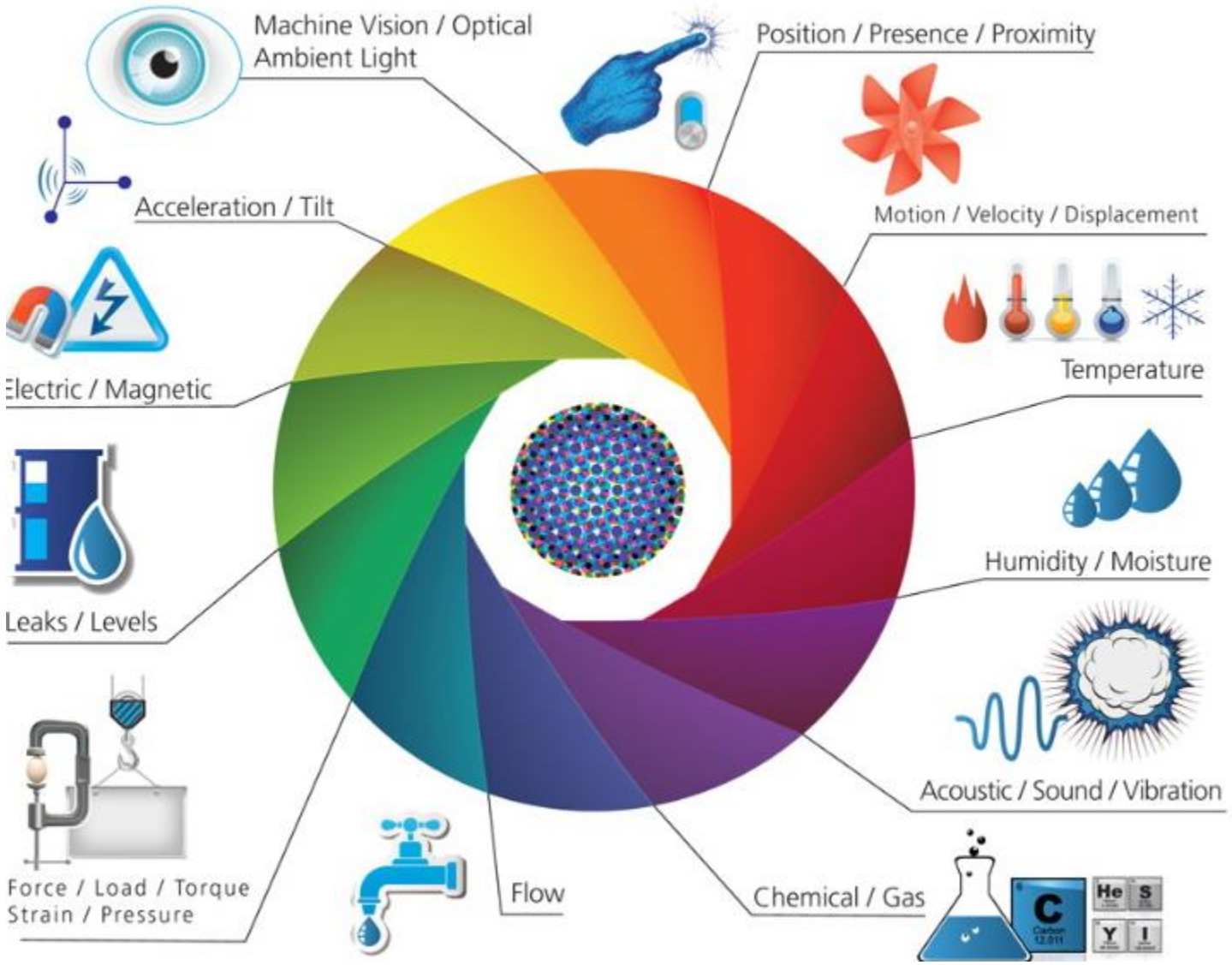


Raspberry Pi

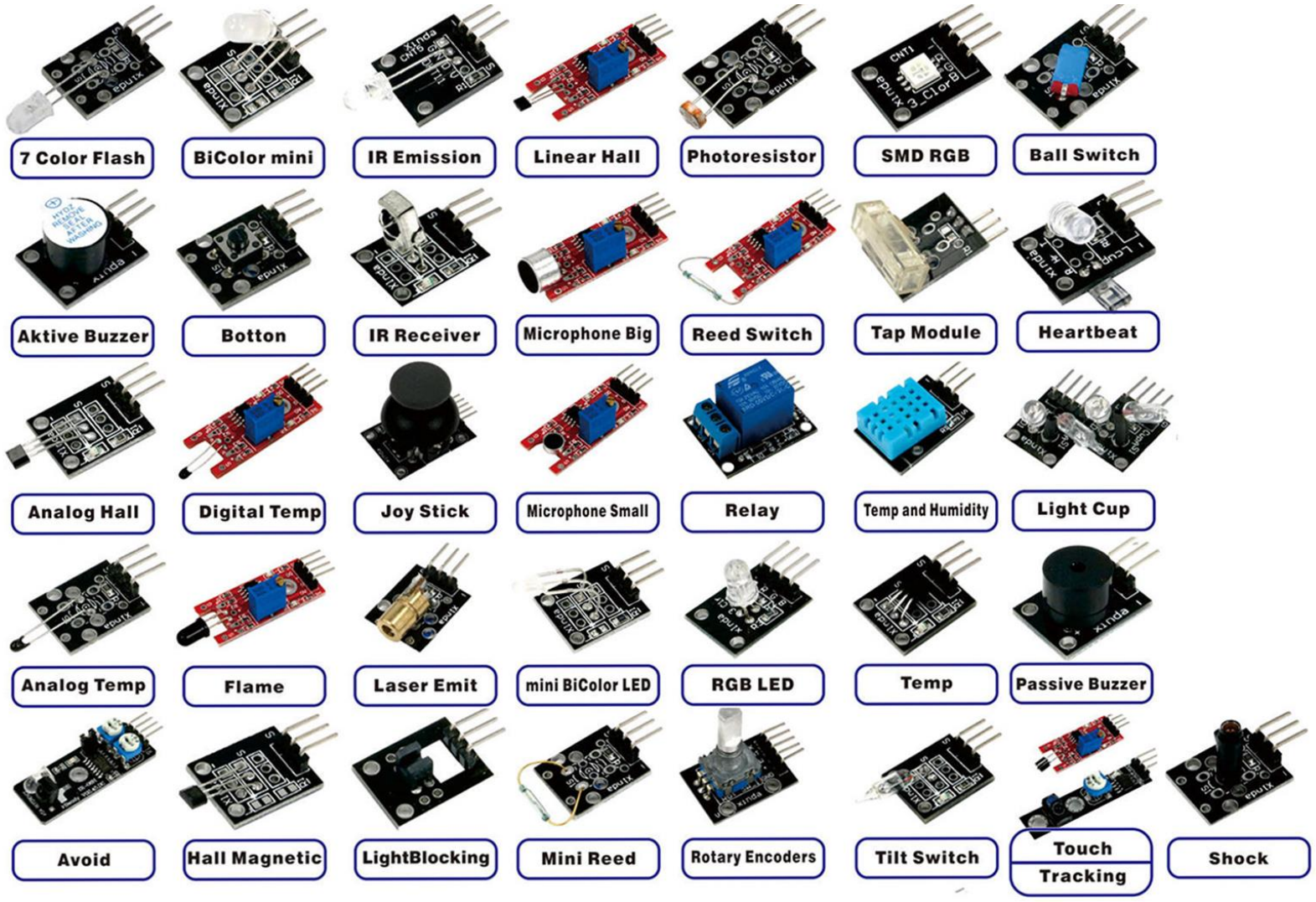
Board Connection



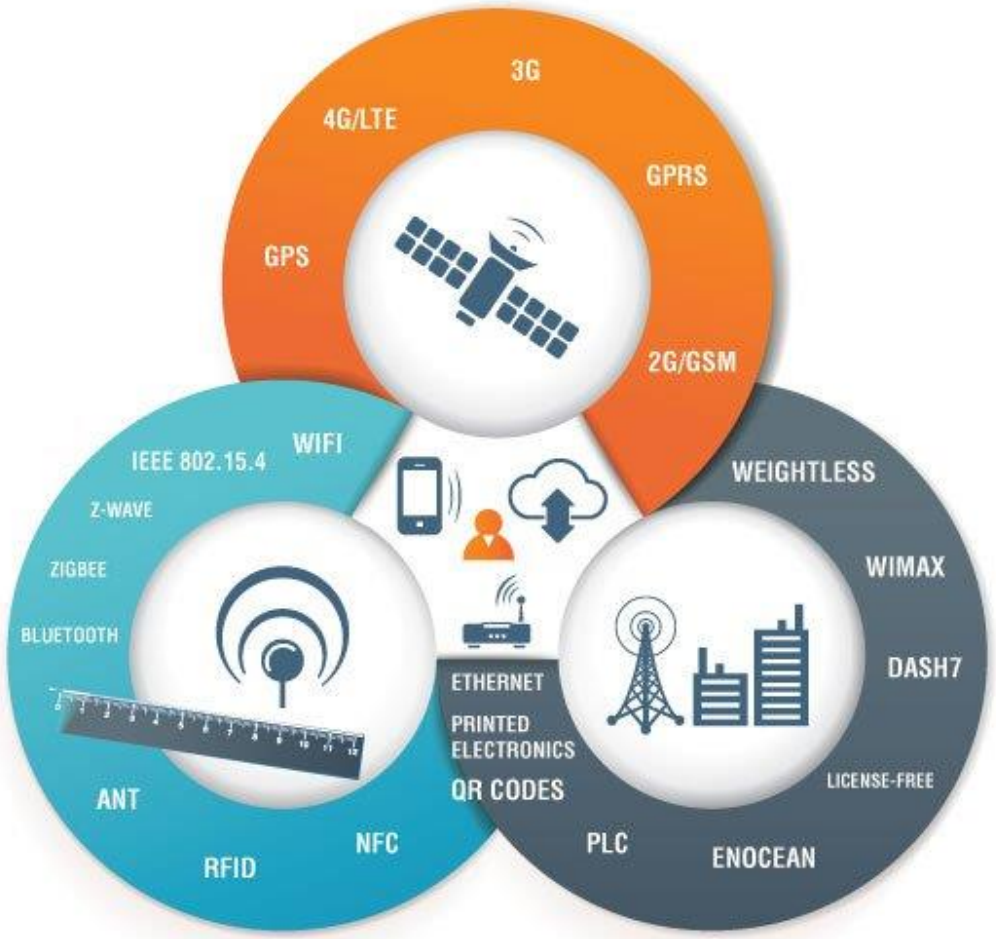
Sensors and Actuators



Sensors available in Market



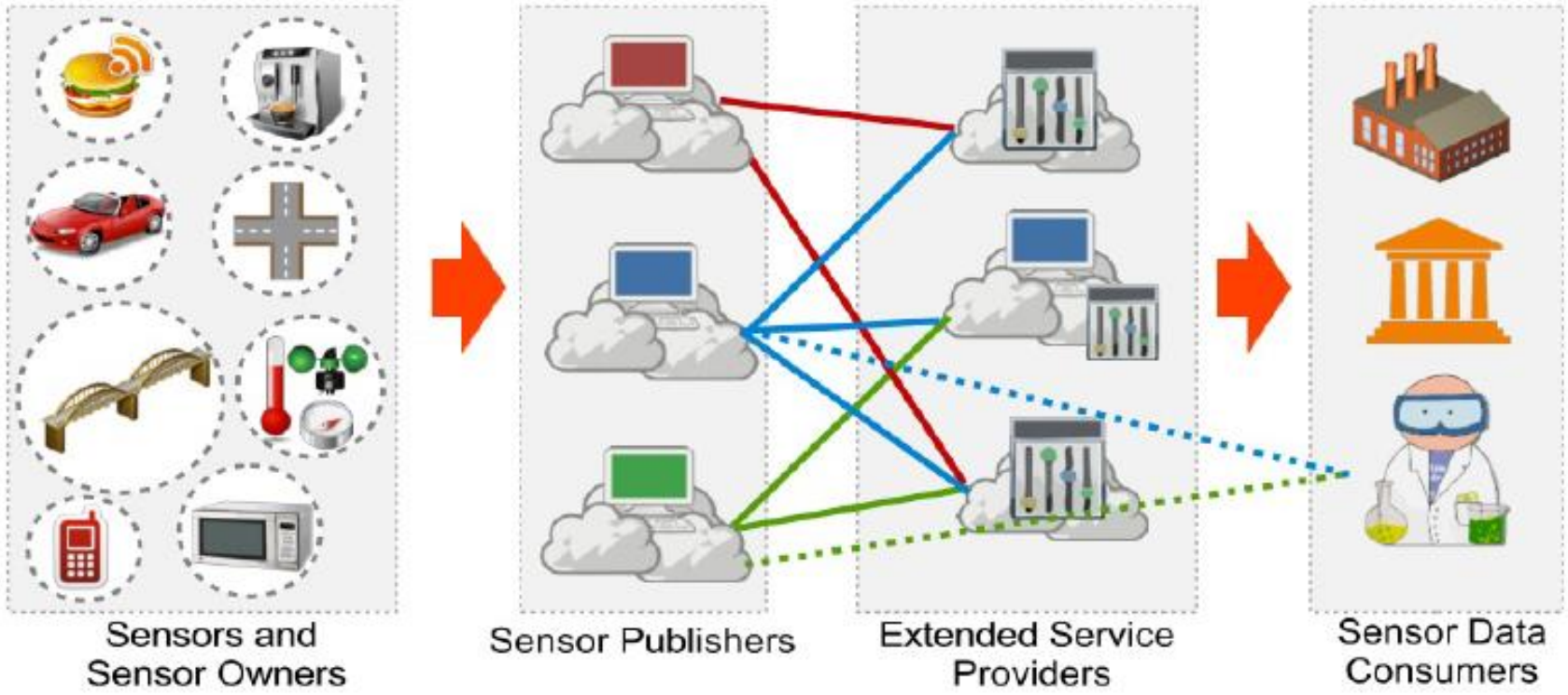
IoT Technologies : Communication Technology



IoT Technologies : Protocols

- CoAP (Constrained Application Protocol)
- MQTT (Message Queue Telemetry Transport)
- XMPP (Extensible Messaging and Presence Protocol)
- 6LoWPAN (Low power Wireless Personal Area Networks)

IoT Technologies : Cloud (Sensing as-a-service Model)



Challenges of IoT

- Connectivity
- Power Management
- Security
- Rapid Evolution