

# SNS College of Engineering

Redesigning Common Mind & Business Towards Excellence





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Build an Entrepreneurial Mindset Through Our Design Thinking FrameWork

#### DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## **Internet Of Things**



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- Machine-to-machine (M2M) refers to the process of communication of a physical object or device at machine with others of the same type, mostly for monitoring but also for control purposes.
- Each machine in an M2M system embeds a smart device.
- The device senses the data or status of the machine, and performs the computation and communication functions.
- A device communicates via wired or wireless systems.
- The communication protocols are 6LowPAN, LWM2M, MQTT, and XMPP. Each communication device is assigned 48-bits Ipv6 address

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#### M2M Communications : M2M vs IoT



- IoT integrates complex M2M communication with the cloud/network, analyses it and takes necessary actions
- M2M must deploy device to device and carry out coordination, monitoring, controlling of devices **without using Internet**.
- IoT **will use Internet**, servers, protocols and cloud based applications
- Example of M2M coordinated movements of tools, robots, drones, refinery operations, sequential control in a production line etc...
- Applications Industrial automation, logistics, smart grids, health and defence, **IIoT**
- IIoT Industrial IoT Manufacturing at multiple locations, railways, mining, agriculture, oil and gas, utilities, transportation etc... along with usage of internet, and softwares for analytics



### M2M Communications : M 2 M Architecture

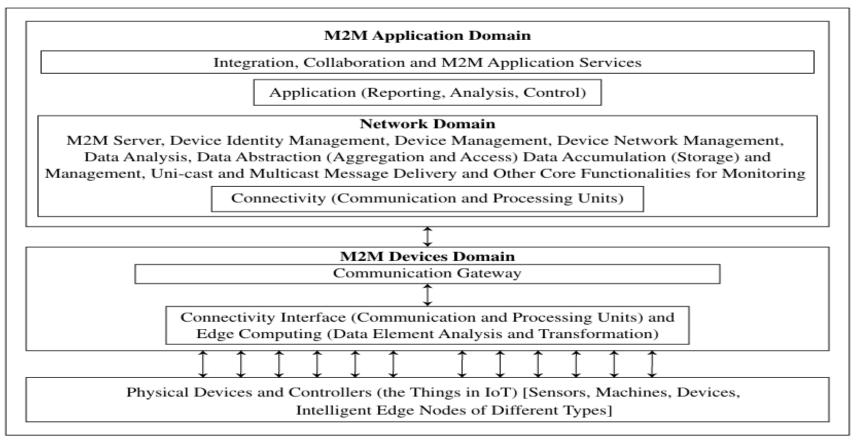




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M2M architecture consists of three domains

- 1. M2M device domain
- 2. M2M network domain
- 3. M2M application domain



#### Three domains of M2M architecture



M2M Communications : Software development tools Redesigning Common Mind & Business Towards Excellence



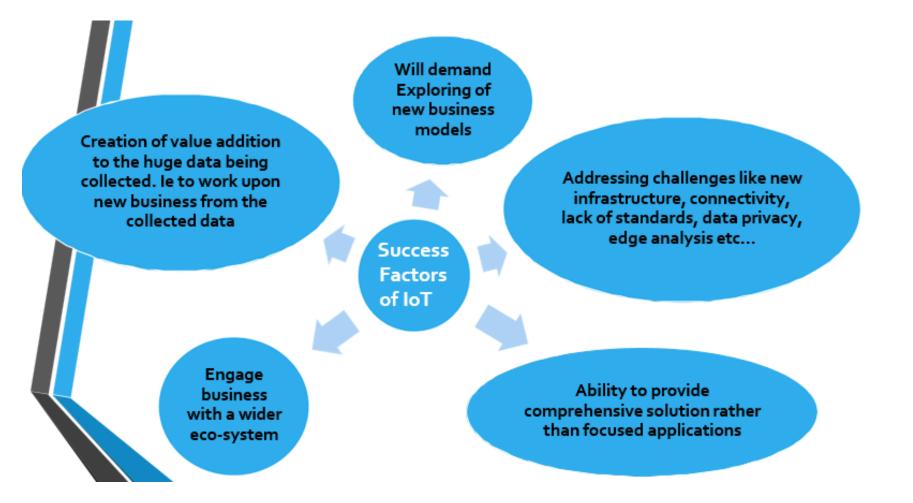
- Mango Open source M2M web based software
- Mainspring from M2M labs
- DeviceHive is an M2M communication
  framework enables connecting devices
  to IoT web based management



### **Success Factors of IoT**

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# **Examples of IoT** /**Application Areas**

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Features of smart watches

- Ability to make phone call
- WiFi & Bluetooth
- GPS enabled
- Health applications & UV monitors
- Tracks health parameters all the time
- Enables payment using wallet
- Video chat
- News & social networking
- Navigation
- Gyroscope, Accelerometer, heart sensor, UV sensor, skin temp sensor, barometer, light sensor etc...



# **Examples of IoT** /**Application Areas**





- Smart homes A home with sensors and actuators, connected and managed via internet
- Cameras, security sensors, thermostats, smart plugs, light and entertainment systems, smoke detector, energy meter interface (electricity, gas, water), surveillance cameras, speakers, LED lights etc...
- Home automation softwares:
  - Intel based intelligent gateway
  - OpenHAB An Eclipse IoT based project runs on java enabled system
  - The Thing System. Language is "Node.js". Can fit into a raspberry pi



# **Examples of IoT** /**Application Areas**

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### Smart Cities – an Architectural framework by CISCO

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	Smart parking Traffic data acquisition, control and monitoring
S	mart streetlights Smart waste management Health services Fire services Smart surveillance
	↓ Internet, GPS
0	Layer 3: Data collection services, data accumulation (storage) at servers, connected data centre, cloud r enterprise server, data analytics, data element analysis and transformation for data abstraction aggregation and access) for the applications and APIs, collaborations, services and processes involving people, city services and processes)
	Internet, GPS
6	Layer 2: Distributed data capture, processing, storage and analytics at distributed points for scalability and responsiveness to real-time and context-critical data
3	$\uparrow \uparrow 3G, 4G, Internet, Wi-Fi,$
1	Layer 1: Physical devices with sensor networks in parking spaces, hospitals, streets, vehicles, banks,



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