

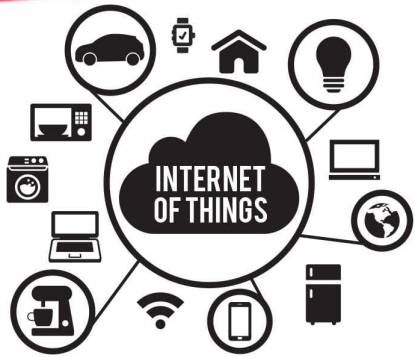


SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



Department of Information Technology



19ITT302 - INTERNET OF THINGS

III B.Tech. IT/ V SEMESTER

UNIT V: DESIGN METHODOLOGY & FUTURE TRENDS

IoT System Management with NETCONF-YANG: Need for IoT Systems Management – Simple Network Management Protocol (SNMP) –Limitations of SNMP, Network Operator Requirements- NETCONF-YANG-IoT Systems Management with NETCONF-YANG -IoT Platforms Design Methodology - IoT Physical Devices & Endpoints - Raspberry Pi- Linux on Raspberry Pi - Raspberry Pi Interfaces - Programming Raspberry Pi with Python - Designing a RESTfulWebAPI - Amazon Web Services for IoT



IoT Physical Devices & Endpoints

- Basic building blocks of an IoT Device
- Exemplary Device: Raspberry Pi
- Raspberry Pi interfaces
- Other IoT devices



IoT Physical Devices & Endpoints

IoT Device Examples

- A home automation device that allows remotely monitoring the status of appliances and controlling the appliances.
- An industrial machine which sends information about its operation and health monitoring data to a server.
- A car which sends information about its location to a cloud-based service.
- A wireless-enabled wearable device that measures data about a person such as the number of steps walked and sends the data to a cloud-based service.



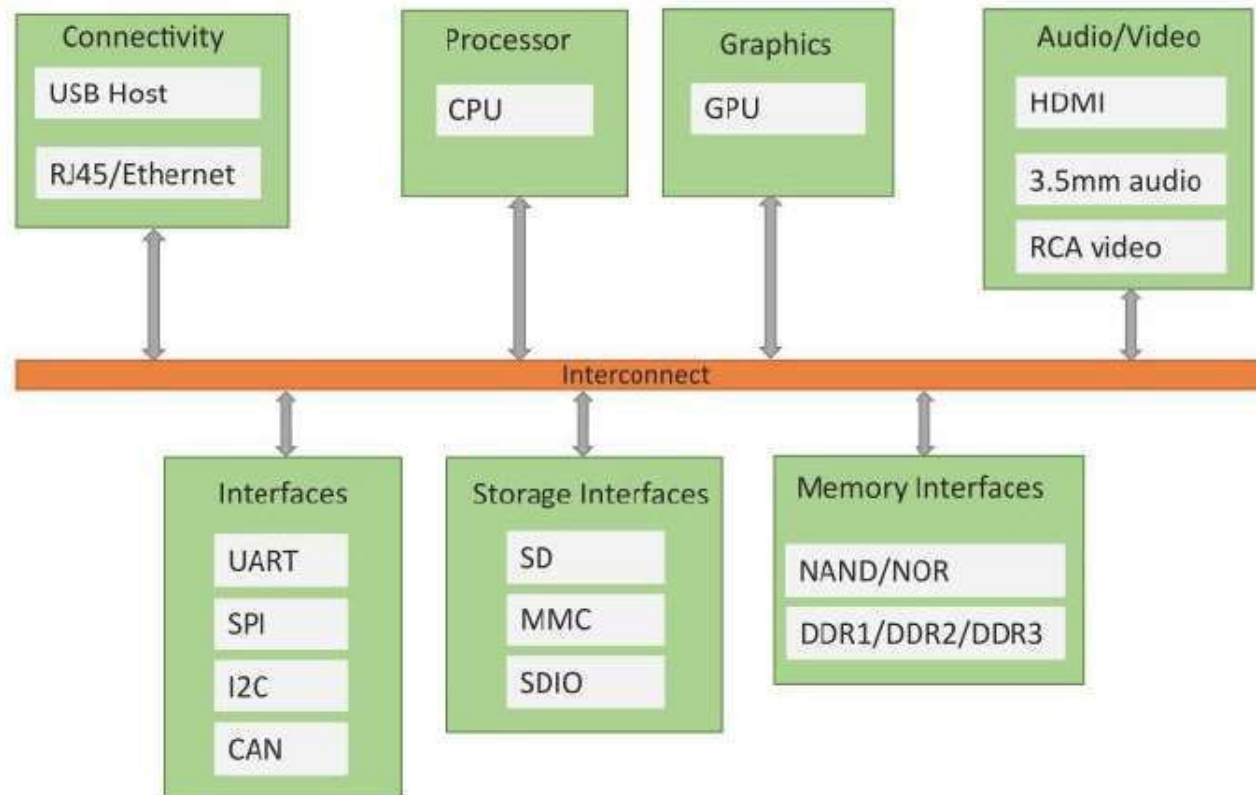
IoT Physical Devices & Endpoints

Basic building blocks of an IoT Device

- Sensing : Sensors can be either on-board the IoT device or attached to the device.
- Actuation : IoT devices can have various types of actuators attached that allow taking actions upon the physical entities in the vicinity of the device.
- Communication : Communication modules are responsible for sending collected data to other devices or cloud-based servers/storage and receiving data from other devices and commands from remote applications.
- Analysis & Processing : Analysis and processing modules are responsible for making sense of the collected data.

IOT PHYSICAL DEVICES & ENDPOINTS

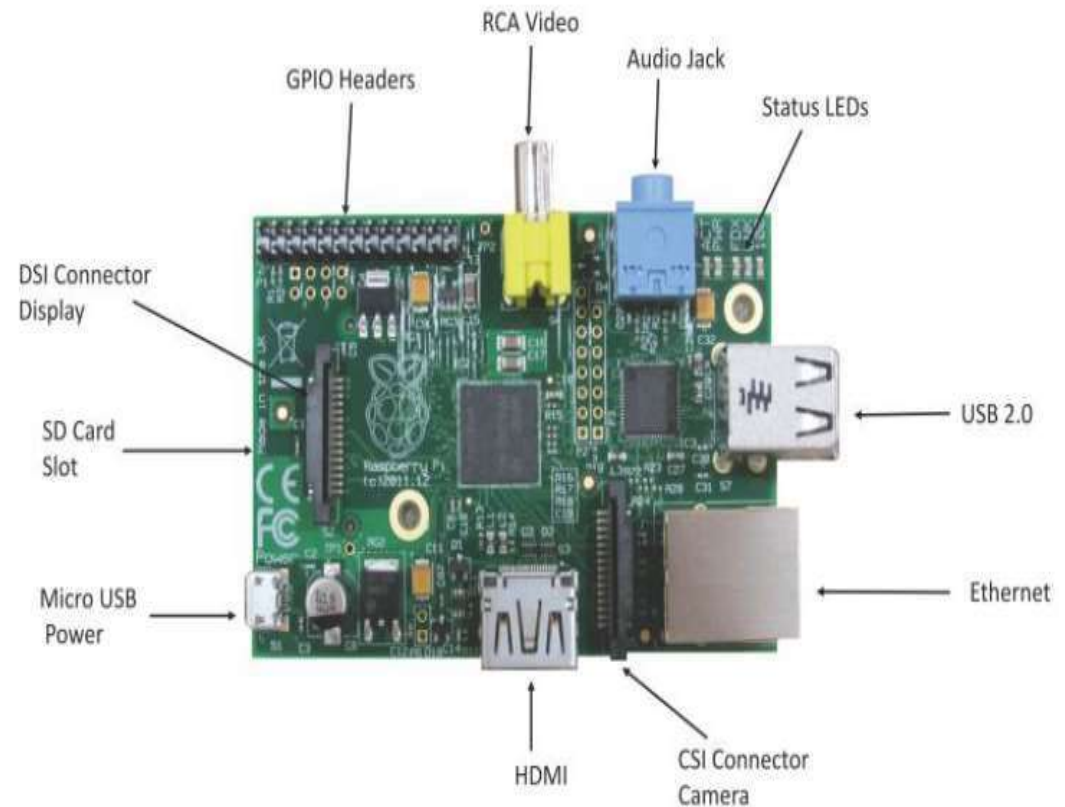
Block diagram of an IoT Device



IoT Physical Devices & Endpoints

Exemplary Device: Raspberry Pi

- Raspberry Pi is a low-cost mini-computer with the physical size of a credit card.
- Raspberry Pi runs various flavors of Linux and can perform almost all tasks that a normal desktop computer can do.
- Raspberry Pi also allows interfacing sensors and actuators through the general purpose I/O pins.
- Since Raspberry Pi runs Linux operating system, it supports Python "out of the box".





IoT Physical Devices & Endpoints

Linux on Raspberry Pi

- Raspbian
- Raspbian Linux is a Debian Wheezy port optimized for Raspberry Pi.
- Arch
- Arch is an Arch Linux port for AMD devices.
- Pidora
- Pidora Linux is a Fedora Linux optimized for Raspberry Pi.
- RaspBMC
- RaspBMC is an XBMC media-center distribution for Raspberry Pi.
- OpenELEC
- OpenELEC is a fast and user-friendly XBMC media-center distribution.
- RISC OS
- RISC OS is a very fast and compact operating system.

IOT PHYSICAL DEVICES & ENDPOINTS

Raspberry Pi GPIO



3V3			5V
GPIO 2 (I2C SDA)			5V
GPIO 3 (I2C SDL)			GROUND
GPIO 4			GPIO 14 (UART TxD)
GROUND			GPIO 15 (UART RxD)
GPIO 17			GPIO 18
GPIO 27			GROUND
GPIO 22			GPIO 23
3V3			GPIO 24
GPIO 10 (SPIO MOSI)			Ground
GPIO 9 (SPIO MISO)			GPIO 25
GPIO 11 (SPIO SCLK)			GPIO 8 (SPIO CE0 N)
GROUND			GPIO 7 (SPIO CE1 N)



IoT Physical Devices & Endpoints

- Raspberry Pi Interfaces
- Serial : The serial interface on Raspberry Pi has receive (Rx) and transmit (Tx) pins for communication with serial peripherals.
- SPI : Serial Peripheral Interface (SPI) is a synchronous serial data protocol used for communicating with one or more peripheral devices.
- I2C : The I2C interface pins on Raspberry Pi allow you to connect hardware modules. I2C interface allows synchronous data transfer with just two pins - SDA (data line) and SCL (clock line).

IoT Physical Devices & Endpoint

Other Devices

- pcDuino
- BeagleBone Black
- Cubieboard

BeagleBone Black



pcDuino



Cubieboard





IoT Physical Devices & Endpoints

- pcDuino
- It is Arduino-pin compatible single board mini computer that comes with a 1 GHz ARM Cortex A8 Processor.
- pcDunio is a high performance and cost effective device that runs PC like OS such as Ubuntu and Android ICS.
- It supports various programming languages like C,C++, Java and Python.
- BeagleBone Black
- It is similar to Raspberry pi but more powerful device. It comes with 1 GHz ARM Cortex A8 Processor that supports Linux and Android OS.
- It has HDMI video/audio interface, USB and Ethernet Ports
- Cubieboard
- It is powered by dual core ARM Cortex A7 Processor and has USB, HDMI, IR, Serial, Ethernet, SATA and 96 pin extended interface. IT supports Linux and Android OS.



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Thank You!