

Single-board Computer - Raspberry-Pi & Programming

Dr. Soharab Hossain Shaikh
Associate Professor, CSE, SoET, BMU

Plan for the upcoming 4 Sessions

Monday, 20th September (today)

- Setting the Context (Why RaspberryPi?)
- Introduction, Installation & Setup - RaspberryPi

Tuesday, 21st September (tomorrow)

- A Quick Intro to Python Programming
- Interfacing Sensors to RaspberryPi and GPIO Programming

Monday, 27th September (next week)

- Image Processing with Python - OpenCV
- Exploring new tools/libraries

Tuesday, 28th September (next week)

- Build Web-interface with Python - Flask
- Run a full-fledged applications with Raspberry-Pi

1

2

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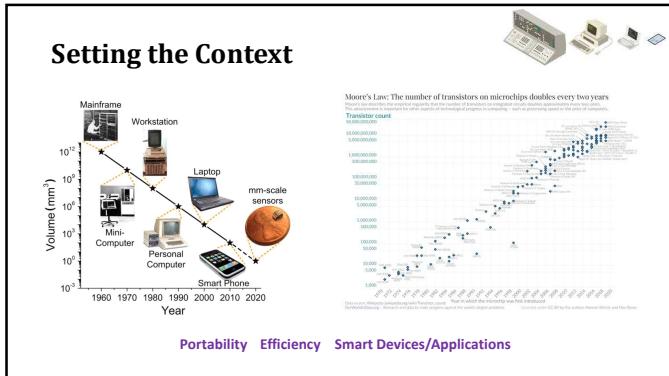
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3

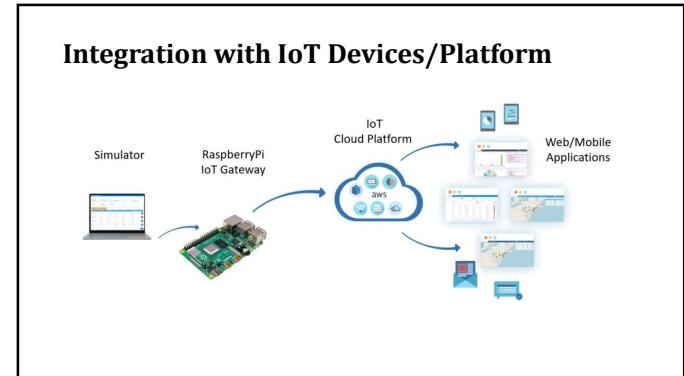
4

Session - 1

- **Setting the Context / Why Raspberry-Pi?**
- **Intro, Installation & Setup - Raspberry-Pi**



5



6

- ### Smart Applications
- Embedded Vision Systems
 - IoT based Applications
 - Small/Mini (size) Devices equipped with AI capabilities
 - Single board computing modules (e.g. Raspberry-Pi)

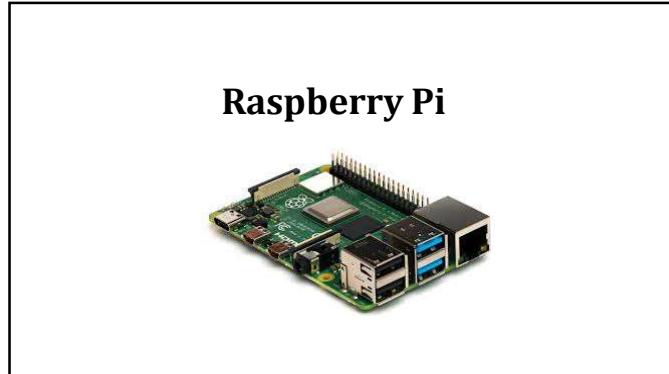
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Our Goal (by next week)

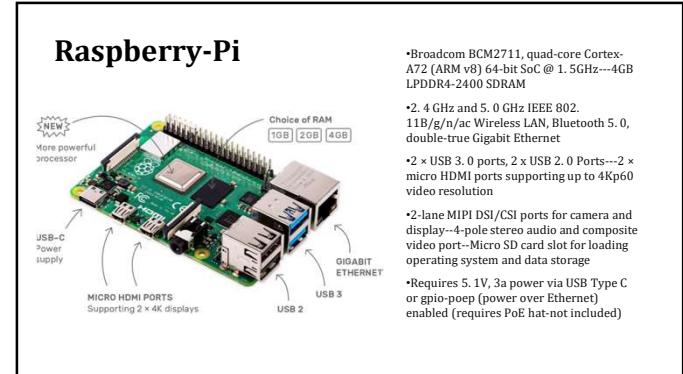
We will build an application of image processing (video-sequence of image frames) with a **credit-card-size-single-board-computer – Raspberry-Pi**.

We will make it a little more interesting by making a web-app and access it with a web-browser from any machine within the same network.

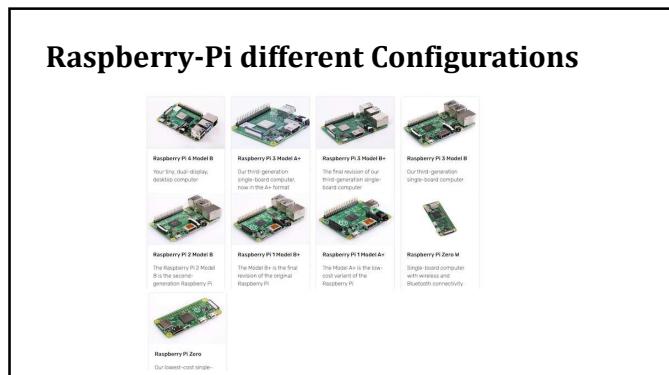
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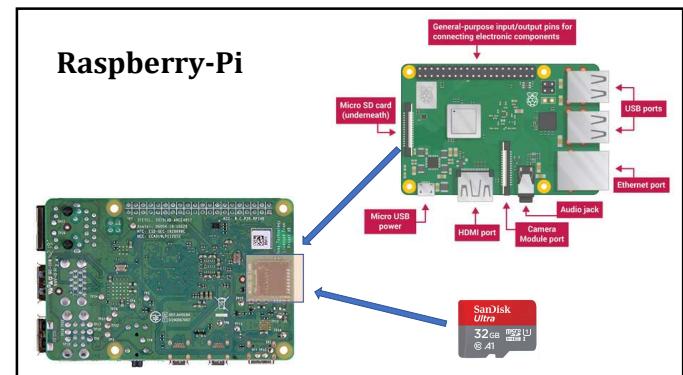
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10



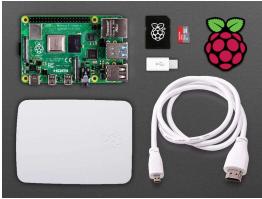
11



12

Accessories

Raspberry-Pi – 4 Model B - 4GB RAM Model with all the required accessories



SanDisk 16GB Class 10 MicroSD Memory Card - With Noots
Micro USB to USB C adapter
Micro HDMI to Standard HDMI Cable for Raspberry Pi
Raspberry Pi 4 Official Case - Red & White
Raspberry Pi 4 Model B - 4 GB RAM

13

Accessories

Raspberry-Pi – 3 Model B - 1GB RAM Model with all the required accessories

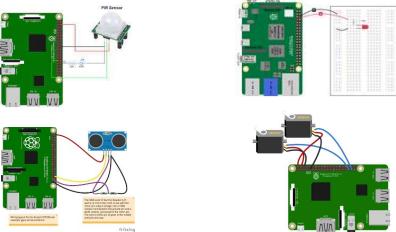
- Raspberry pi3 Model B
- Pi Case
- Power adapter 5.1 V with 2.5A current
- 8 GB SD card with NOOBS pre-loaded
- HDMI to HDMI adapter (To connect to HDMI monitors or HDMI TV)
- Ethernet cable of length 3ft



<https://www.raspberrypi.org/documentation/installation/noobs.md#:~:text=NOOBS%20and%20NOOB5%20lite,system%20requires%20an%20internet%20connection.>

14

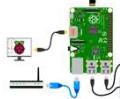
Connecting Sensors and Program them with GPIO



<https://pypi.org/project/RPi.GPIO/>
<https://www.raspberrypi.org/documentation/usage/gpio/python/README.md>

15

Installation and System Setup



<https://github.com/soharabhossain/Raspberry-Pi/tree/main/Raspberry-Pi%20Installation%20Rasbian-OS-Imager>



16

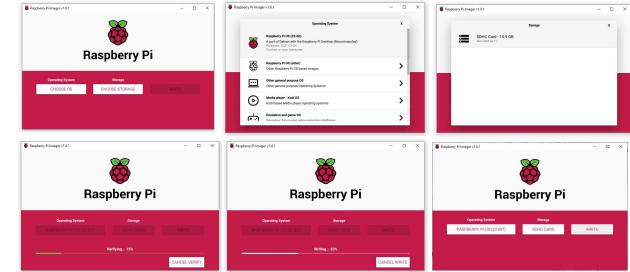
Installation & Set up

- **Download the Raspbian-OS-Imager***
- **Burn the image in the SD Card (next slide)**
- **Put the SD Card in R-Pi Board and power it up**

*Download the exe file from here:
<https://github.com/soharabhoossain/Raspberry-Pi/tree/main/Raspberry-Pi%20Installation%20Raspbian-OS-Imager>

17

Installation of Raspberry-Pi OS



18

How to install Raspberry-Pi-OS in the Memory Card (SD-card)

1. Install this imager in your local machine (Windows laptop).
 - 2 Put the SD card in a suitable adapter and connect it in your local machine (laptop).
 3. Run the software after installation.
 4. Select an operating system (from the list) to be written to the memory card (SD card)
 5. Select the memory card to write to. Let the installation proceed.
 6. When done, take out the card and put it in the slot of the Raspberry-Pi module (board) and power it up.
- Setting-Up:**
- i) You just need to set the **time-zone/keyboard** settings.
 - ii) Also, configure the **wireless network** by selecting one of the available networks and providing the password for the same.

Note down the IP address of the Raspberry-Pi board.

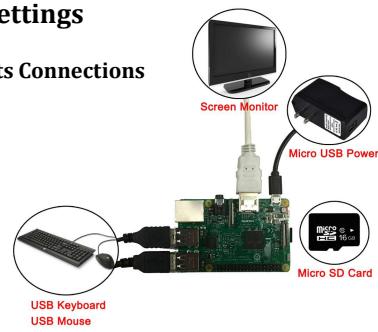
The remote desktop (GUI) login with **VNC/Remote-Desktop** is already set up.

Also, a **PutTY**-based based login is possible (terminal/command prompt).

19

System Settings

Components Connections



20

System Booting

- Remember to connect the R-pi board with a HDMI compatible monitor/TV
- Connect a USB Mouse and Keyboard with it
- Insert the SD Card on Raspberry-Pi board and Power it up

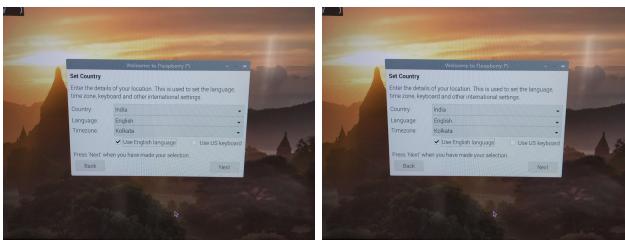
21

Booting the Raspberry-Pi for the First Time



22

Booting the Raspberry-Pi for the First Time



Set the Country/Language/Time-Zone

23

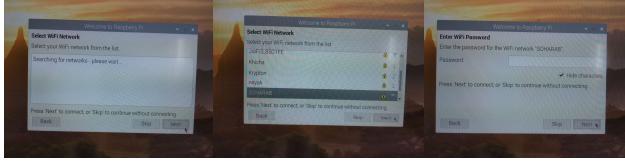
Booting the Raspberry-Pi for the First Time



Optionally you may change the password of the default user '**pi**'. The default password is '**raspberry**'

24

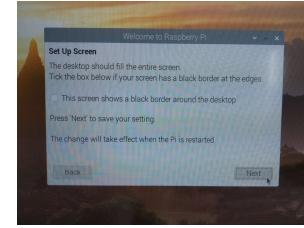
Booting the Raspberry-Pi for the First Time



Set the Wi-Fi network

25

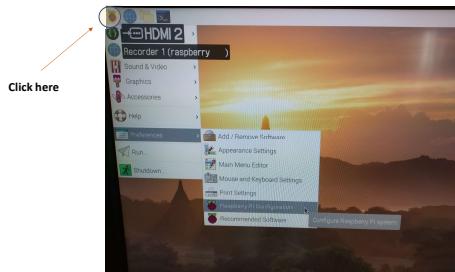
Booting the Raspberry-Pi for the First Time



Optionally change the screen settings

26

Booting the Raspberry-Pi for the First Time



Click here

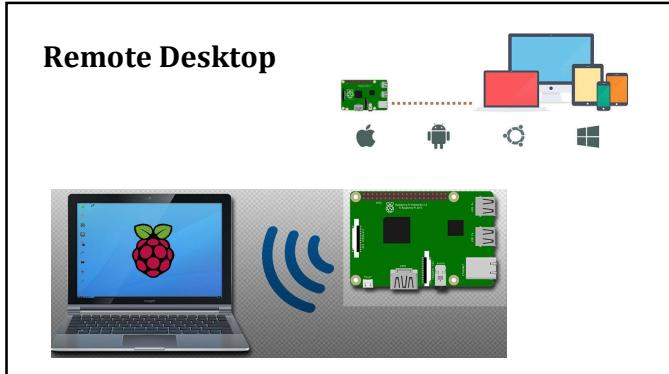
27

Booting the Raspberry-Pi for the First Time



Go to the **Interfaces** tab. Enable the **Camera**, **SSH** and **VNC**. This will enable the camera port where we want to connect the camera module.
SSH and VNC are required [for remote login](#) to the Raspbian OS. Reboot the system.

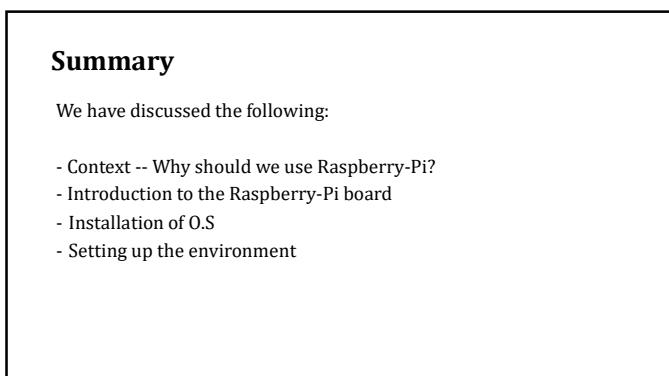
28



29



30



31



32

Thank You



Class material will be uploaded here:
https://github.com/soharabhossain/JoE_2021