

# 사물인터넷: 라즈베리파이를 이용한 스마트 디바이스 구현

2021년 2학기

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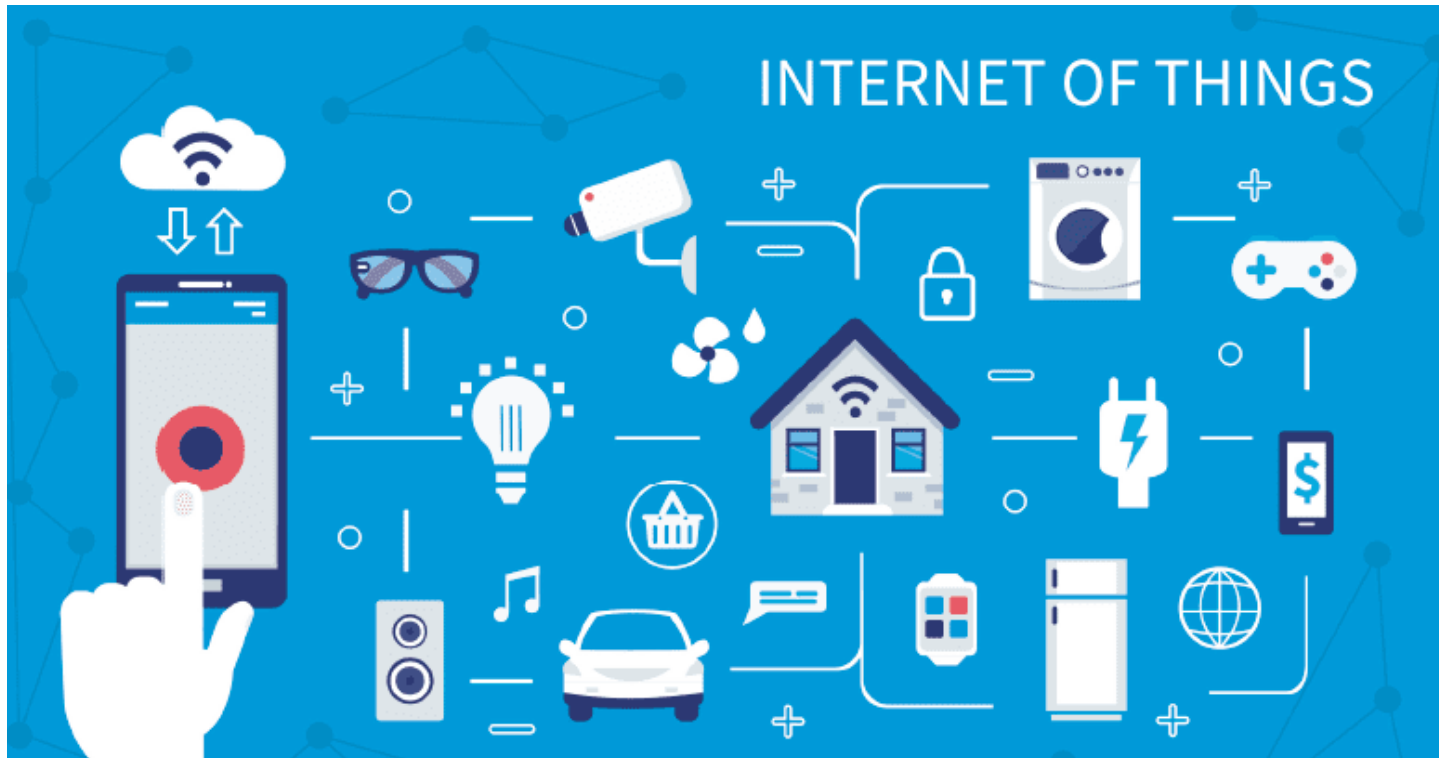
# 내용

- 사물인터넷 개요
  - 라즈베리파이 설치
  - 리눅스 명령어
  - 파이썬 프로그래밍
  - 라즈베리 기반 스마트 센서 디바이스
-

# What is IoT ?

## □ What is IoT (Internet of Things)?

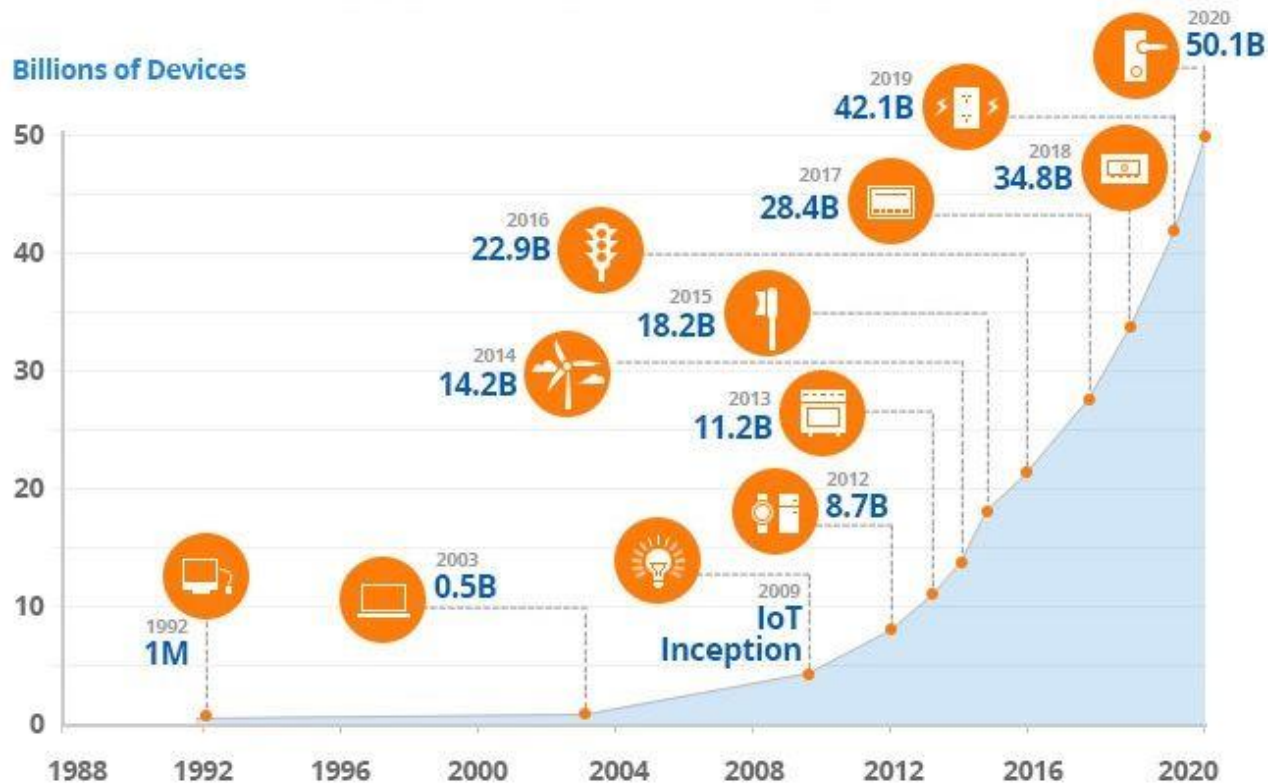
- future Internet technology that **connects things**, and exchanges messages and drives new services and efficiencies in our lives



# What is IoT ?

## □ Connected world

- Number of connected devices are increasing rapidly



# What is IoT ?

## □ What are Things?

- virtually everything connected on the Internet (Internet of Everything)
- smart **sensors**:
  - senses the environment and transmits the value to other things
  - temperature, flame, camera, pressure, motion detection, body sensors, etc.
- smart **actuators**:
  - performs some action to change the physical environment
  - switches, motors, valves, etc.

# What is IoT ?

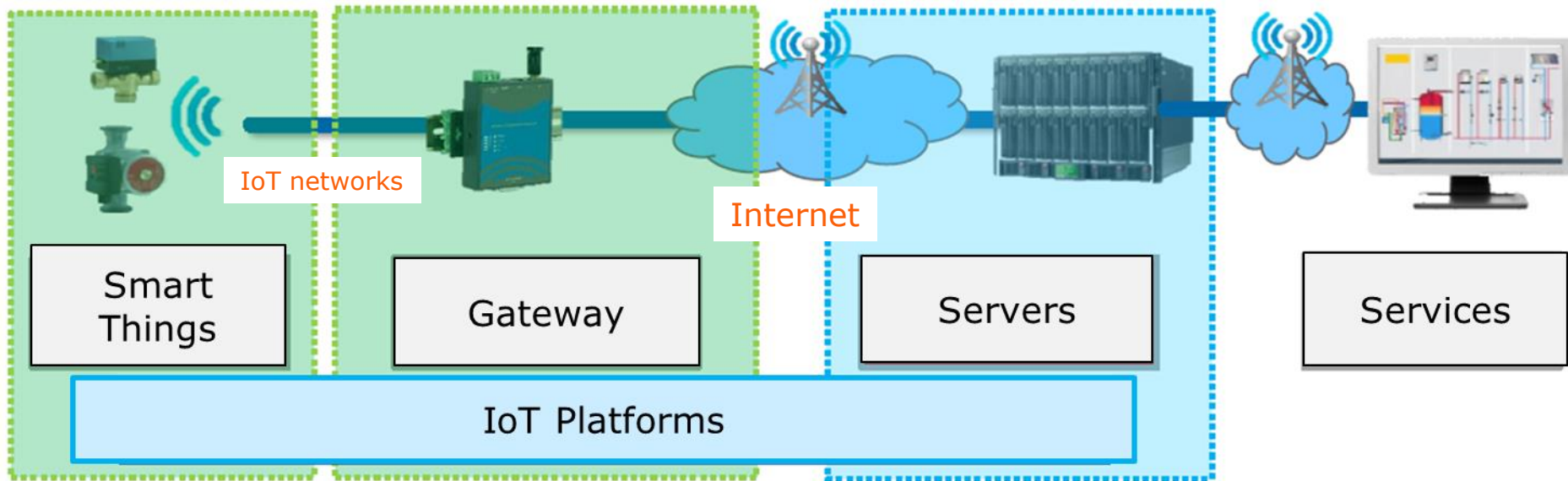
## □ What are things?

- applications:
  - performs some operation for valuable services
  - web-based, mobile, or legacy applications
- Those things are connected to detect physical situation and do some smart operations autonomously and intelligently
- **IoT = (smart) Things + Internet + Data analysis (Intelligence)**

# What is IoT ?

## □ IoT architecture

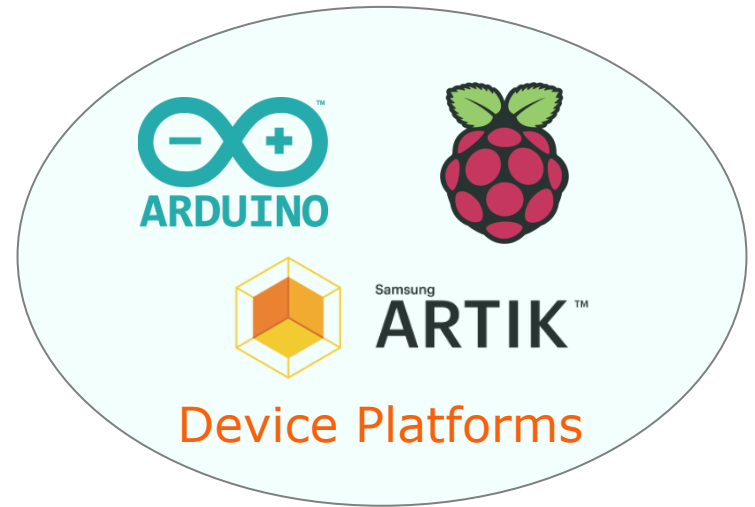
- Things – sensors, actuators devices
- Gateways
- Servers, clouds
- Applications



# IoT Platforms

## IoT platforms

- Device platforms
- OS platforms
- Servers & service platforms





# IoT Applications

## □ Smart city

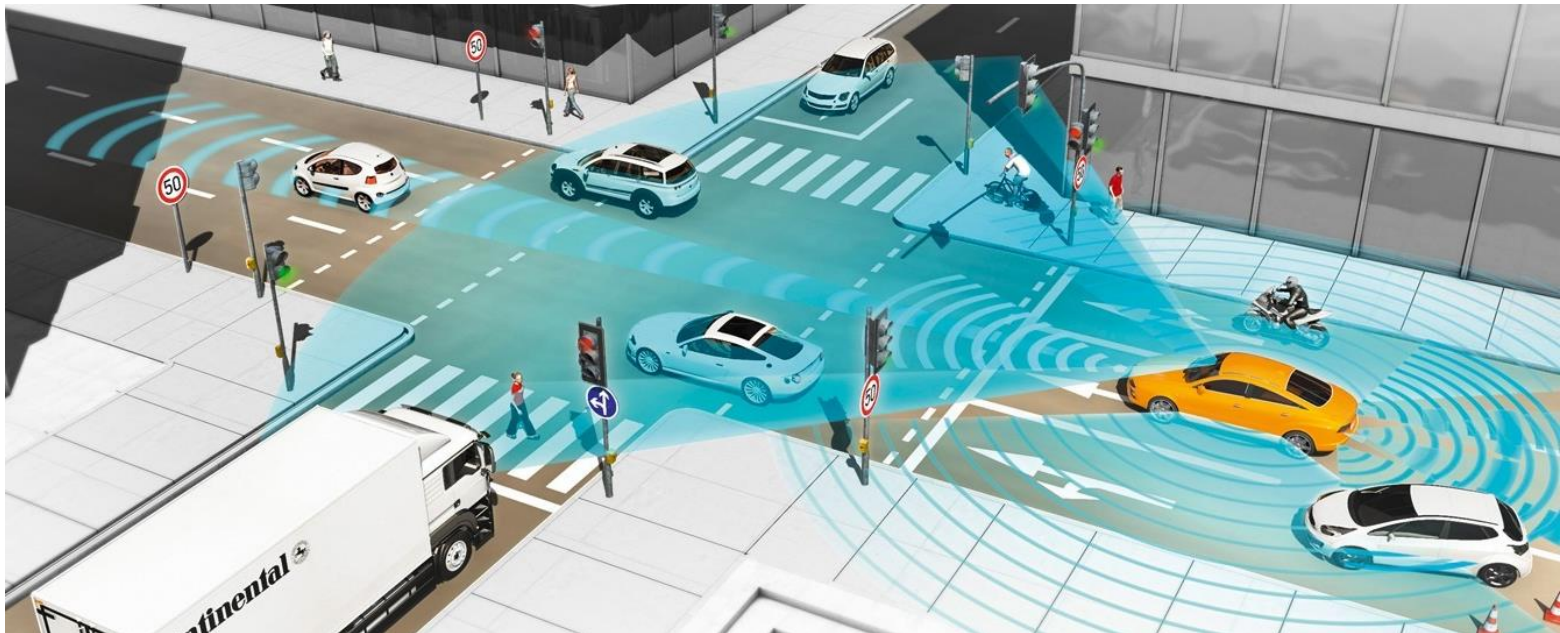
- Smart meter, smart parking, smart traffic, environment (atmosphere, safety) monitoring, street light monitoring/control, etc.
- many countries perform smart city pilot projects



# IoT Applications

## □ Smart (autonomous) car

- vehicle status monitoring, remote maintenance, auto-driving car, car platooning, etc.
- car-to-car communication, car-to-roadside communication



# IoT Applications

## □ Smart healthcare

- Remote healthcare monitoring: monitoring of patients with high blood pressure, diabetes
- monitoring of senior citizen who live alone
- Remote treatment or surgery
- personal healthcare applications



# IoT Applications

## □ Smart logistics

- logistics monitoring
- food monitoring from production to consumption
- monitoring of hazardous materials (toxic chemicals, gases) and movement path tracking of those materials



# Raspberry Pi

- 라즈베리파이 실험실습 환경 구축

# Raspberry Pi

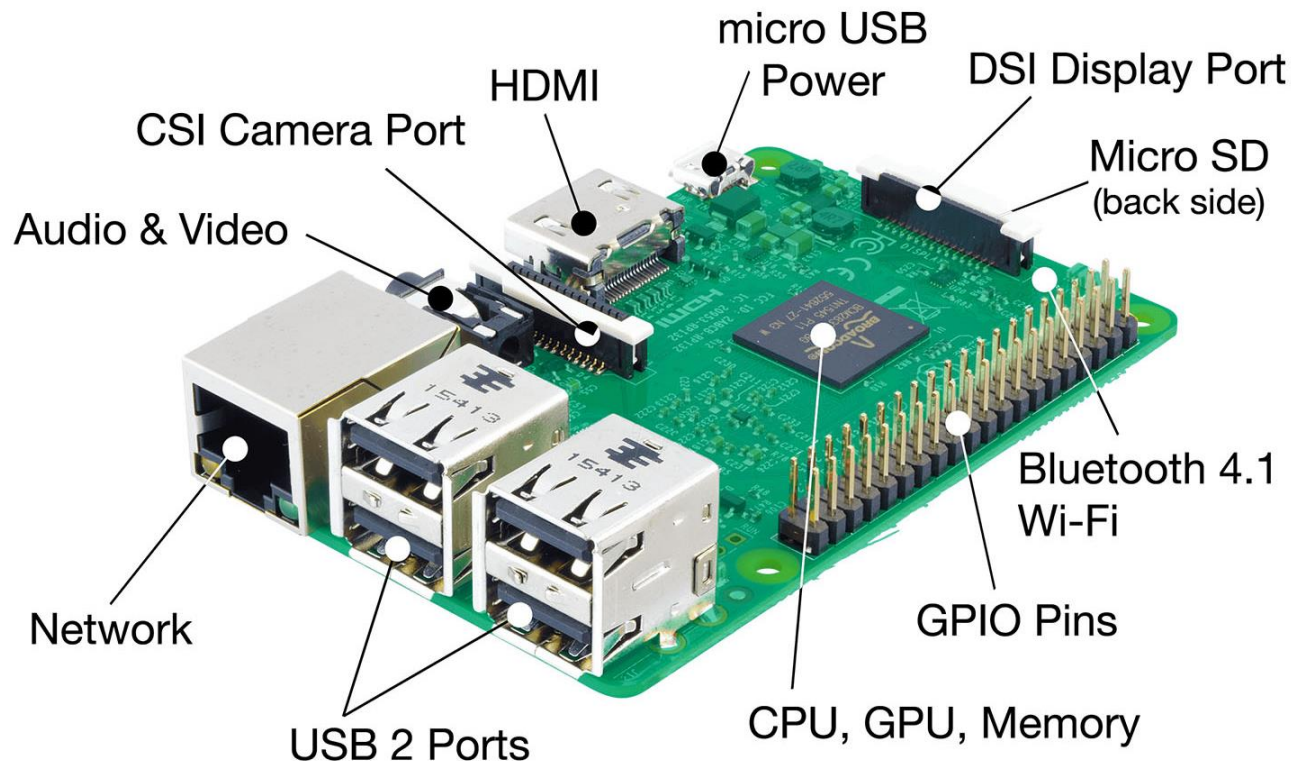
## □ Raspberry Pi 특징

- 2012년 영국의 라즈베리파이 제단에서 교육적인 목적으로 제작 발표한 스마트폰 크기의 싱글보드 컴퓨터
- 오픈소스 리눅스 기반 운영체제 탑재: Raspbian
- 다양한 응용 시스템 개발 툴 존재
- 다양한 센서들과 연결하여 사물인터넷 환경 구축 용이
- 전 세계 수많은 사용자들이 참여하는 다양한 프로젝트/커뮤니티 활성화

# Raspberry Pi

## □ Raspberry Pi 하드웨어 구성

- CPU : Broadcom 사의 BCM2835/BCM2836 SoC 멀티미디어 프로세서로서 H.264 영상 압축 프로세서와 3D 그래픽엔진 탑재

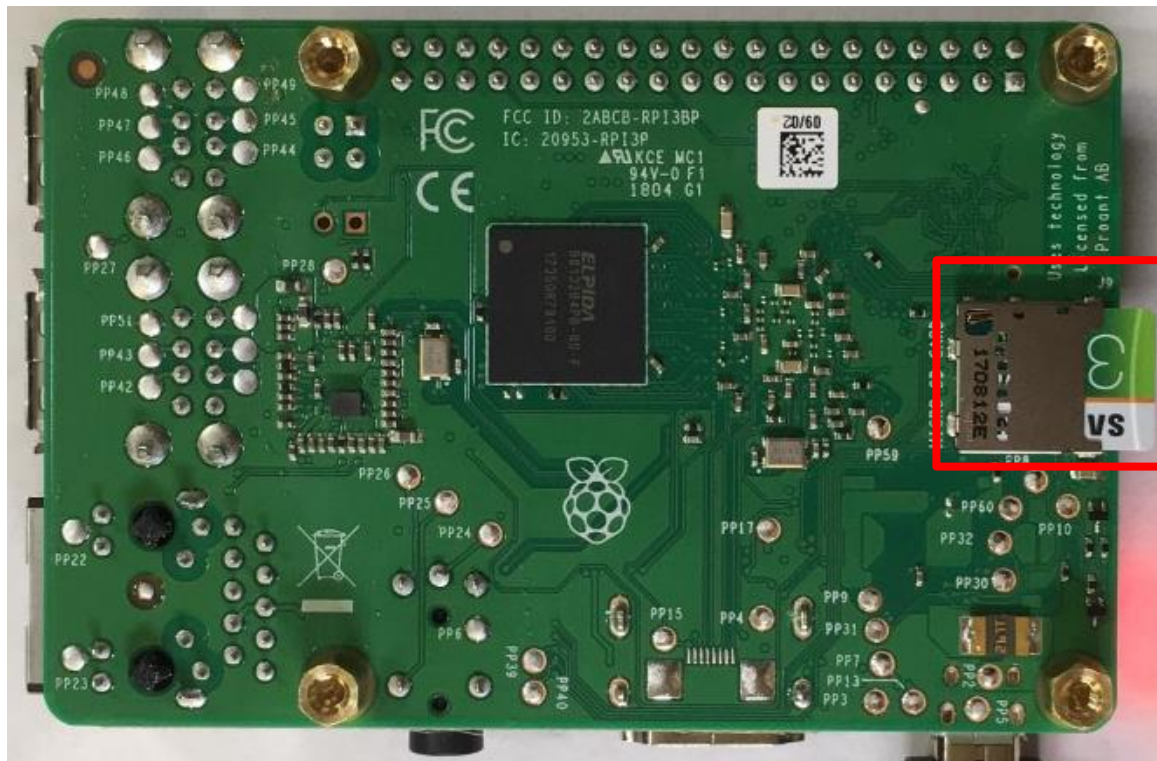




# Raspberry Pi

## □ Raspberry Pi 하드웨어 구성

- back-side



sdcard



# Raspberry Pi

## □ Raspberry Pi 하드웨어 스펙

	Raspberry Pi 3 Model B	Raspberry Pi Zero	Raspberry Pi 2 Model B	Raspberry Pi Model B+
Introduction Date	2/29/2016	11/25/2015	2/2/2015	7/14/2014
SoC	BCM2837	BCM2835	BCM2836	BCM2835
CPU	Quad Cortex A53 @ 1.2GHz	ARM11 @ 1GHz	Quad Cortex A7 @ 900MHz	ARM11 @ 700MHz
Instruction set	ARMv8-A	ARMv6	ARMv7-A	ARMv6
GPU	400MHz VideoCore IV	250MHz VideoCore IV	250MHz VideoCore IV	250MHz VideoCore IV
RAM	1GB SDRAM	512 MB SDRAM	1GB SDRAM	512MB SDRAM
Storage	micro-SD	micro-SD	micro-SD	micro-SD
Ethernet	10/100	none	10/100	10/100
Wireless	802.11n / Bluetooth 4.0	none	none	none
Video Output	HDMI / Composite	HDMI / Composite	HDMI / Composite	HDMI / Composite
Audio Output	HDMI / Headphone	HDMI	HDMI / Headphone	HDMI / Headphone
GPIO	40	40	40	40
Price	\$35	\$5	\$35	\$35

# Raspberry Pi

## □ 주변기기



전원어댑터



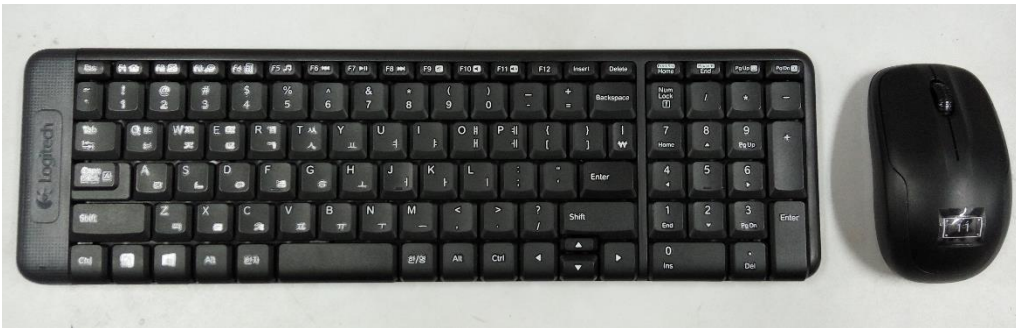
HDMI 케이블



SD카드



SD카드 리더



카보드, 마우스



LAN 케이블

# Raspbian

## □ Raspbian

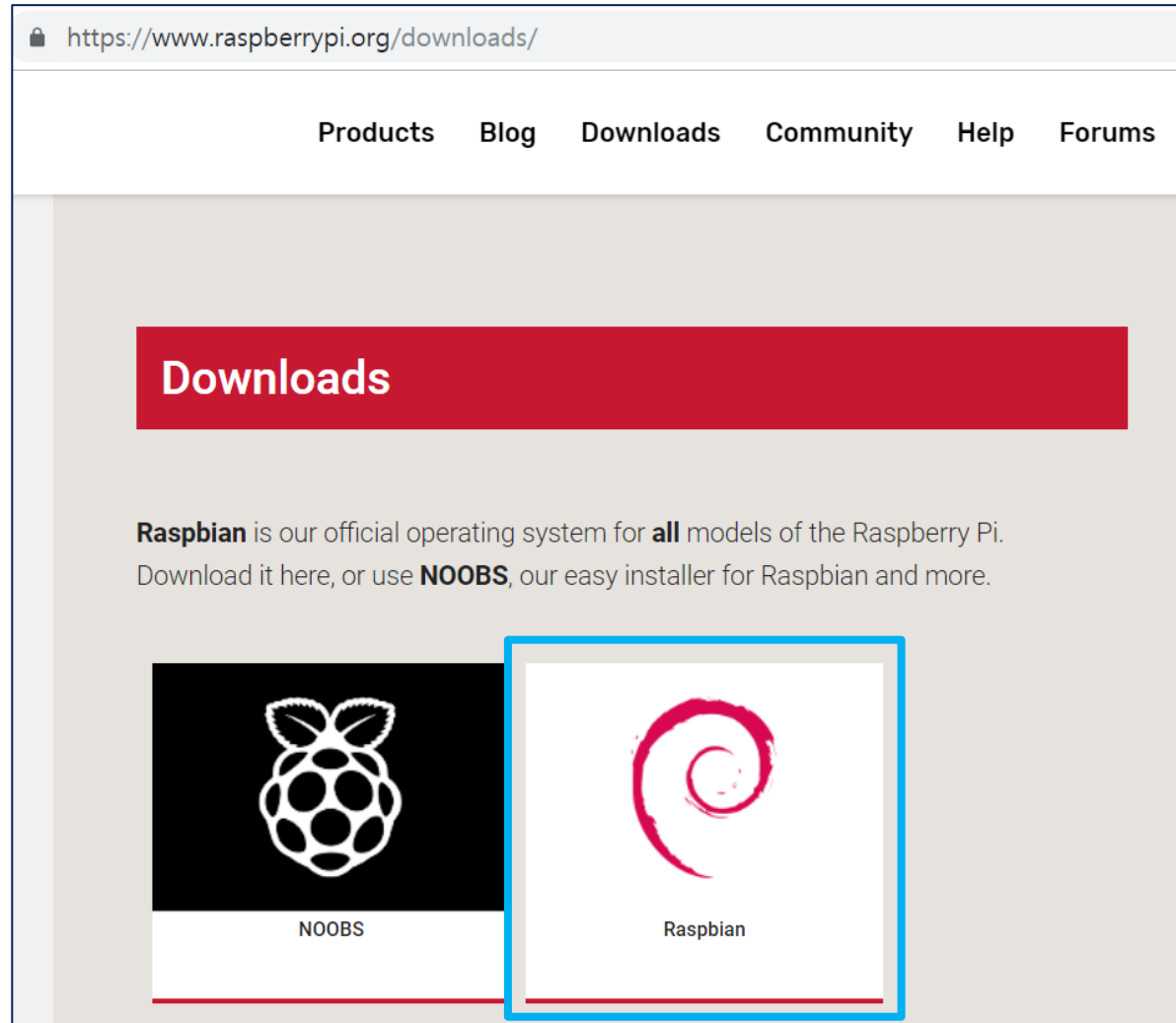
- 가장 많이 사용되는 Raspberry Pi OS
- Debian Linux 기반

## □ Downloading Raspbian

- Download: <https://www.raspberrypi.org/downloads/>


# Raspbian

## □ Downloading Raspbian image



# Raspbian

## □ Downloading Raspbian




**Raspbian Buster with desktop and recommended software**  
Image with desktop and recommended software based on Debian Buster

Version: July 2019  
Release date: 2019-07-10  
Kernel version: 4.19  
Size: 1945 MB

[Release notes](#)

[Download Torrent](#) [Download ZIP](#)

SHA-256: 2bd0613ec8739b6fa4274ea186ec859046f79e6aee4b8c6af0acb6d88f3f533a




**Raspbian Buster with desktop**  
Image with desktop based on Debian Buster

Version: July 2019  
Release date: 2019-07-10  
Kernel version: 4.19  
Size: 1149 MB

[Release notes](#)

[Download Torrent](#) [Download ZIP](#)

SHA-256: 6a1a5f20329e580d5161a0255b3d4163db6f56c3997e1c3b36bdd51140bd768e



**Raspbian Buster Lite**  
Minimal image based on Debian Buster

Version: July 2019  
Release date: 2019-07-10  
Kernel version: 4.19  
Size: 426 MB

[Release notes](#)

[Download Torrent](#) [Download ZIP](#)

SHA-256: 9e5cf24ce483bb96e7736ea75ca422e3560e7b455eee63dd28f66fa1825db70e

# Raspbian

## □ Installing Raspbian

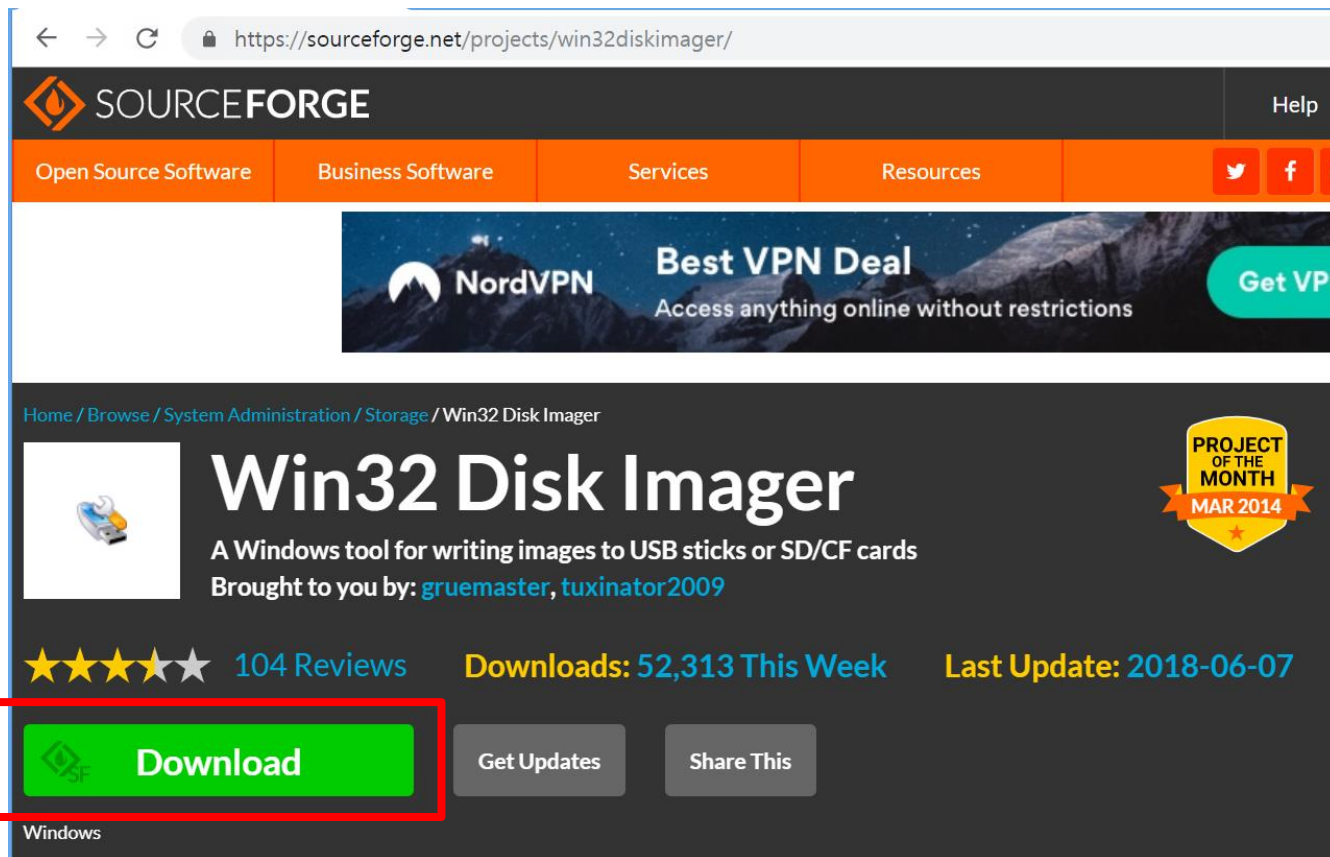
- 다운로드 받은 RASPBIAN파일 압축 해제 → Raspbian 이미지 파일 생성
- [win32diskimager](#) 이용하여 이미지 파일을 micro SD카드에 복사

## □ Downloading win32diskimager

- download: <https://sourceforge.net/projects/win32diskimager/>

# Raspbian

## □ Downloading win32diskimager



The screenshot shows the SourceForge project page for Win32 Disk Imager. The browser address bar displays the URL <https://sourceforge.net/projects/win32diskimager/>. The SourceForge logo is in the top left, and navigation links for Open Source Software, Business Software, Services, and Resources are in the top orange bar. A NordVPN advertisement is featured below the navigation bar. The project title "Win32 Disk Imager" is prominently displayed, along with a description: "A Windows tool for writing images to USB sticks or SD/CF cards". It is attributed to "gruemaster, tuxinator2009". A "PROJECT OF THE MONTH MAR 2014" badge is visible. The project has a rating of 4.5 stars from 104 reviews, 52,313 downloads this week, and a last update of 2018-06-07. A red rectangle highlights the green "Download" button, which includes the SourceForge logo. Other buttons for "Get Updates" and "Share This" are also present. The word "Windows" is visible in the bottom left corner of the project page.


← → ↻ <https://sourceforge.net/projects/win32diskimager/>

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Access anything online without restrictions [Get VPN](#)

Home / Browse / System Administration / Storage / Win32 Disk Imager

 **Win32 Disk Imager**  
A Windows tool for writing images to USB sticks or SD/CF cards  
Brought to you by: [gruemaster](#), [tuxinator2009](#)

**PROJECT OF THE MONTH**  
MAR 2014

★★★★☆ 104 Reviews Downloads: 52,313 This Week Last Update: 2018-06-07

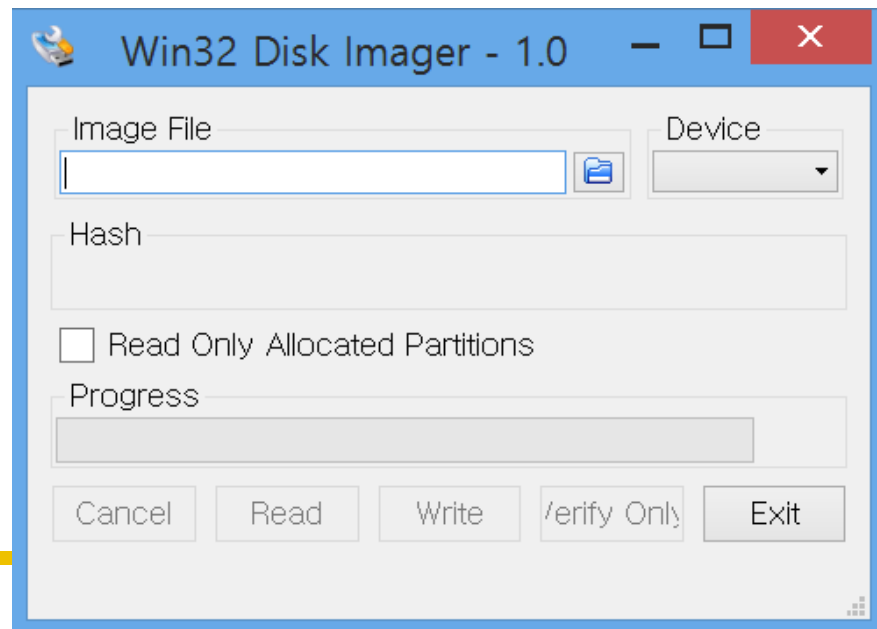
 **Download** [Get Updates](#) [Share This](#)

Windows

# Raspbian

## □ Installing Raspbian

- [win32diskimager](#) 이용하여 이미지 파일을 micro SD카드에 복사
- Image File에 압축된 이미지 파일 선택
- device에 micro-sd카드가 장착된 USB 드라이브 선택
- Write 버튼 클릭

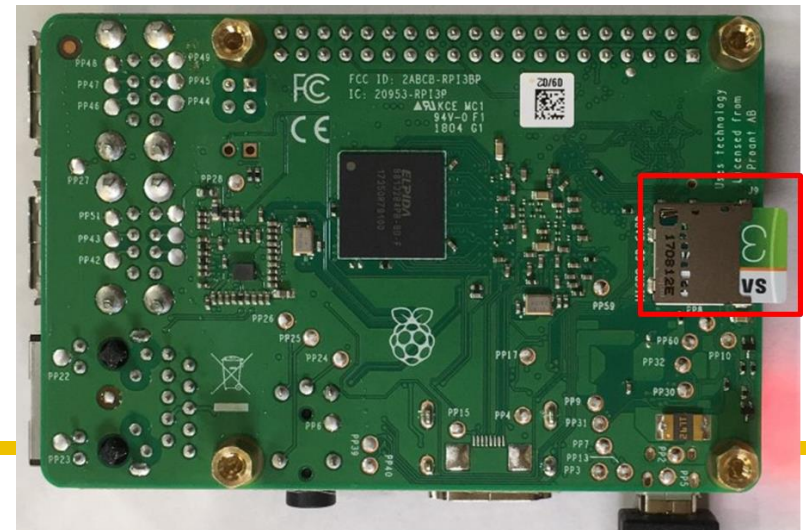




# 원격 접속 설정

## □ Windows 환경에서 라즈베리파이 설정

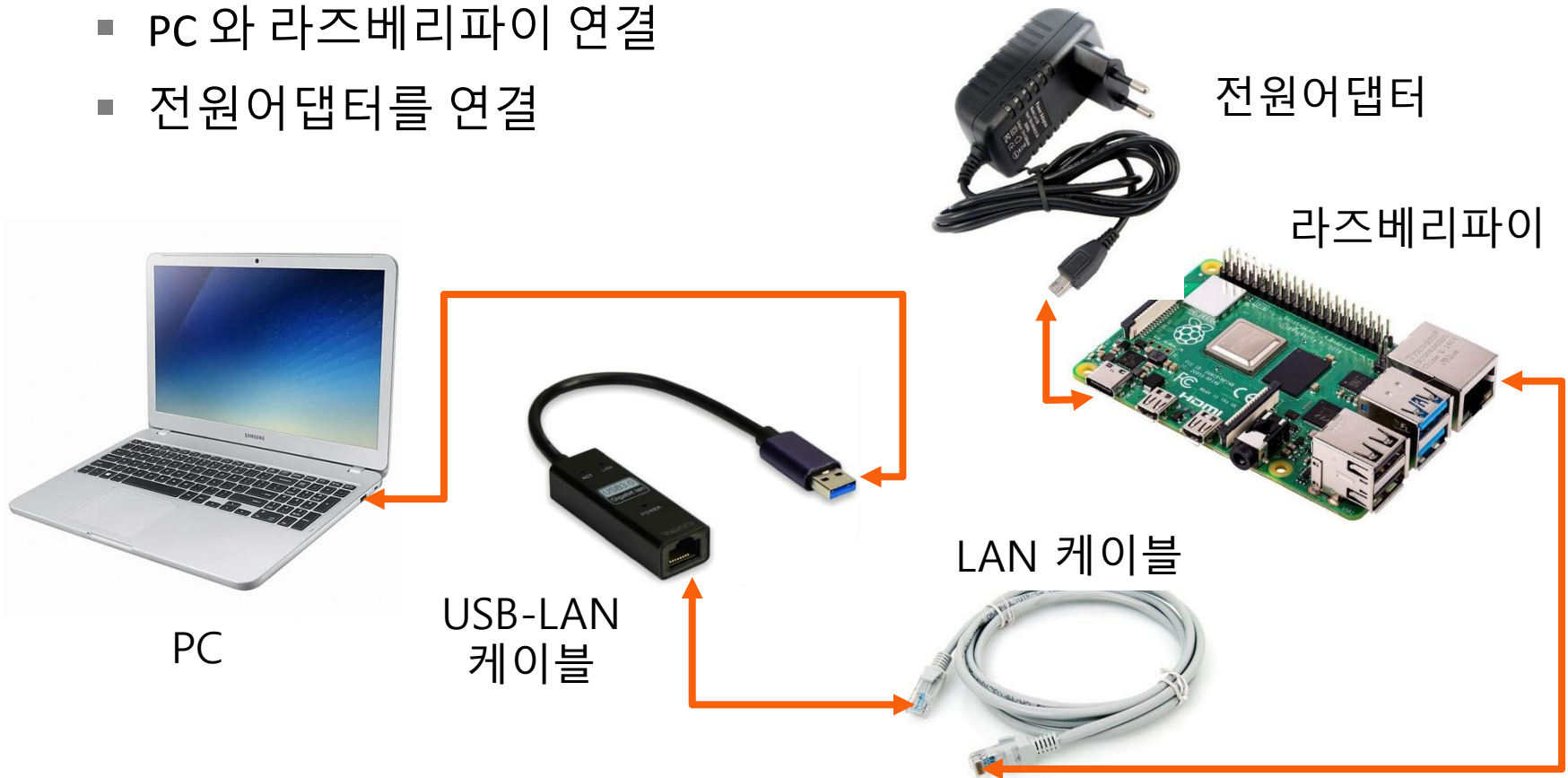
- 부트 디스크 생성: sd-card
- 루트 폴더에서:
- ssh 파일 생성: 확장명 없고, 공백 파일 생성
- cmdline.txt 파일 수정: 메모장 또는 워드패드 이용
  - 맨 뒤에 추가: **ip=192.168.137.100**
- sdcard 를 라즈베리파이에 삽입



# 라즈베리파이 원격 접속

## □ PC를 통한 라즈베리파이 원격접속

- PC 와 라즈베리파이 연결
- 전원어댑터를 연결



# 라즈베리파이 원격 접속

## □ PC – 라즈베리파이 연결 usb-lan 설정

- USB-LAN 케이블을 이용하여 PC-라즈베리파이 연결
- 네트워크 및 공유센터 – 어댑터 설정 변경:



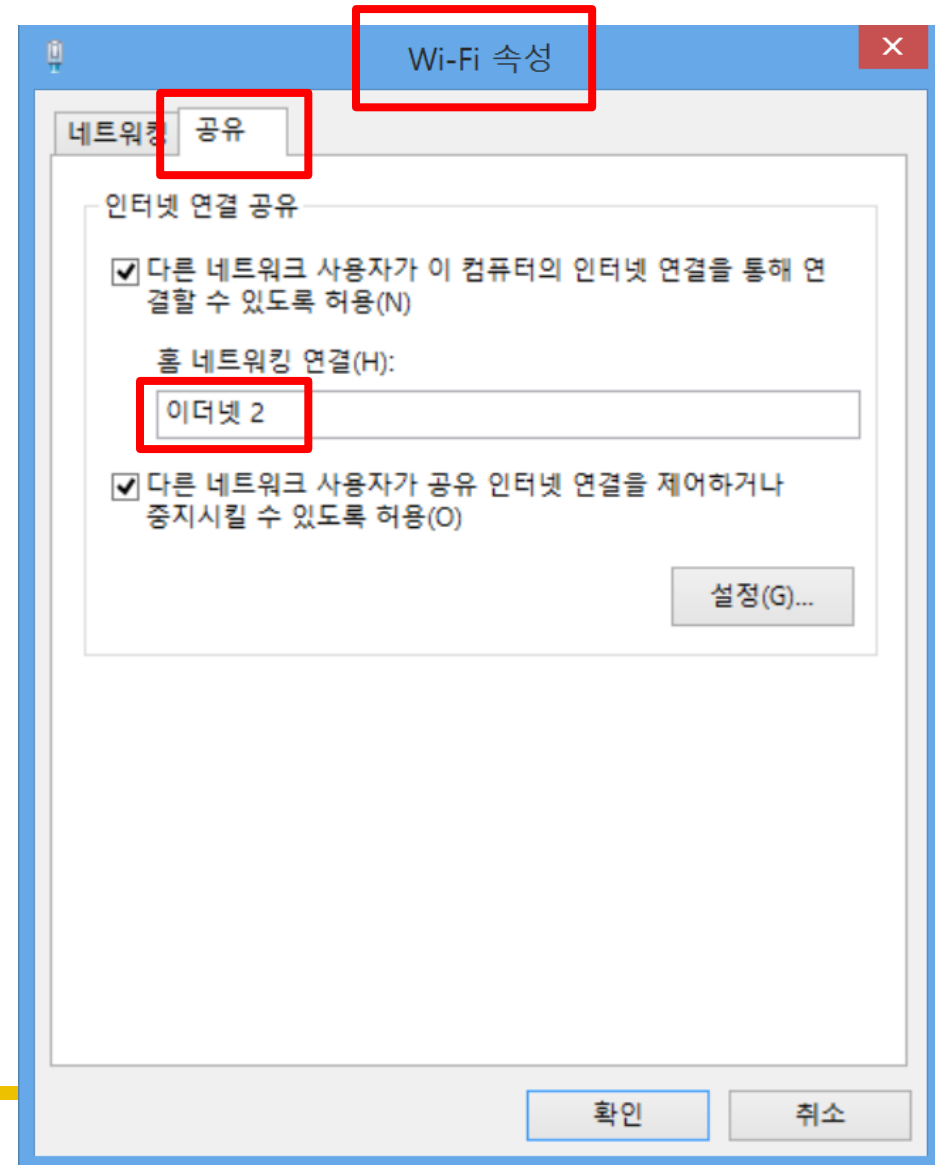
USB-LAN 네트워크

# 라즈베리파이 원격 접속

## □ PC – 라즈베리파이 연결

### ■ 네트워크 공유 설정:

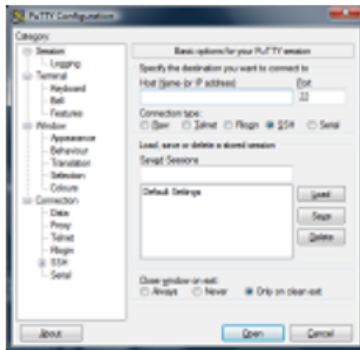
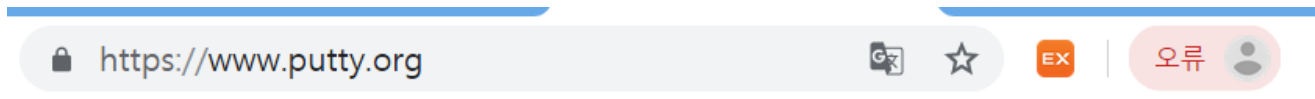
- WiFi : 마우스 오른쪽 버튼 클릭 - 속성 - 공유 선택
- PC의 네트워크 (이더넷 또는 WiFi)를 이더넷2와 공유하도록 설정



# PuTTY를 이용한 원격 접속

## □ PuTTY 프로그램 설치

- PuTTY download: <http://www.putty.org>



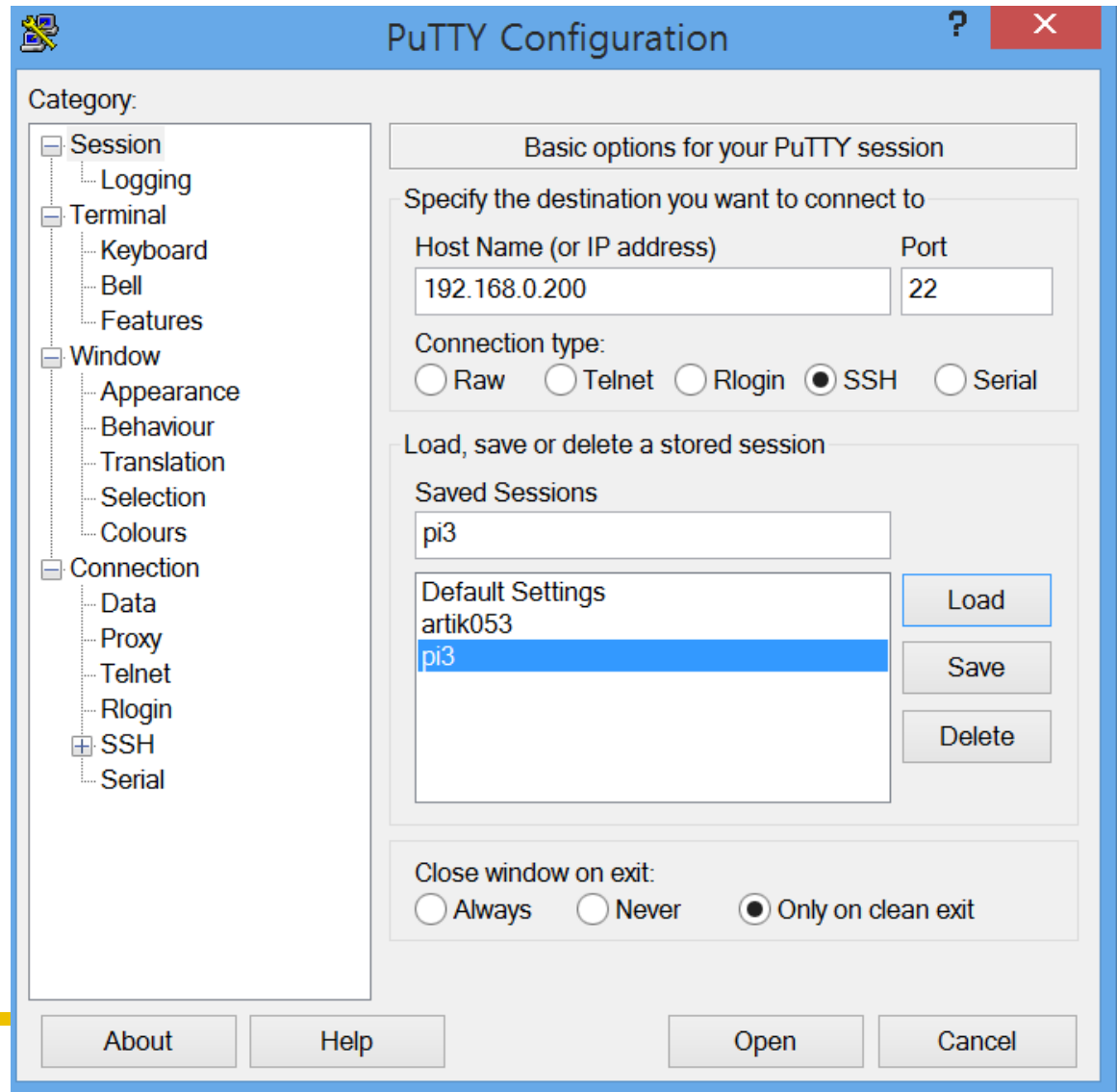
## Download PuTTY

PuTTY is an SSH and telnet client, developed originally by Simon Tatham for the Windows platform. PuTTY is open source software that is available with source code and is developed and supported by a group of volunteers.

You can download PuTTY [here](http://www.putty.org).

# PuTTY를 이용한 원격 접속

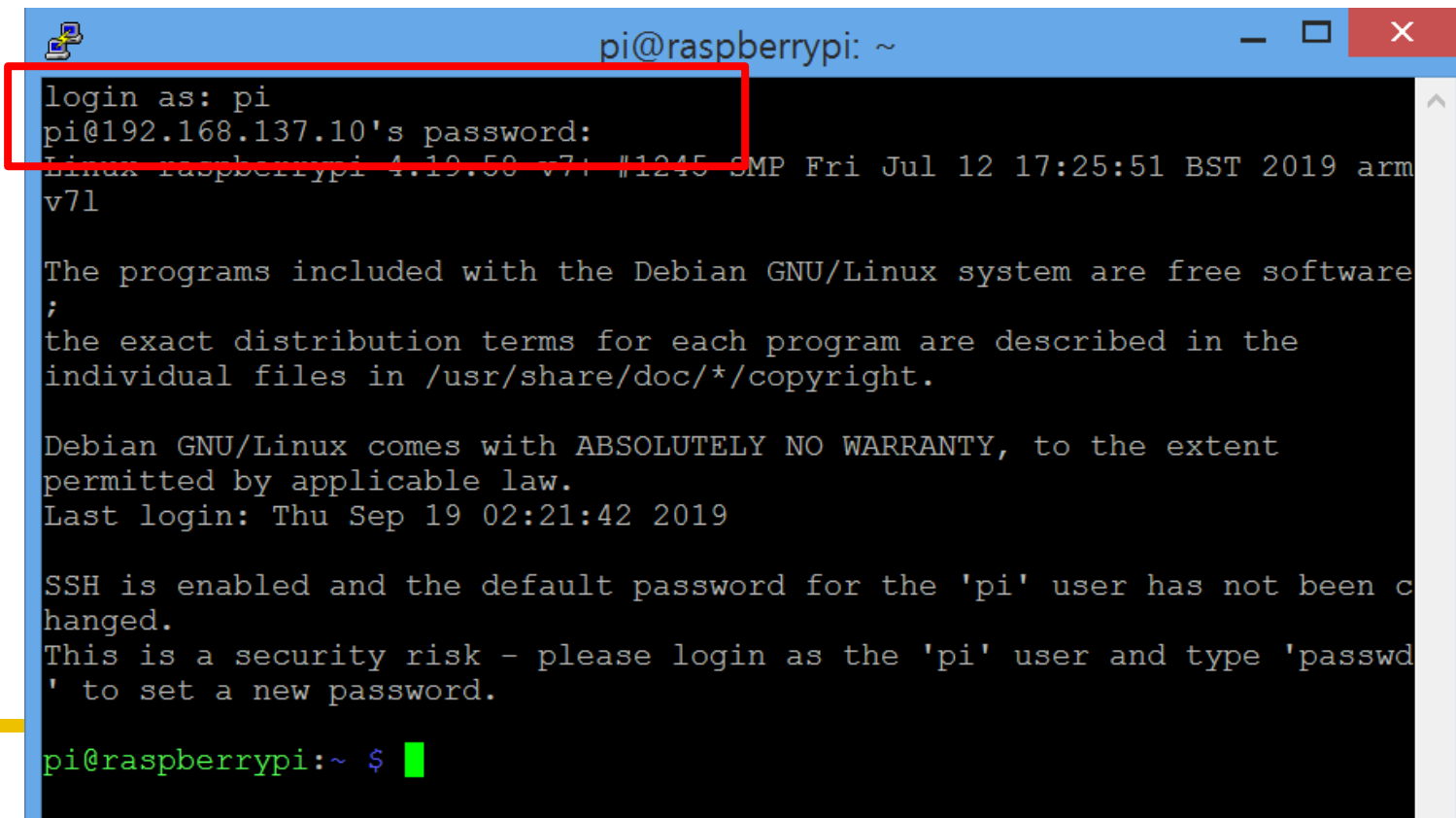
## □ PuTTY 이용 접속



# PuTTY를 이용한 원격 접속

## □ 원격접속: PuTTY

- 사용자: pi
- 패스워드: raspberry



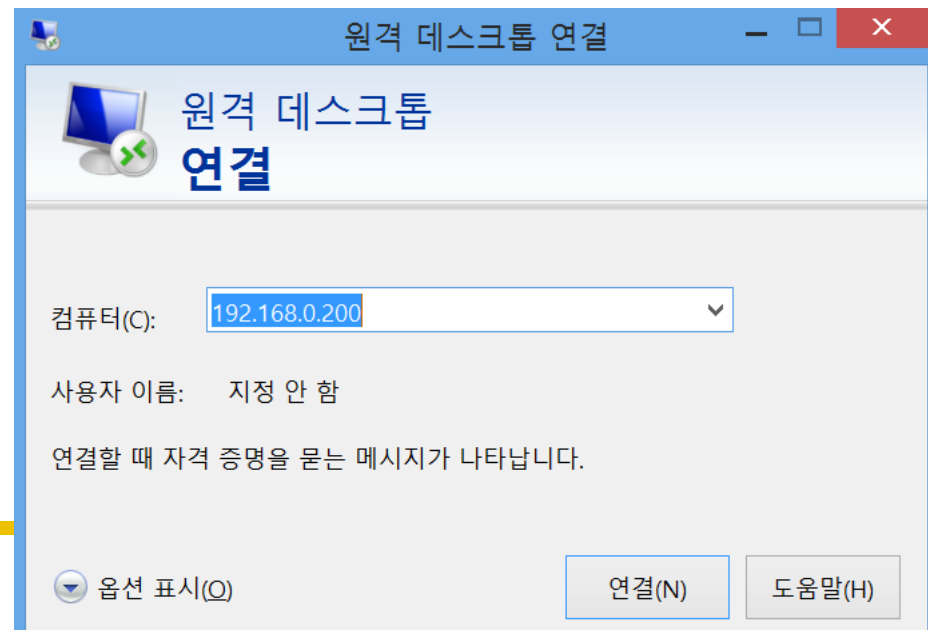
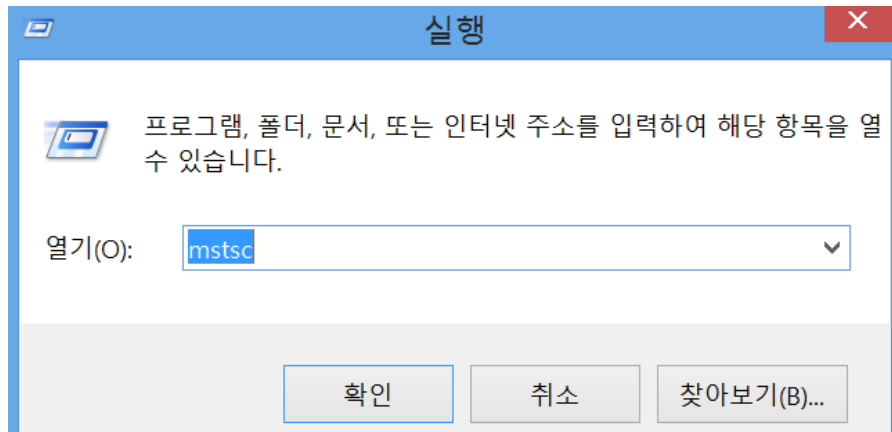
```
pi@raspberrypi: ~  
login as: pi  
pi@192.168.137.10's password:  
Linux raspberrypi 4.19.50-v7l #1245 SMP Fri Jul 12 17:25:51 BST 2019 armv7l  
  
The programs included with the Debian GNU/Linux system are free software  
;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Thu Sep 19 02:21:42 2019  
  
SSH is enabled and the default password for the 'pi' user has not been c  
hanged.  
This is a security risk - please login as the 'pi' user and type 'passwd  
' to set a new password.  
  
pi@raspberrypi:~ $
```

# 그래픽 기반 원격 접속

## □ 그래픽 기반 원격 접속

- XRDP 그래픽 원격 접속 프로그램
- 라즈베리파이 xrdp 설치: PuTTY로 접속하여 xrdp 프로그램 설치  

```
$ sudo apt-get install xrdp
```
- 원격 데스크톱 접속: 실행 - mstsc





# 그래픽 기반 원격 접속

## □ 그래픽 기반 원격 접속

- 원격 데스크톱 접속:

