

# 경기도 자율주행 경진대회 교육 워크숍

Subject: 개발환경 구축

*Automation Lab.*



# PC

## ■ PC 하드웨어 환경



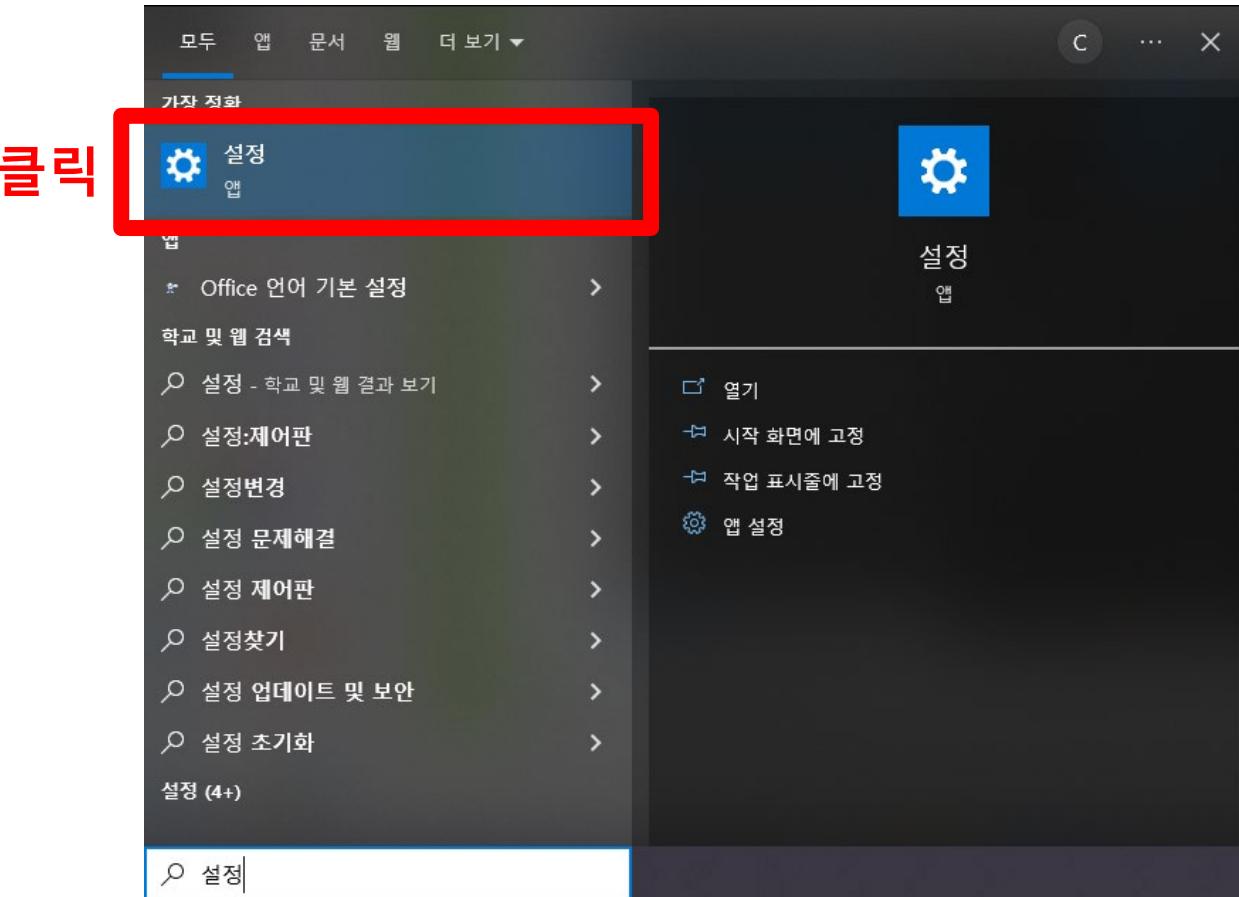
운영체제: Window10



아키텍쳐: x86, x64

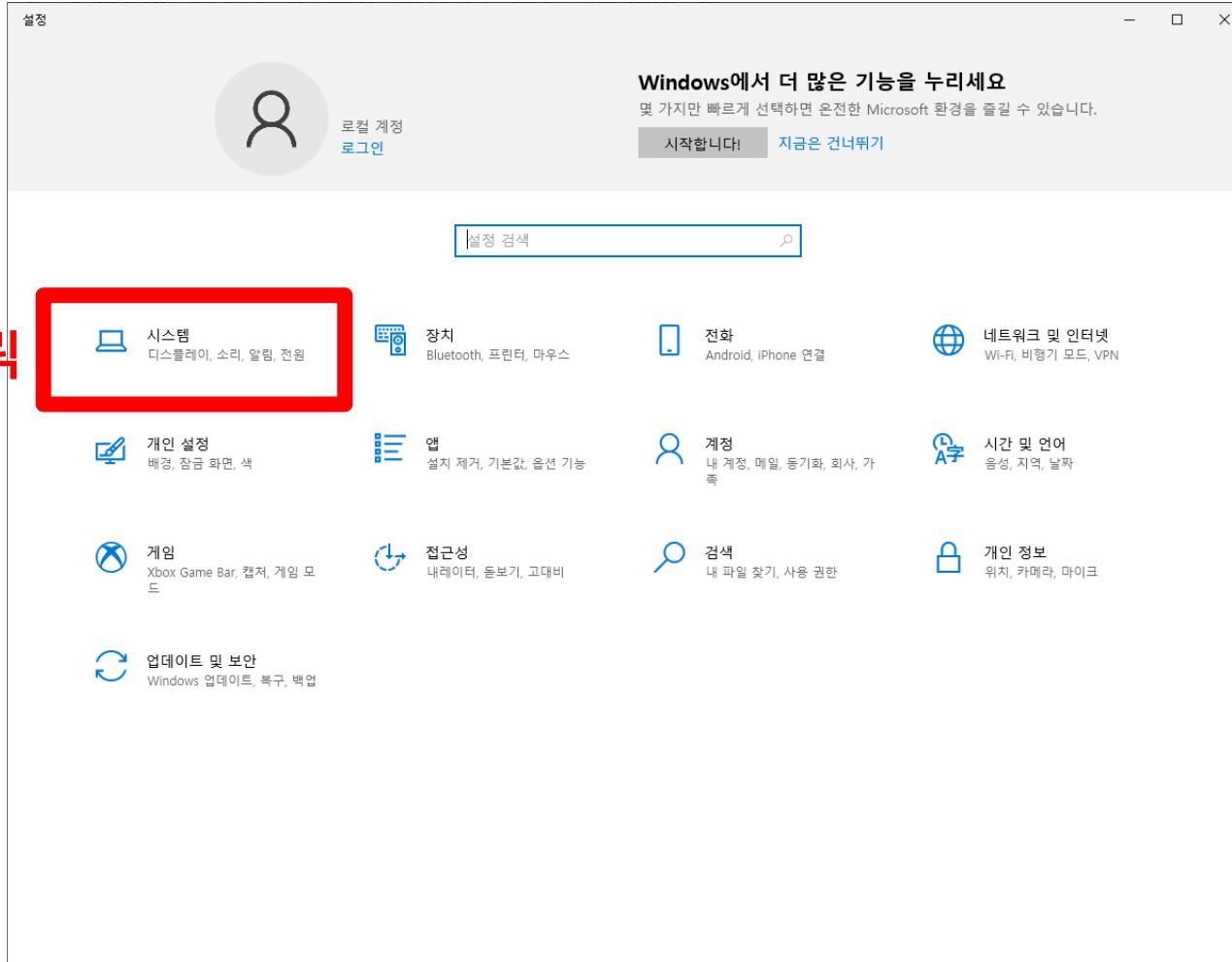
# PC

## ■ PC 하드웨어 사양 확인



# PC

## ■ PC 하드웨어 사양 확인

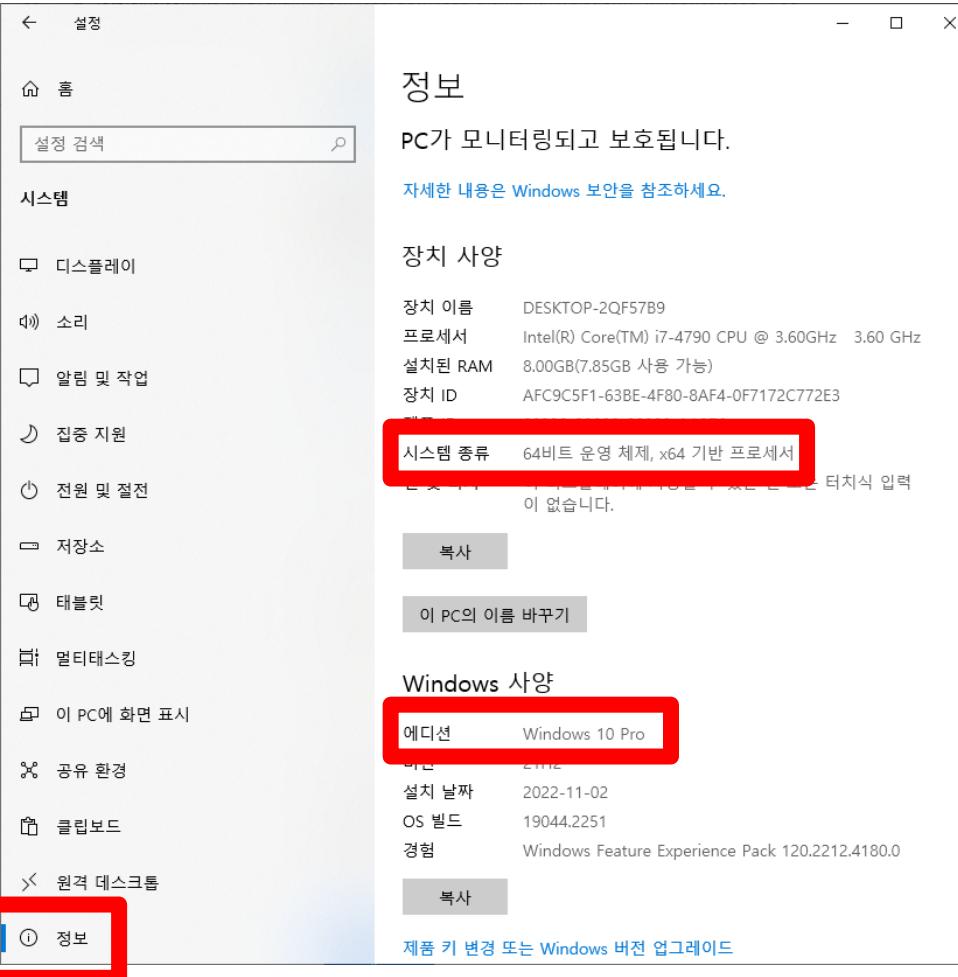


클릭



# PC

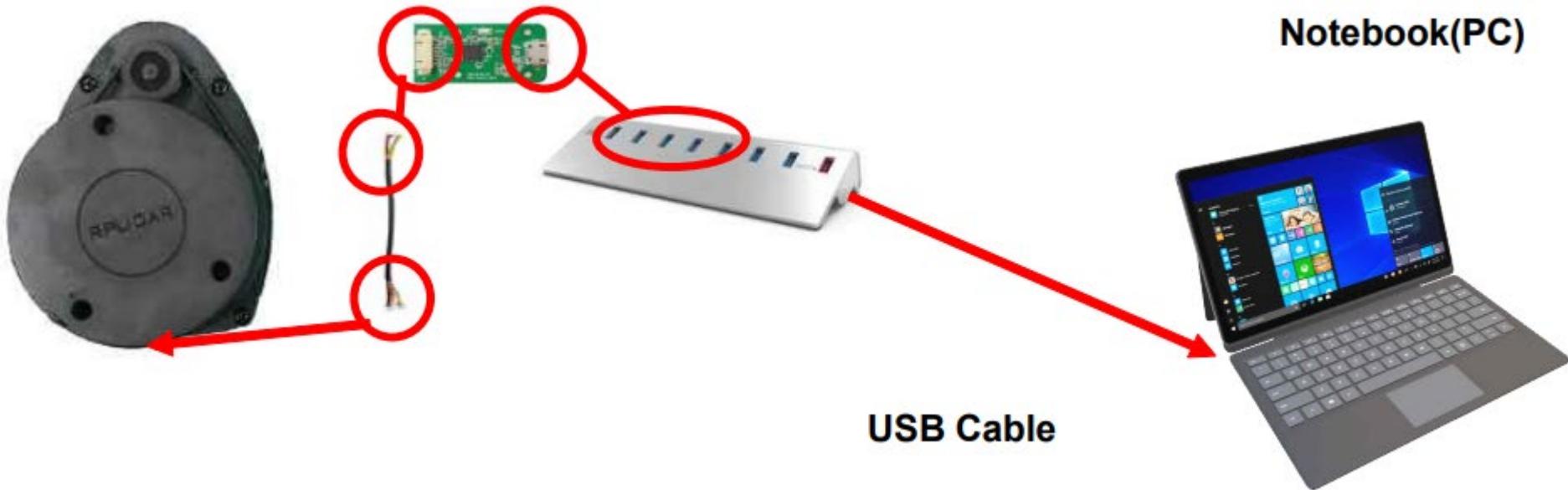
## ■ PC 하드웨어 사양 확인



클릭

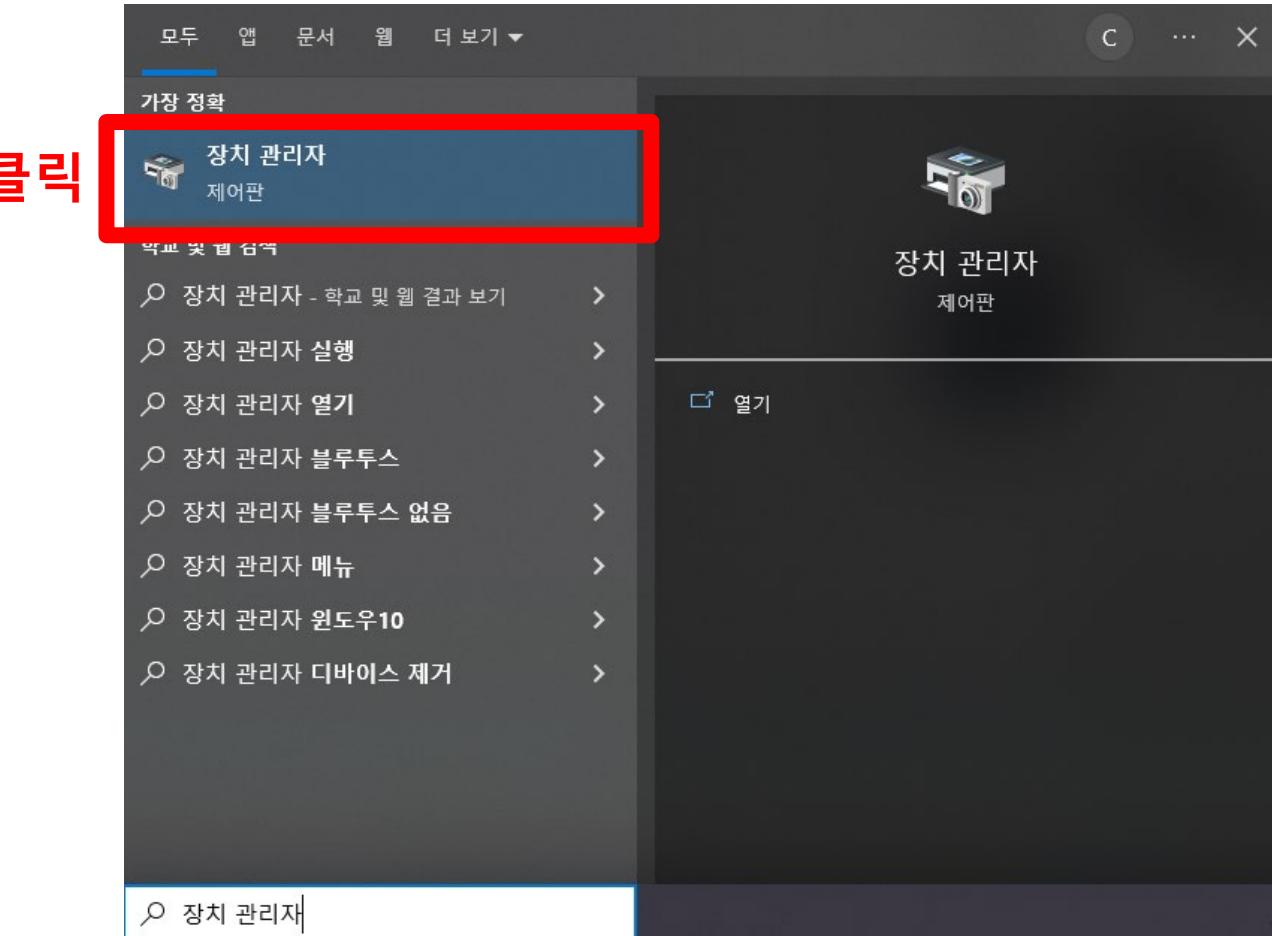
# LiDAR

## ■ 라이다(LiDAR)



# LiDAR

## ■ 라이다 장치 인식 확인



# LiDAR

## ■ 라이다 장치 인식 확인



기타장치 CP2102 USB 인식 확인

인식 안될 시, 라이다 USB 포트 연결 확인

# LiDAR

## ■ 라이다 드라이버 설치

다운로드 페이지:

<https://www.slamtec.com/ko/support#rplidar-a-series>

SLAMTEC 思 | 岚 | 科 | 技

Home Products Cases News Buy Support About Us

Mapper RPLIDAR S2 RPLIDAR S1 RPLIDAR A Series SLAMWARE/Cube SDP mini Platform Developer Center

3D Models

RPLIDAR A3M1 Dev Kit

STL 2D PDF 3D PDF IGS

RPLIDAR A2M4 Dev Kit

STL 2D PDF 3D PDF IGS

RPLIDAR A1M8 Core

STL 2D PDF 3D PDF IGS

RPLIDAR A1M8 Dev Kit

STL 2D PDF 3D PDF IGS

SDK and Firmware

RPLIDAR SDK

Latest Version: 2.0 (2021-11-01)

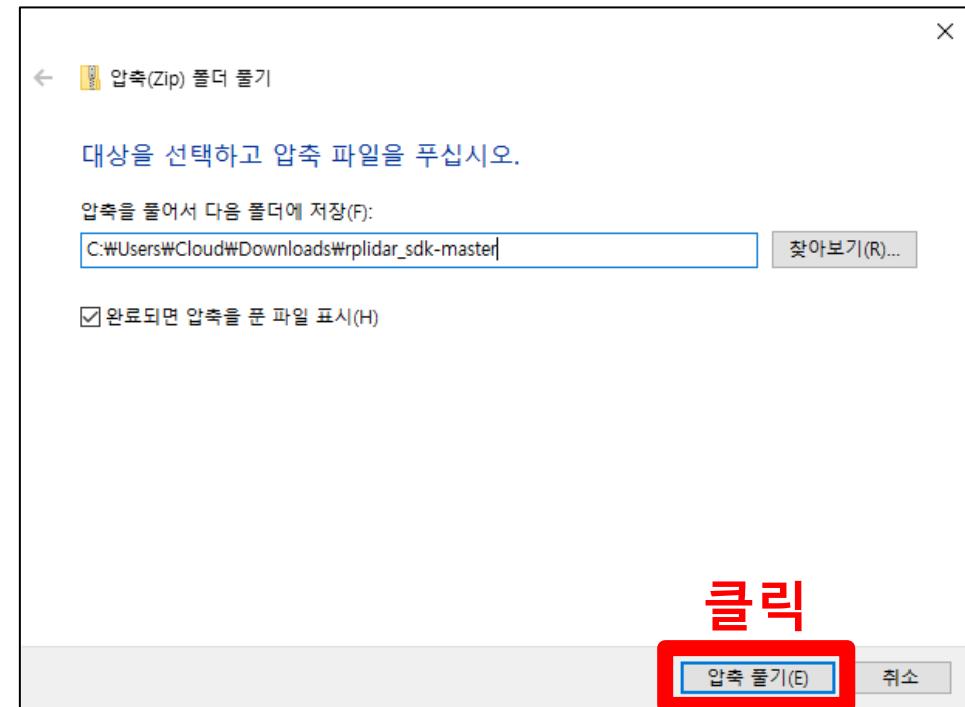
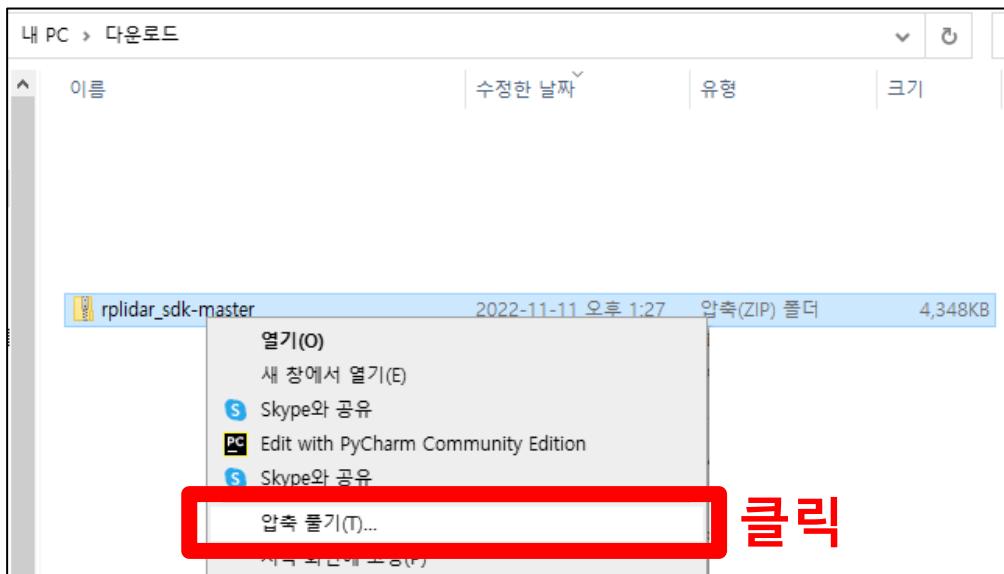
클릭

Download Tool GitHub Repository

경로: SDK and Firmware - RPLIDAR SDK - Download

# LiDAR

## ■ 라이다 드라이버 설치



# LiDAR

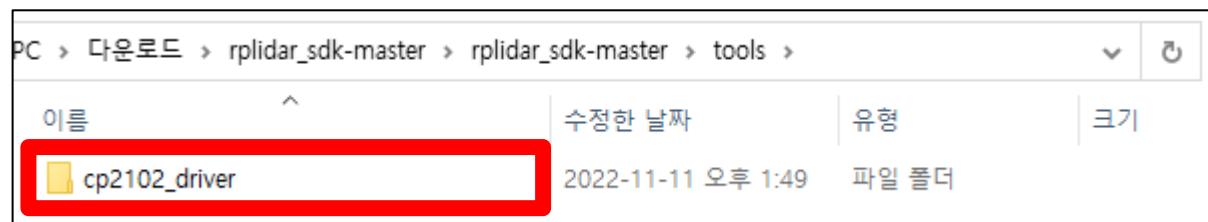
## ■ 라이다 드라이버 설치



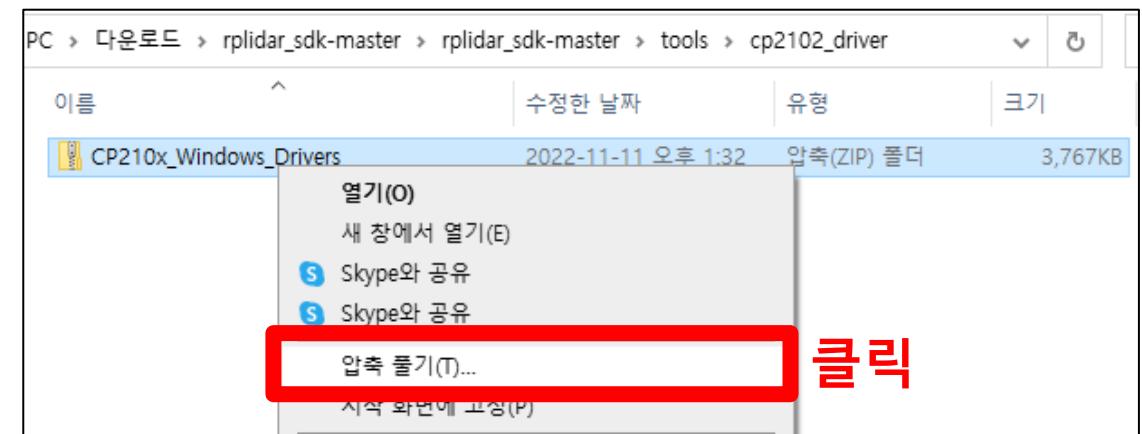
이름	수정한 날짜	유형
app	2022-11-10 오후 5:51	파일 폴더
docs	2022-11-10 오후 5:51	파일 폴더
sdk	2022-11-10 오후 5:51	파일 폴더
tools	2022-11-10 오후 5:51	파일 폴더
workspaces	2022-11-10 오후 5:51	파일 폴더
.gitignore	2022-11-10 오후 5:51	GITIGNORE 파일
cross_compile.sh	2022-11-10 오후 5:51	SH 파일
LICENSE	2022-11-10 오후 5:51	파일
mak_common.inc	2022-11-10 오후 5:51	INC 파일
mak_def.inc	2022-11-10 오후 5:51	INC 파일
Makefile	2022-11-10 오후 5:51	파일
README.md	2022-11-10 오후 5:51	MD 파일

# LiDAR

## ■ 라이다 드라이버 설치



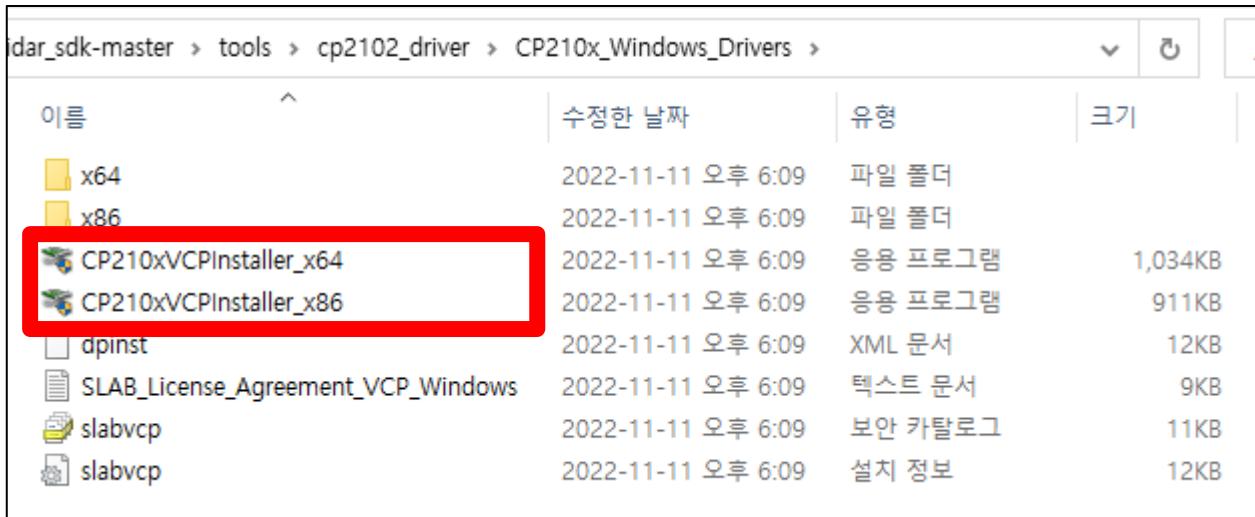
클릭



클릭

# LiDAR

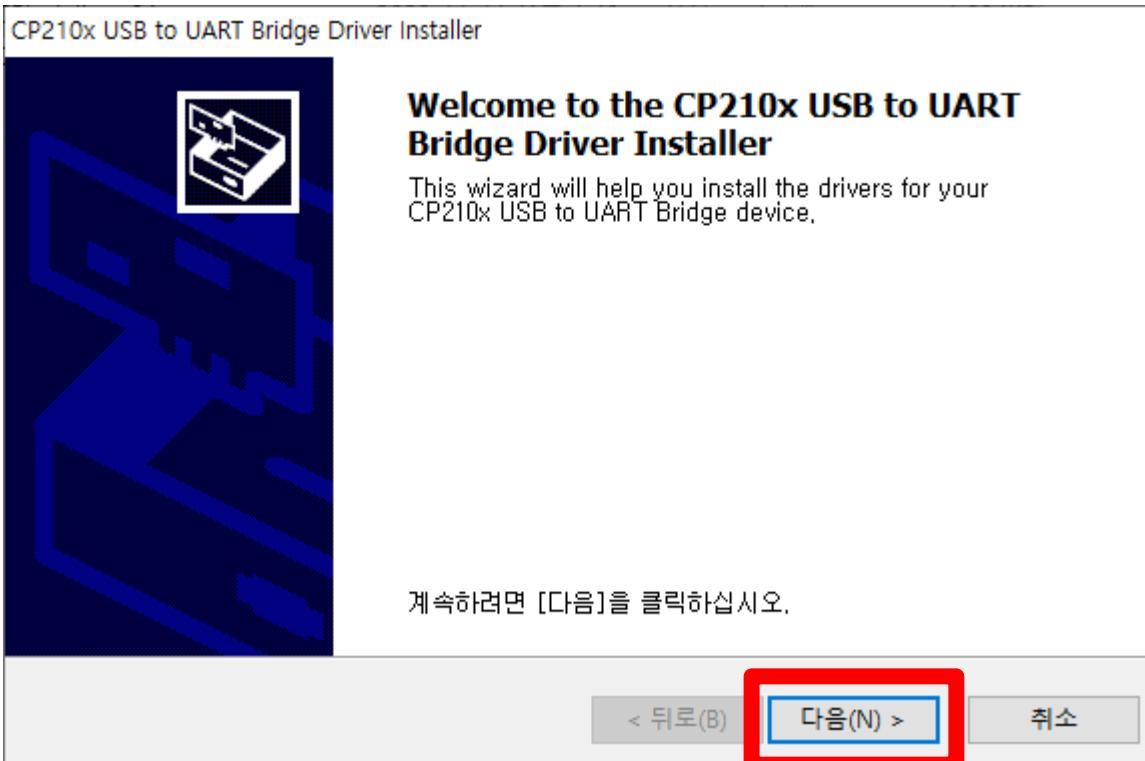
## ■ 라이다 드라이버 설치



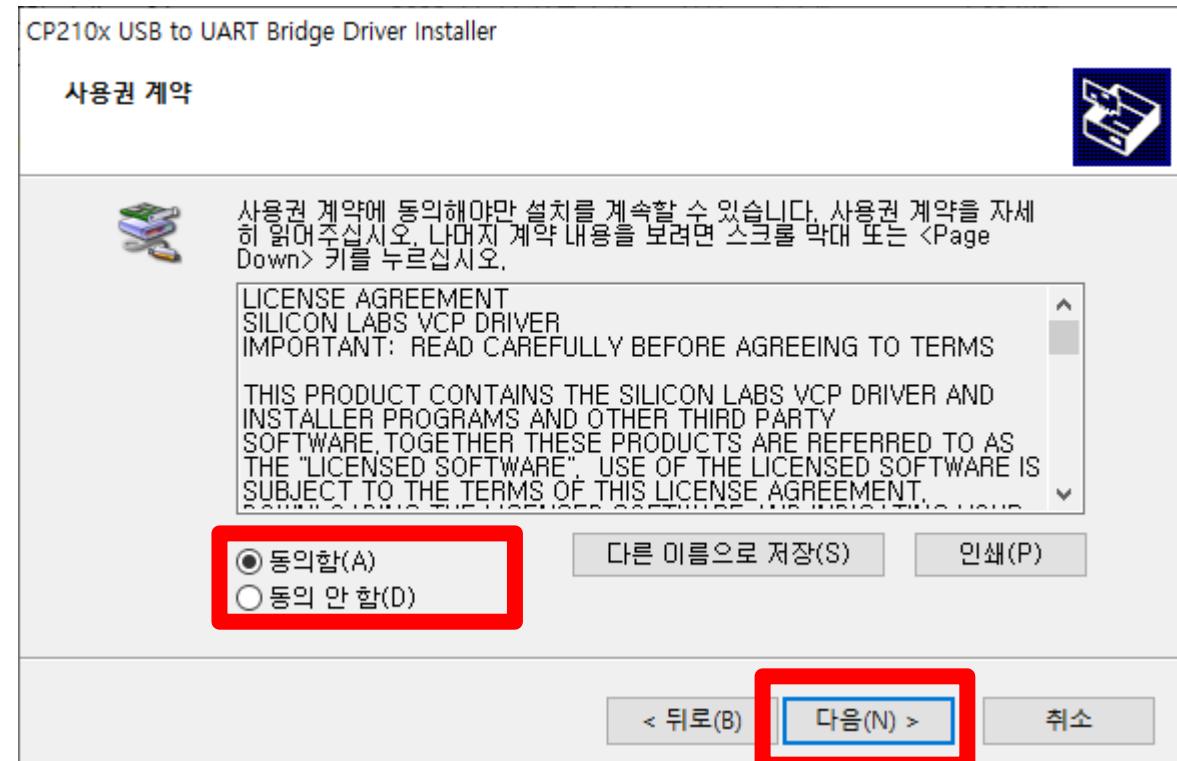
PC 사양에 맞는 프로그램 실행

# LiDAR

## ■ 라이다 드라이버 설치



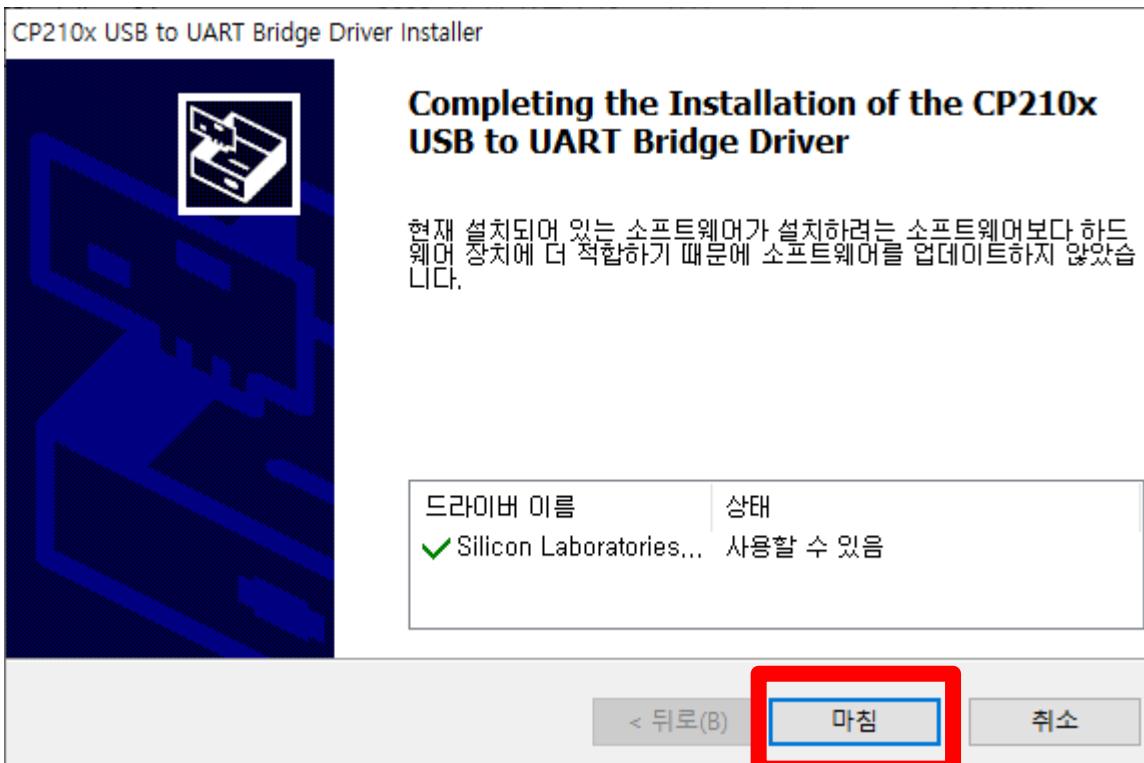
클릭



동의함 체크 후 다음

# LiDAR

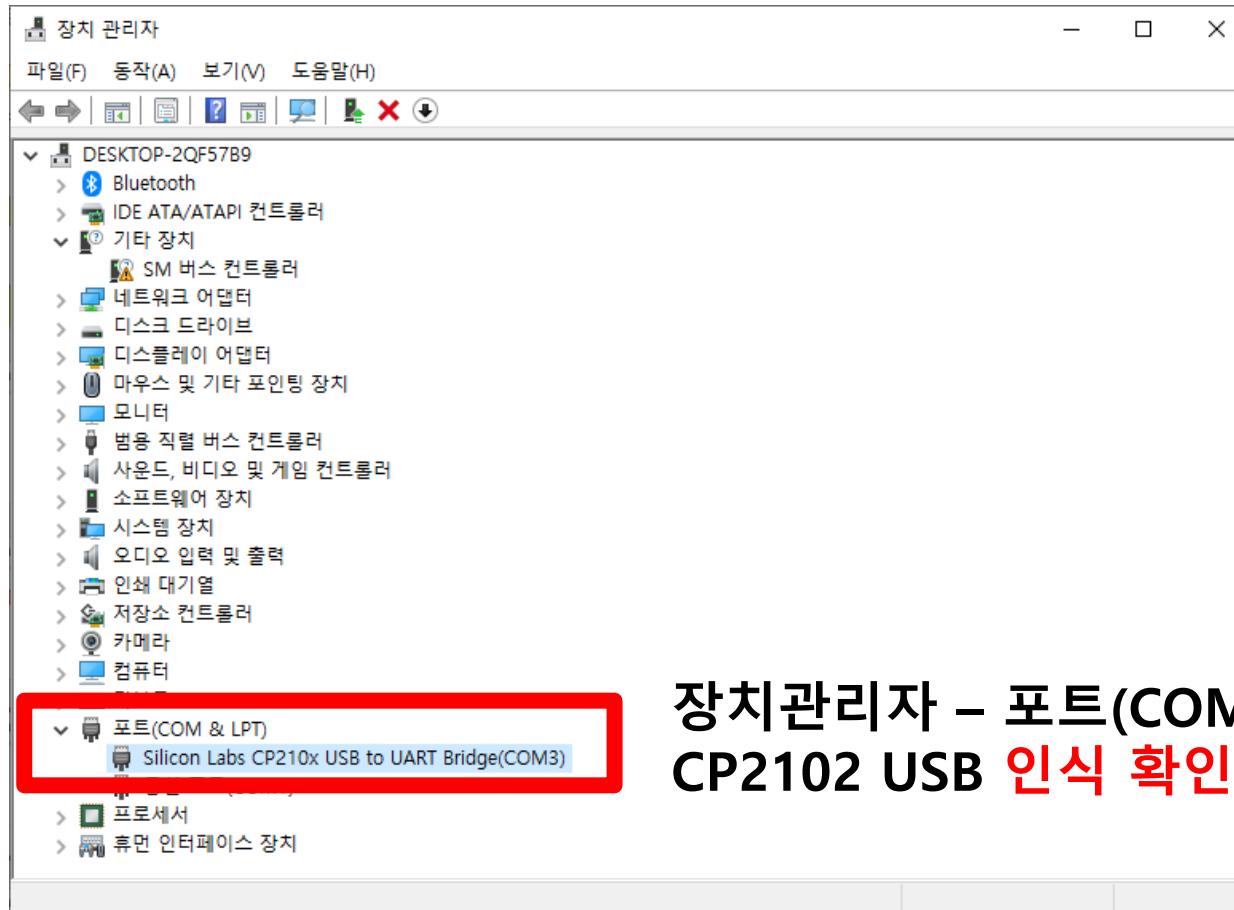
## ■ 라이다 드라이버 설치



클릭

# LiDAR

## ■ 라이다 장치 인식 확인



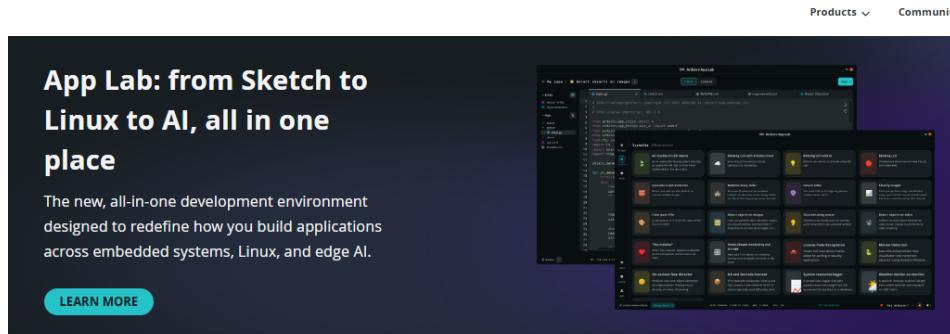
장치관리자 – 포트(COM & LPT)  
CP2102 USB 인식 확인

# Arduino IDE

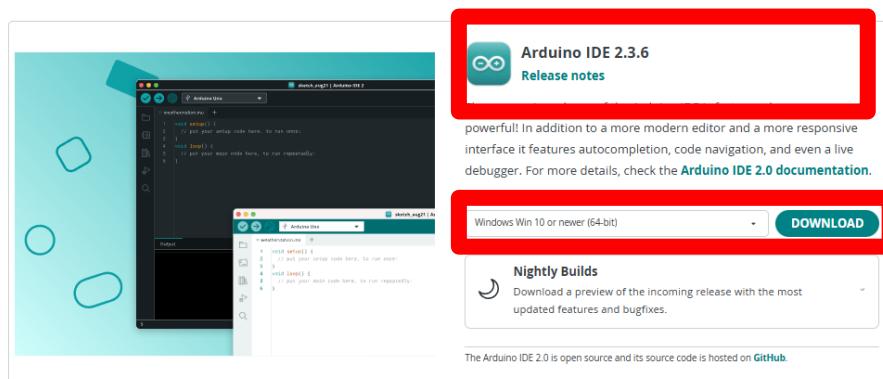
## ■ Arduino IDE 설치

다운로드 페이지:

<https://www.arduino.cc/en/software/>



Bring Your Projects to Life with Arduino Software

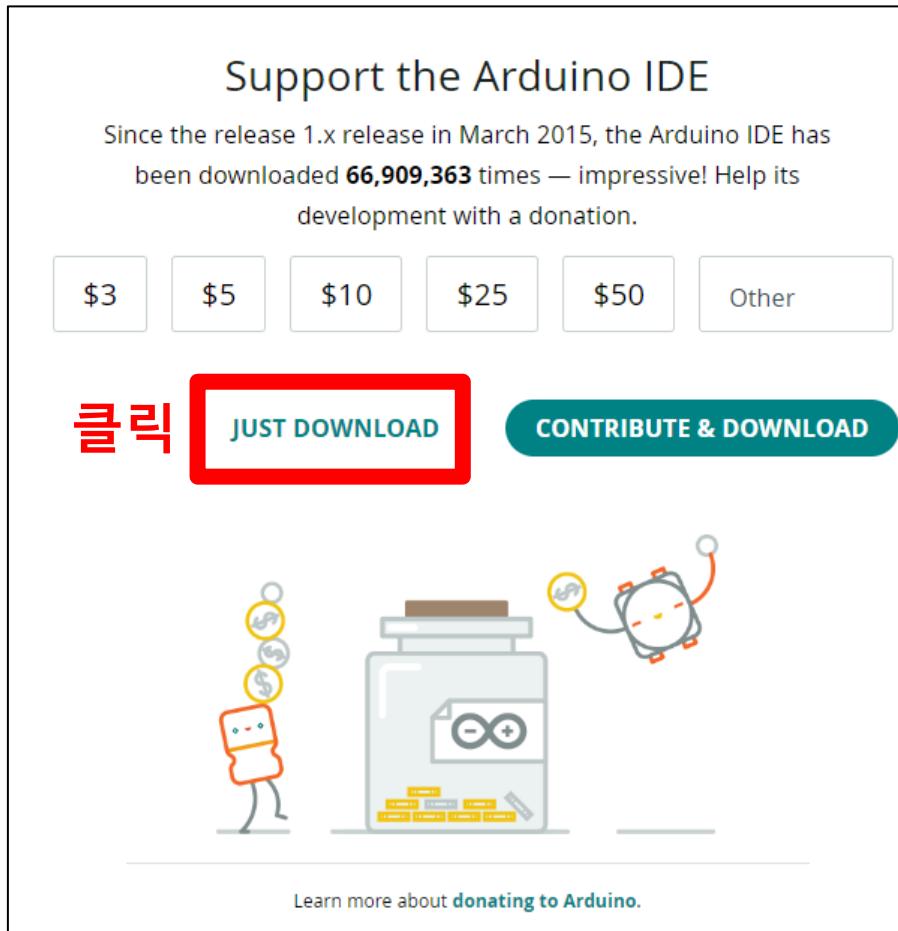


Arduino IDE 2.3.6  
버전 확인

Windows Win 10 or newer  
클릭 후 다운로드

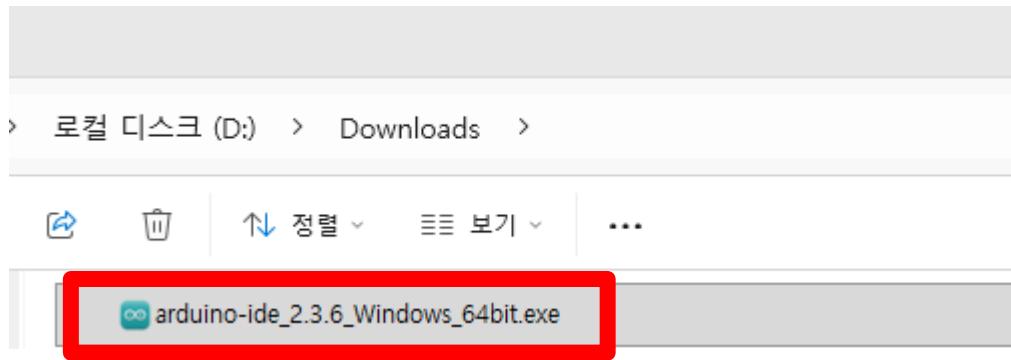
# Arduino IDE

## ■ Arduino IDE 설치

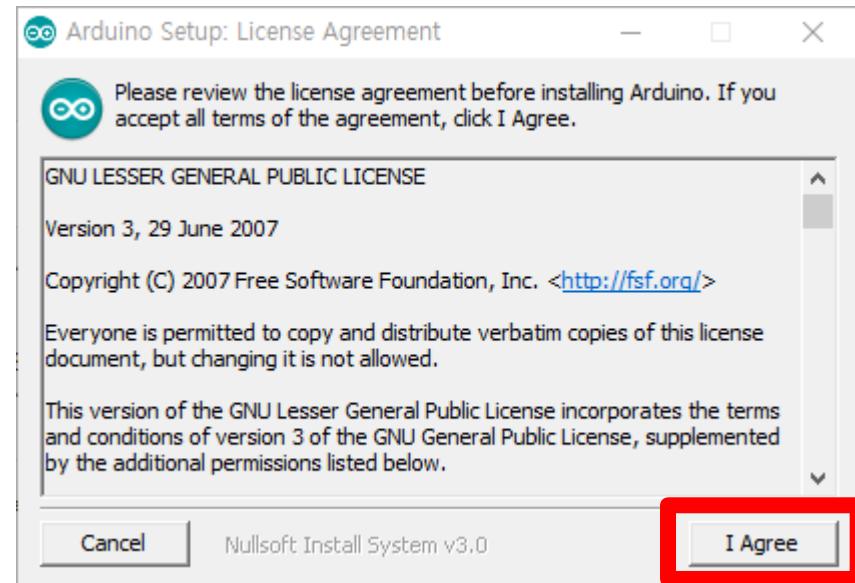


# Arduino IDE

## ■ Arduino IDE 설치



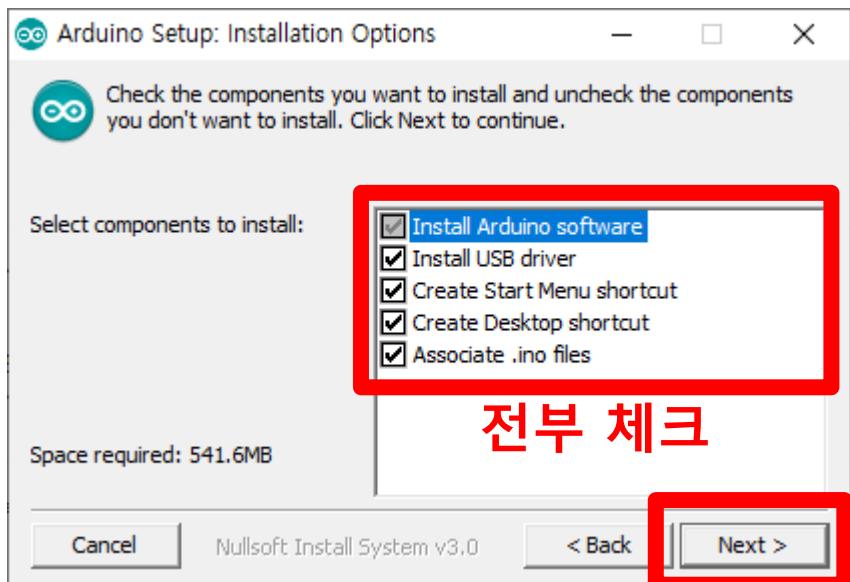
클릭



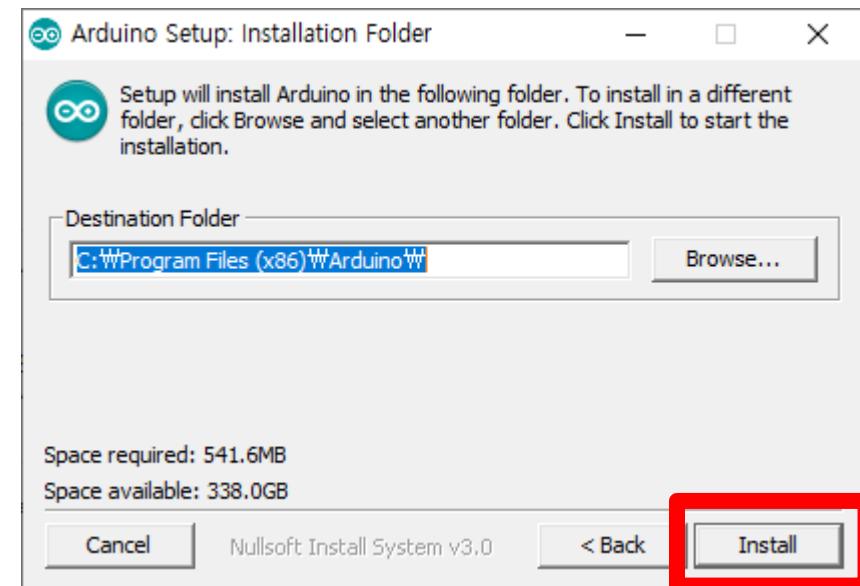
클릭

# Arduino IDE

## ■ Arduino IDE 설치



클릭



클릭

# Arduino IDE

## ■ Arduino IDE 설치

### 장치 소프트웨어 설치 알림 뜰 시, 모두 설치



# Arduino IDE

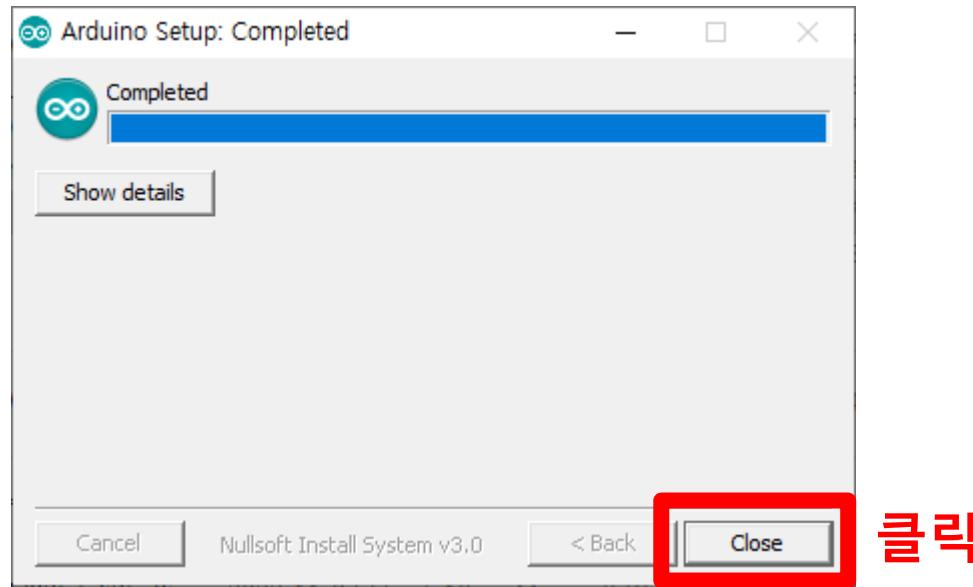
## ■ Arduino IDE 설치

장치 소프트웨어 설치 알림 뜰 시, 모두 설치



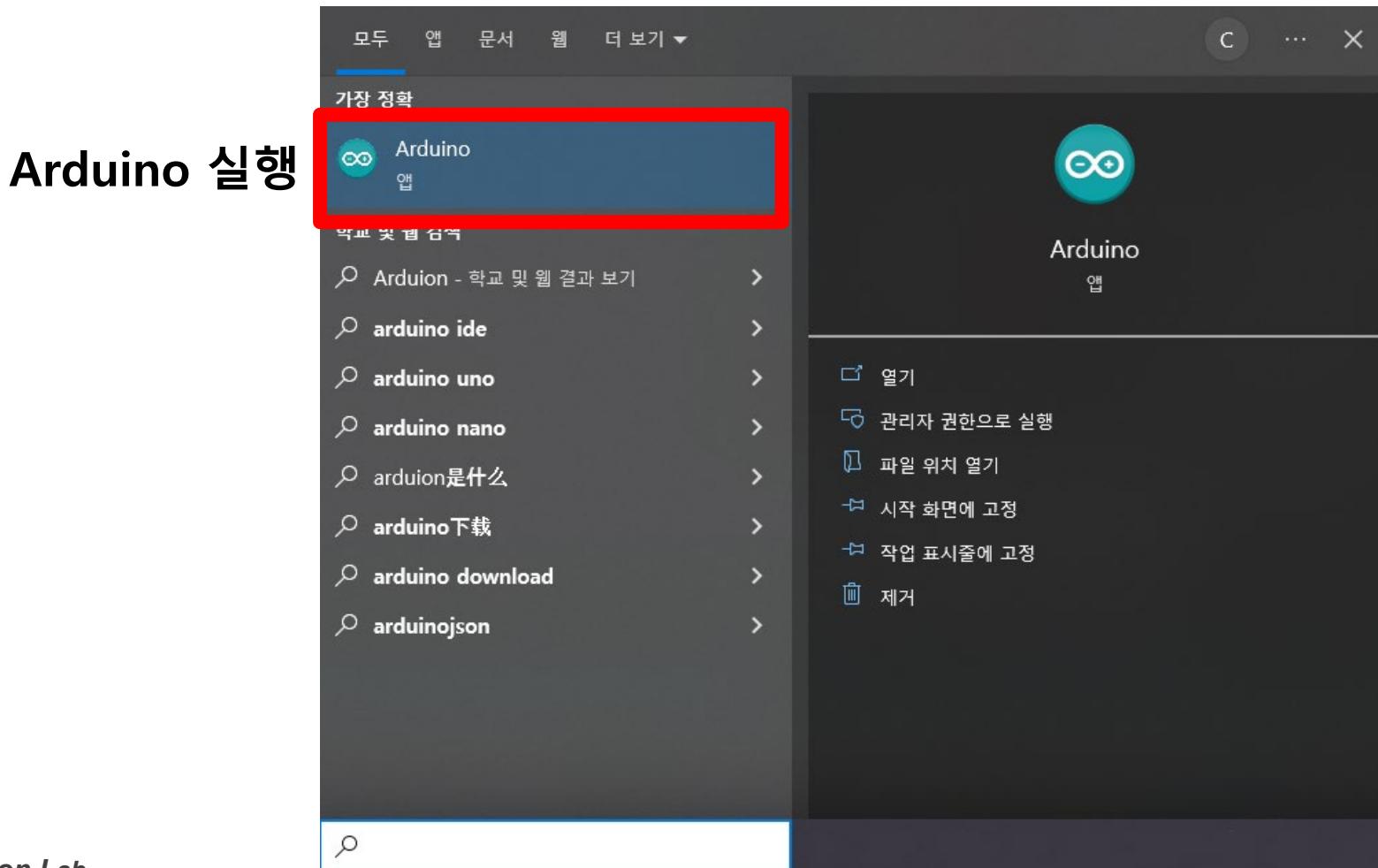
# Arduino IDE

## ■ Arduino IDE 설치



# Arduino IDE

## ■ Arduino IDE 설치



# Arduino IDE

## ■ Arduino IDE 설치



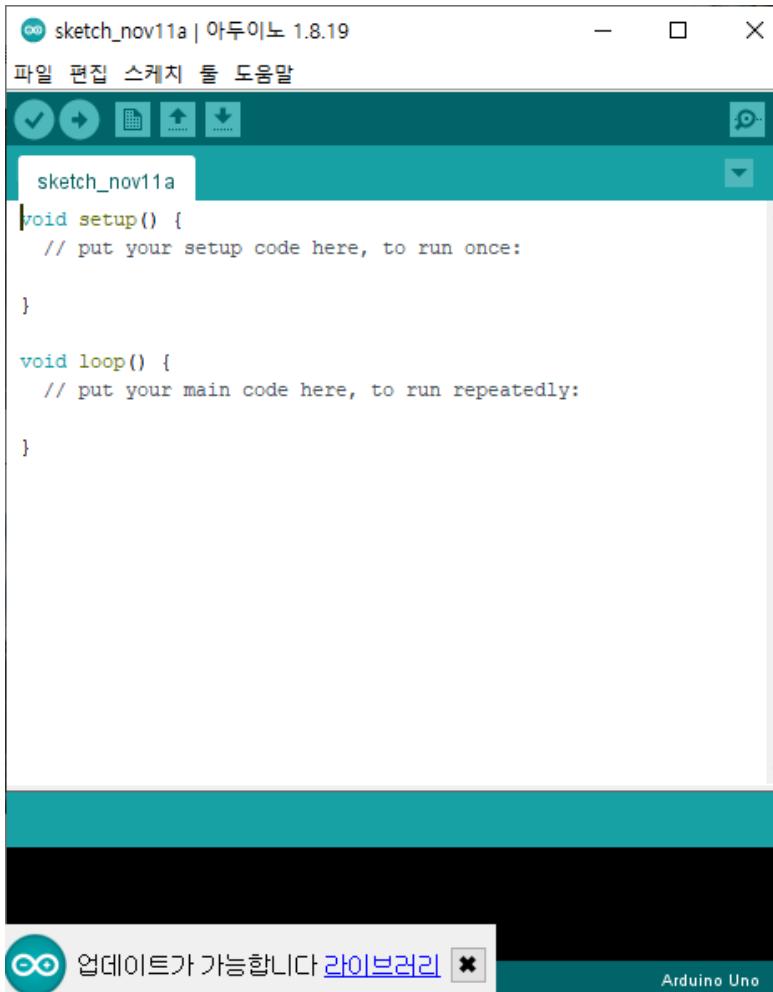
개인 네트워크 체크

클릭

액세스 허용(A)

# Arduino IDE

## ■ Arduino IDE 초기 화면



# Python

## ■ Python 설치

다운로드 페이지:

<https://www.python.org/downloads/>

설치 할 버전  
선택하여 다운로드

The screenshot shows the Python Downloads page. At the top, there's a banner for the latest version (3.11.0) for Windows, featuring two boxes descending from the sky on yellow and white parachutes. Below this, a yellow box encourages users to support Python in 2022 with a special deal until November 22nd, with a 'Join in today!' button. A table lists 'Active Python Releases' with columns for Python version, Maintenance status, First released, End of support, and Release schedule. The table includes rows for versions 3.11 through 3.7. A red box highlights a section where specific release versions are listed, including 3.7.14, 3.8.14, 3.9.14, 3.10.7, 3.10.6, 3.10.5, 3.9.13, and 3.10.4, each with a download link and release notes.

Python version	Maintenance status	First released	End of support	Release schedule
3.11	bugfix	2022-10-24	2027-10	PEP 664
3.10	bugfix	2021-10-04	2026-10	PEP 619
3.9	security	2020-10-05	2025-10	PEP 596
3.8	security	2019-10-14	2024-10	PEP 569
3.7	security	2018-06-27	2023-06-27	PEP 537

Looking for a specific release? Python releases by version number:

Release version	Release date	Click for more
Python 3.7.14	Sept. 6, 2022	Download Release Notes
Python 3.8.14	Sept. 6, 2022	Download Release Notes
Python 3.9.14	Sept. 6, 2022	Download Release Notes
Python 3.10.7	Sept. 6, 2022	Download Release Notes
Python 3.10.6	Aug. 2, 2022	Download Release Notes
Python 3.10.5	June 6, 2022	Download Release Notes
Python 3.9.13	May 17, 2022	Download Release Notes
Python 3.10.4	March 24, 2022	Download Release Notes

# Python

## ■ Python 설치

다운로드 페이지:

<https://www.python.org/downloads/>

Release version	Release date		Click for more
Python 3.7.14	Sept. 6, 2022	 Download	<a href="#">Release Notes</a>
Python 3.8.14	Sept. 6, 2022	 Download	<a href="#">Release Notes</a>
Python 3.9.14	Sept. 6, 2022	 Download	<a href="#">Release Notes</a>
Python 3.10.7	Sept. 6, 2022	 Download	<a href="#">Release Notes</a>
Python 3.10.6	Aug. 2, 2022	 Download	<a href="#">Release Notes</a>
Python 3.10.5	June 6, 2022	 Download	<a href="#">Release Notes</a>
Python 3.9.13	May 17, 2022	 Download	<a href="#">Release Notes</a>
Python 3.10.4	March 24, 2022	 Download	<a href="#">Release Notes</a>

본 교육에서는 3.9.13 버전을 활용합니다.  
**Download 클릭**

# Python

## ■ Python 설치

The screenshot shows the Python 3.9.13 release page. At the top, there's a navigation bar with links for About, Downloads, Documentation, Community, Success Stories, News, and Events. Below the navigation bar, the title "Python 3.9.13" is displayed, followed by the release date "Release Date: May 17, 2022". A note states: "This is the thirteenth and final regular maintenance release of Python 3.9." The "Downloads" section is highlighted with a red box. It contains a table with columns for Version, Operating System, Description, MD5 Sum, File Size, and SHA256. The table lists several Windows installers, including "Windows installer (x64 MSI)" which is recommended. The "More resources" section includes links for Online Documentation, Python Jobs, A Release Schedule, Report Bugs, Help Fund Python, and a GitHub repository.

Version	Operating System	Description	MD5 Sum	File Size	SHA256
Gzipped source tarball	Source release	source release (gzipped tarball)	261344087	565	5f5a...
tar.gz compressed source tarball	Source release	tar.gz compressed source tarball	261344087	565	5f5a...
macOS universal binary installer	macOS	For macOS 10.9 and later, deprecated	411332317	565	5f5a...
macOS Intel universal installer	macOS	For macOS 10.9 and later	409621162	565	5f5a...
miniconda executable package (64-bit)	Windows	Miniconda executable package	3720000	565	5f5a...
miniconda executable package (64-bit)	Windows	Miniconda executable package (64-bit)	86370390	565	5f5a...
Miniconda Help file	Windows	Miniconda help file	3065200	565	5f5a...
Windows installer (32-bit)	Windows	Windows installer (32-bit)	2000000000	565	5f5a...
Windows installer (64-bit)	Windows	Windows installer (64-bit)	2000000000	565	5f5a...

**And Now for Something Completely Different**

Mr. Pradise [John Cleese]: "I'D LIKED TO BE reading, Hastings, this is your time-of-death, about-call [takes pen out of the cage, writes it up in the air and sticks it to the floor.]

Mr. Pradise: Now I'd like to call a dead person.

Owner [Michael Palin]: You...you...he's deceased!

Mr. Pradise: I'm sorry!

Owner: Right! You obtained him, just as he was walking home from his daily jog.

Mr. Pradise: Yes...now look, now, I've definitely had enough of this. That pen is definitely deceased, and when I purchased it not all that long ago, you assured me that its total lack of movement was due to it being dead and dragged out following a prolonged stroke.

Owner: Well, here...here, all...probably passing for the static.

Full Changelog

**Files**

**About**    **Downloads**    **Documentation**    **Community**    **Success Stories**    **News**

Applications    All releases    Documentation    Community    Success Stories    News

Questions    Source code    Audio/Visual Talks    Mailing Lists    Arts

Getting Started    Source code    Beginner's Guide    Mailing Lists    Python News

Help    macOS    Developers' Guide    Events    Mailing Lists    M&S Newsletter

Python Structure    Other Infrastructure    FAQ    M&S Annual Impact Report    Government    Python News

Licenses    Linux    Non-English Docs    Python Conferences    Academic

창 아래쪽 Files 확인

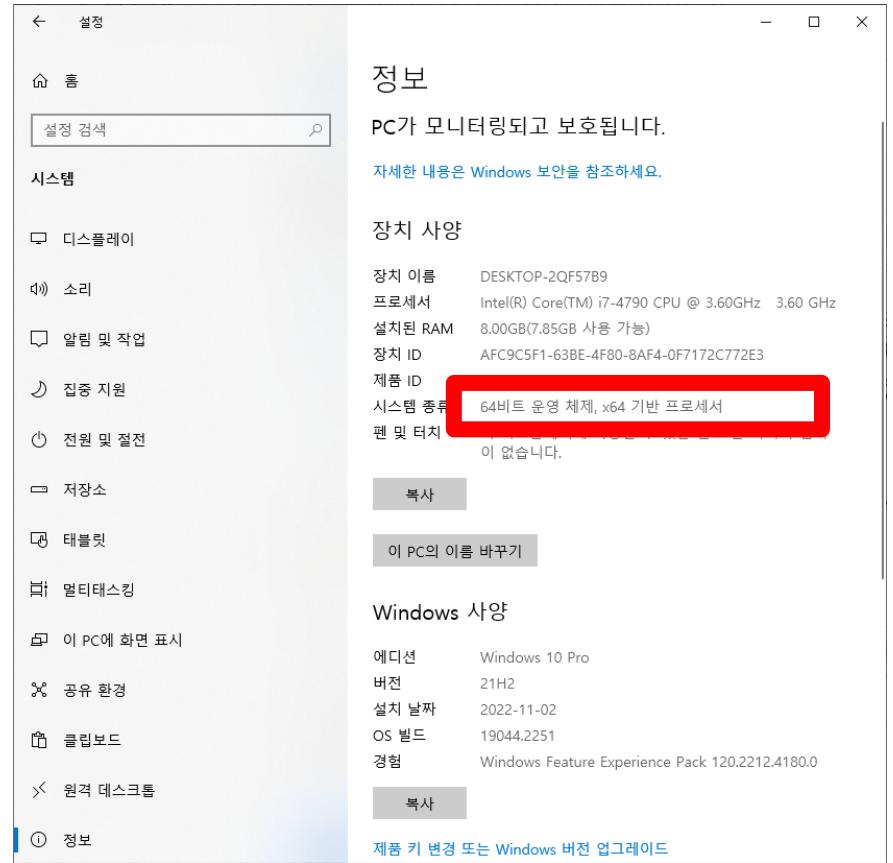


# Python

## ■ Python 설치

Version	Operating System	Description	MD5 Sum	File Size	GPG
<a href="#">Gzipped source tarball</a>	Source release		eafda83543bad127cadef4d288fdab87	26355887	<a href="#">SIG</a>
<a href="#">XZ compressed source tarball</a>	Source release		5e2411217b0060828d5f923eb422a3b8	19754368	<a href="#">SIG</a>
<a href="#">macOS 64-bit intel-only installer</a>	macOS	for macOS 10.9 and later, deprecated	671848930809decf27f586ddf98c6e9b	30997161	<a href="#">SIG</a>
<a href="#">macOS 64-bit universal2 installer</a>	macOS	for macOS 10.9 and later	76b63cf623e32cdf27c5033434bd69ce	38821163	<a href="#">SIG</a>
<a href="#">Windows embeddable package (32-bit)</a>	Windows		fec0bc06857502a56dd1aea6488ef8	7729405	<a href="#">SIG</a>
<a href="#">Windows embeddable package (64-bit)</a>	Windows		57731cf80b1c429a0be7133266d7d7cf	8570740	<a href="#">SIG</a>
<a href="#">Windows help file</a>	Windows		c86feba059b340a1de2a9d2ee7059a6d	8953644	<a href="#">SIG</a>
<a href="#">Windows installer (32-bit)</a>	Windows		46c35b0a2a4325c275b2ed3187b08ac4	28096840	<a href="#">SIG</a>
<a href="#">Windows installer (64-bit)</a>	Windows	Recommended	e7062b85c3624af82079794729618eca	29235432	<a href="#">SIG</a>

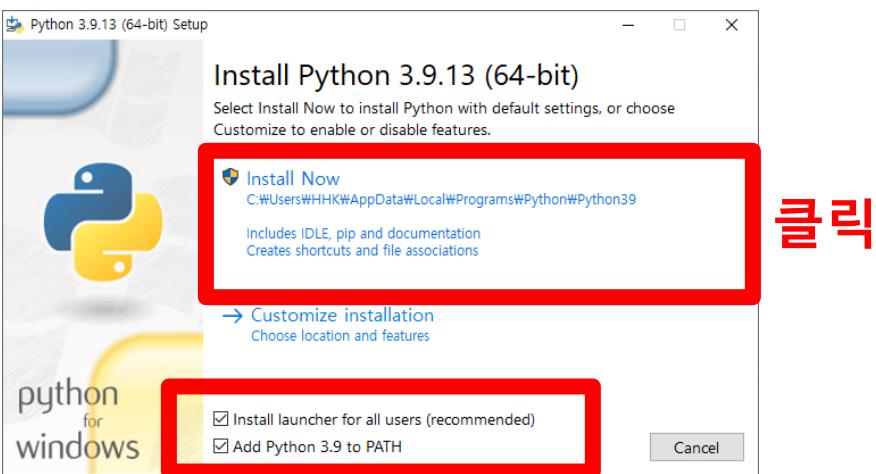
본인 PC 하드웨어 사양(64bit, 32bit) 선택



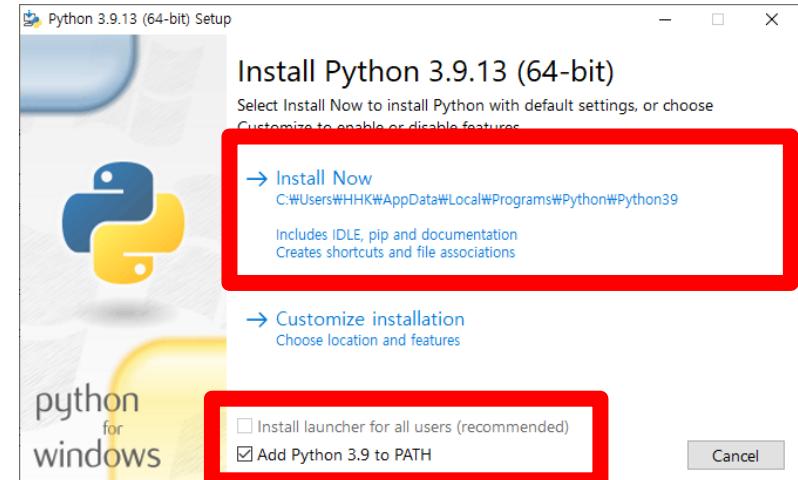
하드웨어 사양  
본 교육자료 첫 부분(page 5)에서 확인

# Python

## ■ Python 설치



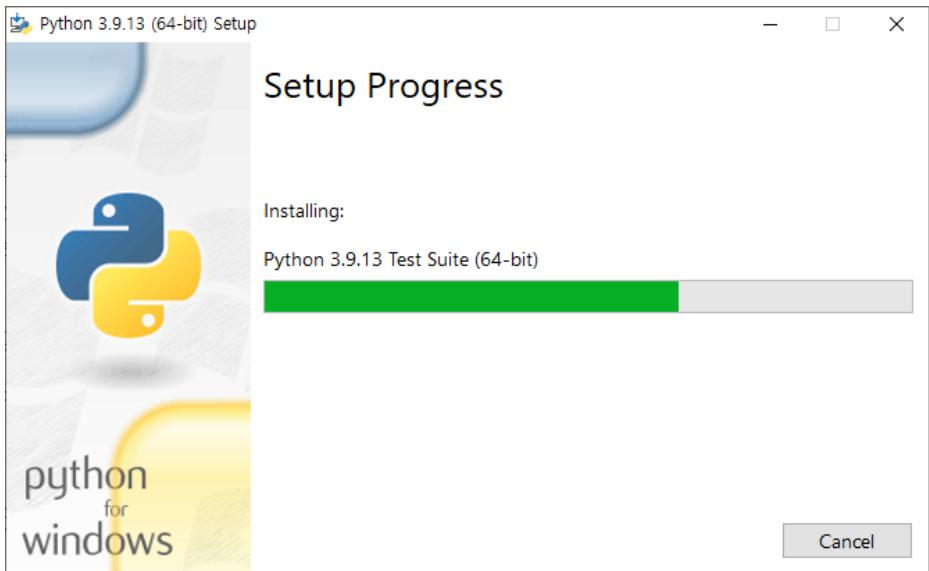
체크박스 둘 다 활성화 되어 있는 경우  
둘 다 체크



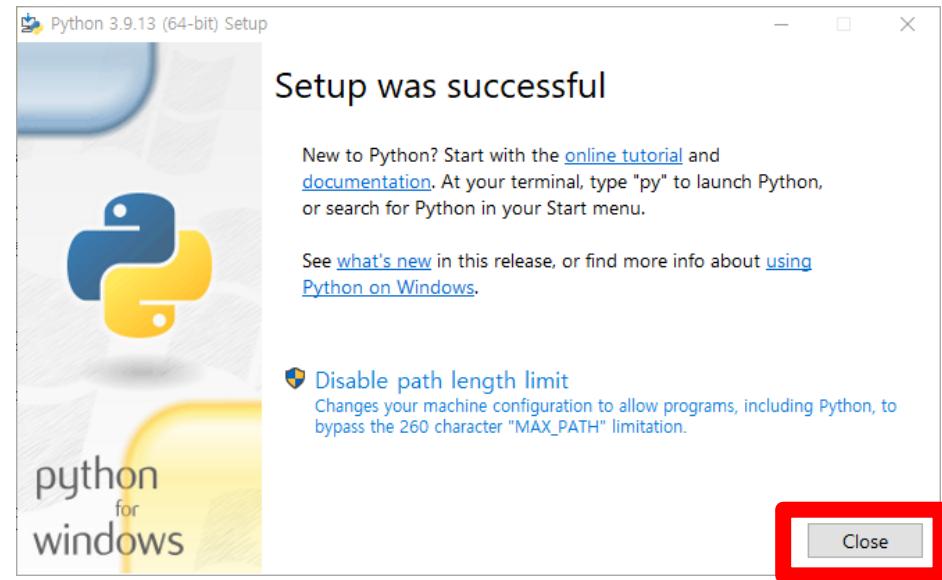
하나만 활성화 되어있는 경우  
아래 것만 체크

# Python

## ■ Python 설치



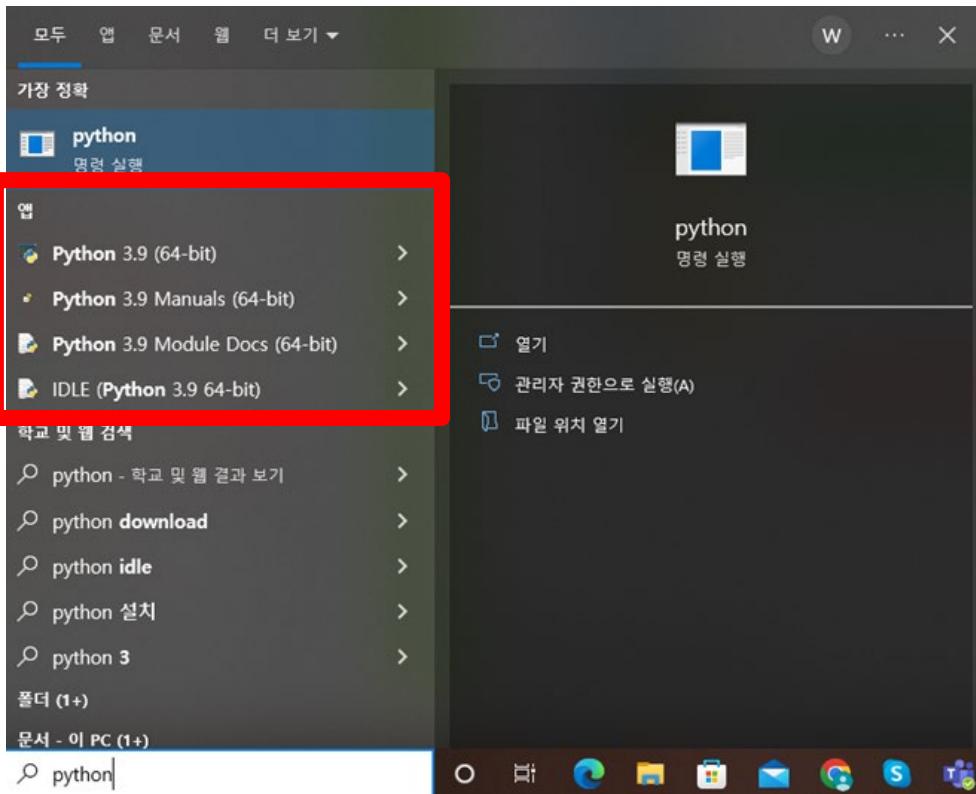
설치 중 화면



클릭

# Python

## ■ Python 설치



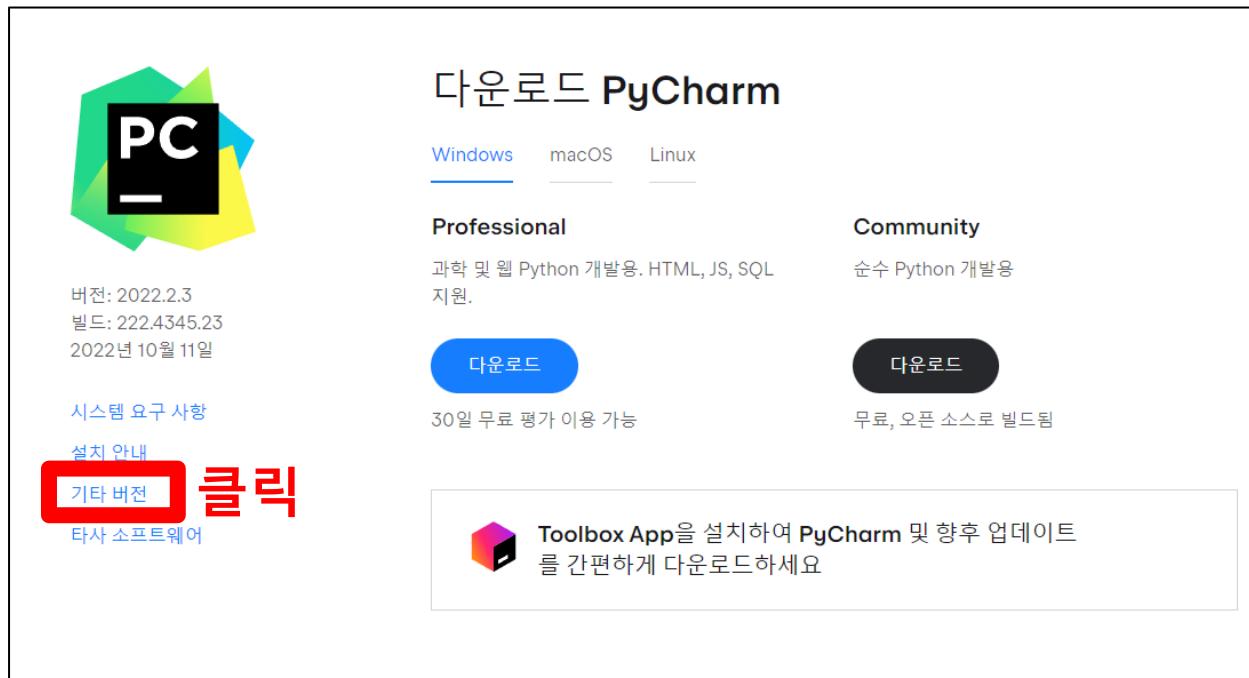
Python 검색 후  
설치 완료되었는지 확인

# PyCharm

## ■ PyCharm 설치

다운로드 페이지:

<https://www.jetbrains.com/ko-kr/pycharm/download/#section=windows>



# PyCharm

## ■ PyCharm 설치

### 기타 버전

Version 2022.2

2022.2.3

PyCharm Professional Edition

[2022.2.3 - Linux \(tar.gz\)](#)

[2022.2.3 - Windows \(exe\)](#)

[2022.2.3 - macOS \(dmg\)](#)

[2022.2.3 - macOS Apple Silicon \(dmg\)](#)

PyCharm Community Edition

[2022.2.3 - Linux \(tar.gz\)](#)

[2022.2.3 - Windows \(exe\)](#)

[2022.2.3 - macOS \(dmg\)](#)

[2022.2.3 - macOS Apple Silicon \(dmg\)](#)

Version 2022.1

2022.1.4

PyCharm Professional Edition

[2022.1.4 - Linux \(tar.gz\)](#)

[2022.1.4 - Windows \(exe\)](#)

[2022.1.4 - macOS \(dmg\)](#)

[2022.1.4 - macOS Apple Silicon \(dmg\)](#)

PyCharm Community Edition

[2022.1.4 - Linux \(tar.gz\)](#)

[2022.1.4 - Windows \(exe\)](#)

[2022.1.4 - macOS \(dmg\)](#)

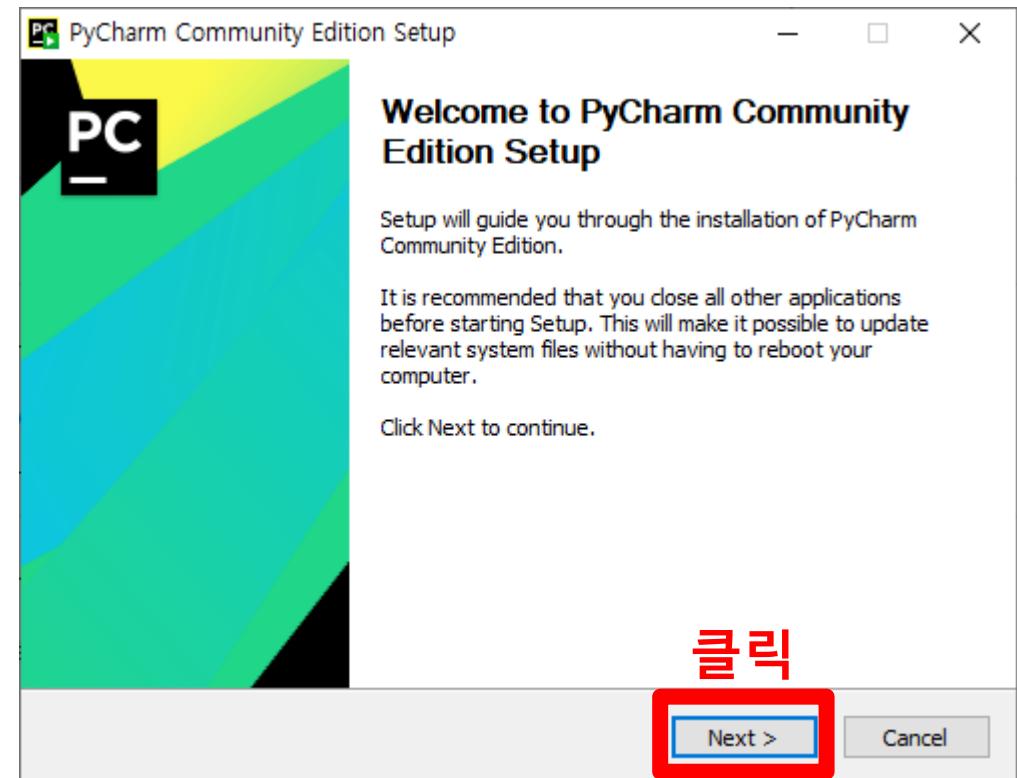
[2022.1.4 - macOS Apple Silicon \(dmg\)](#)

클릭



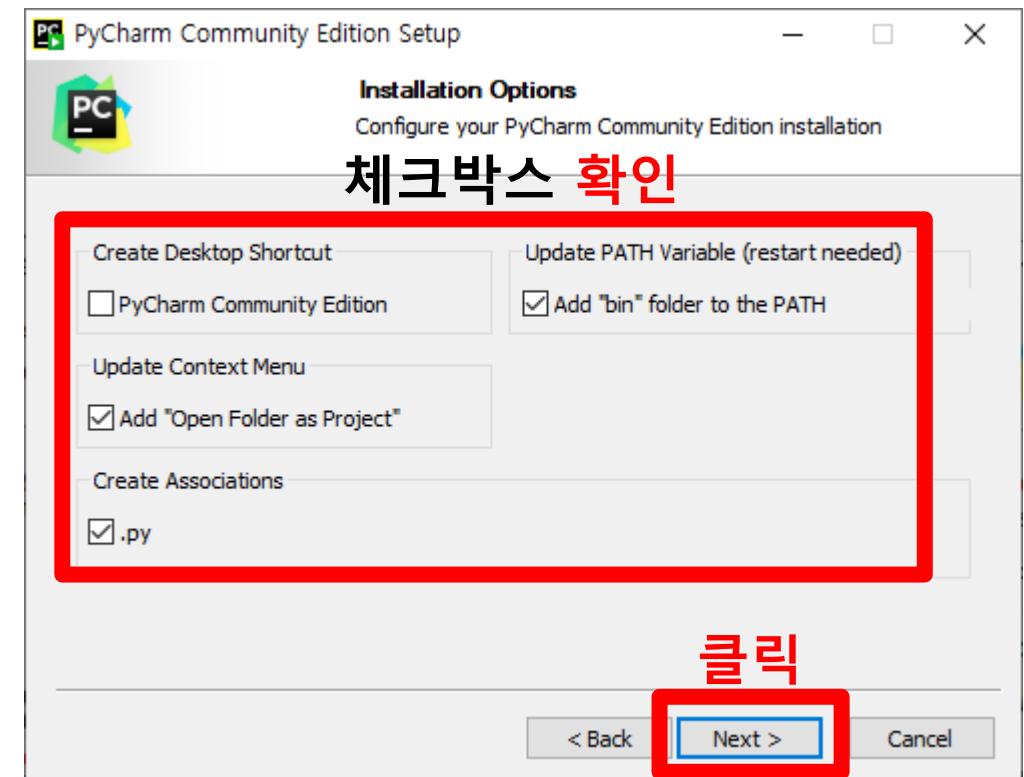
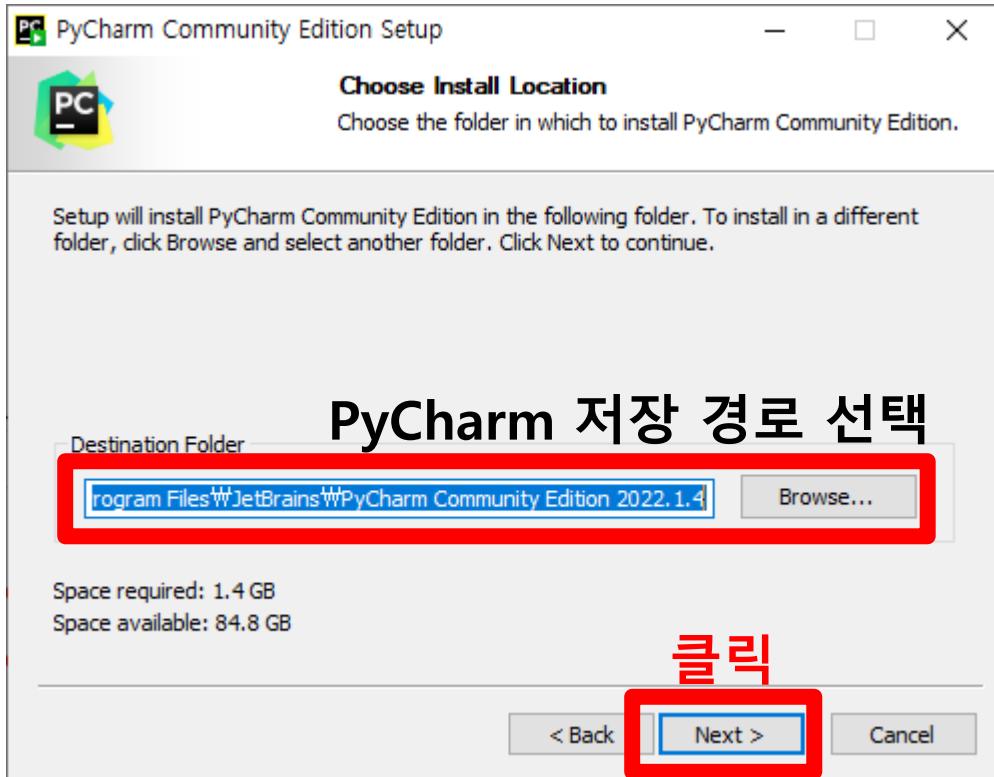
# PyCharm

## ■ PyCharm 설치



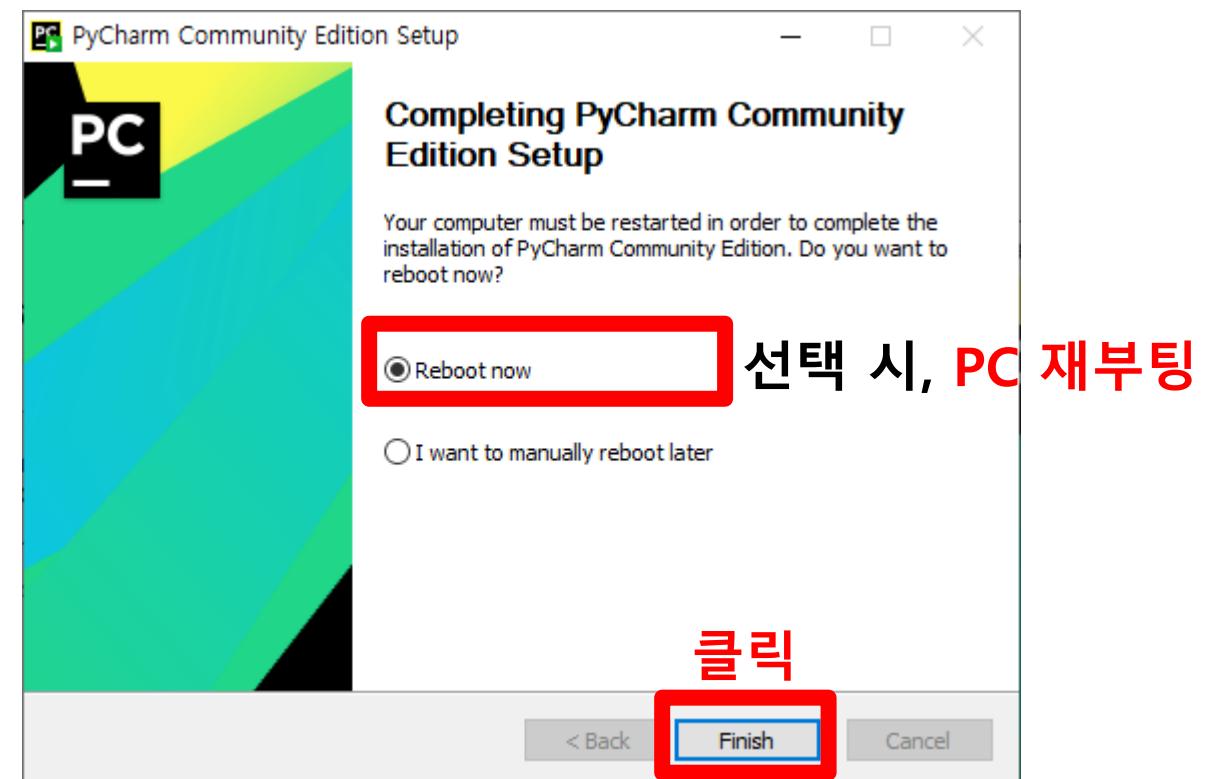
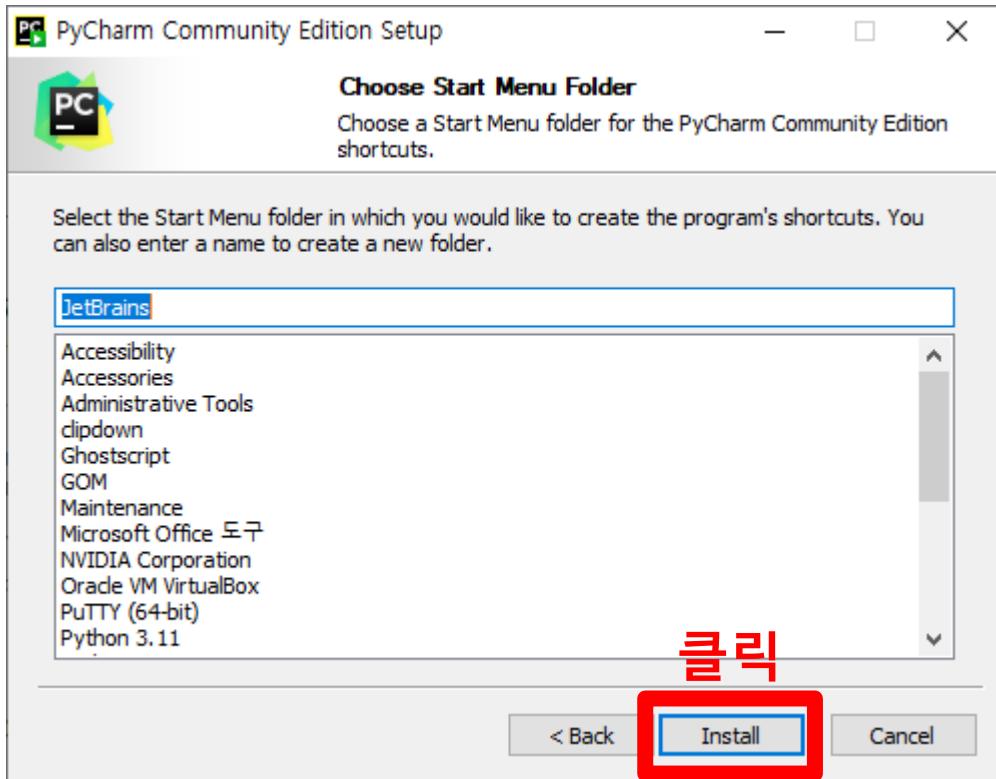
# PyCharm

## ■ PyCharm 설치



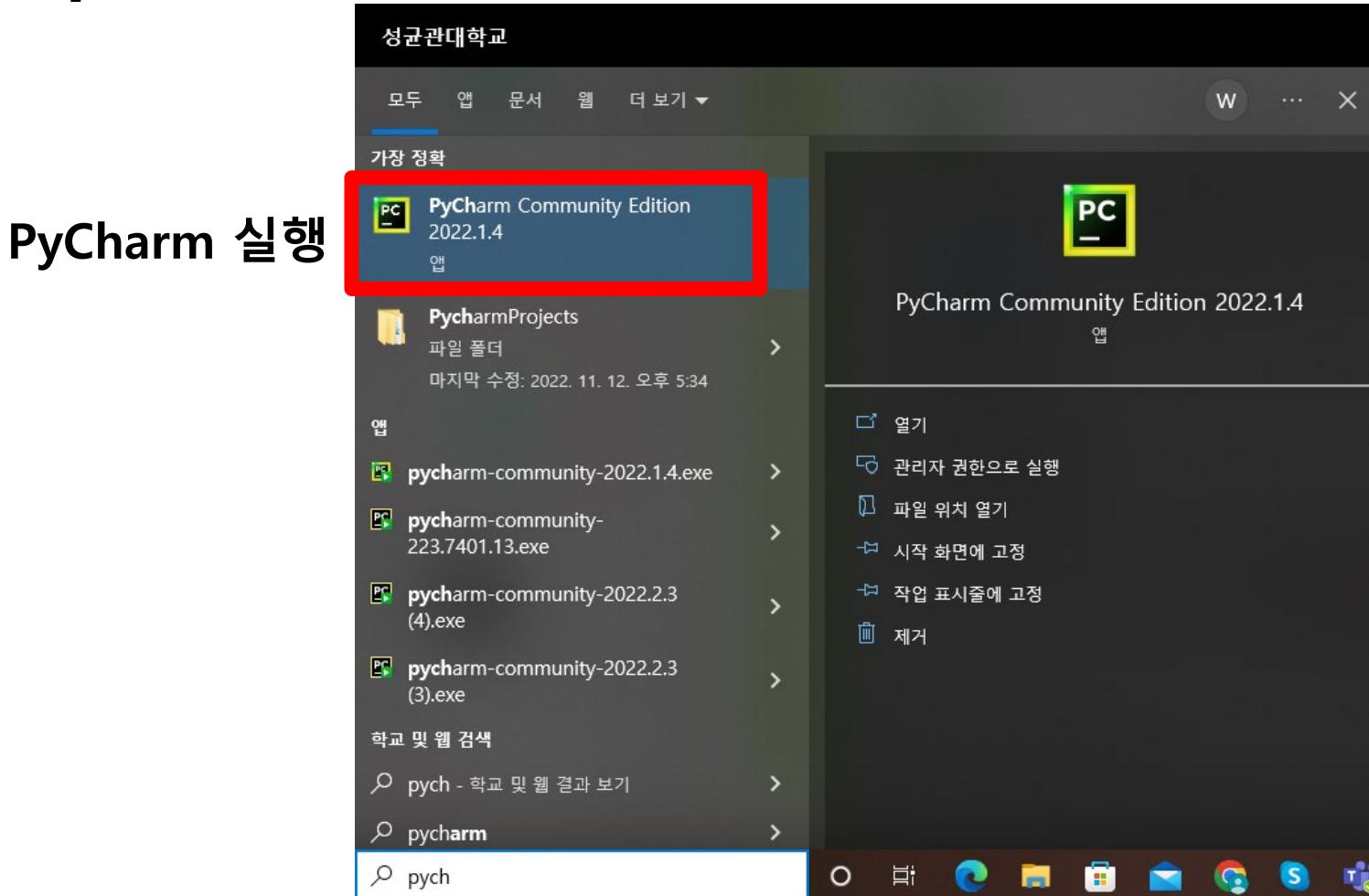
# PyCharm

## ■ PyCharm 설치



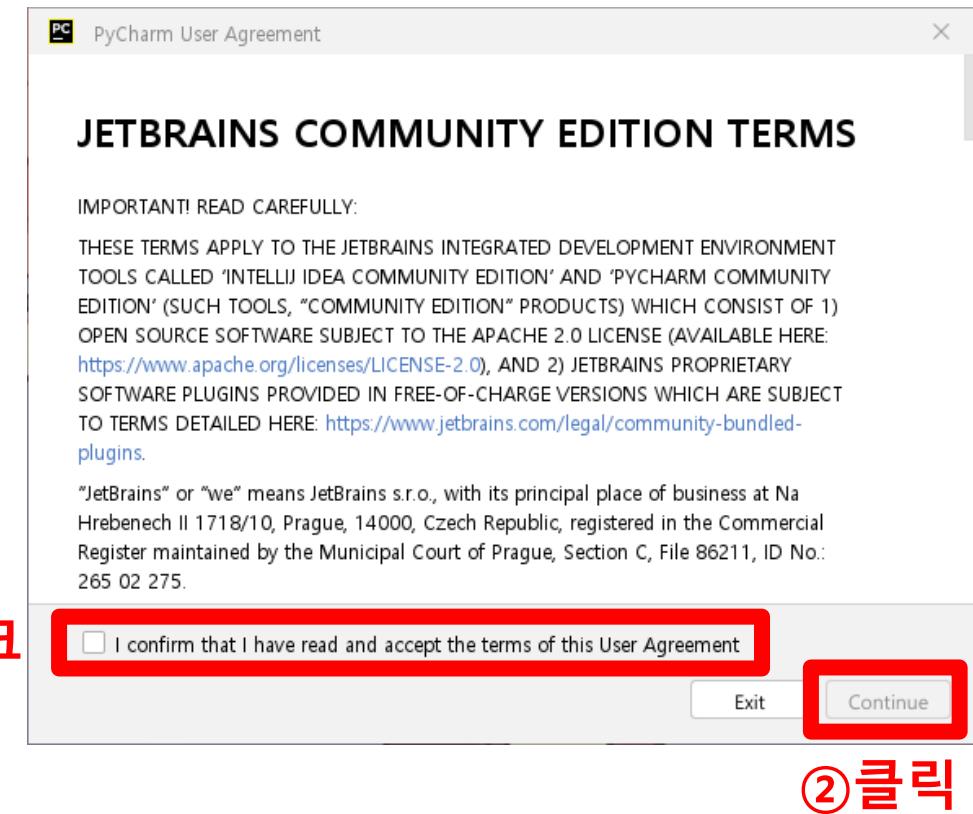
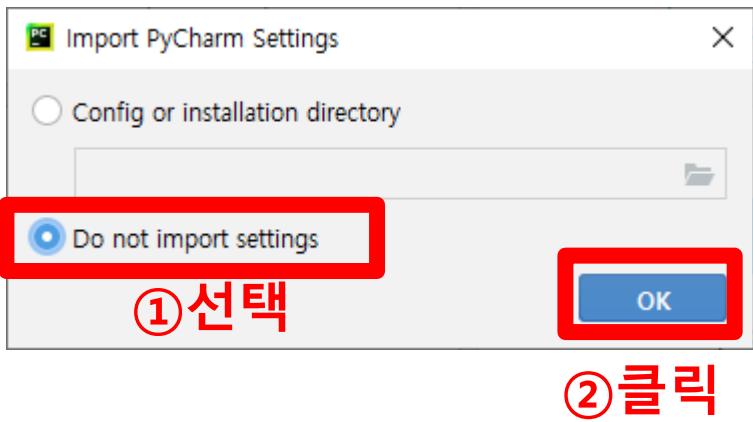
# PyCharm

## ■ Interpreter 설정



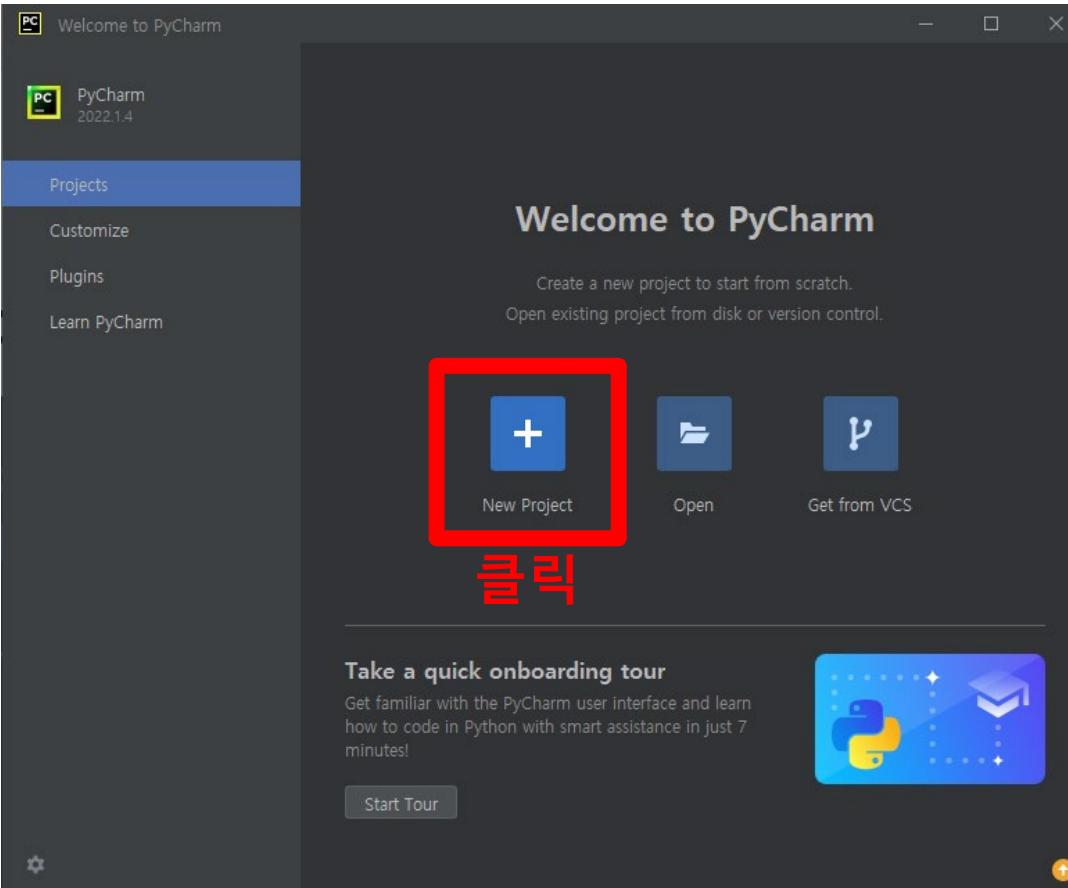
# PyCharm

## ■ Interpreter 설정



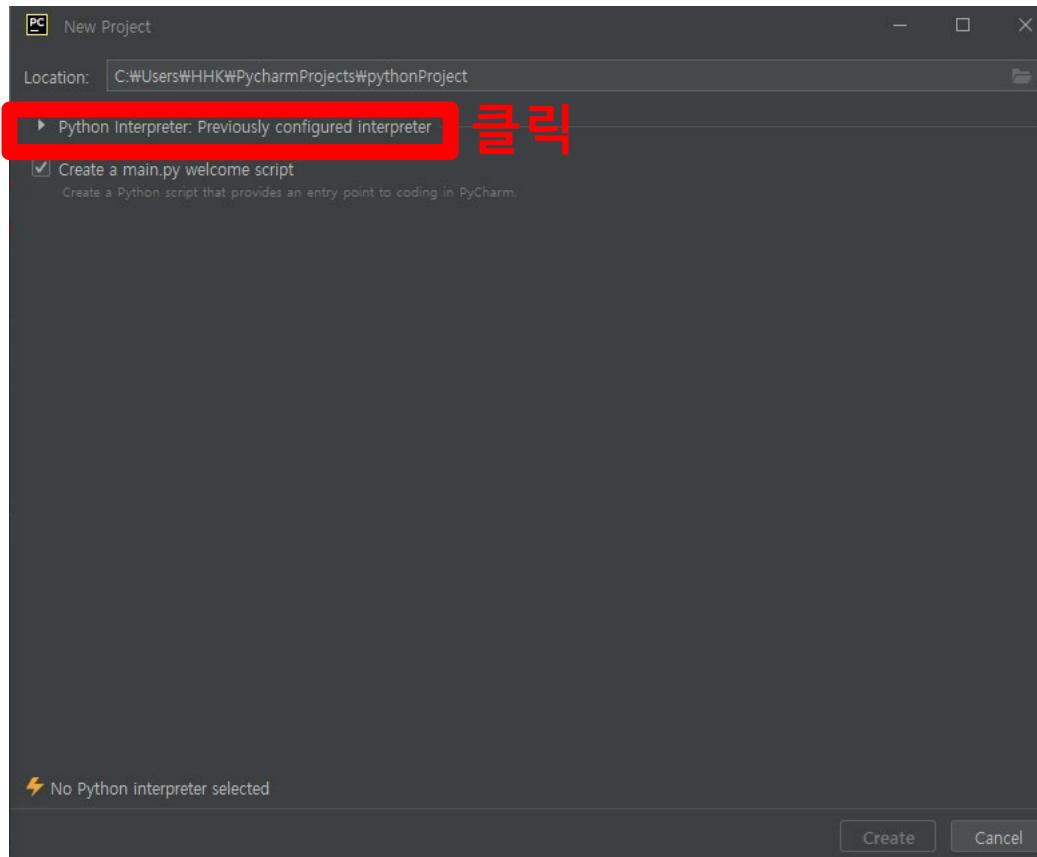
# PyCharm

## ■ Interpreter 설정



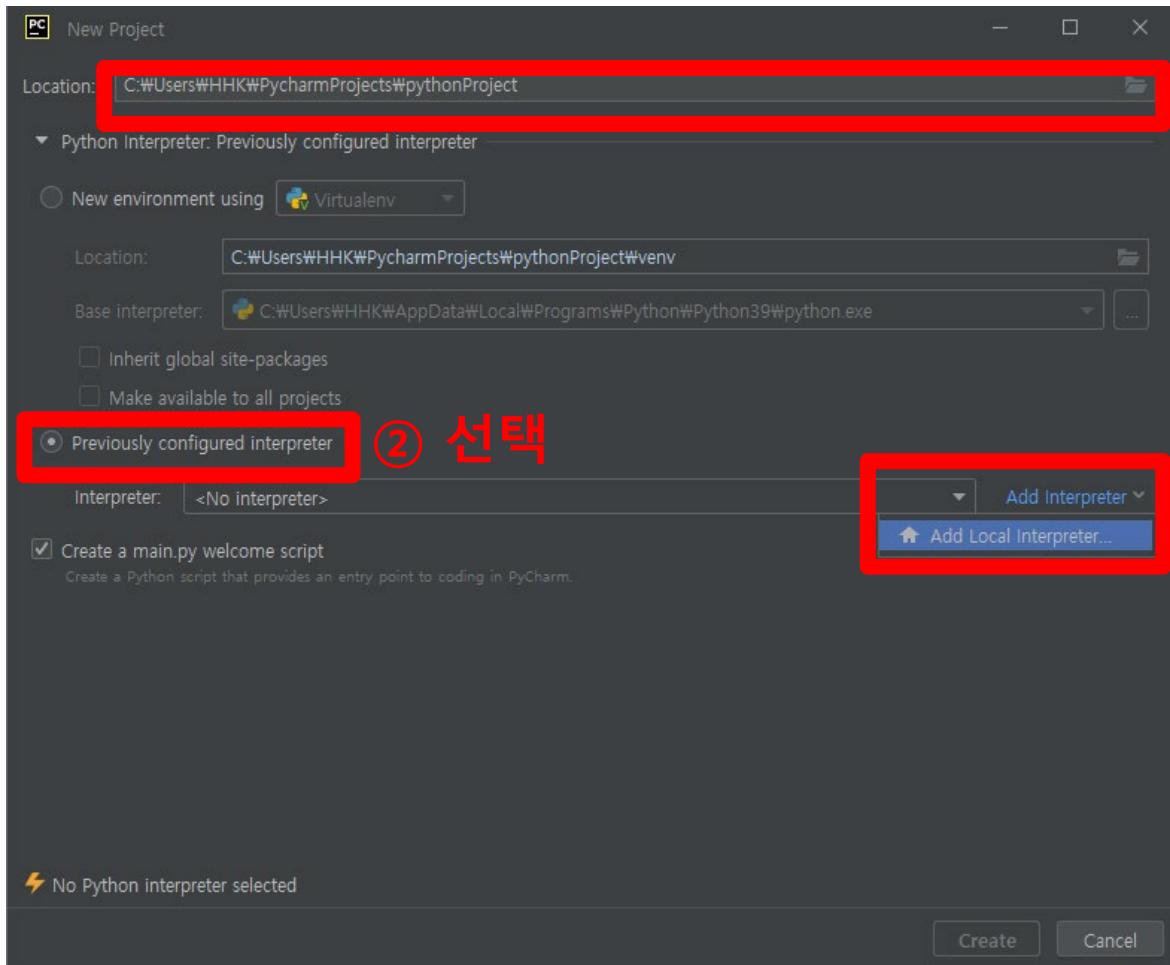
# PyCharm

## ■ Interpreter 설정



# PyCharm

## ■ Interpreter 설정



① 프로젝트 파일 폴더 위치 지정  
(초기값 유지)

② 선택

③ Add Interpreter  
-> Add Local Interpreter 클릭

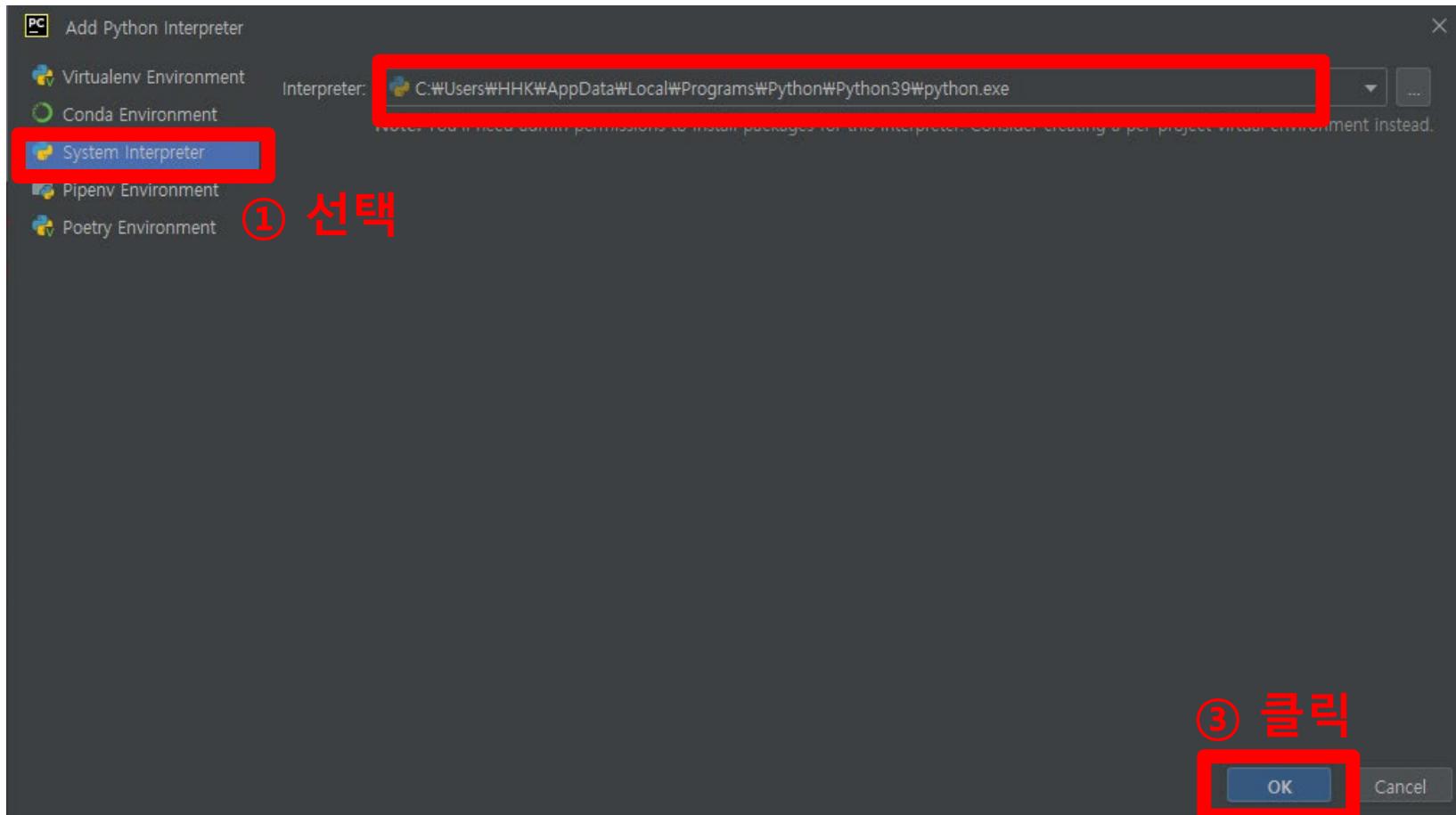


③-1 다음과 같이 뜨는 경우 ... 클릭하여 진행

# PyCharm

## ■ Interpreter 설정

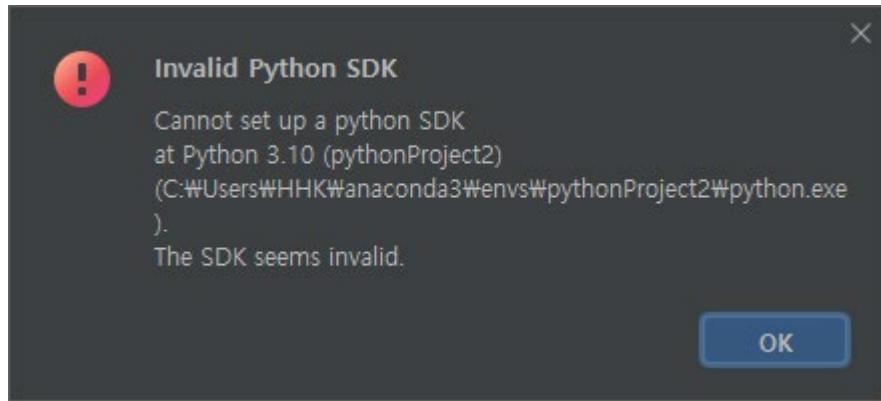
### ② Interpreter 선택



만일 Interpreter 없으면,  
Python이 설치 안 된 것  
Python 재설치 필요

# PyCharm

## ■ Interpreter 설정

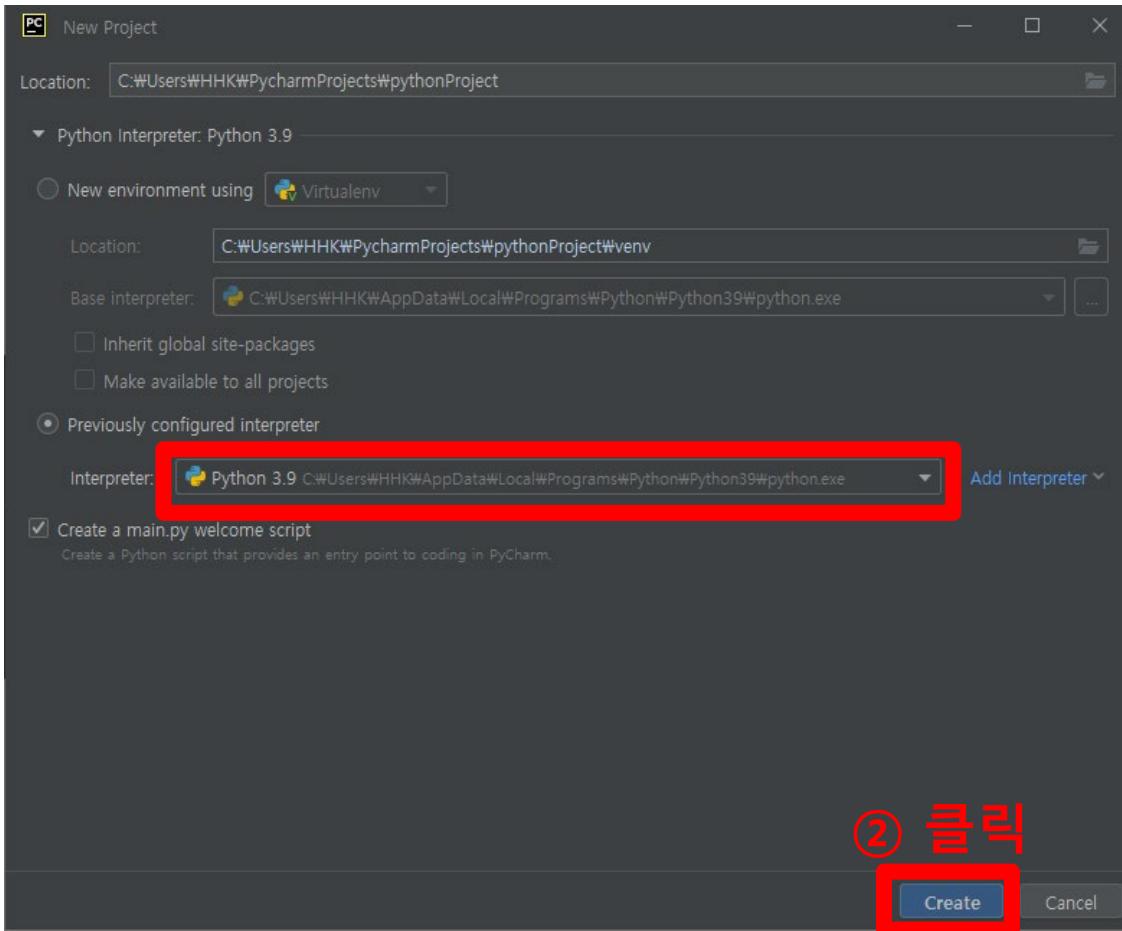


다음과 같은 오류 발생 시

2022.1.4 버전으로 재설치

# PyCharm

## ■ Interpreter 설정

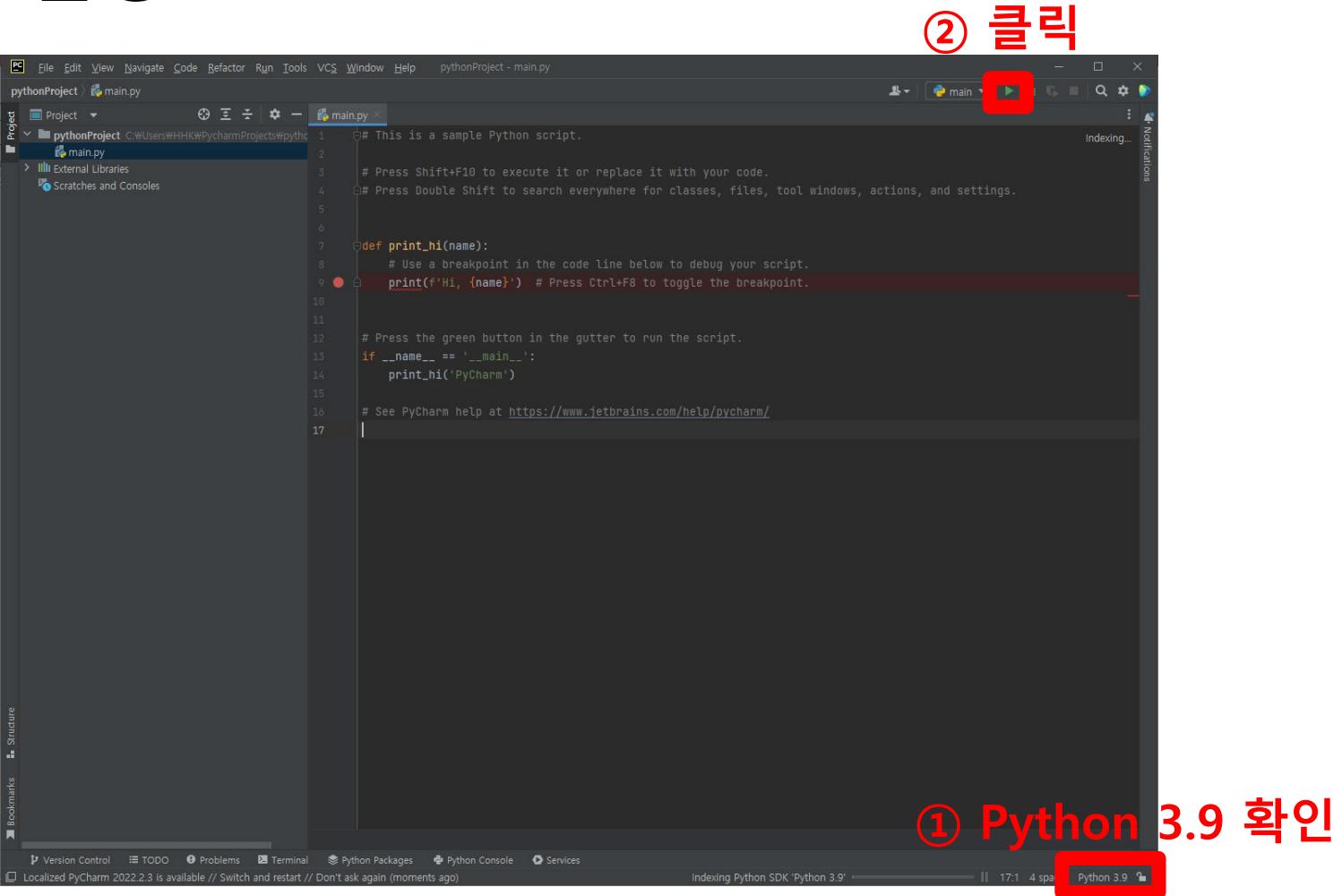


① interpreter 확인  
(Python 3.9)

② 클릭

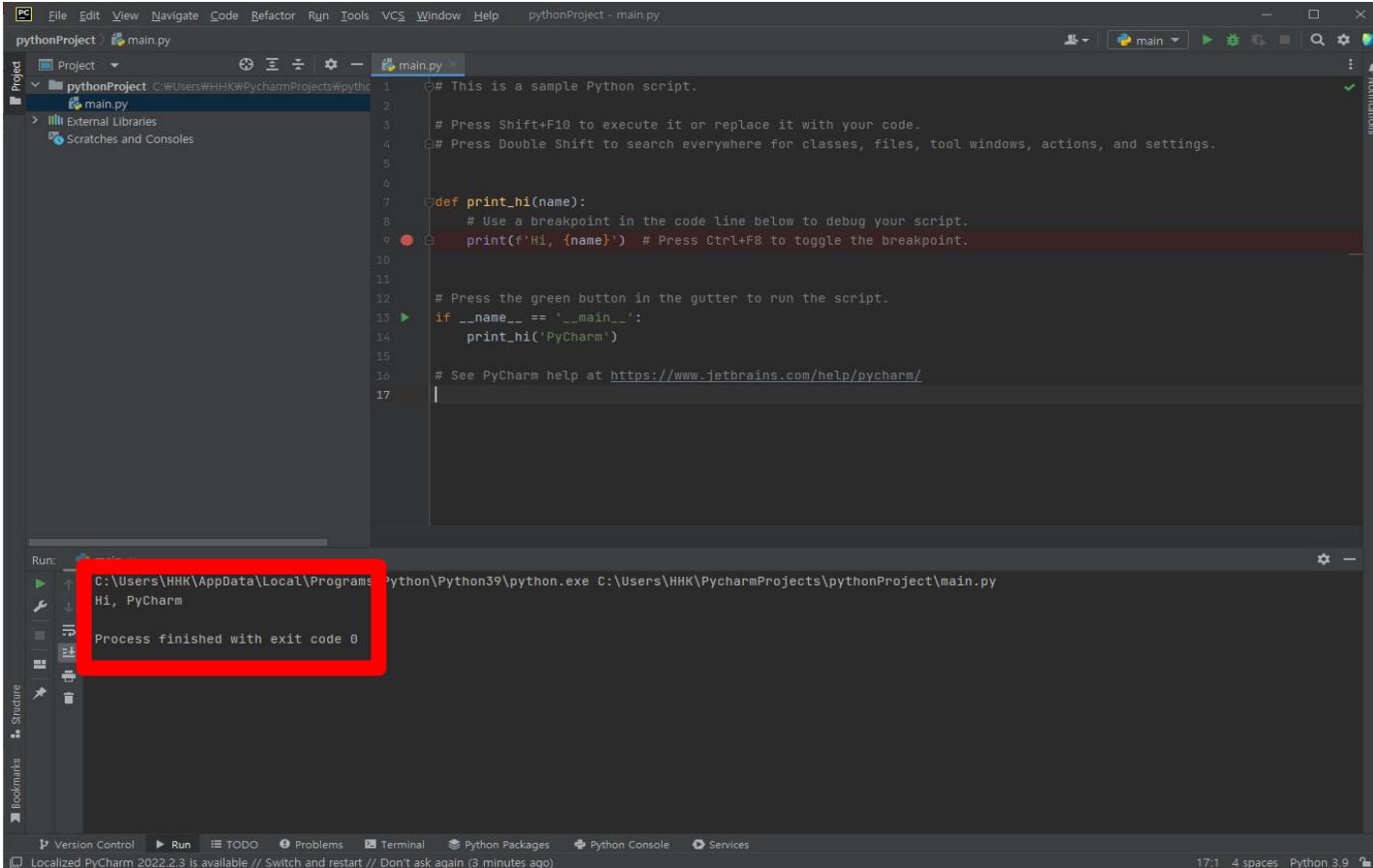
# PyCharm

## ■ Interpreter 설정



# PyCharm

## ■ Interpreter 설정



The screenshot shows the PyCharm IDE interface. The main window displays a Python script named `main.py` with the following code:

```
# This is a sample Python script.  
# Press Shift+F10 to execute it or replace it with your code.  
# Press Double Shift to search everywhere for classes, files, tool windows, actions, and settings.  
  
def print_hi(name):  
    # Use a breakpoint in the code line below to debug your script.  
    print(f'Hi, {name}') # Press Ctrl+F8 to toggle the breakpoint.  
  
if __name__ == '__main__':  
    print_hi('PyCharm')  
  
# See PyCharm help at https://www.jetbrains.com/help/pycharm/
```

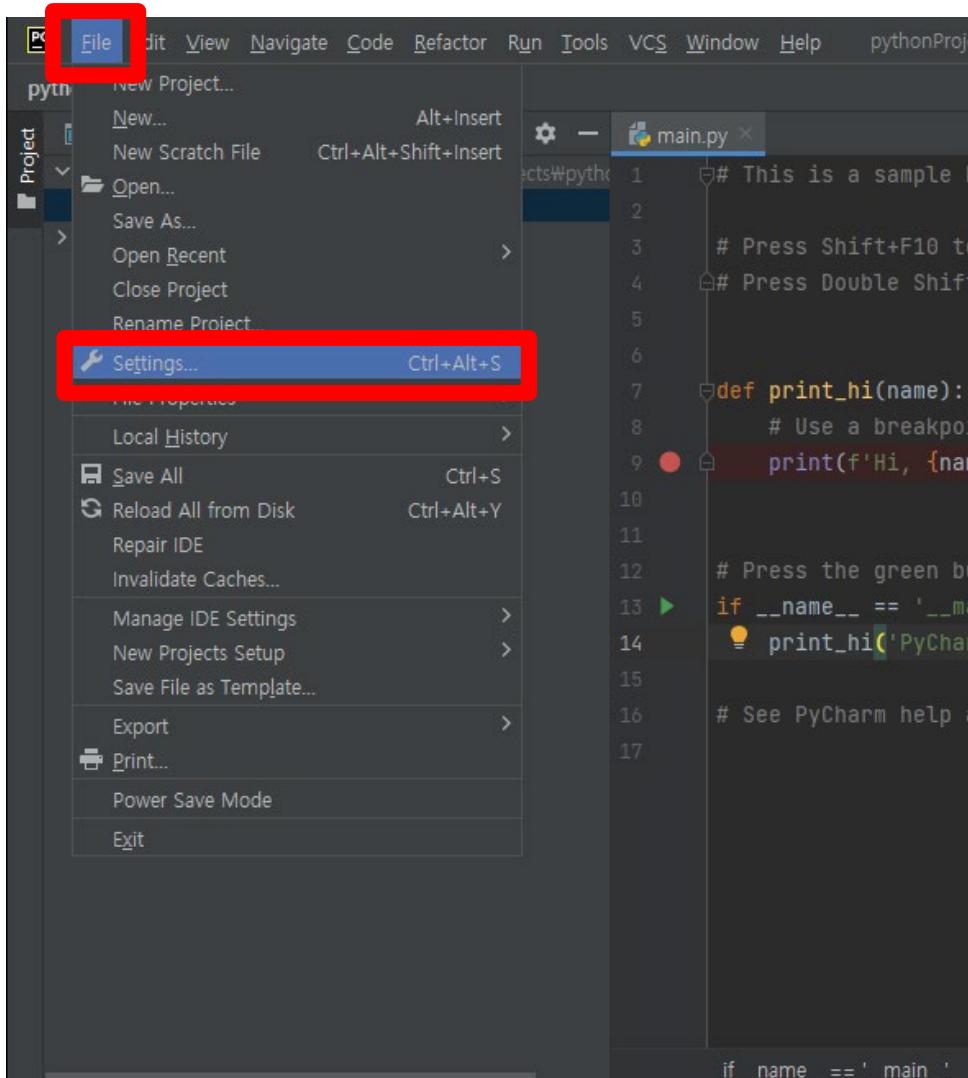
The Run tab at the bottom shows the command: `C:\Users\HHK\AppData\Local\Programs\Python\Python39\python.exe C:\Users\HHK\PycharmProjects\pythonProject\main.py`. The output window shows the result: `Hi, PyCharm` followed by `Process finished with exit code 0`. A red box highlights this output text.

'Hi, PyCharm'  
출력 시 성공

# Library

## ■ 라이브러리 설치

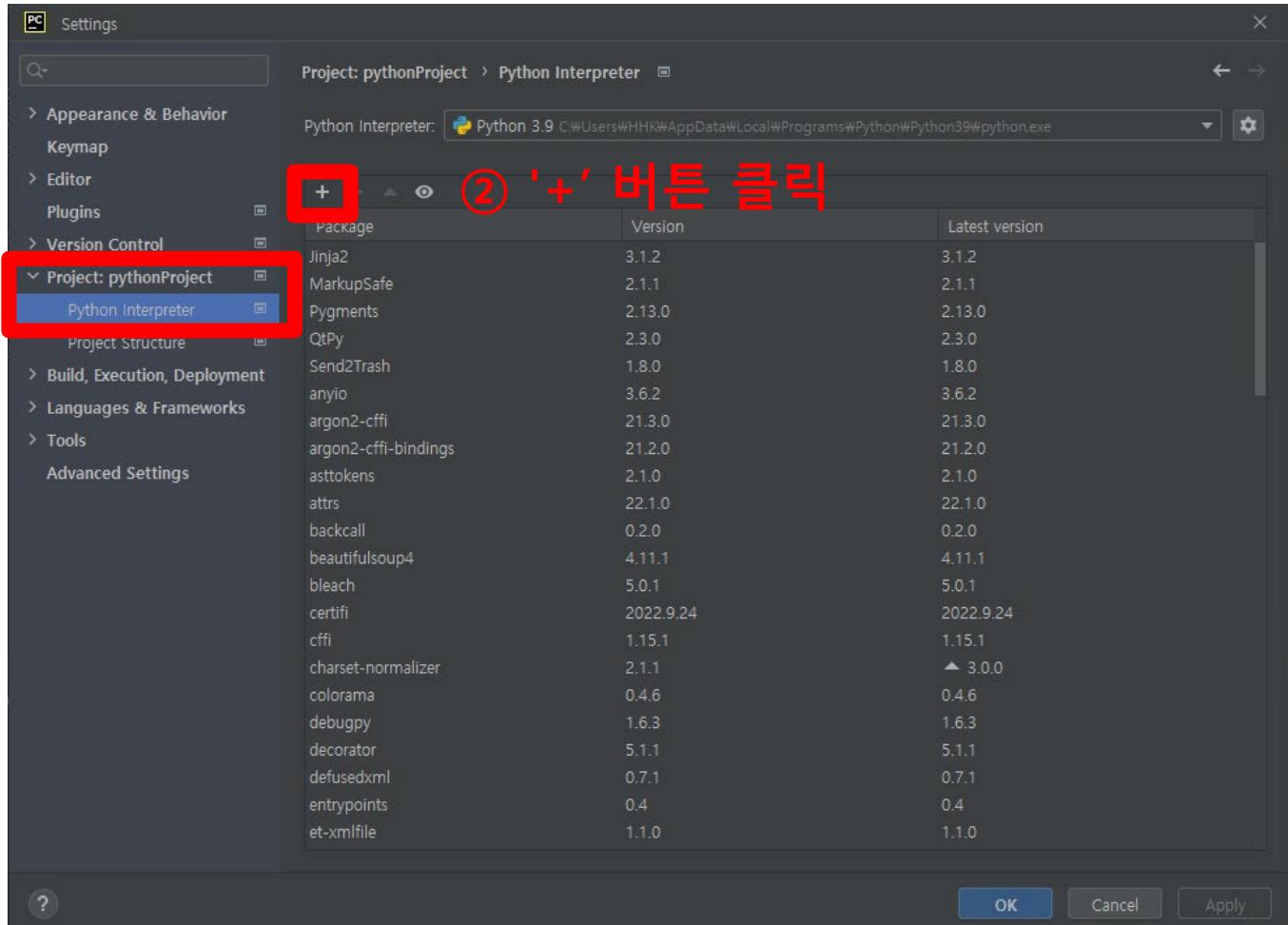
화면 상단  
File - Settings 클릭



# Library

## ■ 라이브러리 설치

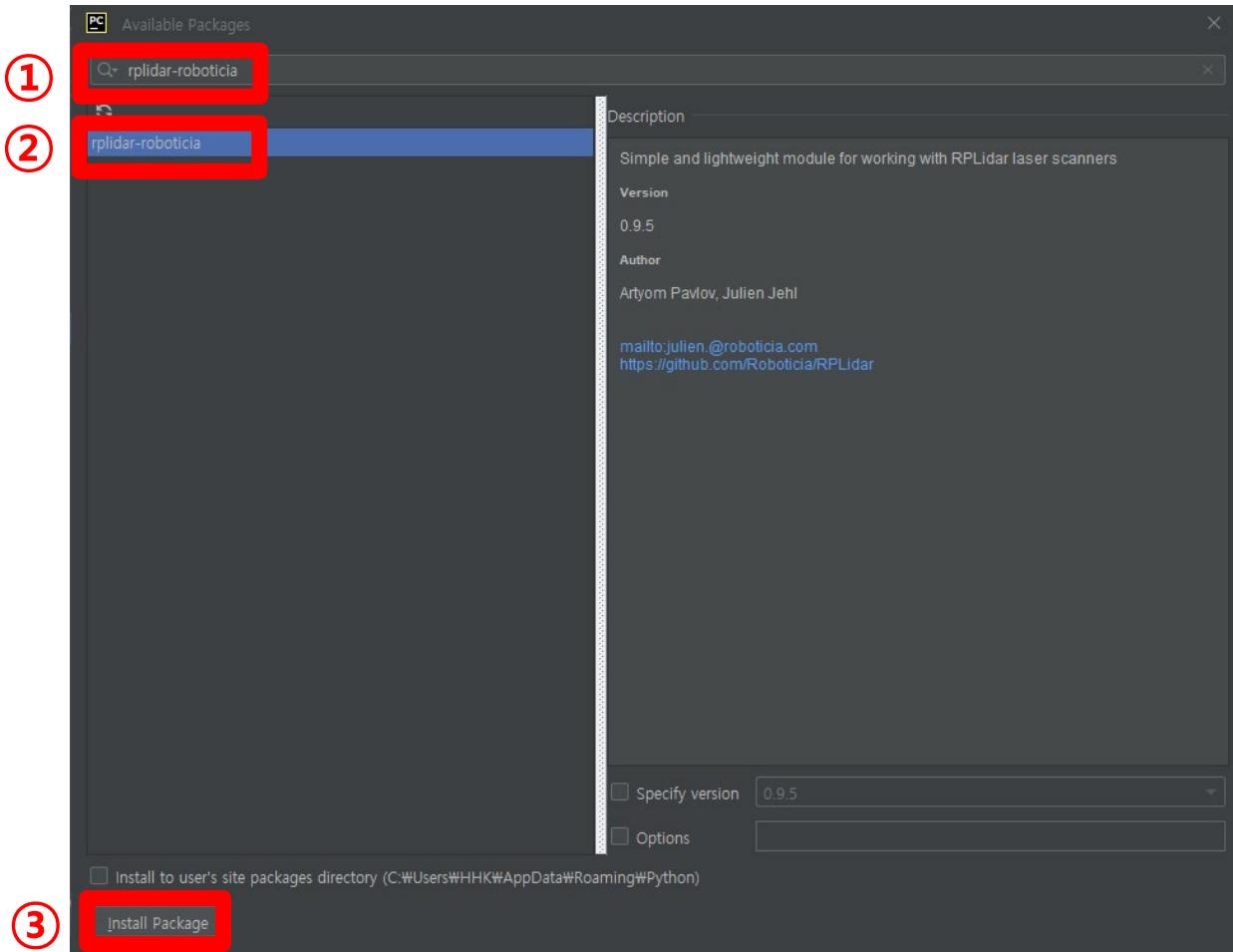
- ① Project: <프로젝트 이름>  
-> Python Interpreter 선택



# Library

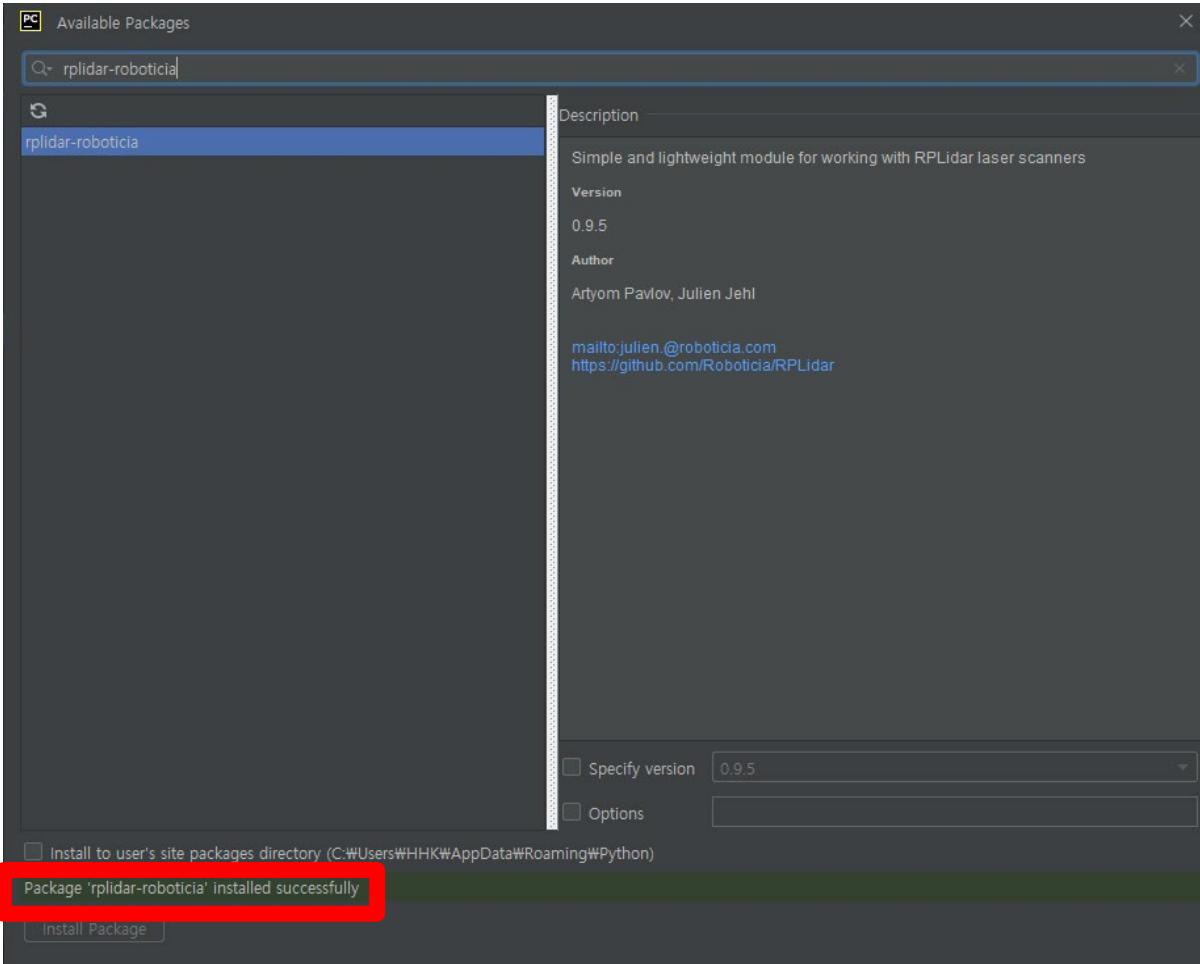
## ■ LiDAR 라이브러리 설치

- ① rplidar-roboticia 검색
- ② rplidar-roboticia 선택
- ③ Install Package 클릭



# Library

## ■ LiDAR 라이브러리 설치

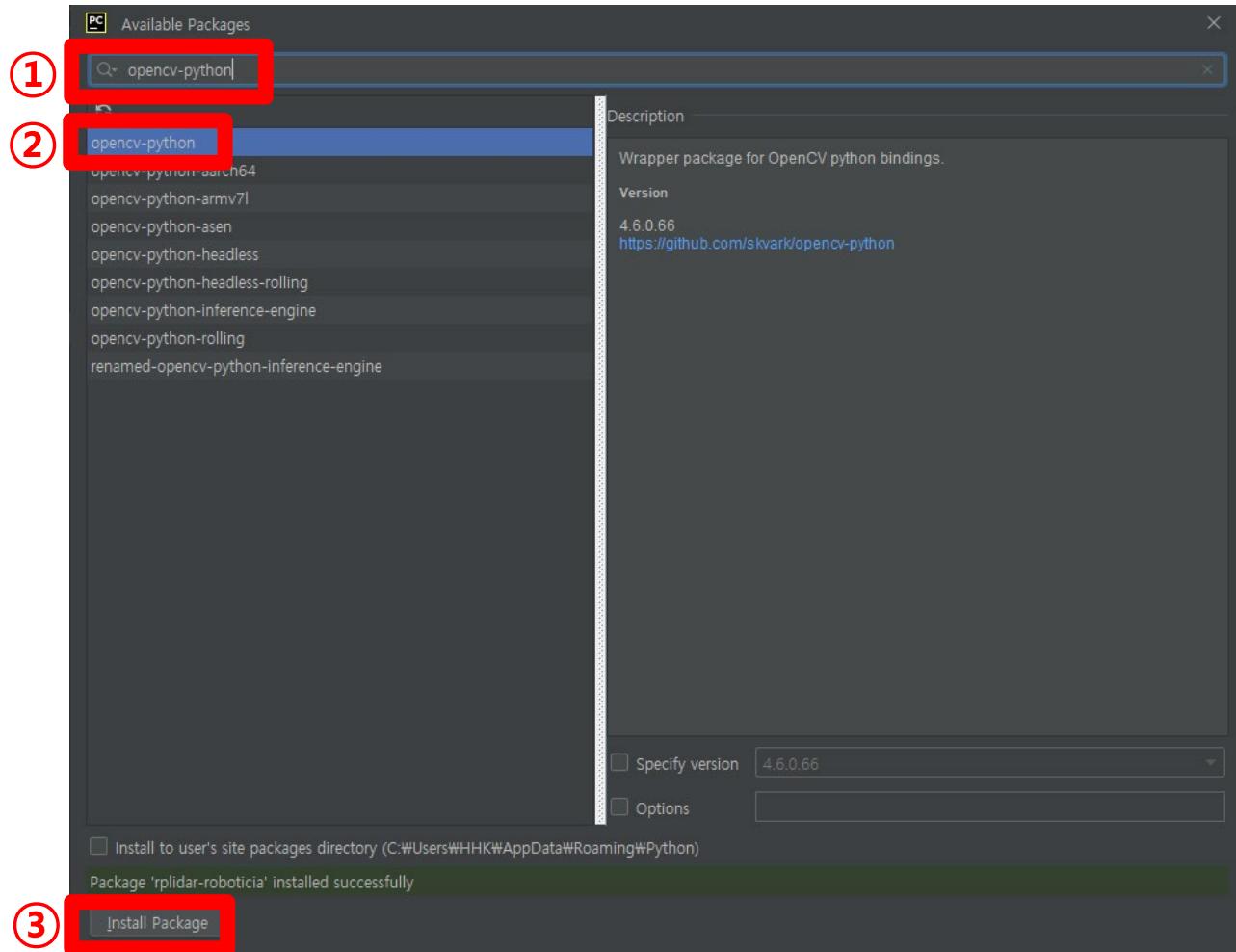


설치 성공 메시지 확인

# Library

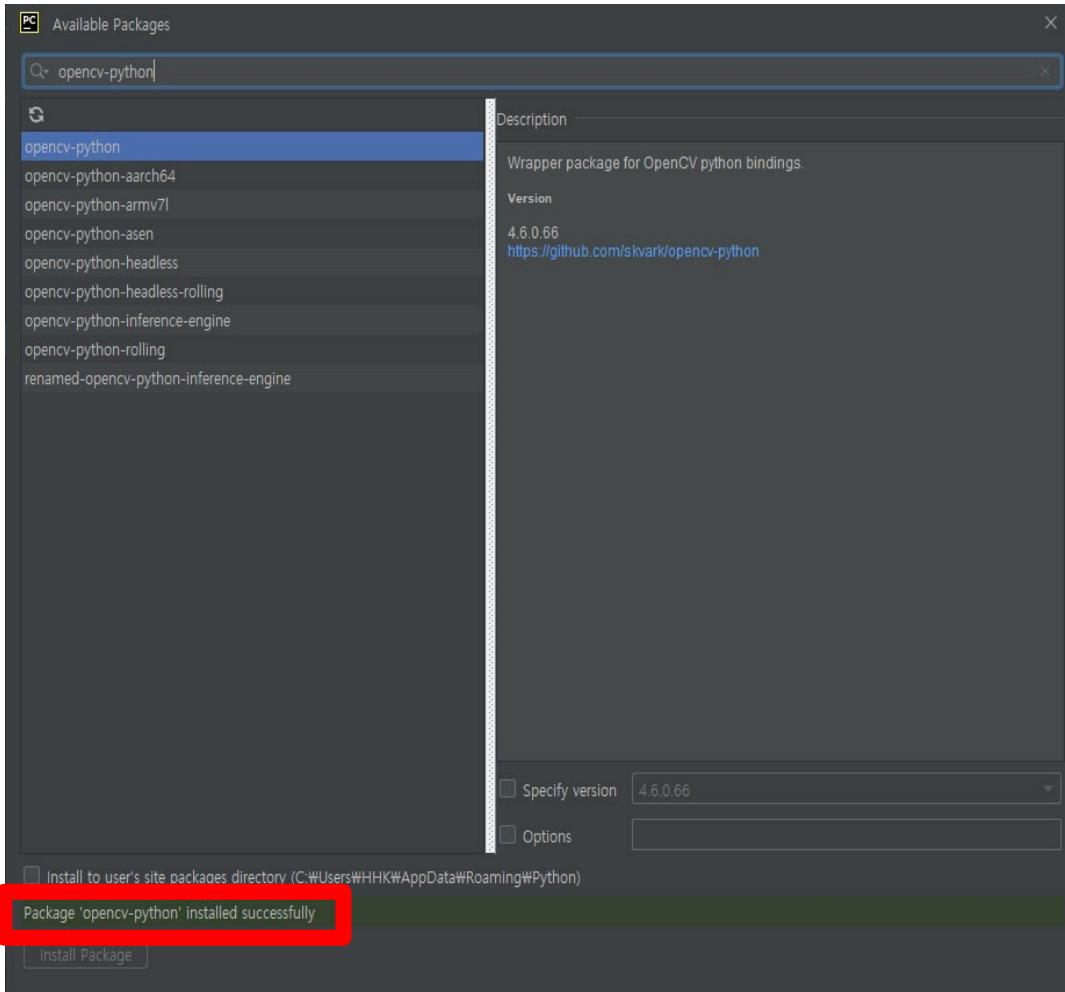
## ■ Camera 라이브러리 설치

- ① opencv-python 검색
- ② opencv-python 선택
- ③ Install Package 클릭



# Library

## ■ Camera 라이브러리 설치

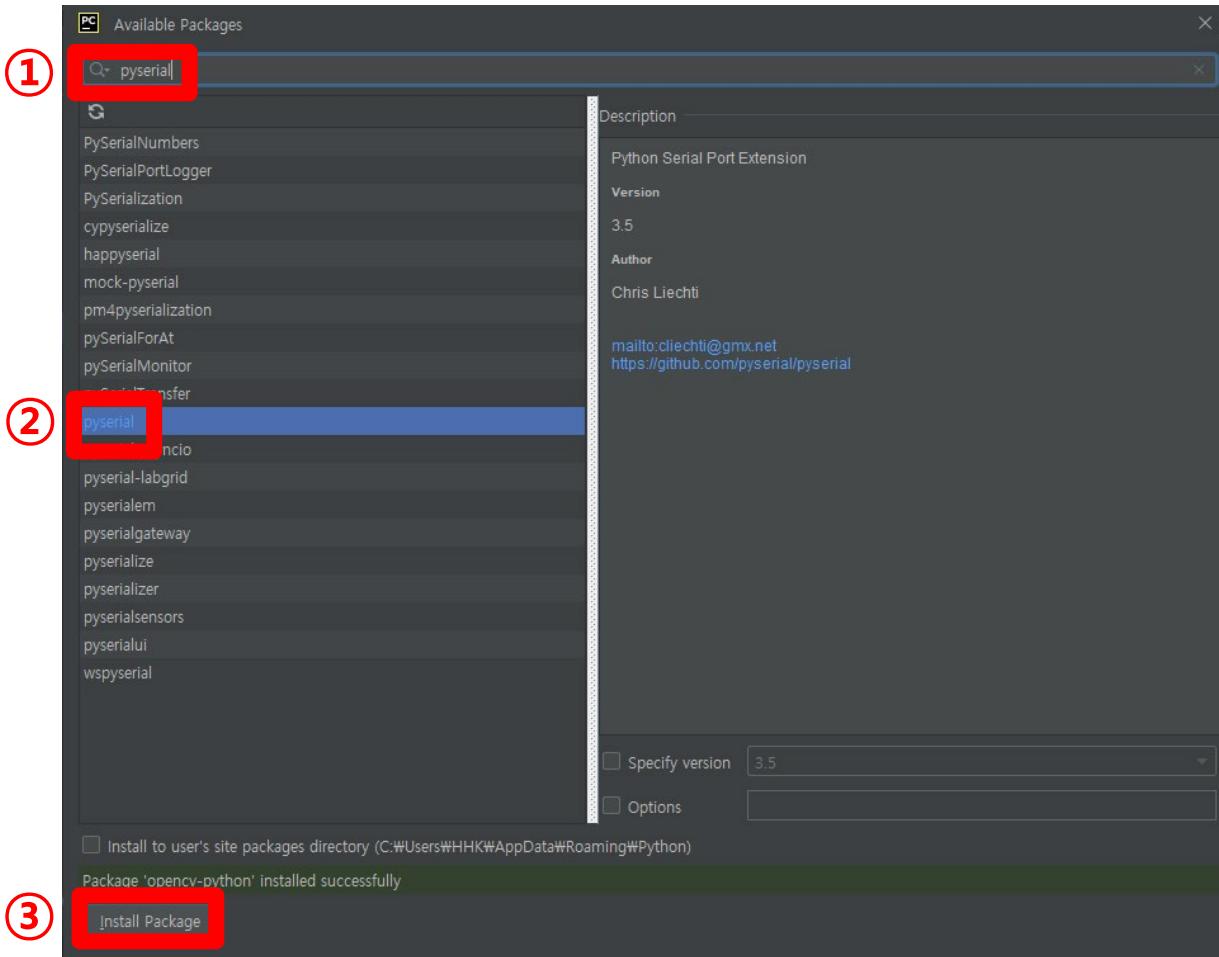


설치 성공 메시지 확인

# Library

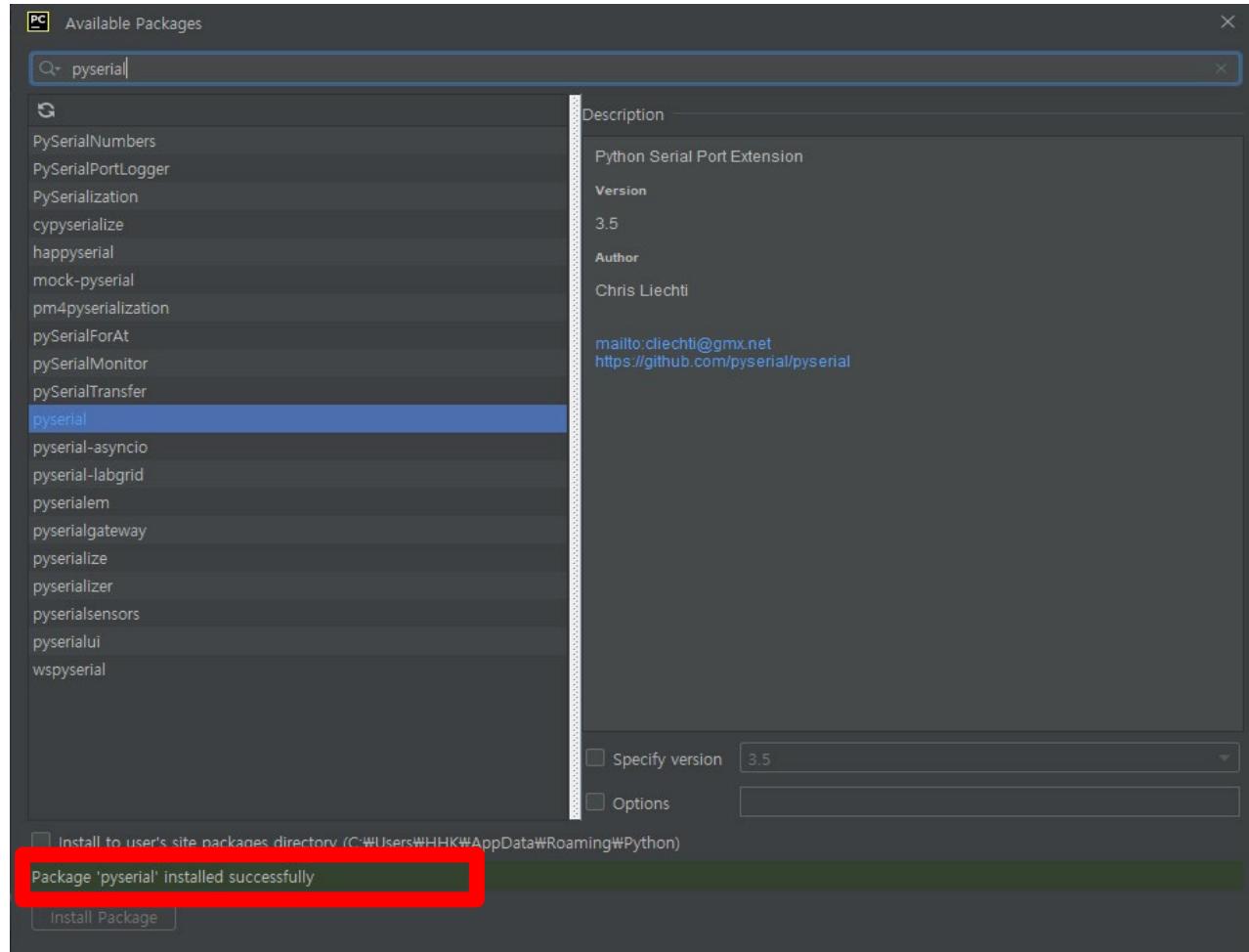
## ■シリ얼통신 라이브러리 설치

- ① pyserial 검색
- ② pyserial 선택
- ③ Install Package 클릭



# Library

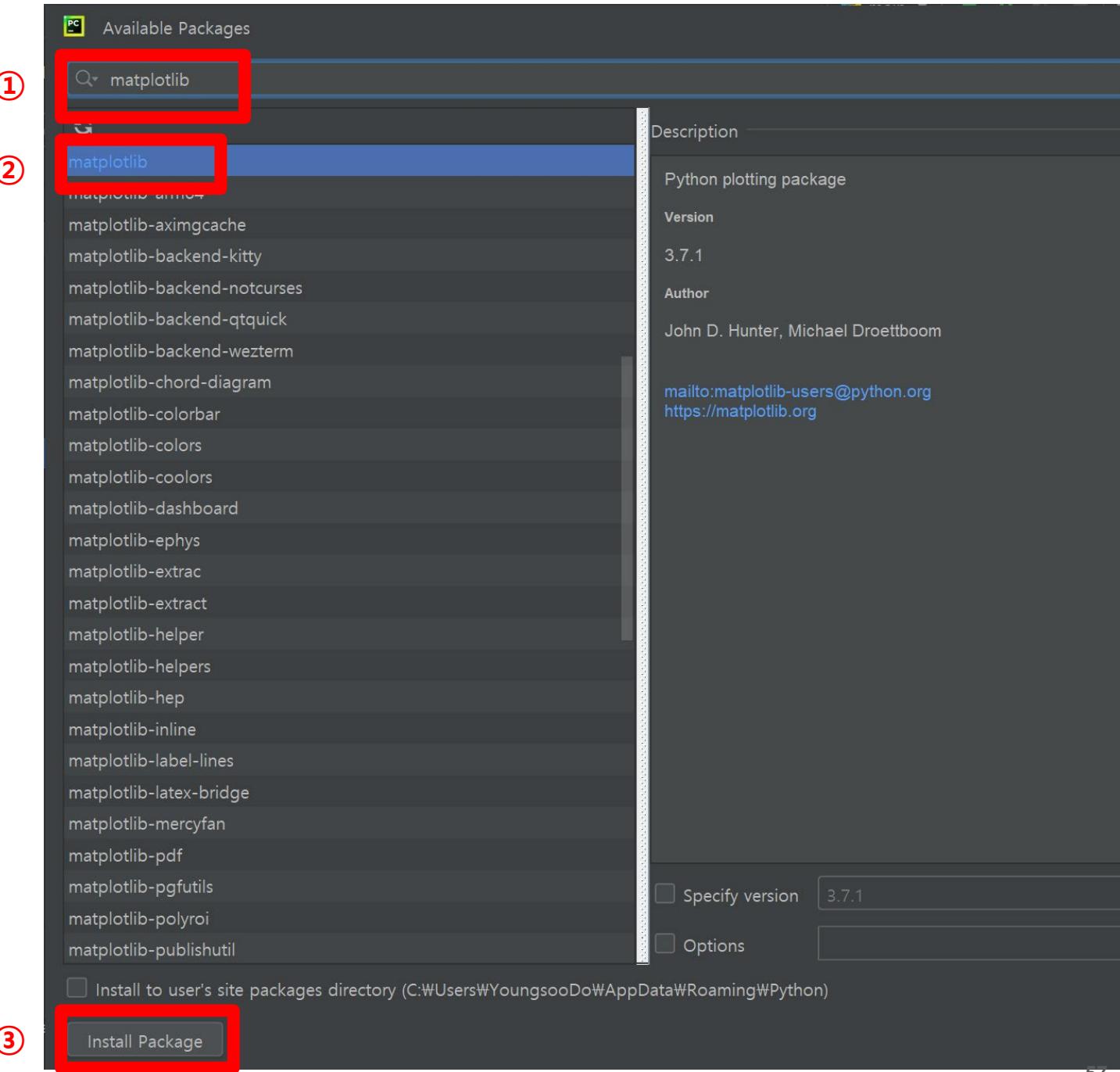
## ■シリ얼통신 라이브러리 설치



설치 성공 메시지 확인

# Library

## ■ Matplotlib 설치



# Exercise

## ■ 라이브러리 및 장치 설치 확인

- 새로운 프로젝트를 생성한 후, 기존의 'main.py' 파일 제거
- 배포된 'Function\_Library.py' 파일과 'main.py' 파일을 해당 프로젝트로 옮김

The screenshot shows the PyCharm IDE interface. The top bar displays the menu: File, Edit, View, Navigate, Code, Refactor, Run, Tools, VCS, Window, Help. The title bar indicates the project is named 'pythonProject' and the file is 'main.py'. The toolbar includes icons for user, main file, run, debug, and search. The left sidebar shows the 'Project' view with a folder named 'pythonProject' containing two files: 'Function\_Library.py' and 'main.py'. A red box highlights this folder and its contents. The right side of the interface shows the code editor with the following Python script:

```
from rplidar import RPLidar
import cv2
import serial
import time

# This is a sample Python script.
```

# Exercise

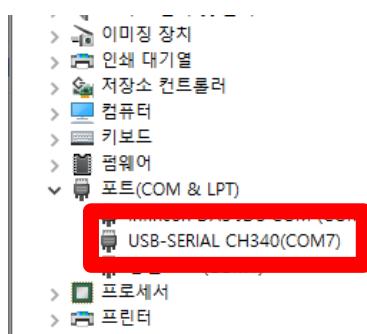
장치 관리자 – LiDAR

## ■ 라이브러리 및 장치 설치 확인

### ● 'main.py' 파일의 init 함수의 parameter 값 변경

- Parm 1 : 아두이노 COM port 번호
- Pram 2 : LiDAR COM port 번호

장치 관리자 – 아두이노

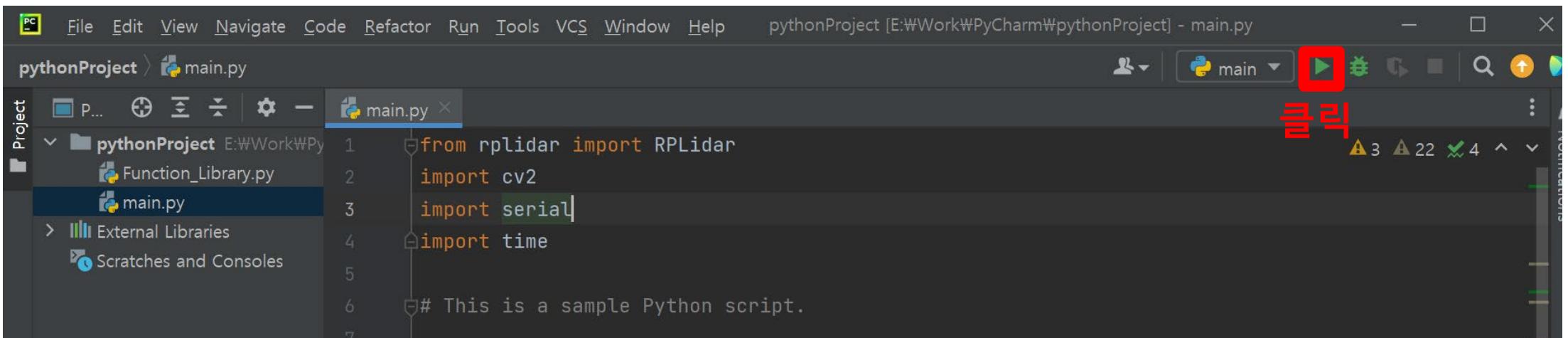


```
else:  
    print('\tPort : [X]')  
  
    print('\tVersion : ', cv2.__version__)  
  
# Press the green button in the gutter to run the script.  
if __name__ == '__main__':  
    # Parm 1 : Arduino's COM port number  
    # Parm 2 : LiDAR's COM port number  
    # * the port number must be capitalized.  
    # * and we can see this port number on device manager in windows.  
    init('COM5', 'COM11')  
  
# See PyCharm help at https://www.jetbrains.com/help/pycharm/
```

# Exercise

## ■ 라이브러리 및 장치 설치 확인

- Run()



```
pythonProject [E:\Work\PyCharm\pythonProject] - main.py
File Edit View Navigate Code Refactor Run Tools VCS Window Help
pythonProject > main.py
Project main.py
pythonProject E:\Work\PyCharm\pythonProject
Function_Library.py
main.py
External Libraries
Scratches and Consoles
from rplidar import RPLidar
import cv2
import serial
import time
# This is a sample Python script.
```

# Exercise

## ■ 라이브러리 및 장치 설치 확인

```
[Arduino] Check
  Lib : [OK]
  Port : [OK]
[LiDAR] Check
  Lib : [OK]
  Port : [OK]
  Info: {'model': 40, 'firmware': (1, 28), 'hardware': 7, 'serialnumber': 'EC8FEDF9C7E29BCEA7E39EF27C5C4304'}
[Computer Vision] Check
  Lib : [OK]
  Port : [OK]
  Version : 4.6.0
```

다음과 같은 문구 출력 시  
라이브러리 및 장치 올바르게 설치

# Thank You!

*Automation Lab.*

