

# 미래형 자동차 교육 워크샵

Subject: 개발환경 구축

***Embedded System Lab.***



# PC

## ■ PC 하드웨어 환경



운영체제: Window10

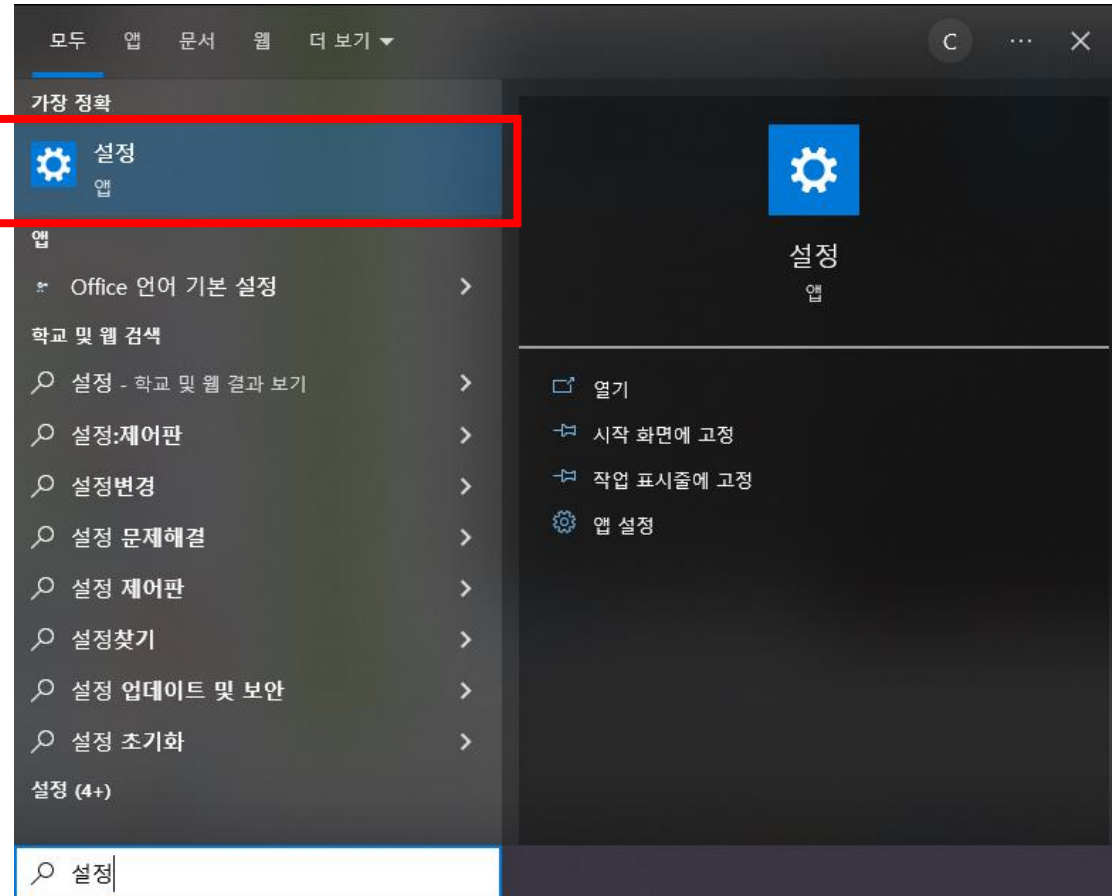


아키텍처: x86, x64

# PC

## ■ PC 하드웨어 사양 확인

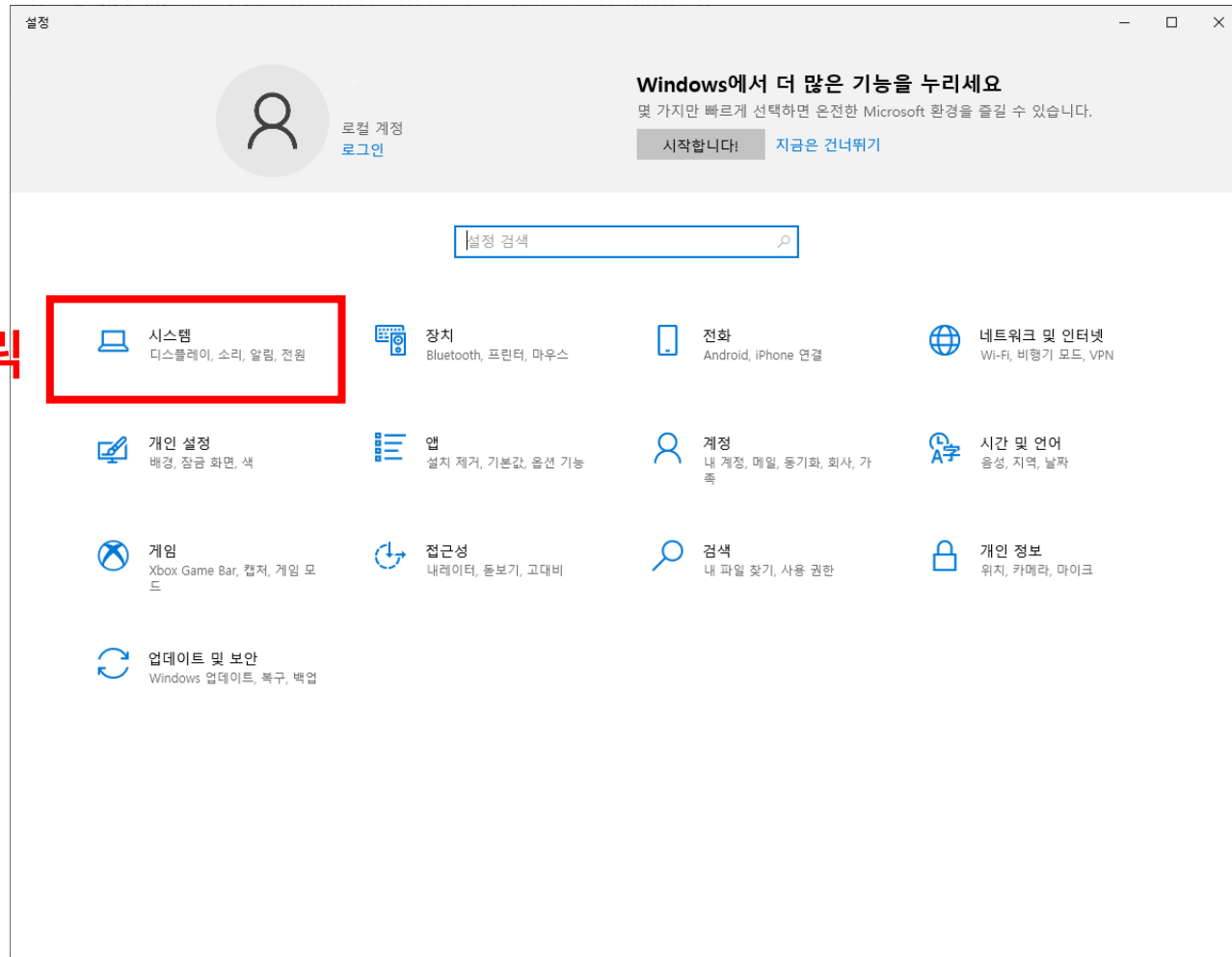
클릭



# PC

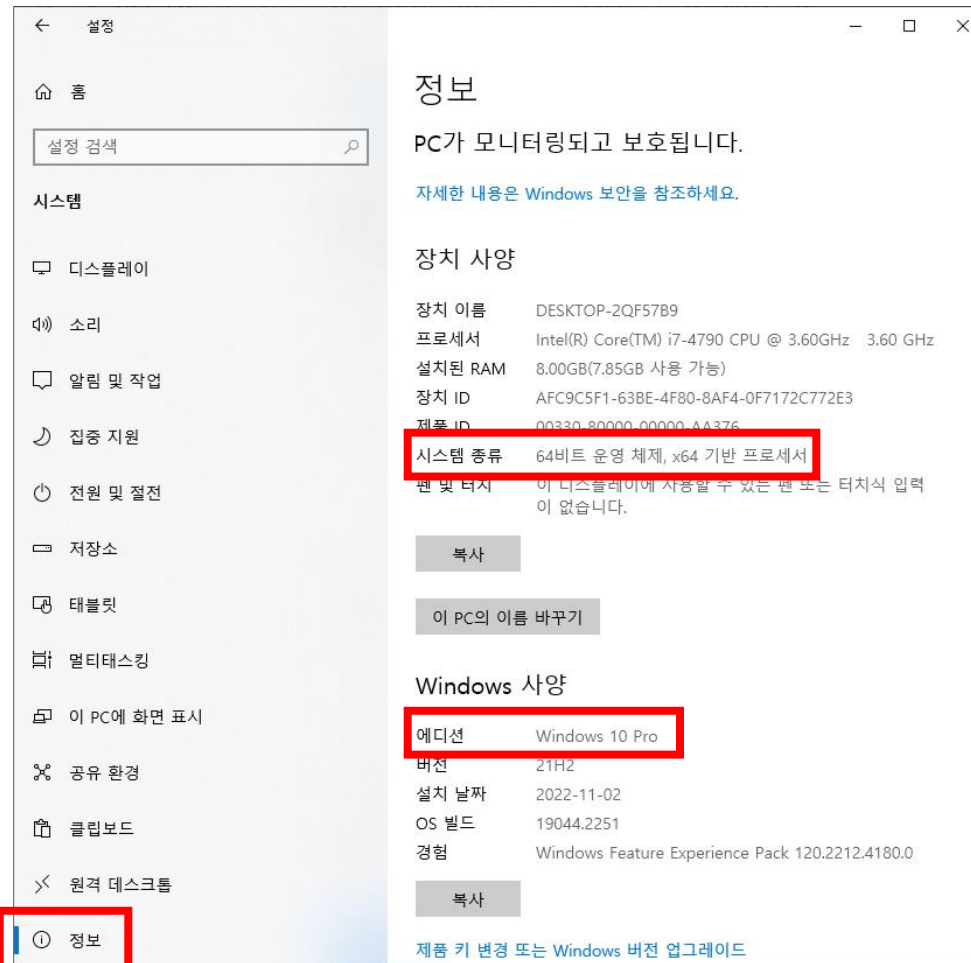
## ■ PC 하드웨어 사양 확인

클릭



# PC

## ■ PC 하드웨어 사양 확인



클릭

① 정보

# LiDAR

## ■ 라이다(LiDAR)

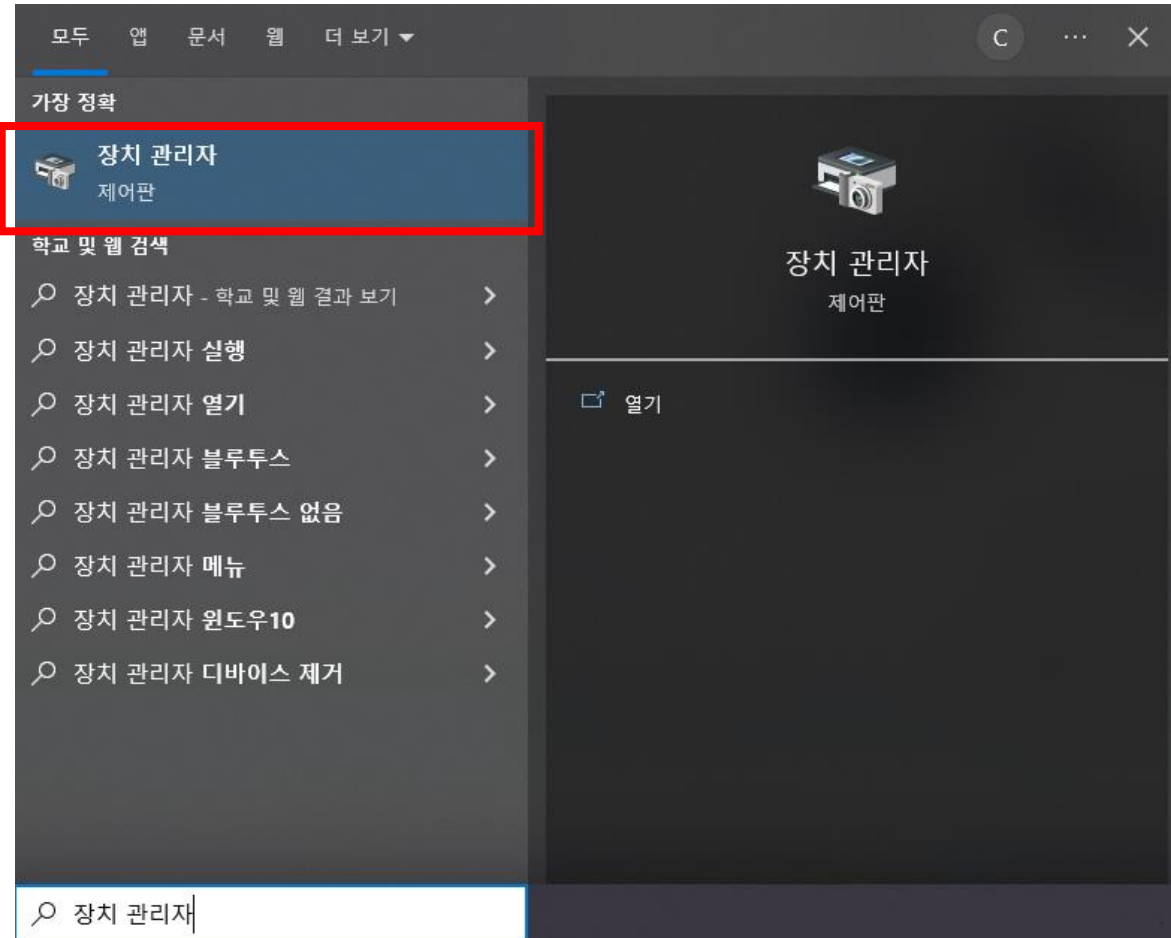


짧은 선을 PC에 연결

# LiDAR

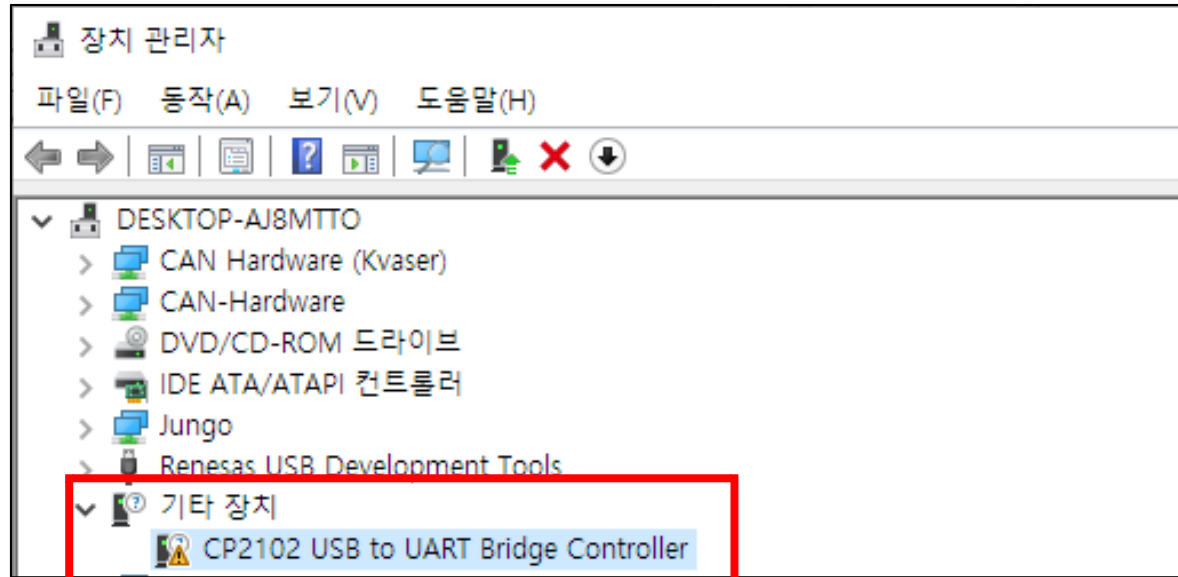
## ■ 라이다 장치 인식 확인

클릭



# LiDAR

## ■ 라이다 장치 인식 확인



**기타장치 CP2102 USB 인식 확인**

**인식 안될 시, 라이다 USB 포트 연결 확인**

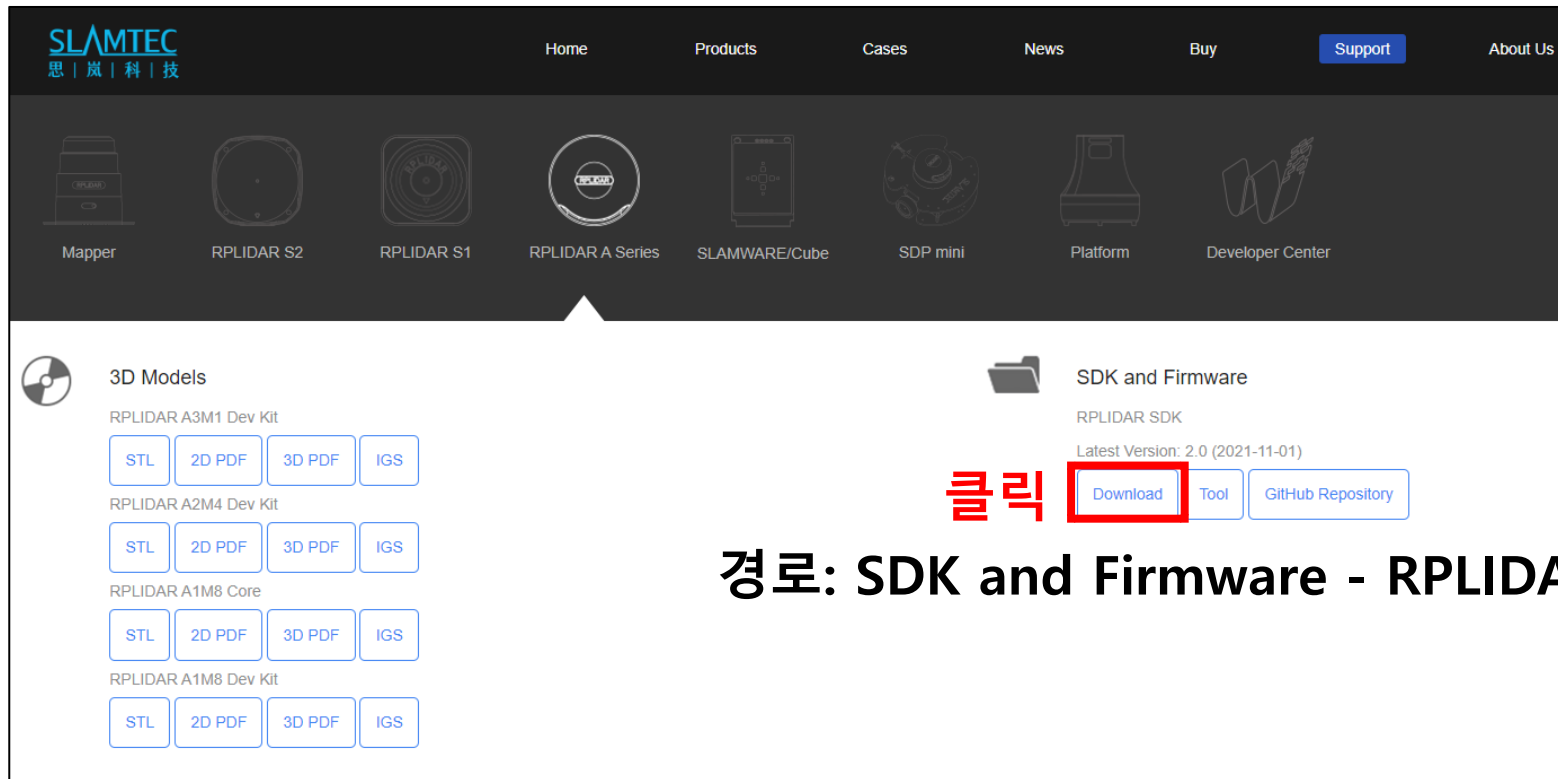


# LiDAR

## ■ 라이다 드라이버 설치

다운로드 페이지:

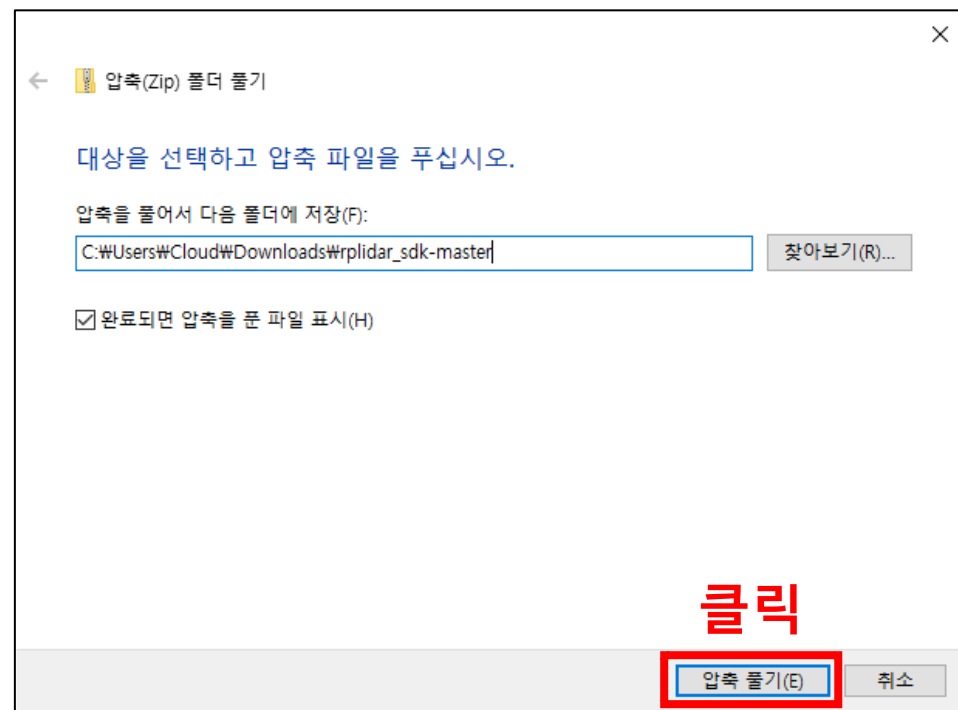
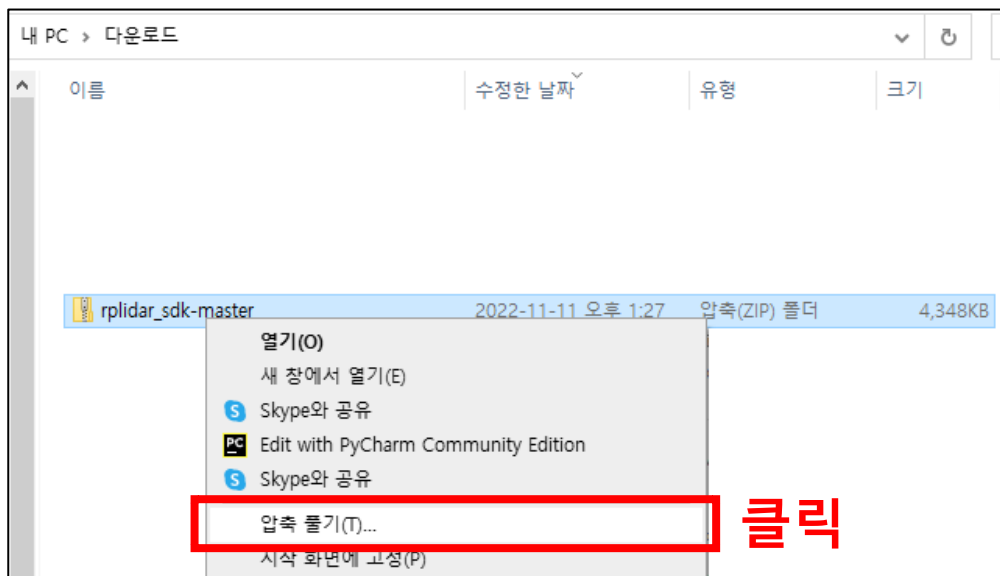
<https://www.slamtec.com/en/support#rplidar-a-series>



경로: SDK and Firmware - RPLIDAR SDK - Download

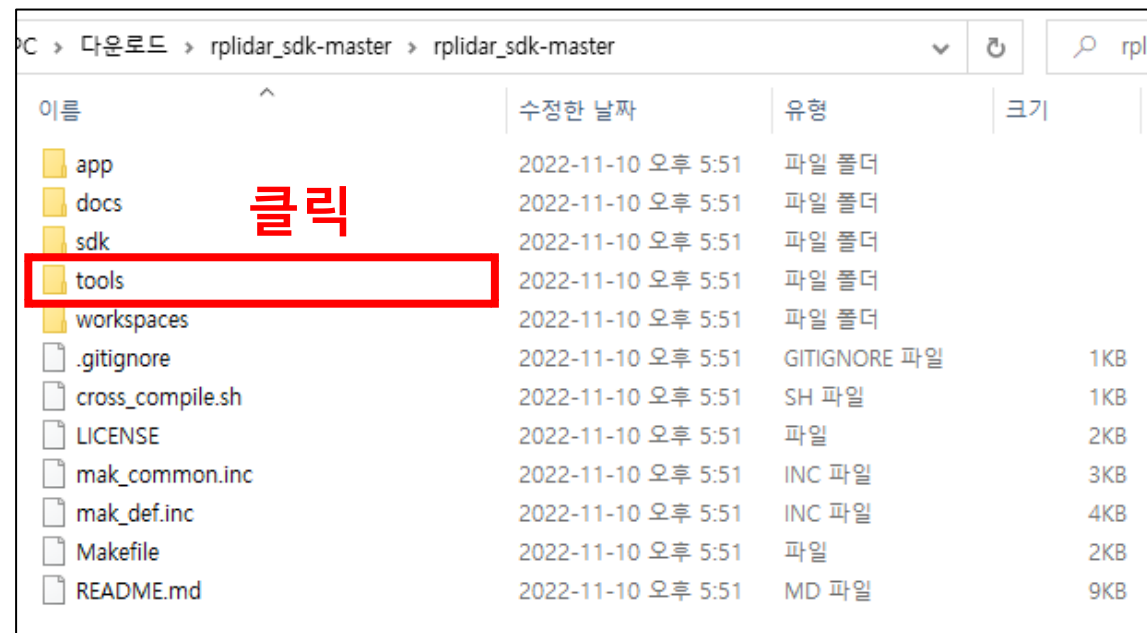
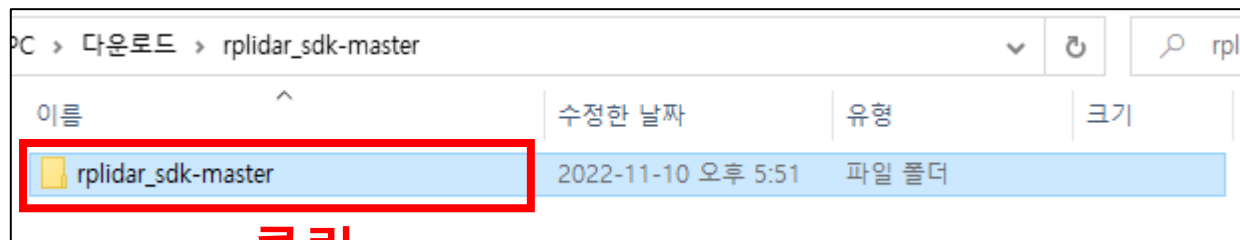
# LiDAR

## ■ 라이다 드라이버 설치



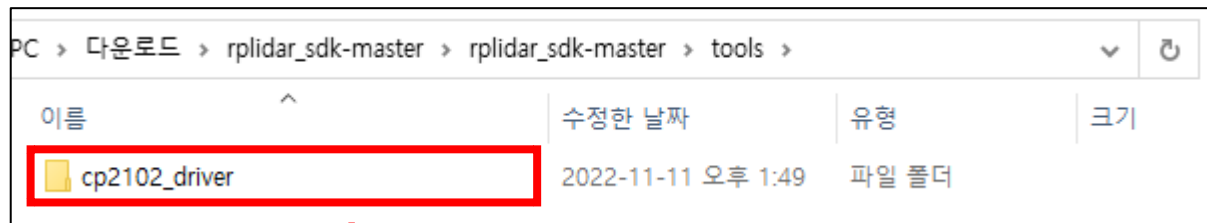
# LiDAR

## ■ 라이다 드라이버 설치

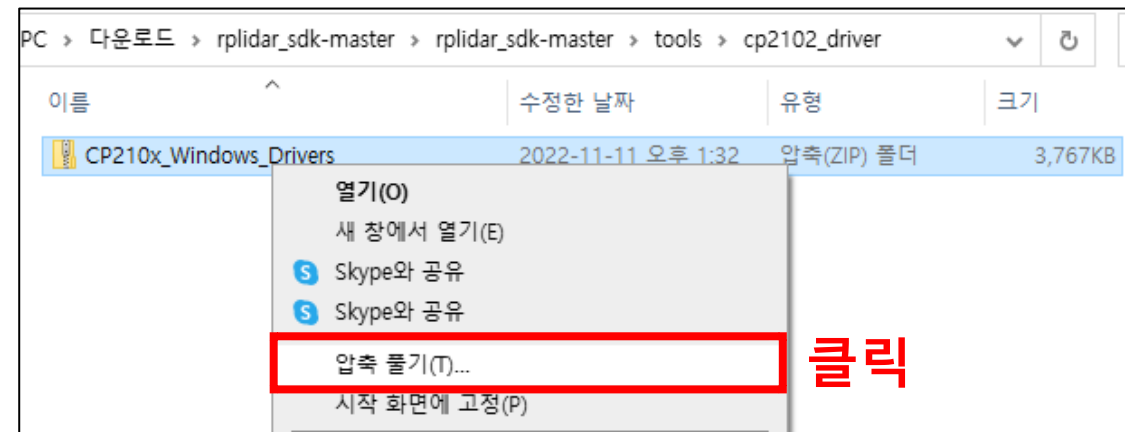


# LiDAR

## ■ 라이다 드라이버 설치



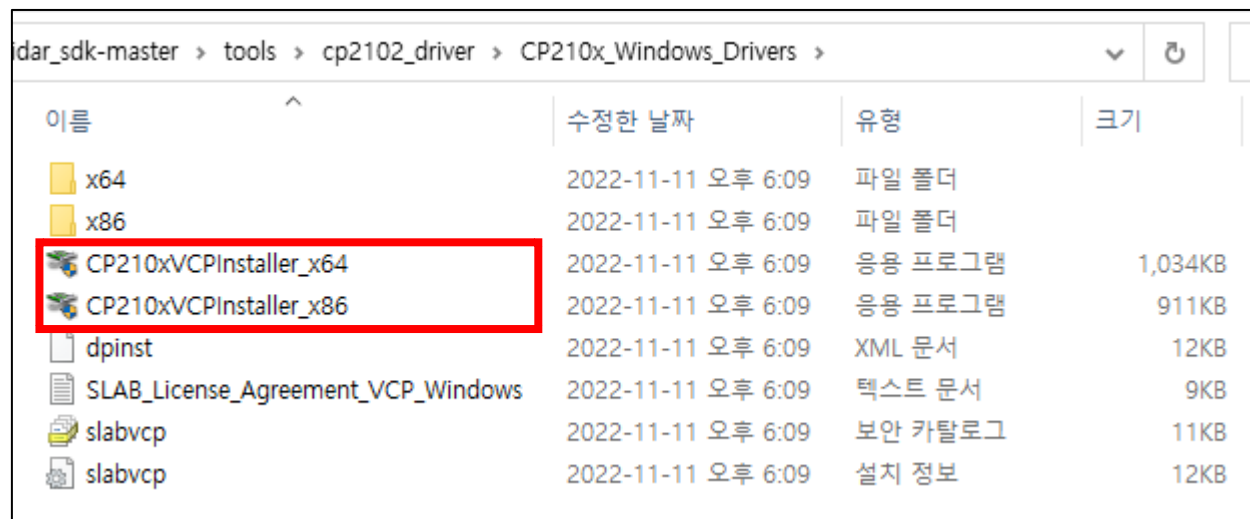
클릭



클릭

# LiDAR

## ■ 라이다 드라이버 설치



이름	수정한 날짜	유형	크기
x64	2022-11-11 오후 6:09	파일 폴더	
x86	2022-11-11 오후 6:09	파일 폴더	
CP210xVCPInstaller_x64	2022-11-11 오후 6:09	응용 프로그램	1,034KB
CP210xVCPInstaller_x86	2022-11-11 오후 6:09	응용 프로그램	911KB
dpinst	2022-11-11 오후 6:09	XML 문서	12KB
SLAB_License_Agreement_VCP_Windows	2022-11-11 오후 6:09	텍스트 문서	9KB
slabvcp	2022-11-11 오후 6:09	보안 카탈로그	11KB
slabvcp	2022-11-11 오후 6:09	설치 정보	12KB

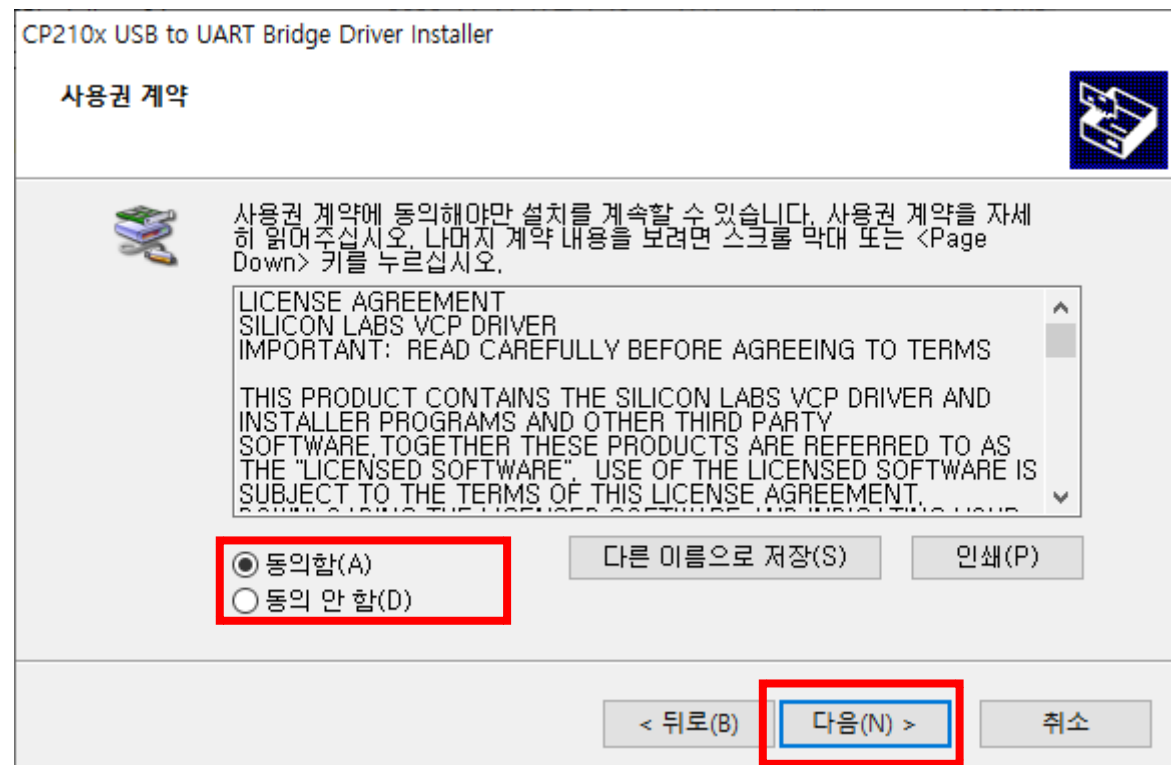
PC 사양에 맞는 프로그램 실행

# LiDAR

## ■ 라이다 드라이버 설치



클릭



동의함 체크 후 다음

# LiDAR

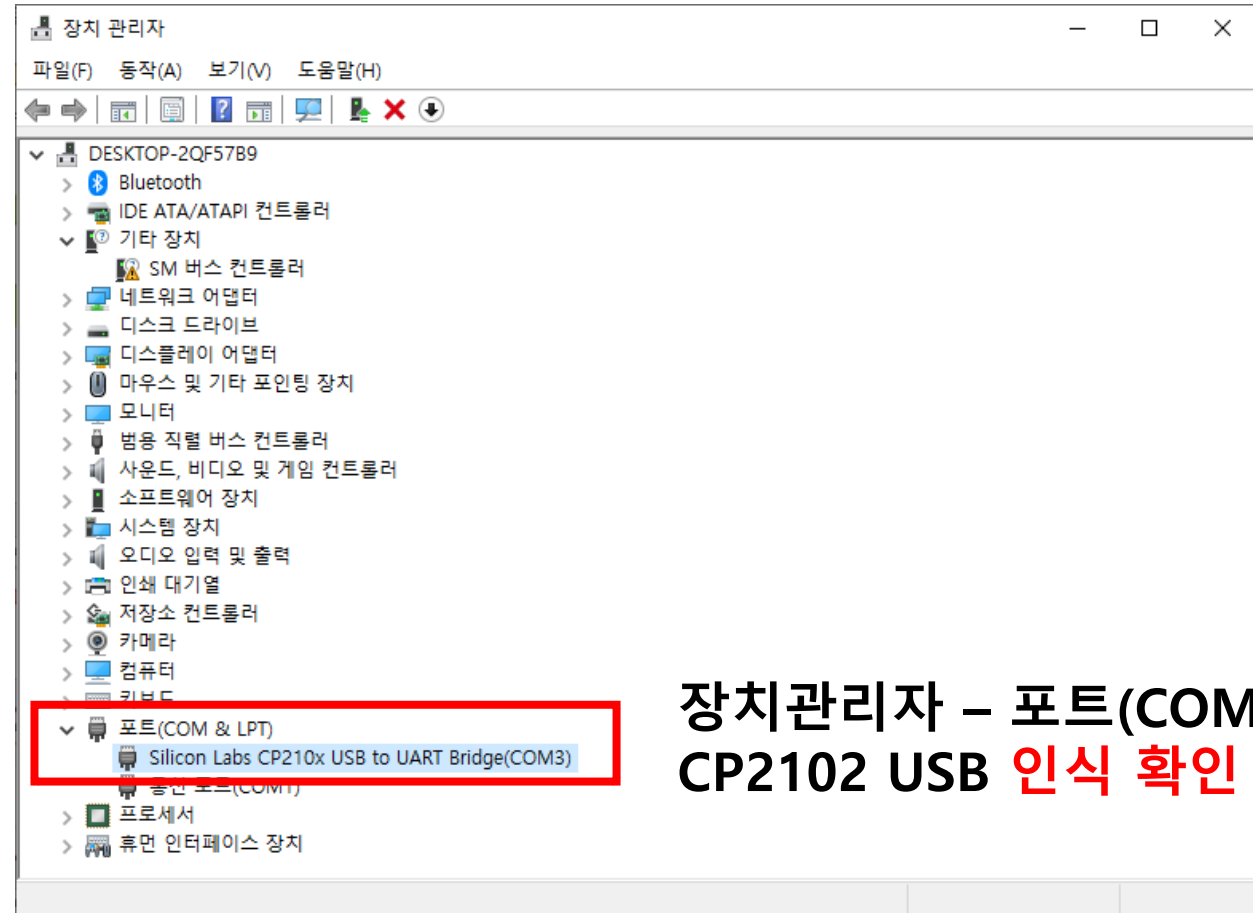
## ■ 라이다 드라이버 설치



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>

Arduino IDE 1.8.19  
버전 확인

Legacy IDE (1.8.X)

 **Arduino IDE 1.8.19**

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. This software can be used with any Arduino board.

Refer to the [Getting Started](#) page for Installation instructions.

**SOURCE CODE**

Active development of the Arduino software is [hosted by GitHub](#). See the instructions for [building the code](#). Latest release source code archives are available [here](#). The archives are PGP-signed so they can be verified using [this](#) gpg key.

**DOWNLOAD OPTIONS**

- Windows** Win 7 and newer [windows zip file](#)
- Windows app** Win 8.1 or 10 [Get](#)
- Linux** 32 bits
- Linux** 64 bits
- Linux** ARM 32 bits
- Linux** ARM 64 bits
- Mac OS X** 10.10 or newer

[Release Notes](#)

[Checksums \(sha512\)](#)

**Previous Releases**

Download the previous version of the current release, the classic 1.0.x, or old beta releases.

**DOWNLOAD OPTIONS**

- [Previous Release 1.8.18](#)
- [Arduino 1.0.x](#)
- [Arduino 1.5.x beta](#)

Windows Win 7 and newer  
클릭 후 다운로드

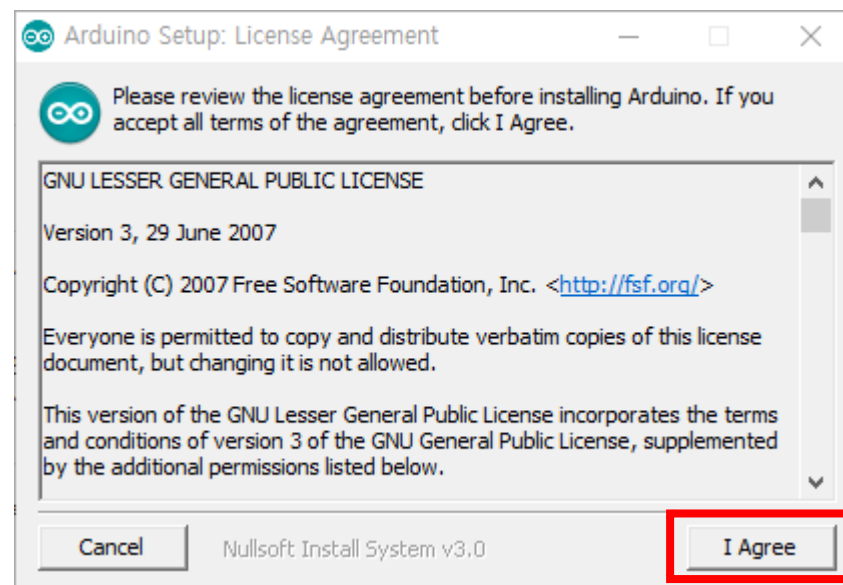
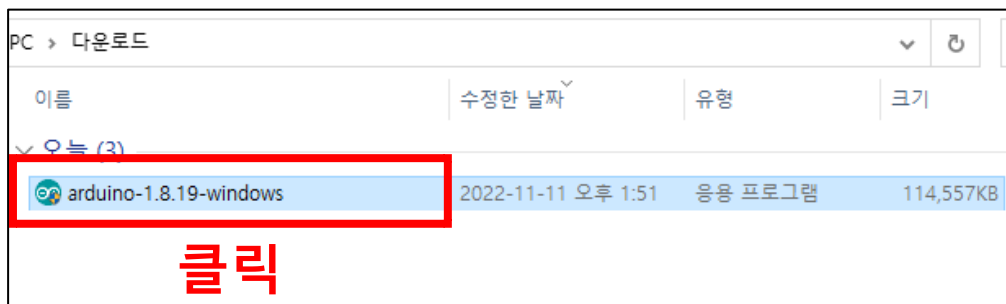
# Arduino IDE

## ■ Arduino IDE 설치



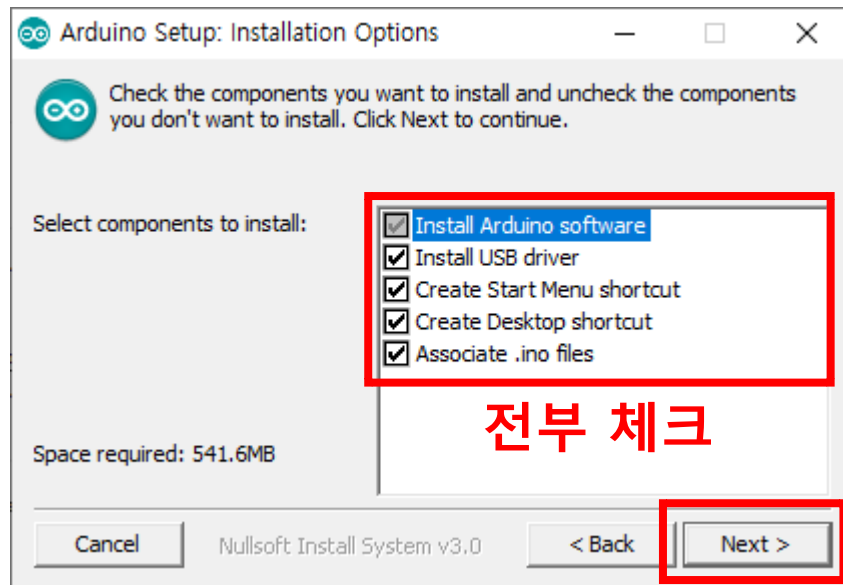
# Arduino IDE

## ■ Arduino IDE 설치

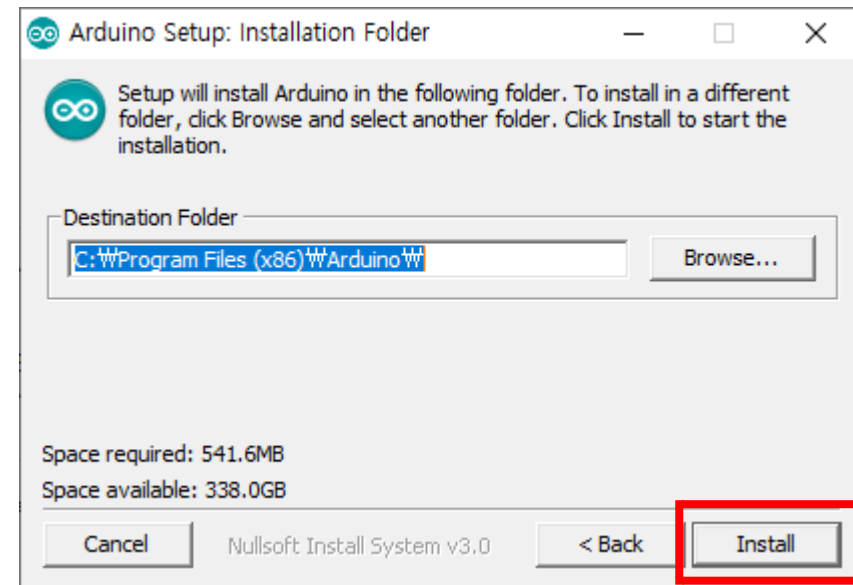


# Arduino IDE

## ■ Arduino IDE 설치



클릭



클릭

# Arduino IDE

## ■ Arduino IDE 설치

장치 소프트웨어 설치 알림 뜰 시, 모두 설치



# Arduino IDE

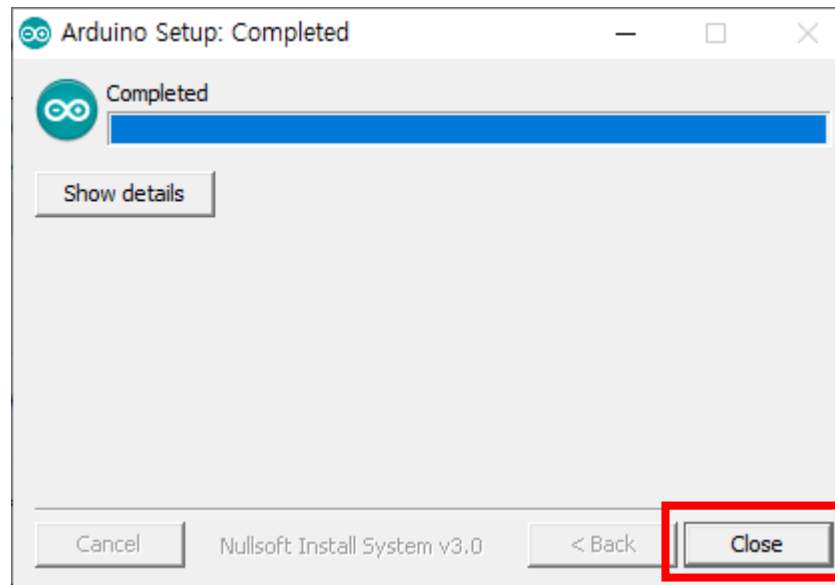
## ■ Arduino IDE 설치

장치 소프트웨어 설치 알림 뜰 시, 모두 설치



# Arduino IDE

## ■ Arduino IDE 설치

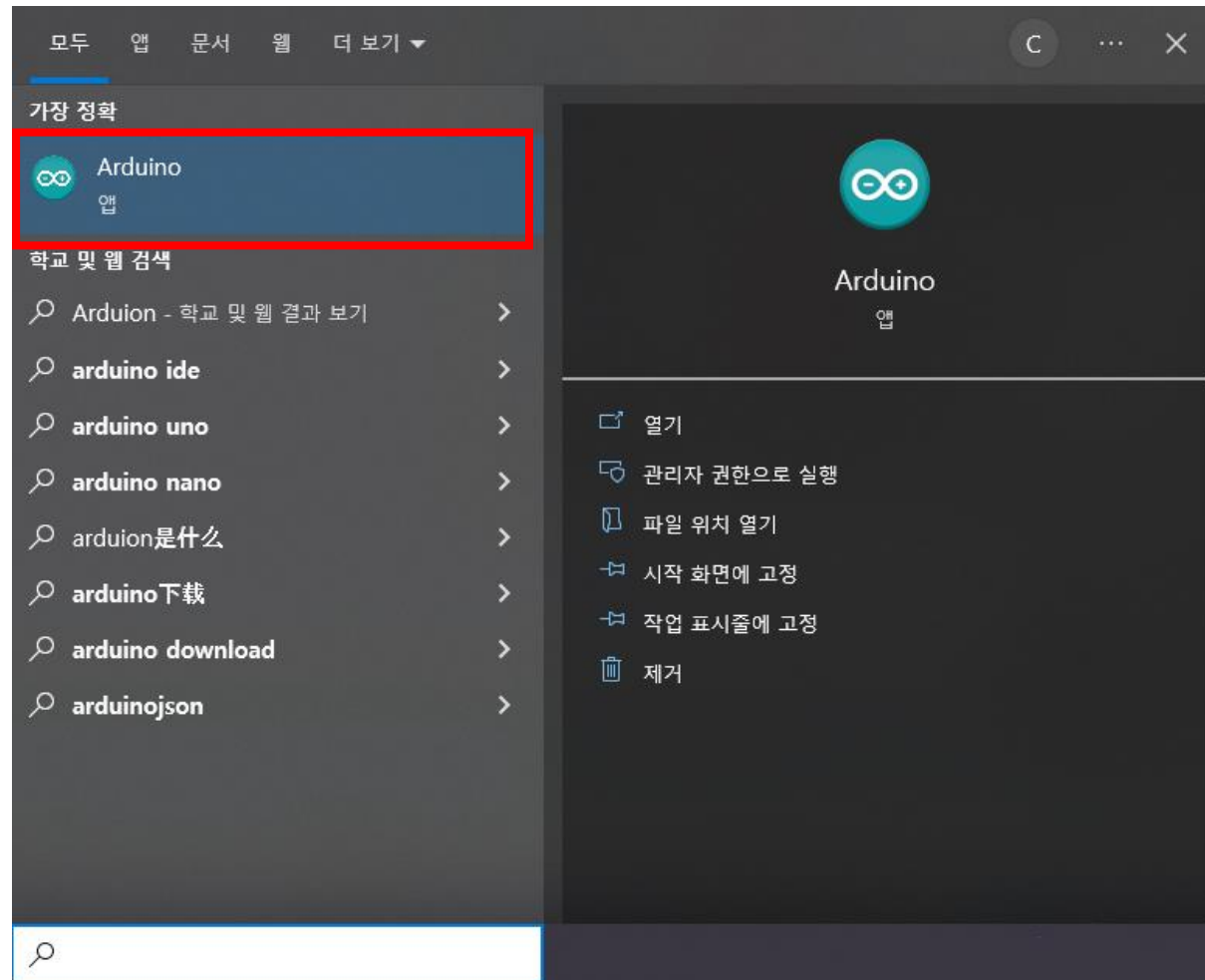


클릭

# Arduino IDE

## ■ Arduino IDE 설치

Arduino 실행





# Arduino IDE

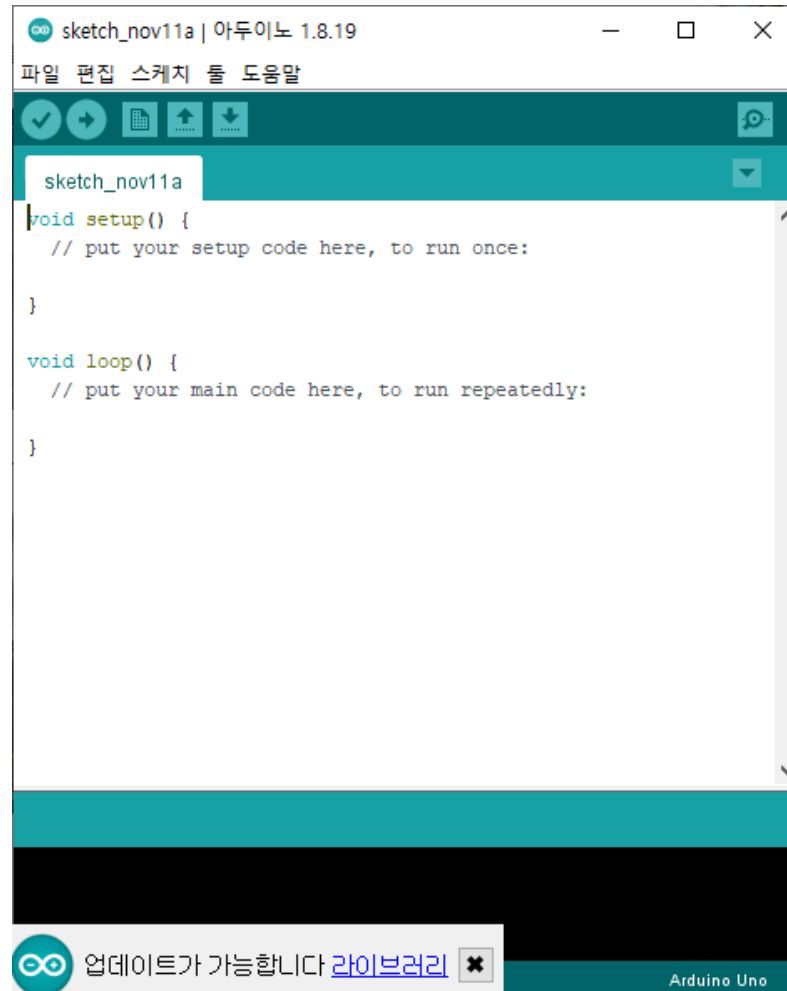
## ■ Arduino IDE 설치



개인 네트워크 체크

# Arduino IDE

## ■ Arduino IDE 초기 화면



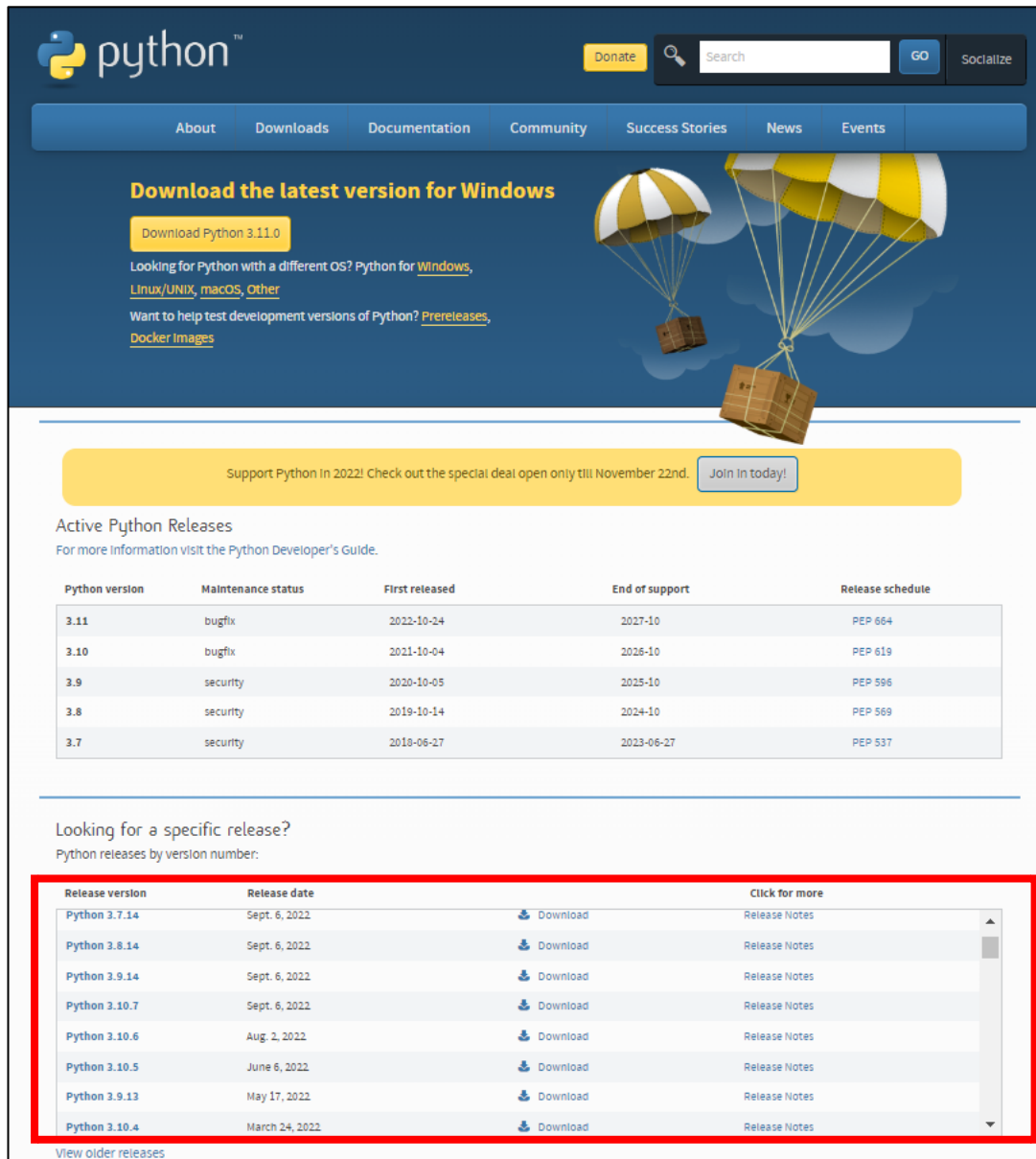
# Python

## ■ Python 설치

다운로드 페이지:

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

설치 할 버전  
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**Active Python Releases**

For more information visit the [Python Developer's Guide](#).

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

[View older releases](#)

# Python

## ■ Python 설치

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

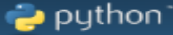
Release version	Release date	Click for more	
<a href="#">Python 3.7.14</a>	Sept. 6, 2022	<a href="#">Download</a>	<a href="#">Release Notes</a>
<a href="#">Python 3.8.14</a>	Sept. 6, 2022	<a href="#">Download</a>	<a href="#">Release Notes</a>
<a href="#">Python 3.9.14</a>	Sept. 6, 2022	<a href="#">Download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

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본 교육에서는 **3.9.13 버전**을 활용합니다.  
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# Python

## ■ Python 설치



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Python 3.9.13

Release Date: May 17, 2022

This is the thirteenth and final regular maintenance release of Python 3.9

**Note:** The release you're looking at is Python 3.9.13, a **bugfix release** for the legacy 3.9 series. Python 3.10 is now the latest feature release series of Python 3. [Get the latest release of 3.10 a few.](#)

According to the release calendar specified in [PEP 566](#), Python 3.9.13 is the final regular maintenance release. Starting now, the 3.9 branch will only accept security fixes, and releases of those will be made in source-only form until October 2026.

Compared to the 3.8 series, this last regular bugfix release is still pretty active at 266 commits since 3.9.12. In comparison, version 3.8.20, the final regular bugfix release of Python 3.8, included only 10 commits, however, it's likely that it was 3.8 that was special here with the governance changes occupying core developers' minds. For reference, version 3.7.16, the final regular bugfix release of Python 3.7, included 187 commits.

In any case, 266 commits is quite a few changes, some of which being pretty important fixes. Take a look at the [change log](#) for details.

**Major new features of the 3.9 series, compared to 3.8**

Some of the new major new features and changes in Python 3.9 are:

- [PEP 566](#), Module State Access from C: Extension Methods
- [PEP 565](#), Union Operators in C (C4C)
- [PEP 565](#), Type Hinting Services in Standard Collections
- [PEP 565](#), Iterable Function and variable annotations
- [PEP 565](#), Python adopts a stable annual release cadence
- [PEP 565](#), Relaxing Grammar Restrictions On decorators
- [PEP 565](#), Support for the IANA Time Zone Database in the Standard Library
- [PEP 565](#), String methods to remove prefixes and suffixes
- [PEP 565](#), New PEP parser for CPython
- [PEP 565](#), garbage collection does not block on unconnected objects
- [PEP 565](#), os.path.open added that allows process management without races and signals
- [PEP 565](#), Unicode support updated to version 10.0.0
- [PEP 565](#), when Python is initialized multiple times in the same process, it does not leak memory anymore
- A number of Python builtins (range, tuple, set, frozenset, list, dict) are now typed up using [PEP 565](#) annotations
- A number of Python modules (abc, audioop, \_abc, codecs, \_collections, \_crypt, \_functools, \_hash, \_locale, operator, random, time, \_weakref) now use [multiphase](#) installation as defined by [PEP 565](#)
- A number of standard library modules (audioop, set, \_abc, \_hashlib, \_hash, \_posixsubprocess, random, select, struct, termios, \_tk) are now using the stable ABI defined by [PEP 565](#)

You can find a more comprehensive list in this release's ["What's New"](#) document.

**More resources**

- [Online Documentation](#)
- [Python 3.9 Release Schedule](#)
- [Report bugs at https://bugs.python.org](#)
- [Help: Start Python and its community](#)

**And Now for Something Completely Different**

**MC Python (John Cleese):** "Well, MC Python! (singing) (singing) (This is your new or'clock, alarm call) (takes point out of the cage), throws it up in the air and watches it plummet to the floor.)

**MC Python:** Now that's what I call a dead parrot.

**Downer (Michael Palin):** No, no...No, he's retired!

**MC Python:** I UNDERST!

**Downer:** Well, you should have, just as he was walkin' up Norwagian Alms that rainy, rainy.

**MC Python:** Yes... now look, man... I'm definitely 'ad enough of this. That parrot is definitely deceased, and when I purchased it, not 'off on how you, you assured me that its total lack of movement was due to it being 'dead and shaggy and following a prolonged seizure.

**Downer:** Well, he's... he's... ah... probably pining for the Islands.

[Full Changelog](#)

Files

Version	Operating System	Description	MD5 Sum	File Size	GPU
<a href="#">Original source (tarball)</a>		Source release	af76a0a5f8b2a277c3a0f0c0a0f0a0f	29154087	<a href="#">Size</a>
<a href="#">32 compressed source (tarball)</a>		Source release	af76a0a5f8b2a277c3a0f0c0a0f0a0f	29154088	<a href="#">Size</a>
<a href="#">python3.9.13-macos11.0-universal2-install</a>	macOS	for macOS 10.16 and later, deprecated	af76a0a5f8b2a277c3a0f0c0a0f0a0f	30961241	<a href="#">Size</a>
<a href="#">python3.9.13-macos11.0-universal2-installer</a>	macOS	for macOS 10.16 and later	af76a0a5f8b2a277c3a0f0c0a0f0a0f	30961242	<a href="#">Size</a>
<a href="#">Windows.python3.9.13.0.exe</a>	Windows		af76a0a5f8b2a277c3a0f0c0a0f0a0f	7729905	<a href="#">Size</a>
<a href="#">Windows.python3.9.13.0.exe</a>	Windows		af76a0a5f8b2a277c3a0f0c0a0f0a0f	8670730	<a href="#">Size</a>
<a href="#">Windows.python3.9.13.0.exe</a>	Windows		af76a0a5f8b2a277c3a0f0c0a0f0a0f	8670731	<a href="#">Size</a>
<a href="#">Windows.python3.9.13.0.exe</a>	Windows		af76a0a5f8b2a277c3a0f0c0a0f0a0f	8670732	<a href="#">Size</a>
<a href="#">Windows.python3.9.13.0.exe</a>	Windows	Not recommended	af76a0a5f8b2a277c3a0f0c0a0f0a0f	8670733	<a href="#">Size</a>

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창 아래쪽 Files 확인

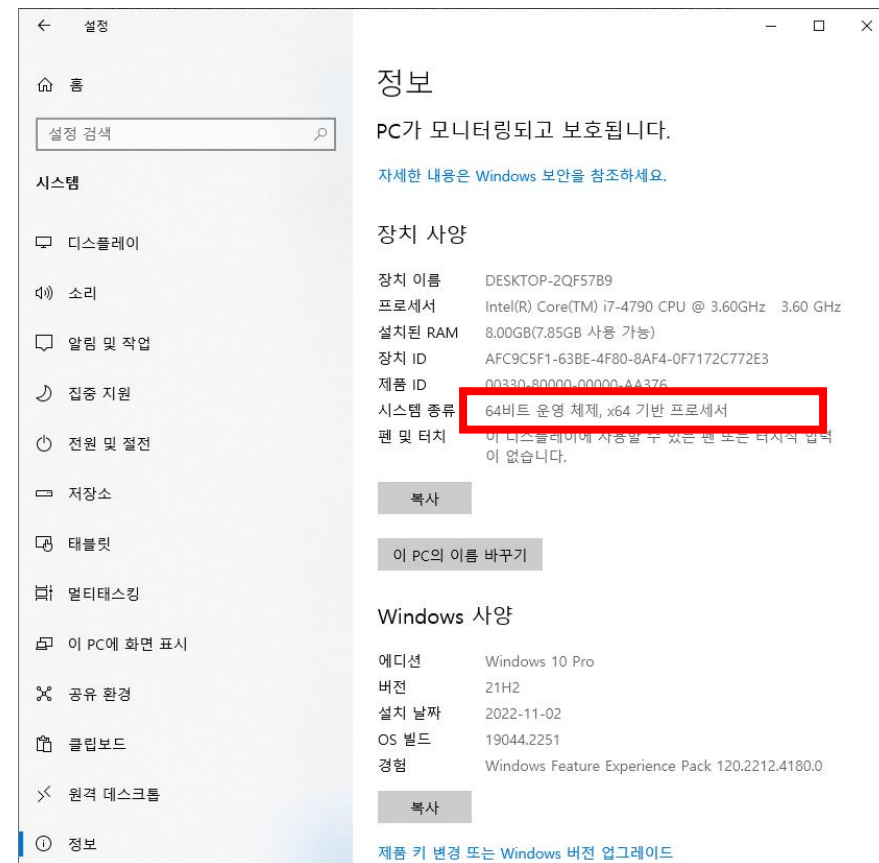
# Python

## ■ Python 설치

### Files

Version	Operating System	Description	MD5 Sum	File Size	GPG
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<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		fec0bc06857502a56dd1aeaea6488ef8	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>
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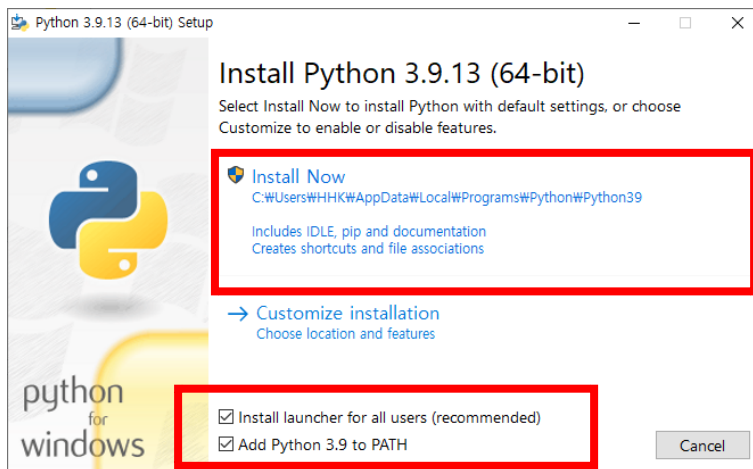
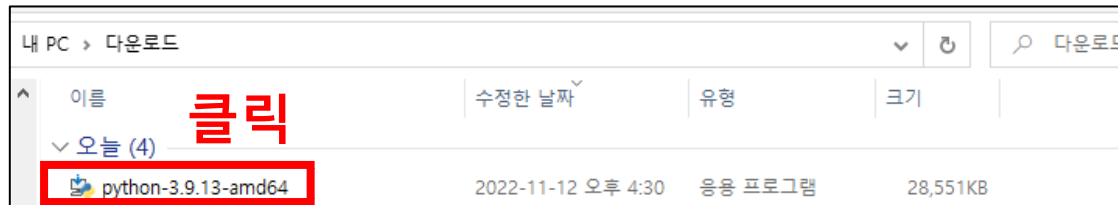
본인 PC 하드웨어 사양(64bit, 32bit) 선택



하드웨어 사양  
본 교육자료 첫 부분(page 5)에서 확인

# Python

## ■ Python 설치



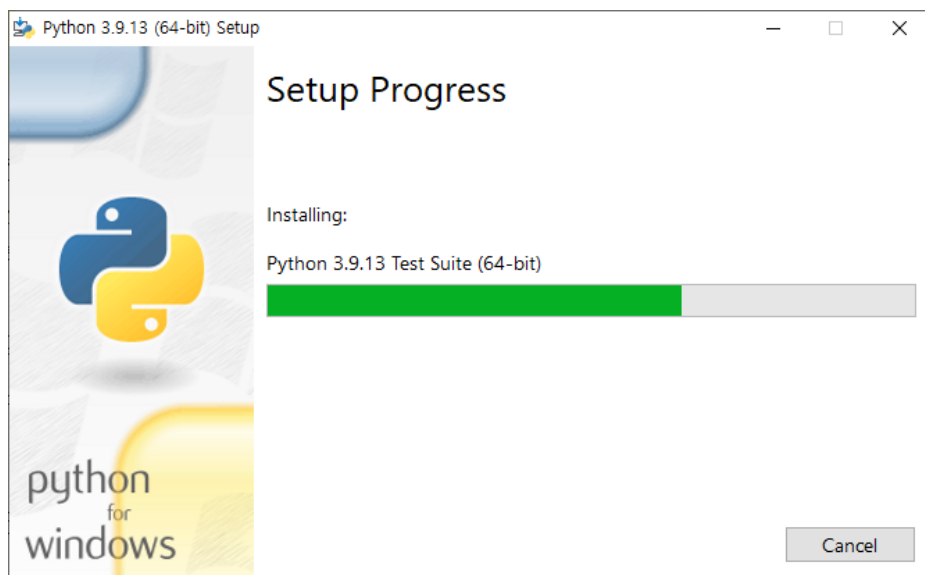
체크박스 둘 다 활성화 되어 있는 경우  
둘 다 체크



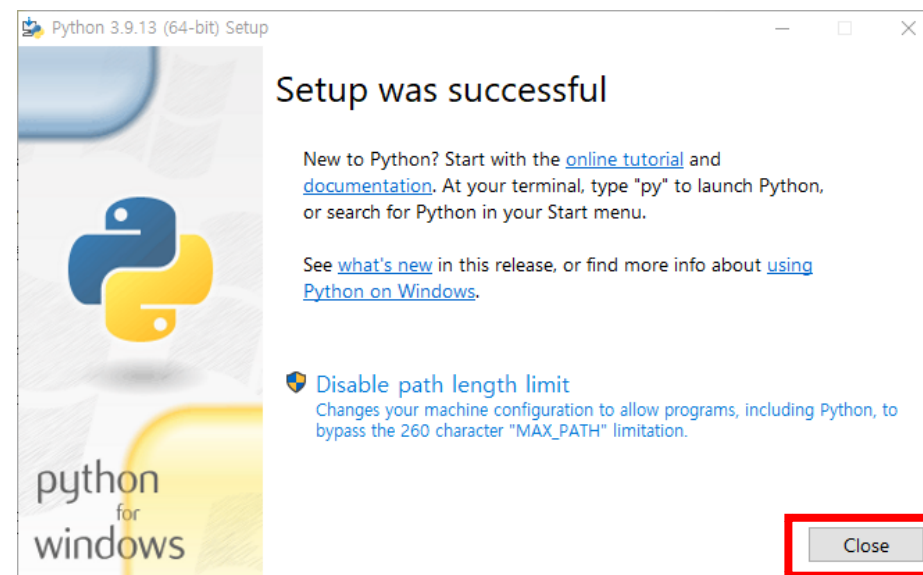
하나만 활성화 되어있는 경우  
아래 것만 체크

# Python

## ■ Python 설치



설치 중 화면

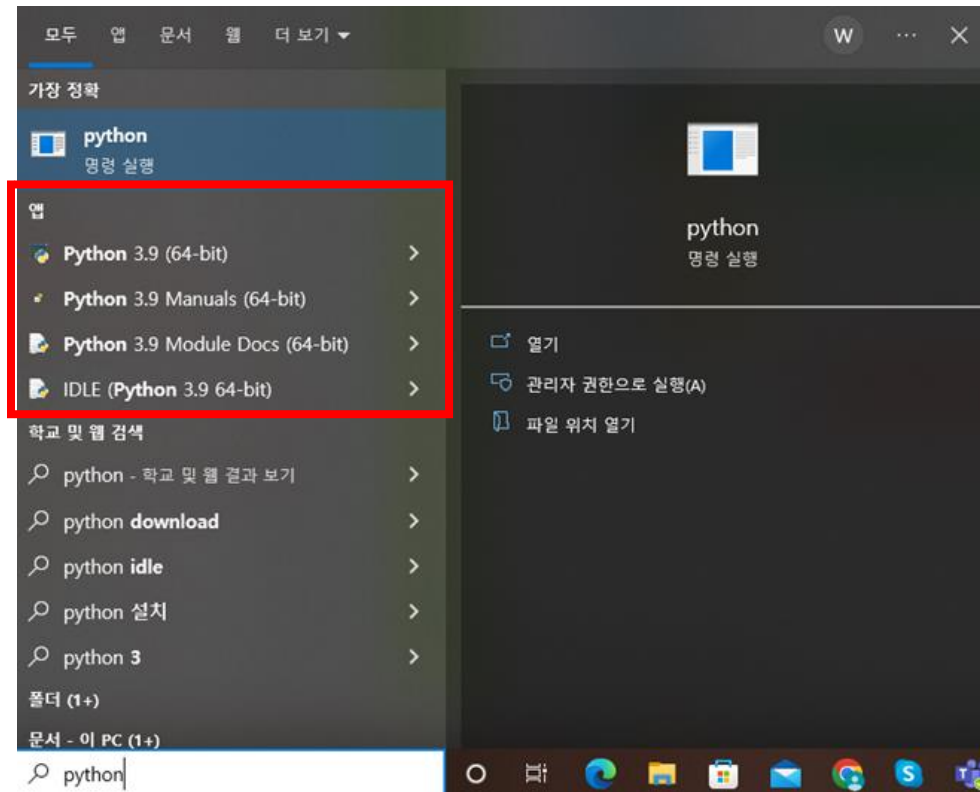


클릭



# Python

## ■ Python 설치



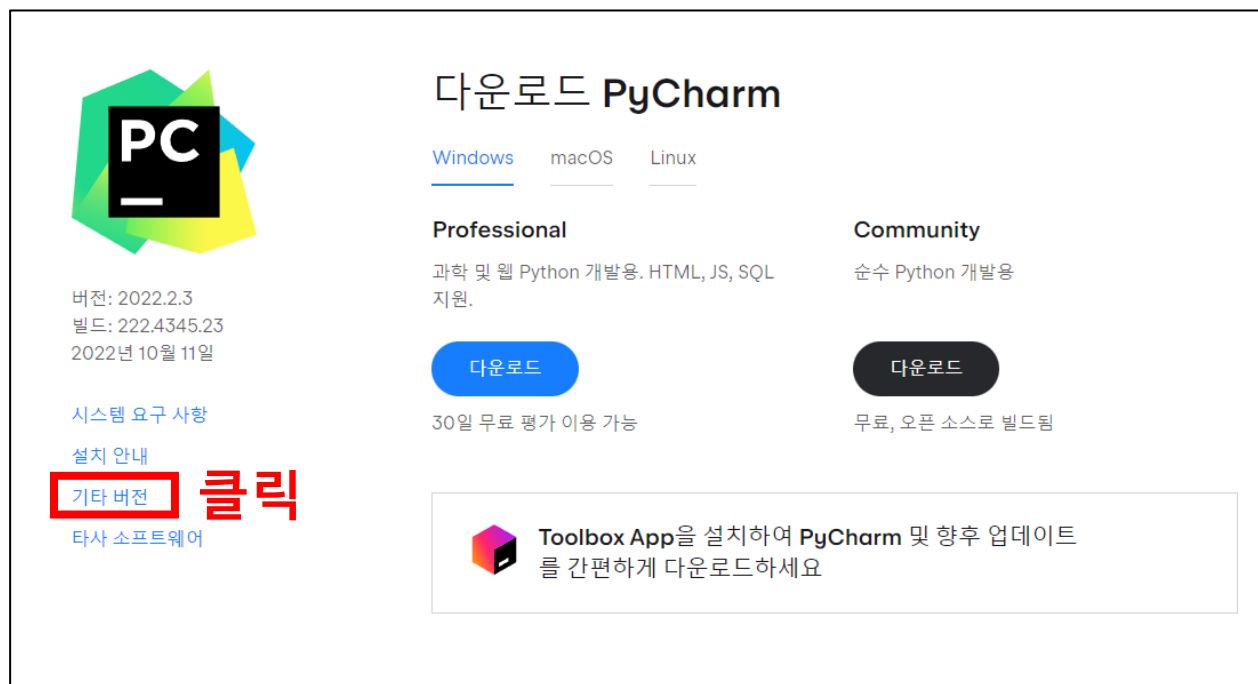
Python 검색 후  
설치 완료되었는지 확인

# PyCharm

## ■ PyCharm 설치

다운로드 페이지:

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



**다운로드 PyCharm**

Windows macOS Linux

**Professional**  
과학 및 웹 Python 개발용. HTML, JS, SQL 지원.

**Community**  
순수 Python 개발용

버전: 2022.2.3  
빌드: 222.4345.23  
2022년 10월 11일

시스템 요구 사항  
설치 안내  
**기타 버전** **클릭**  
타사 소프트웨어

다운로드  
30일 무료 평가 이용 가능

다운로드  
무료, 오픈 소스로 빌드됨

Toolbox App을 설치하여 PyCharm 및 향후 업데이트를 간편하게 다운로드하세요

# PyCharm

## ■ PyCharm 설치

### 기타 버전

Version 2022.2

#### 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

#### 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

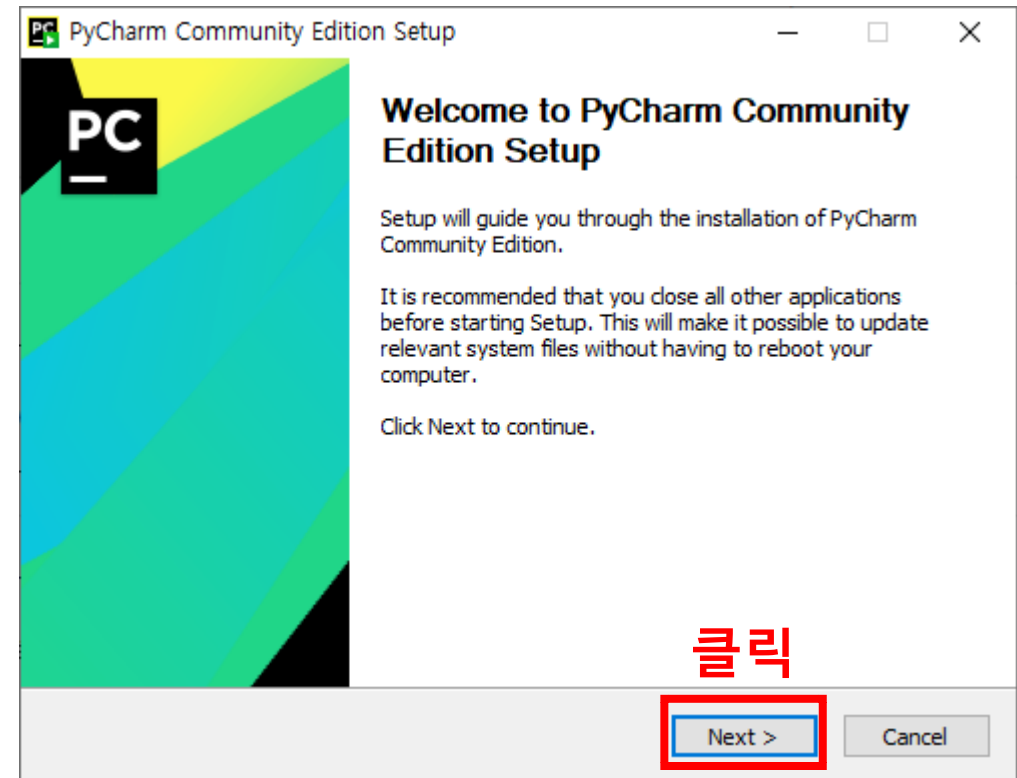
# PyCharm

## ■ PyCharm 설치

PC > 다운로드

이름	수정된 날짜	유형	크기
pycharm-community-2022.1.4	2022-11-12 오후 6:03	응용 프로그램	387,723KB

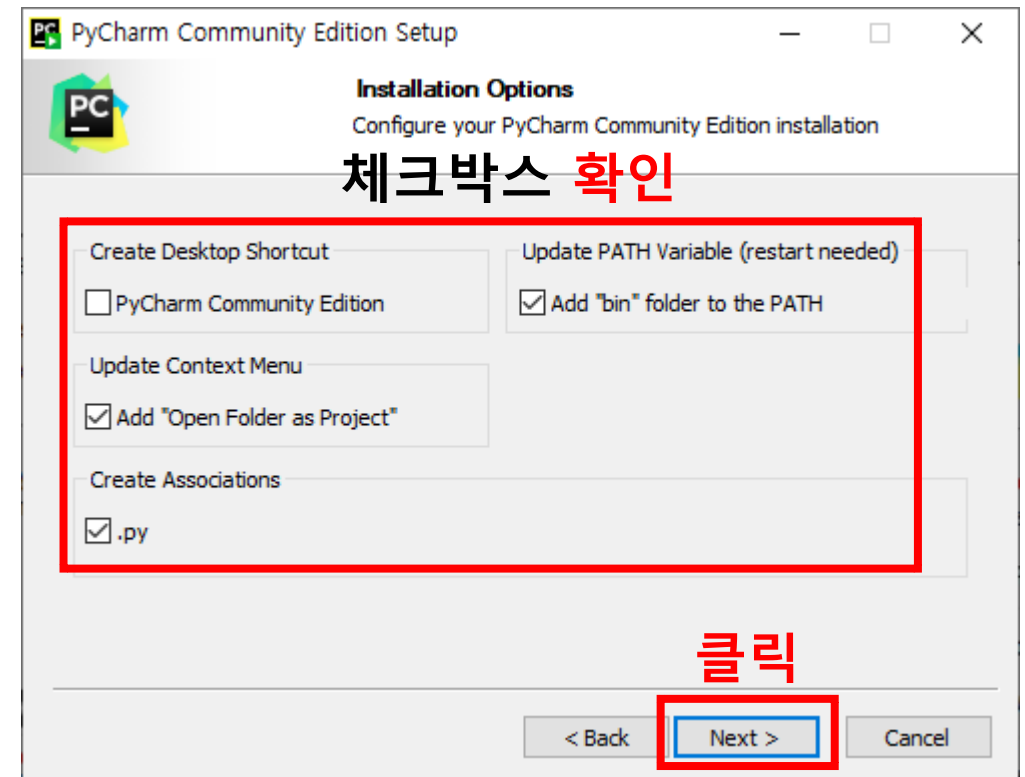
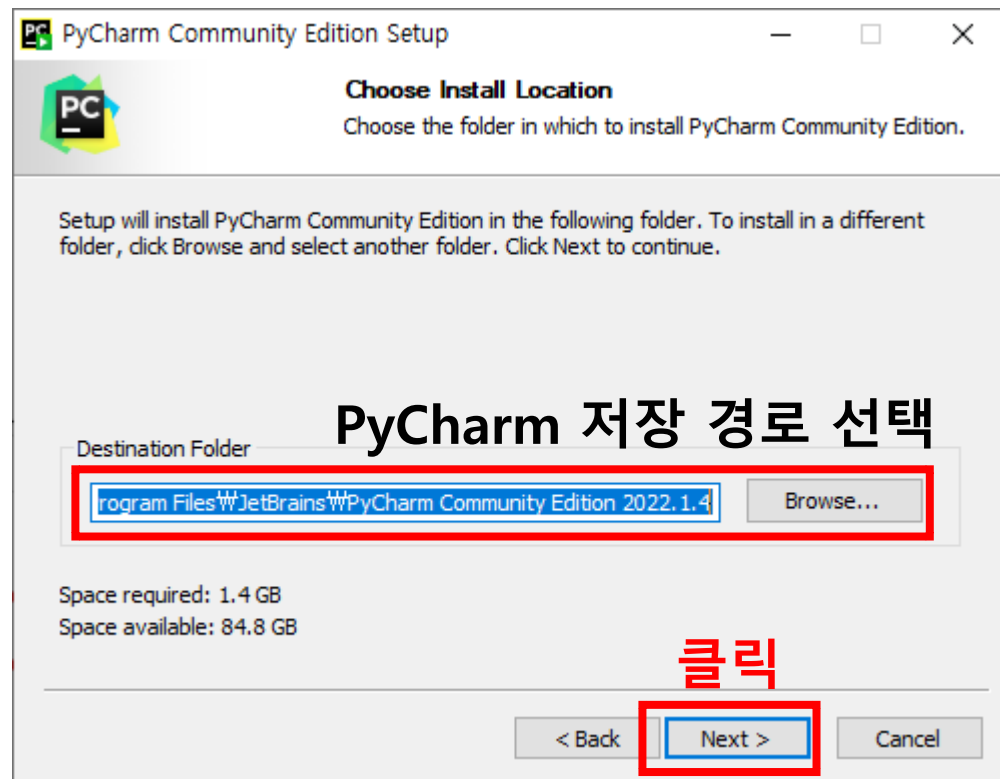
클릭



클릭

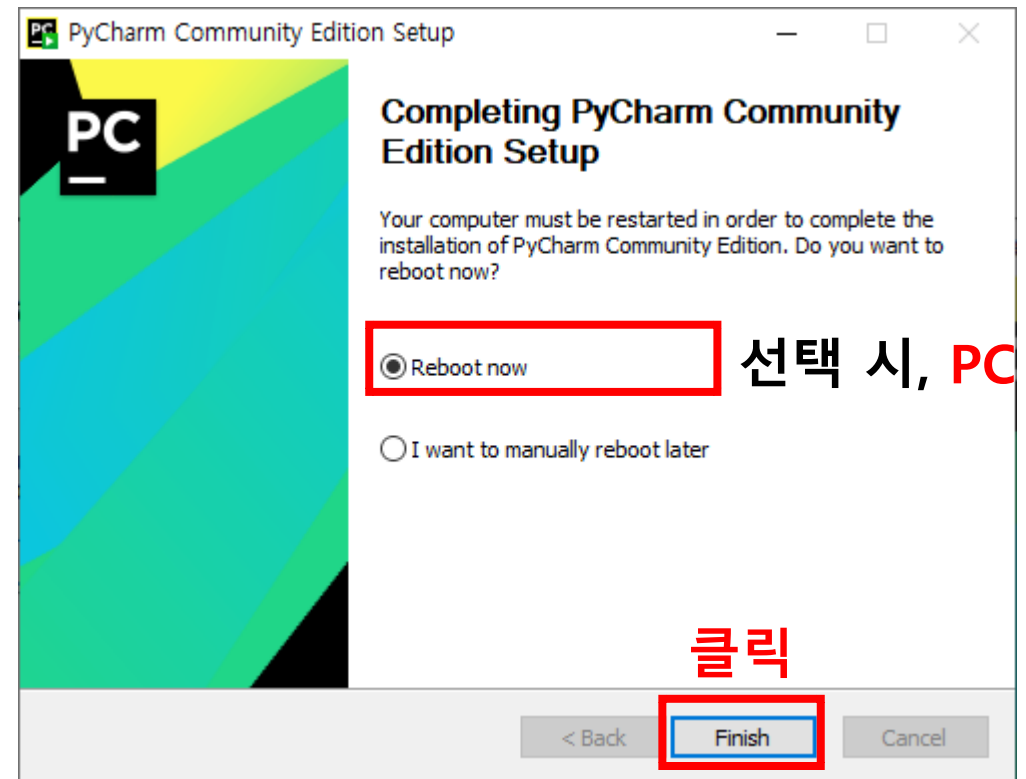
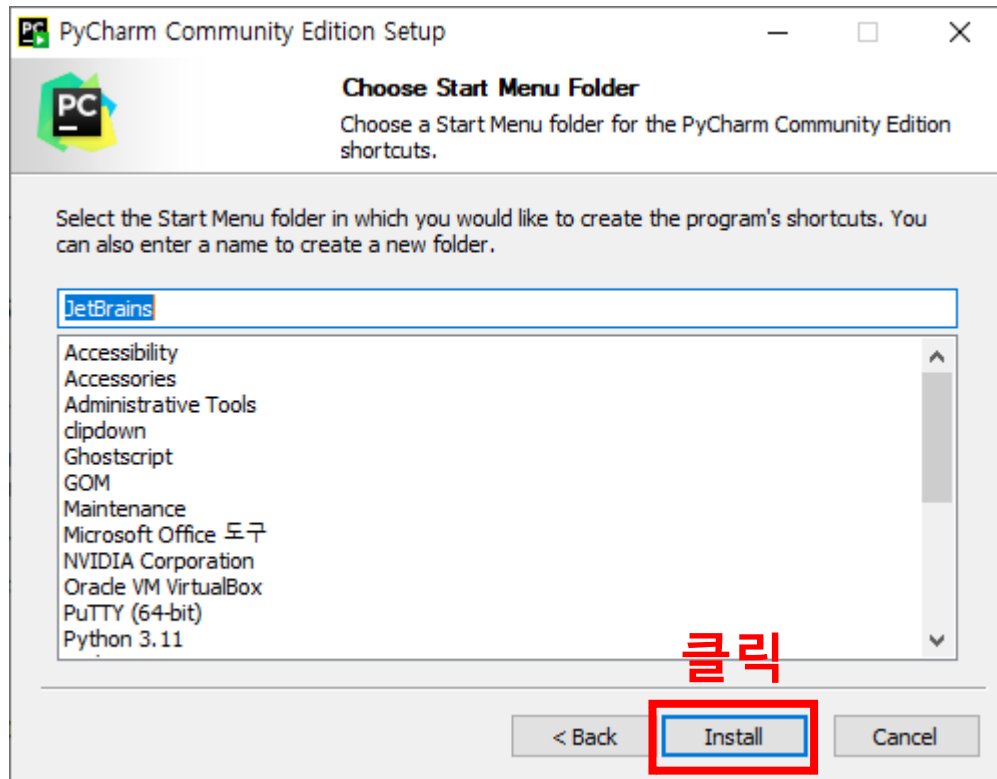
# PyCharm

## ■ PyCharm 설치



# PyCharm

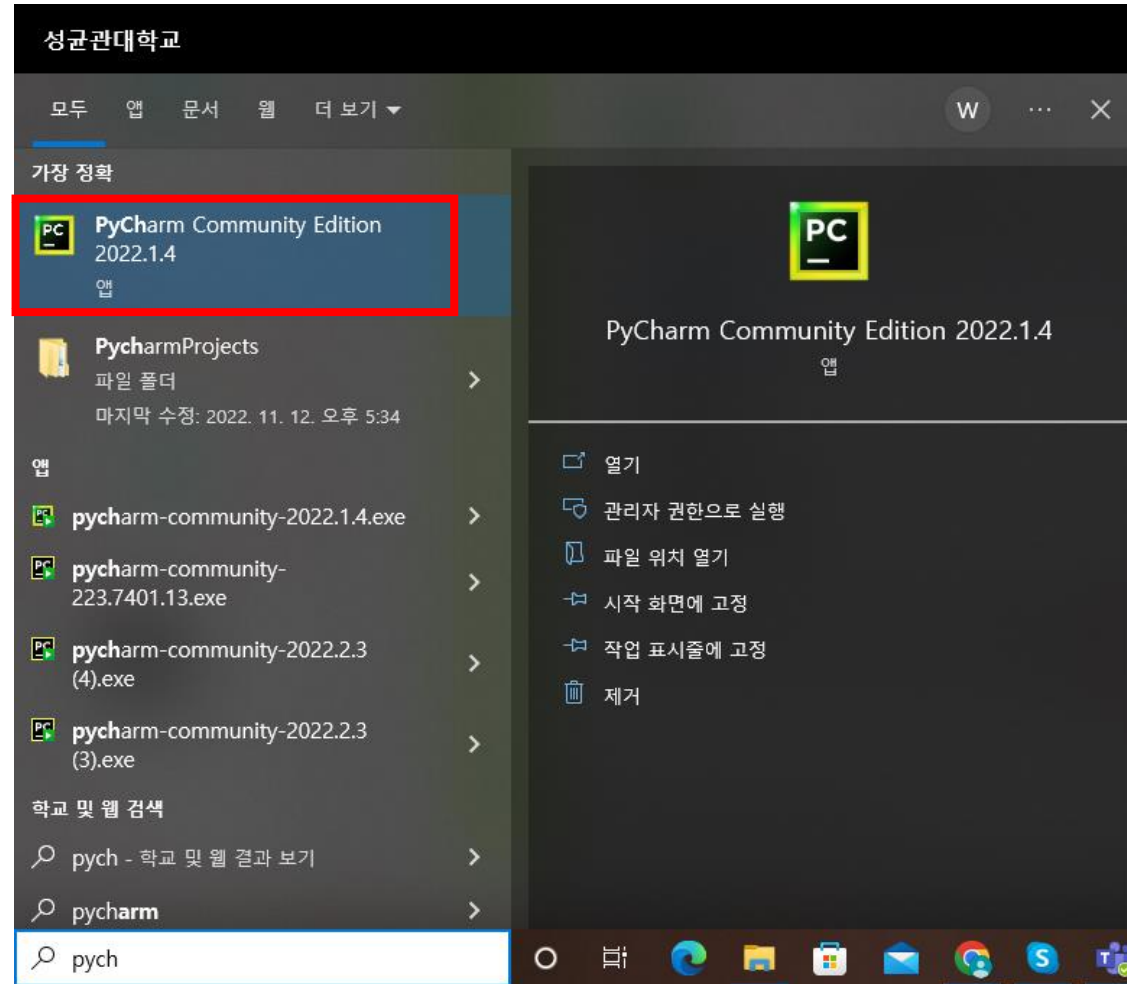
## ■ PyCharm 설치



# PyCharm

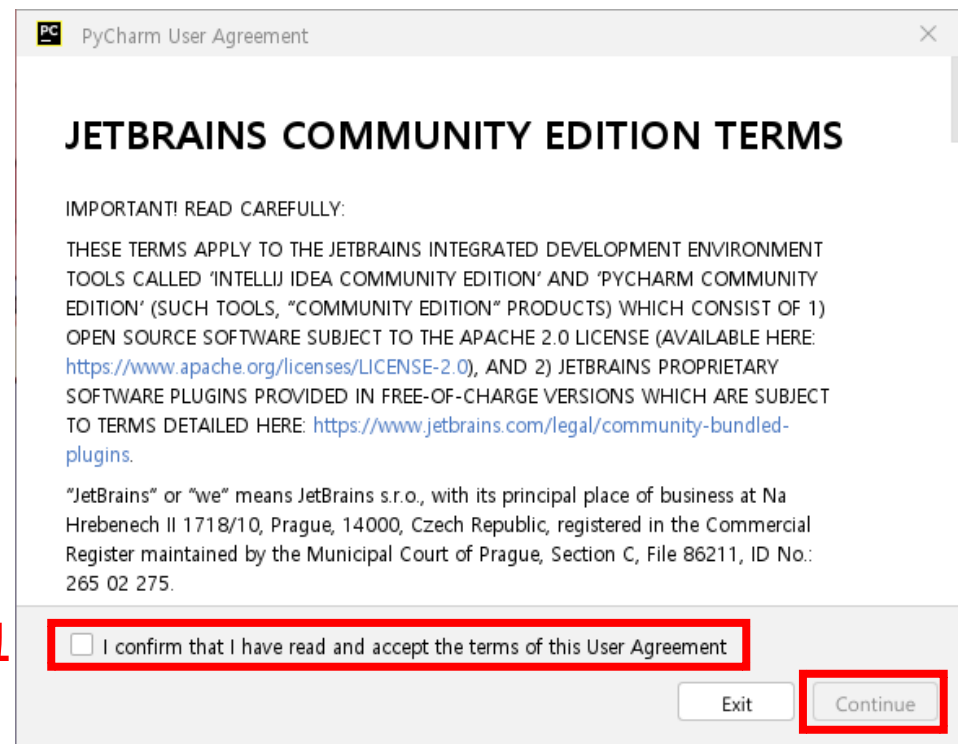
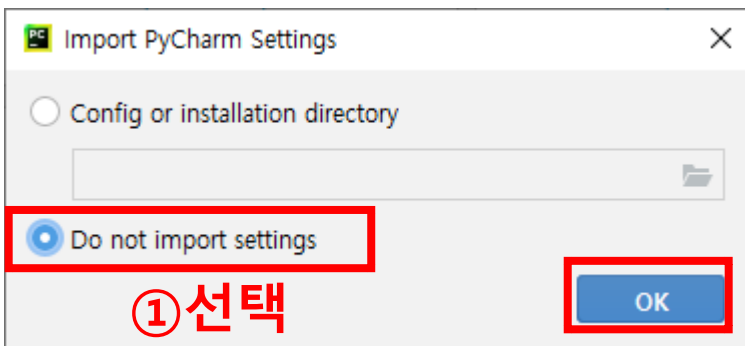
## ■ Interpreter 설정

PyCharm 실행



# PyCharm

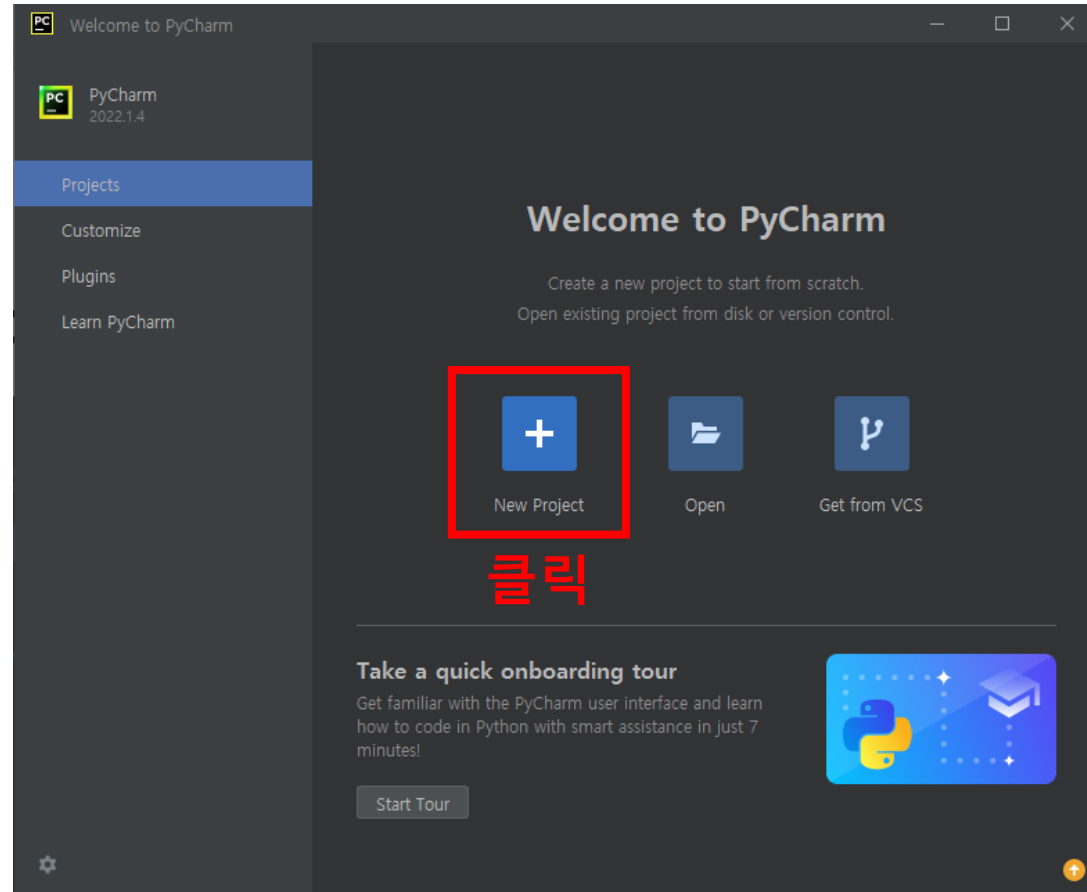
## ■ Interpreter 설정





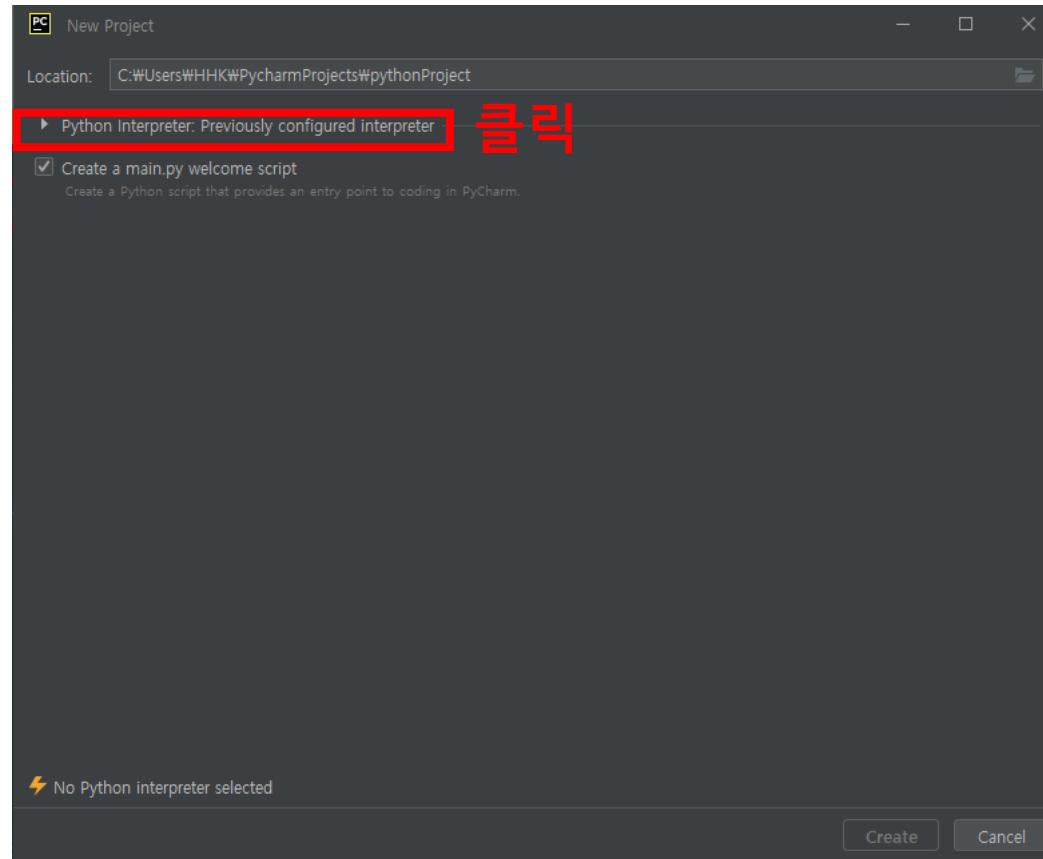
# PyCharm

## ■ Interpreter 설정



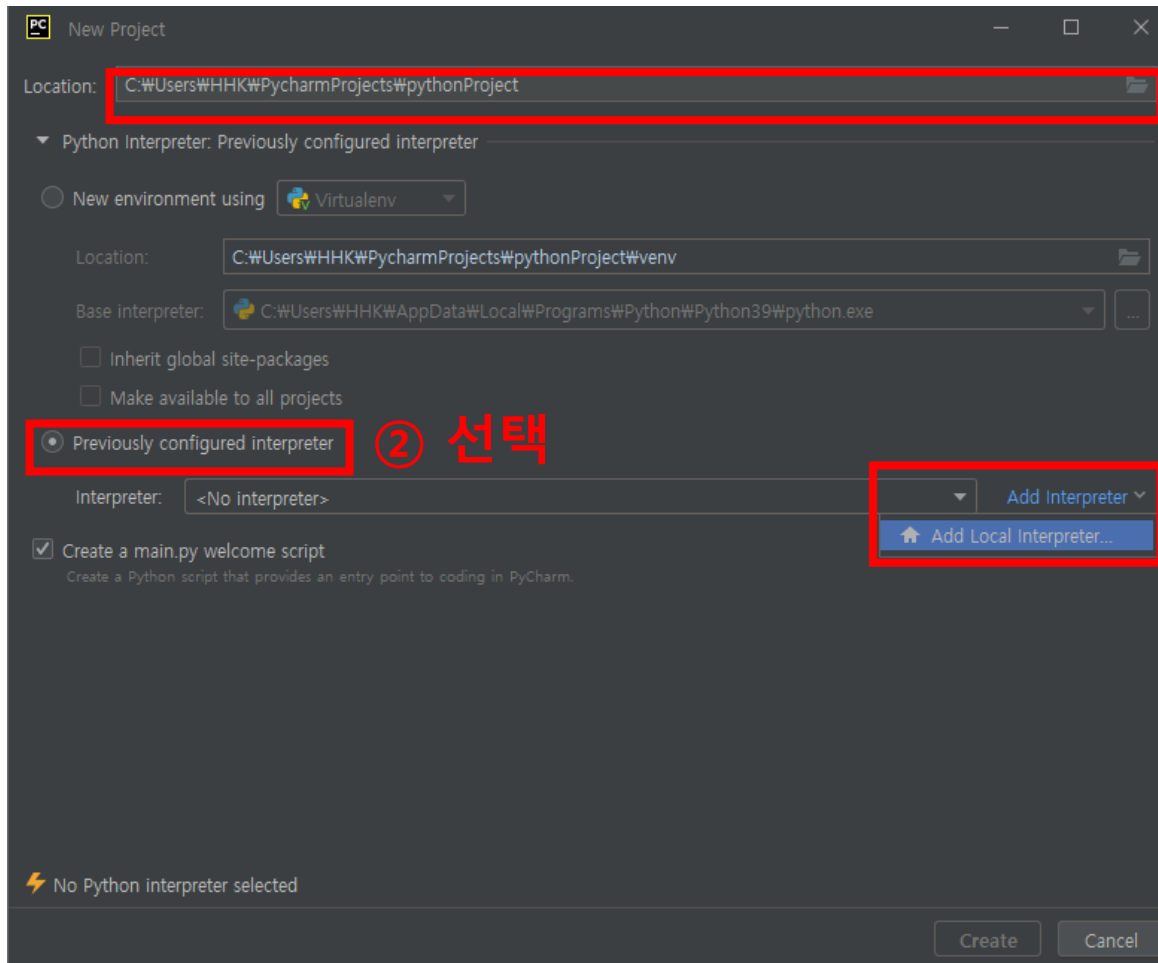
# PyCharm

## ■ Interpreter 설정



# PyCharm

## ■ Interpreter 설정



① 프로젝트 파일 폴더 위치 지정  
(초기값 유지)

③ Add Interpreter  
->Add Local Interpreter 클릭

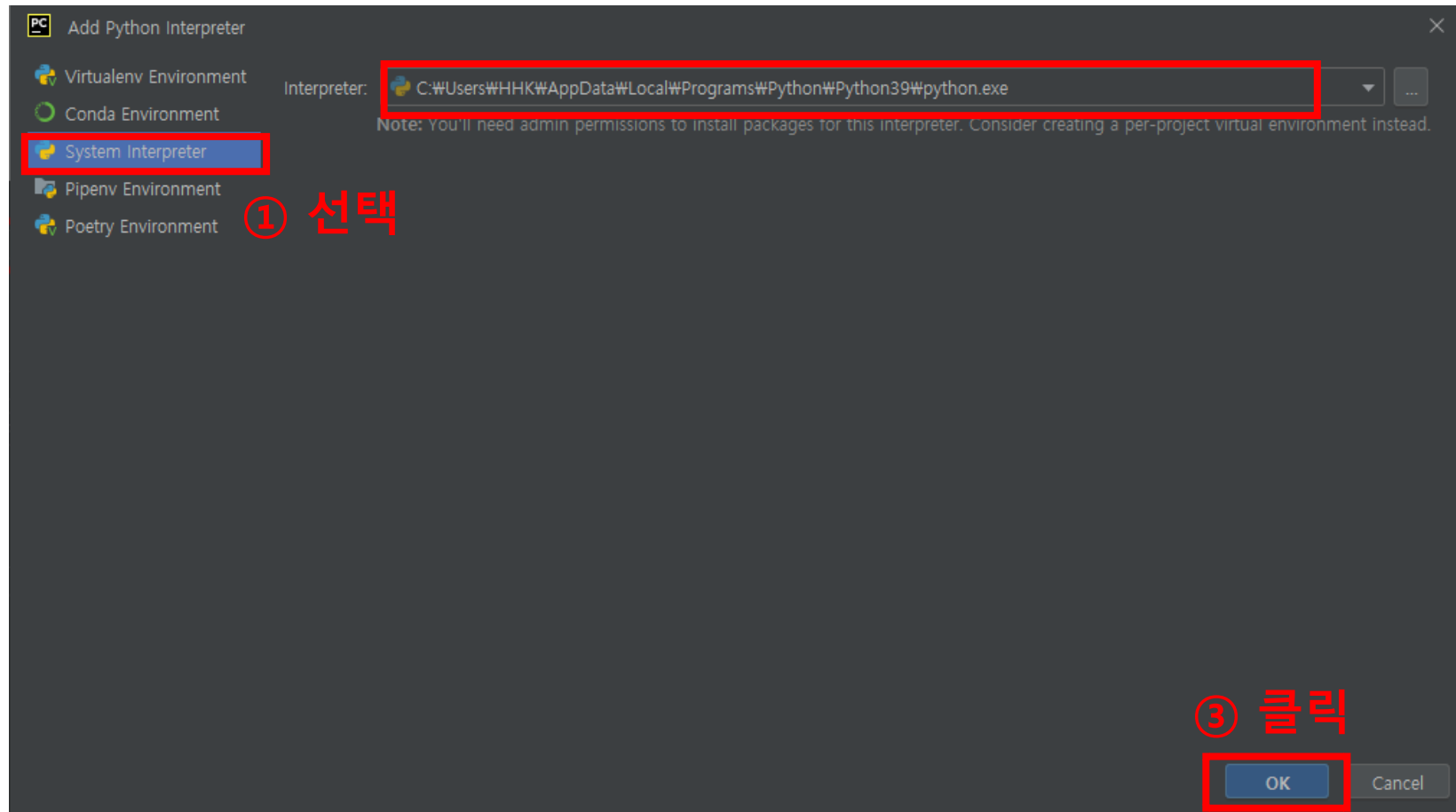


③-1 다음과 같이 뜨는 경우 ... 클릭하여 진행

# PyCharm

## ■ Interpreter 설정

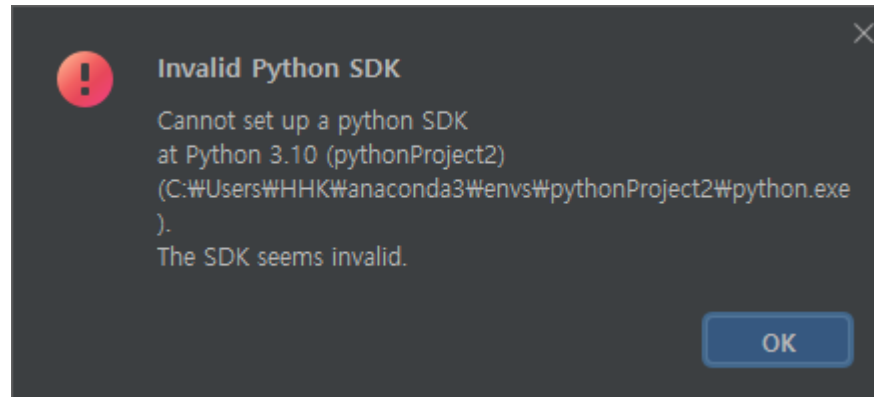
### ② Interpreter 선택



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

# PyCharm

## ■ Interpreter 설정

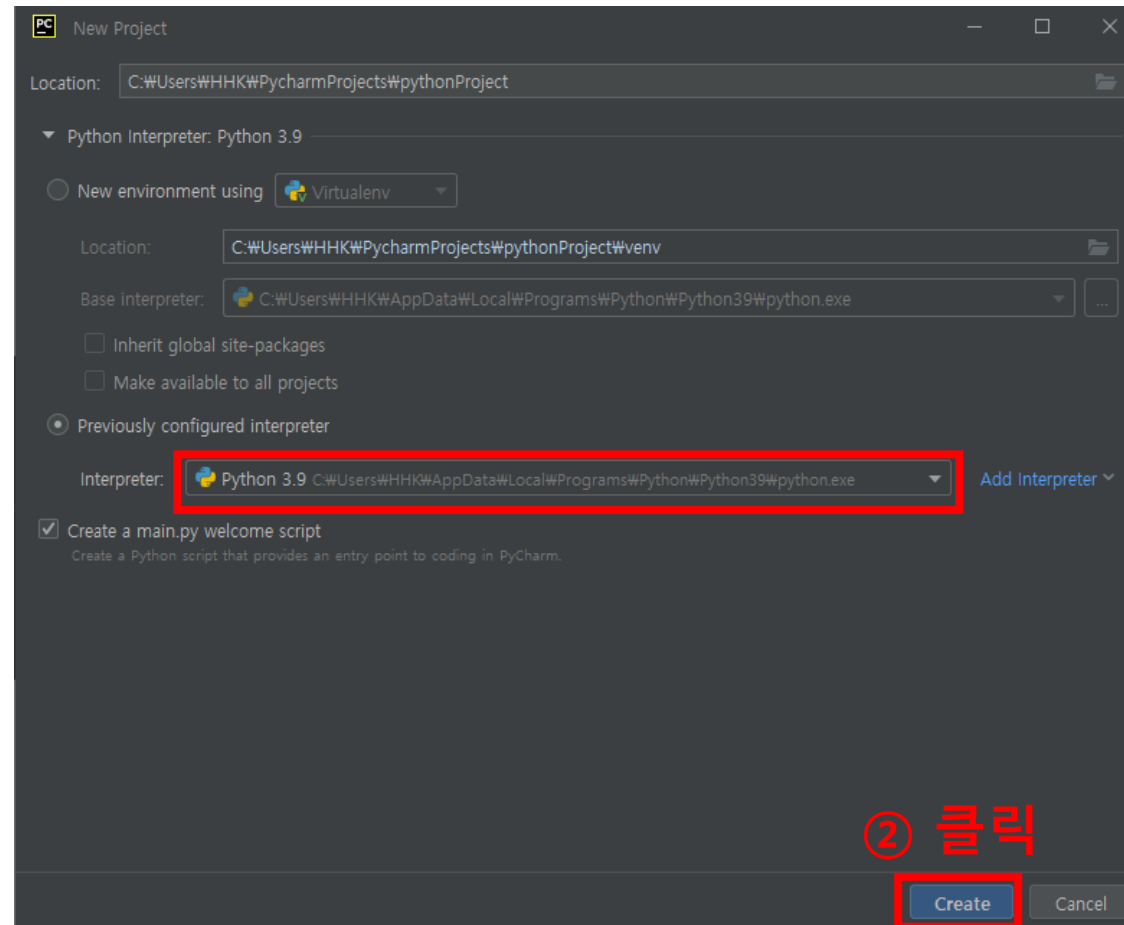


다음과 같은 오류 발생 시

2022.1.4 버전으로 **재설치**

# PyCharm

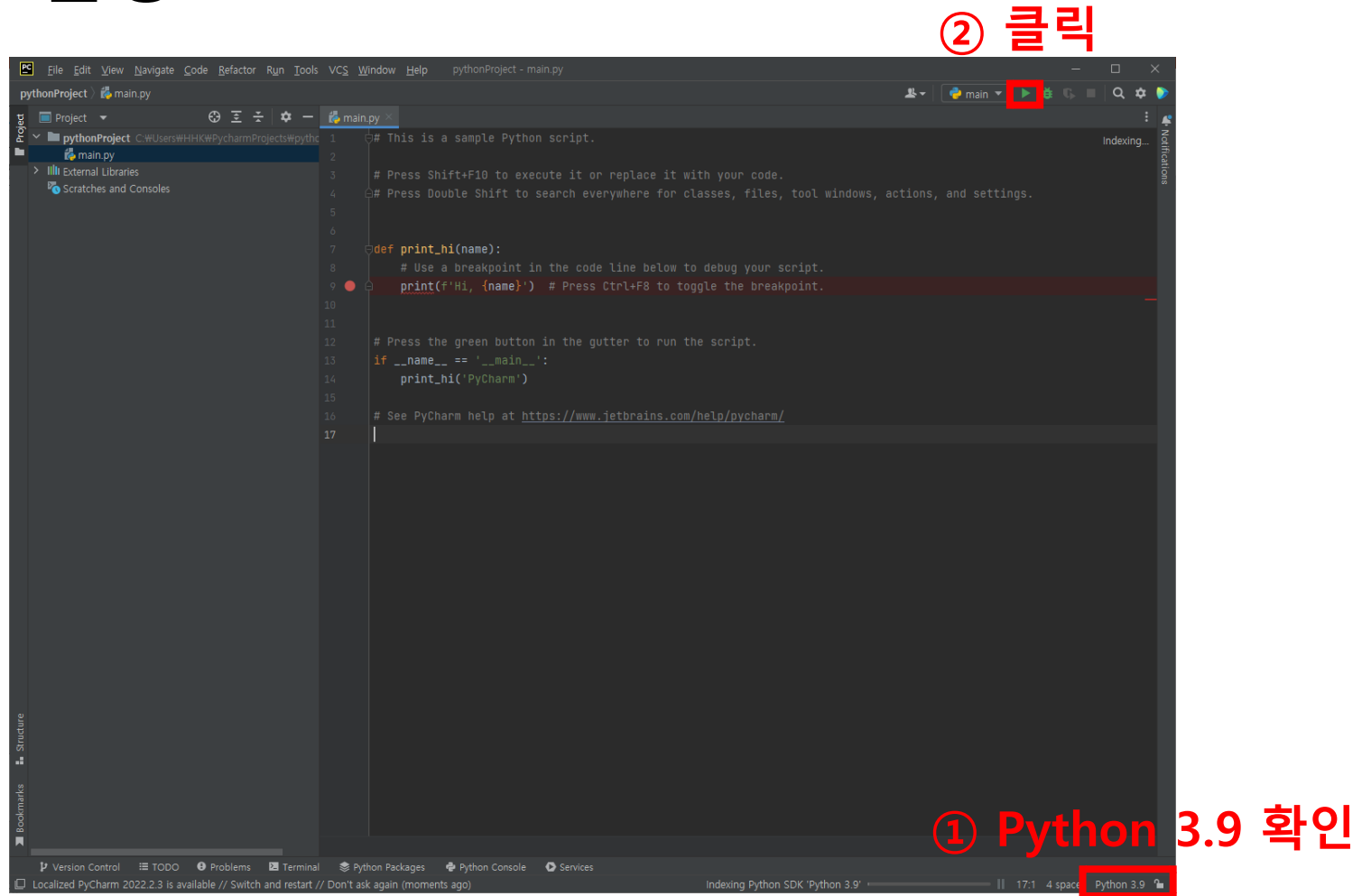
## ■ Interpreter 설정



① interpreter 확인  
(Python 3.9)

# PyCharm

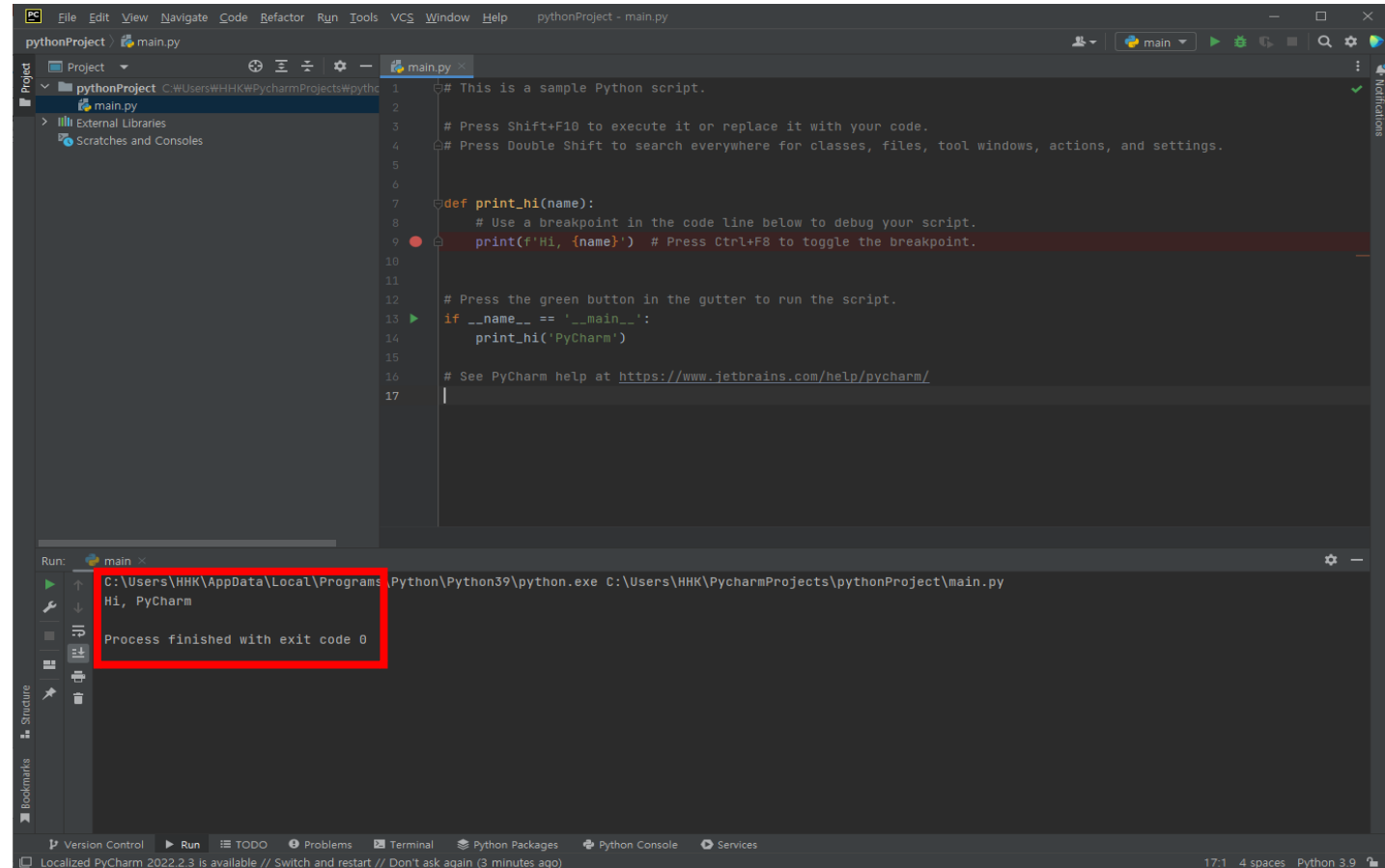
## ■ Interpreter 설정



# PyCharm

## ■ Interpreter 설정

'Hi, PyCharm'  
출력 시 성공

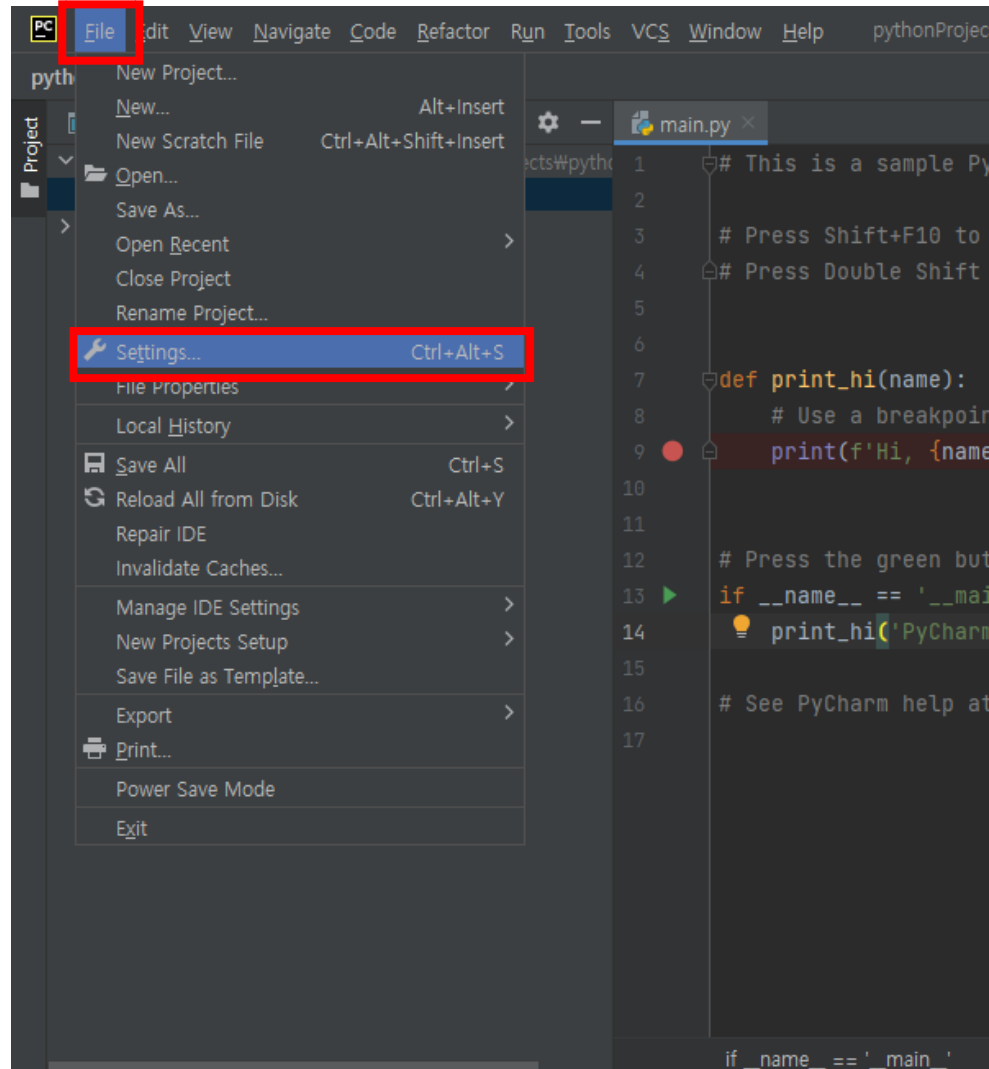




# Library

## ■ 라이브러리 설치

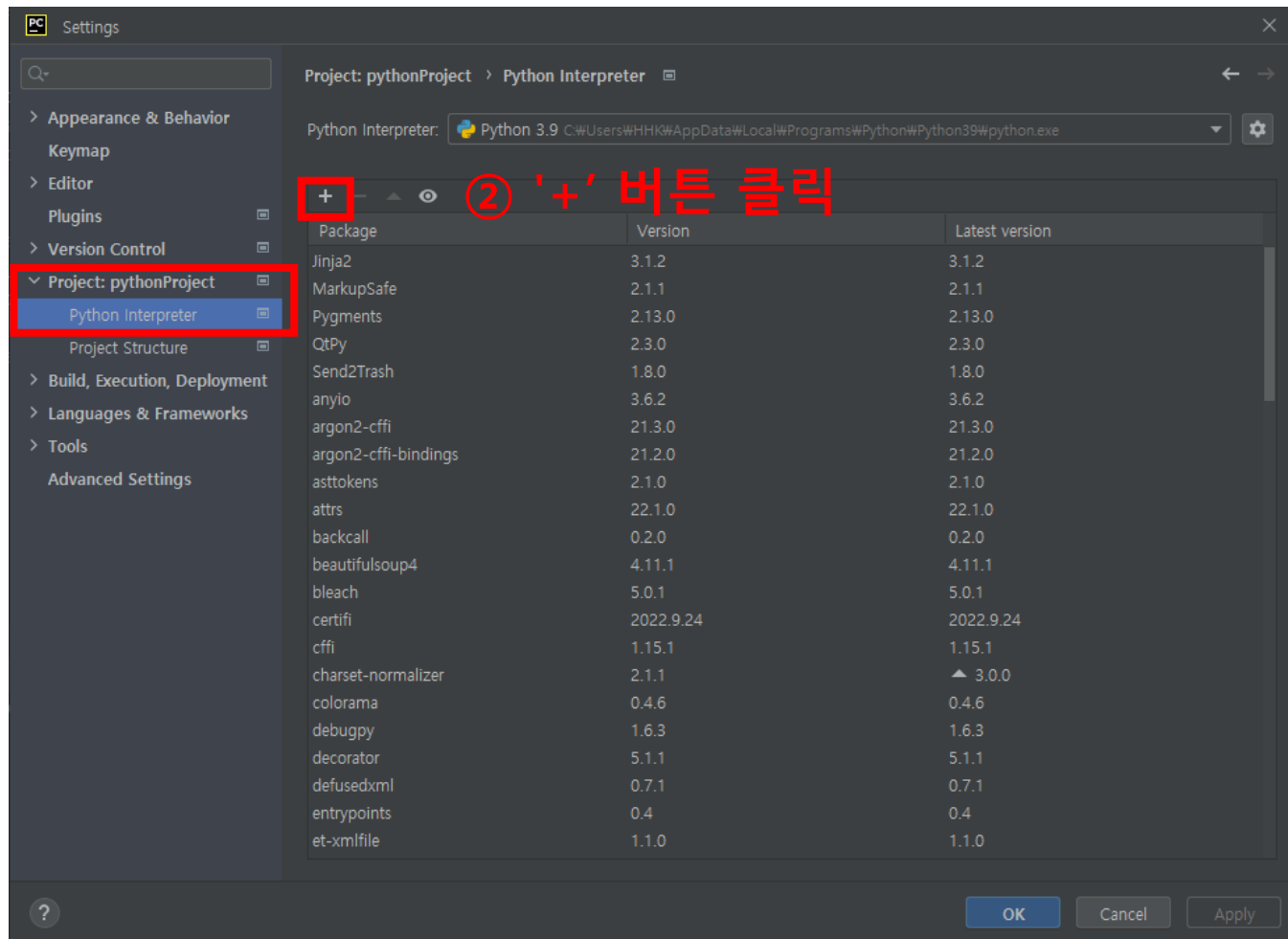
화면 상단  
File - Settings 클릭



# Library

## ■ 라이브러리 설치

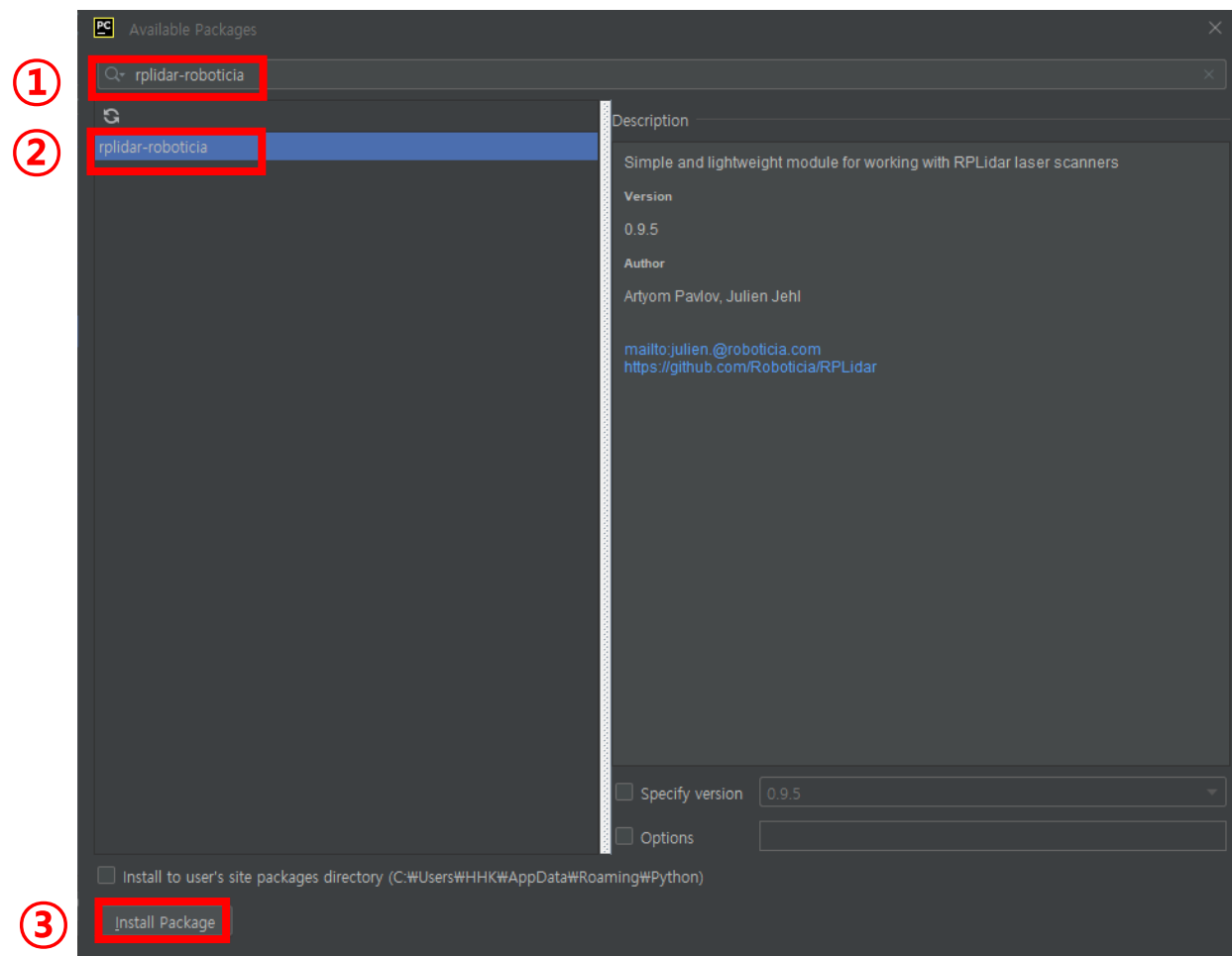
① Project: <프로젝트 이름>  
-> Python Interpreter 선택



# Library

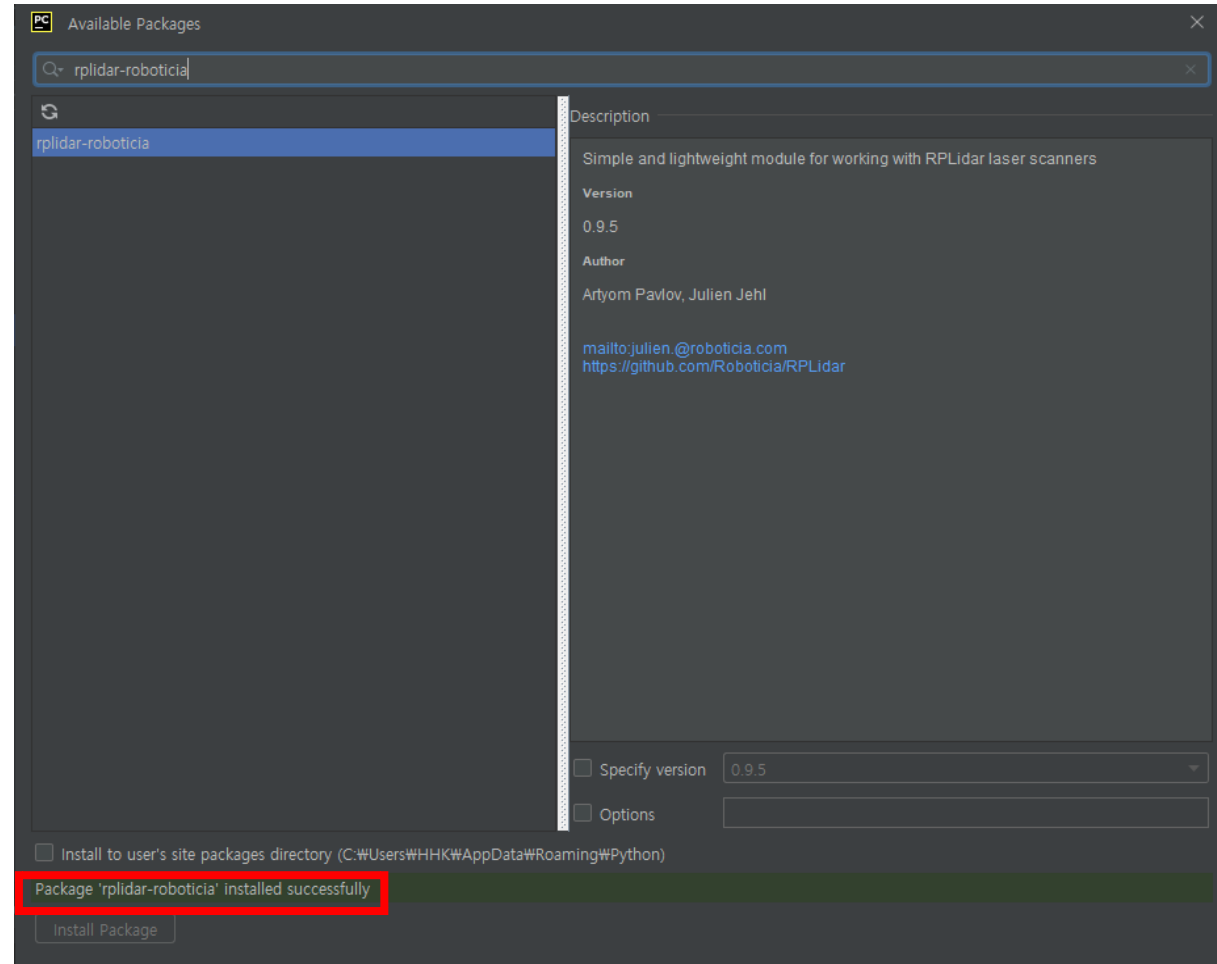
## ■ LiDAR 라이브러리 설치

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



# Library

## ■ LiDAR 라이브러리 설치

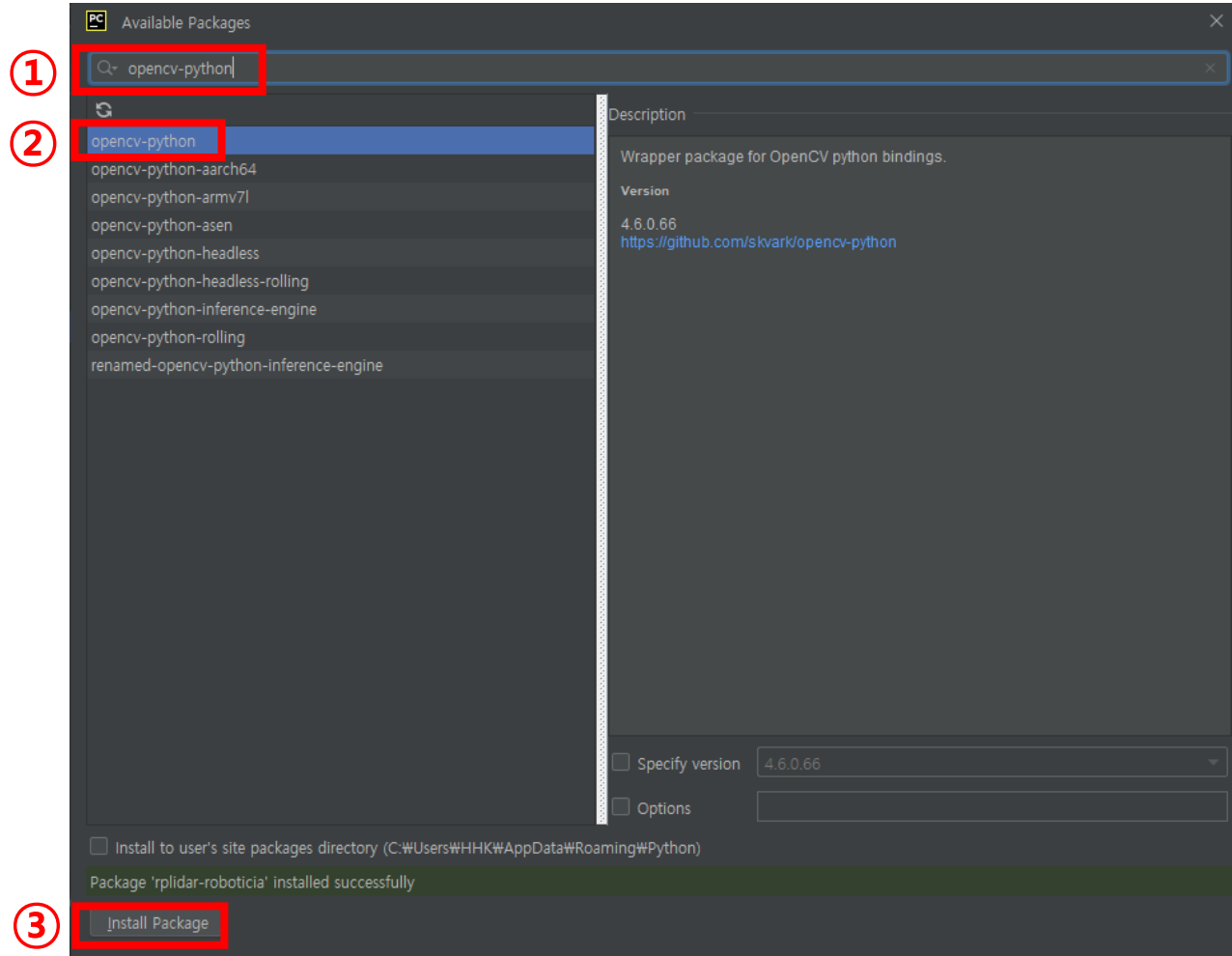


설치 성공 메시지 확인

# Library

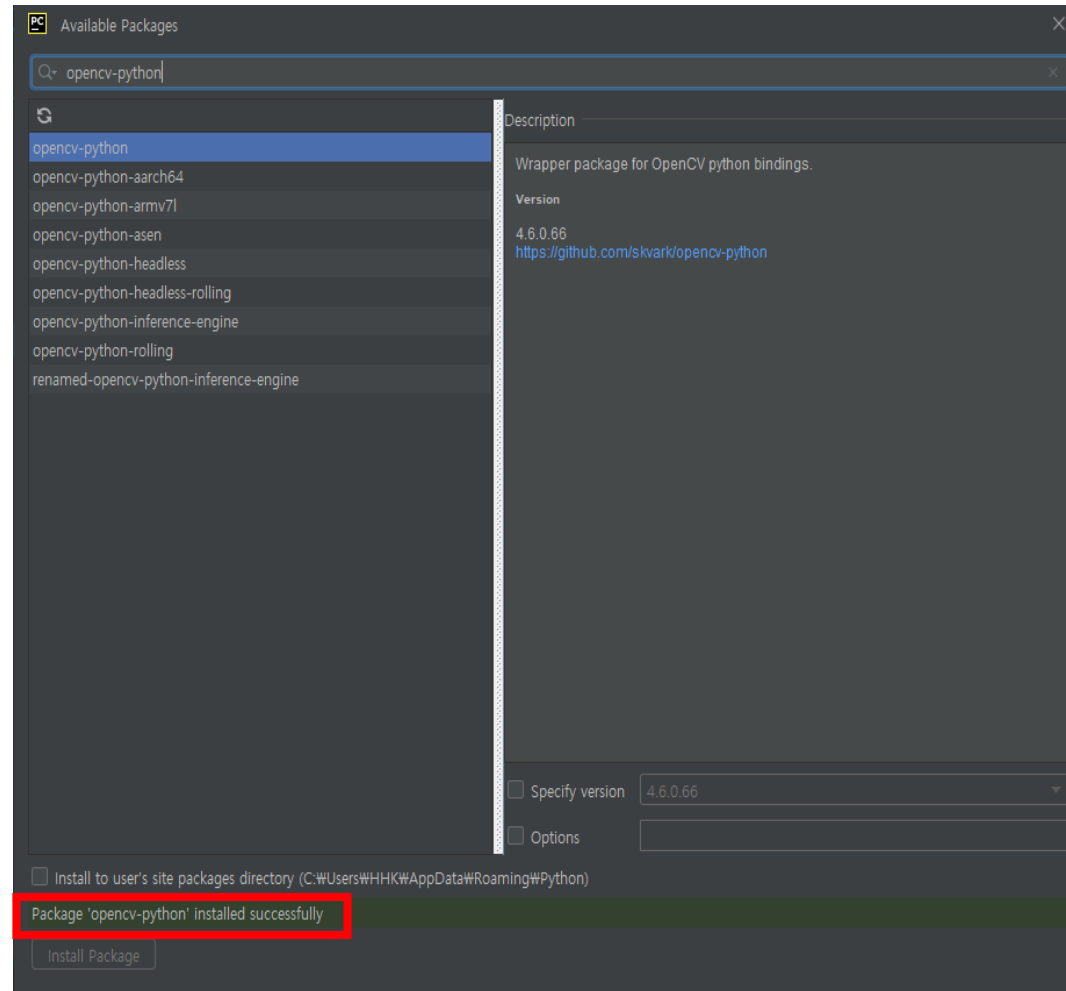
## ■ Camera 라이브러리 설치

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



# Library

## ■ Camera 라이브러리 설치

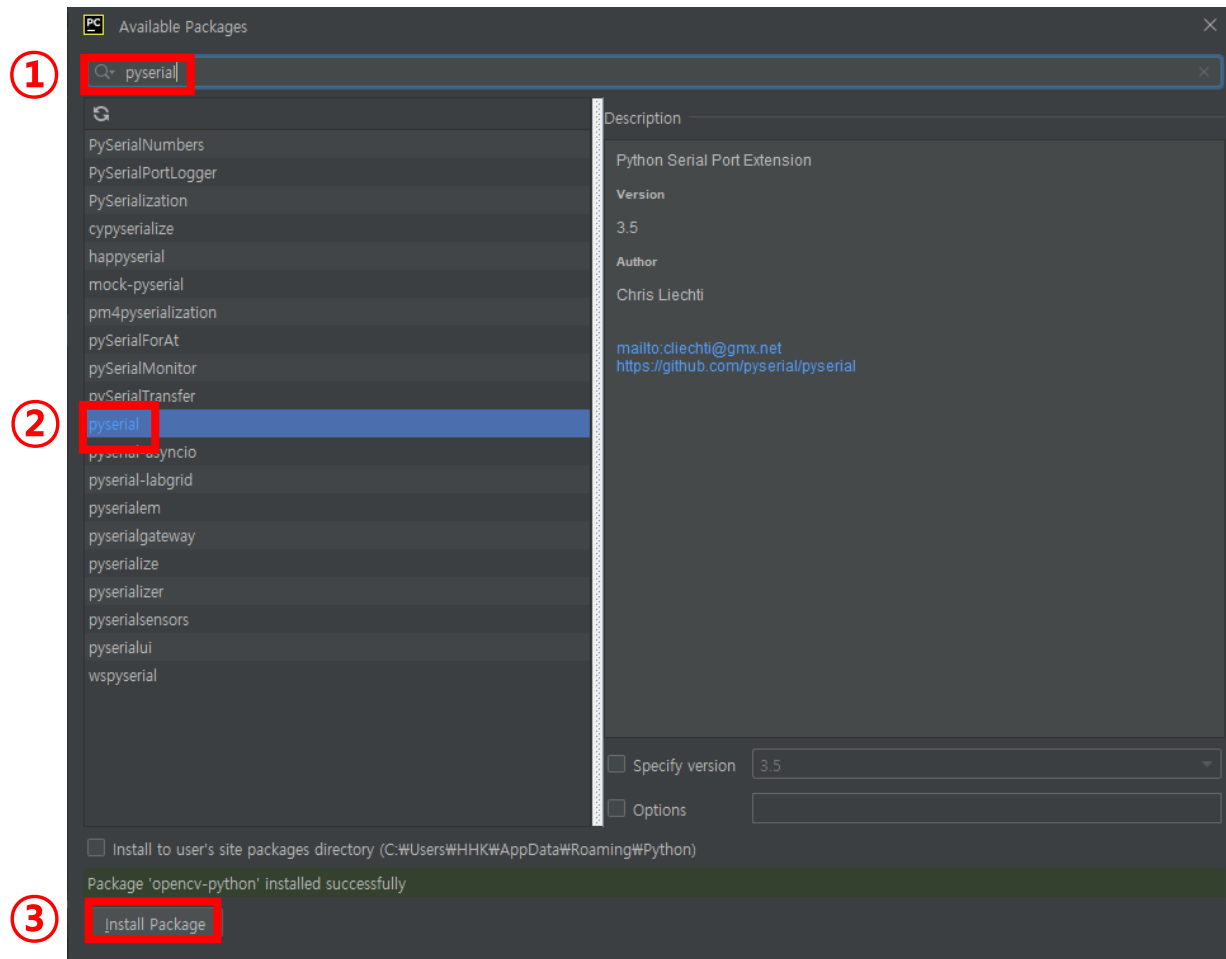


설치 성공 메시지 확인

# Library

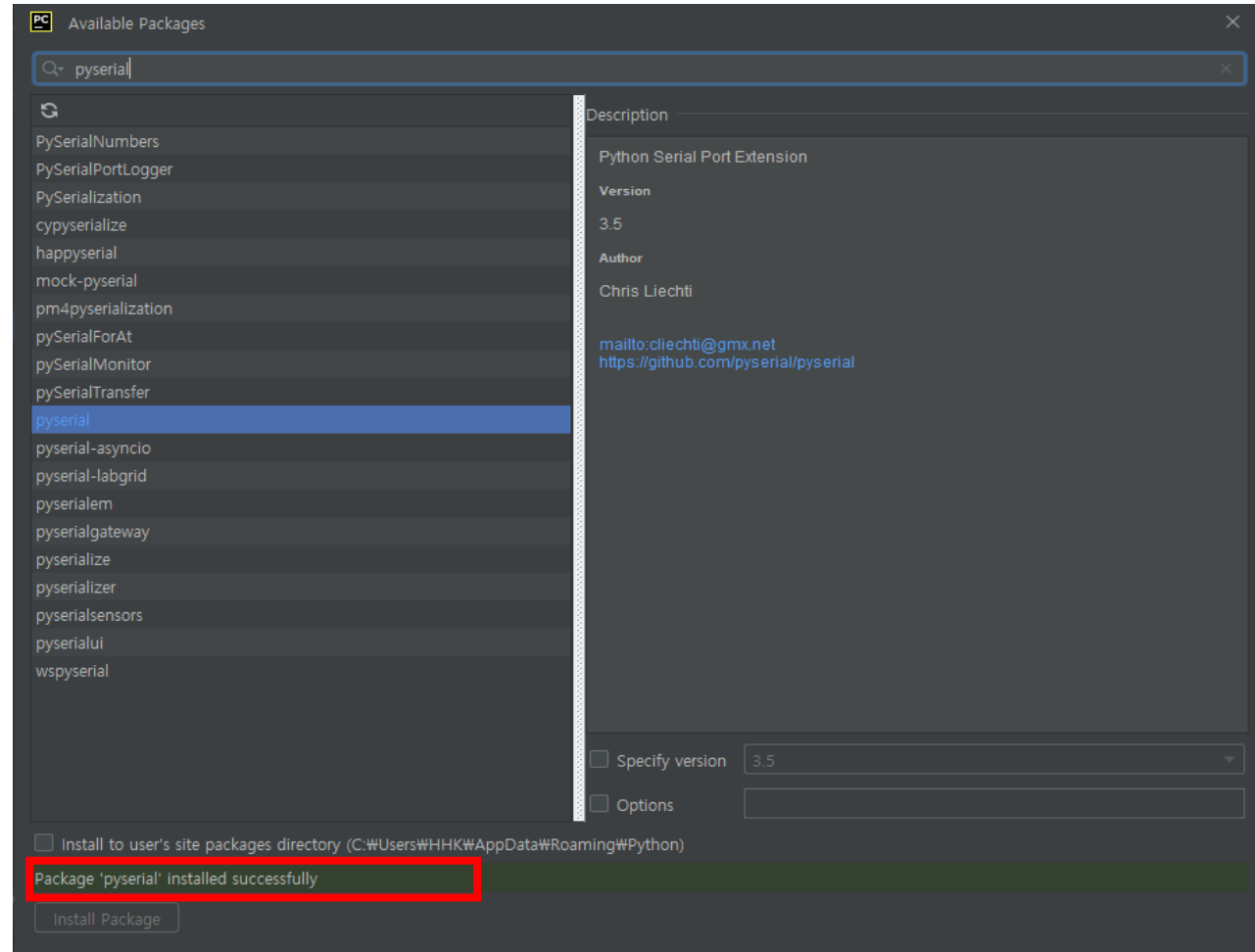
## ■ 시리얼통신 라이브러리 설치

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



# Library

## ■ 시리얼통신 라이브러리 설치

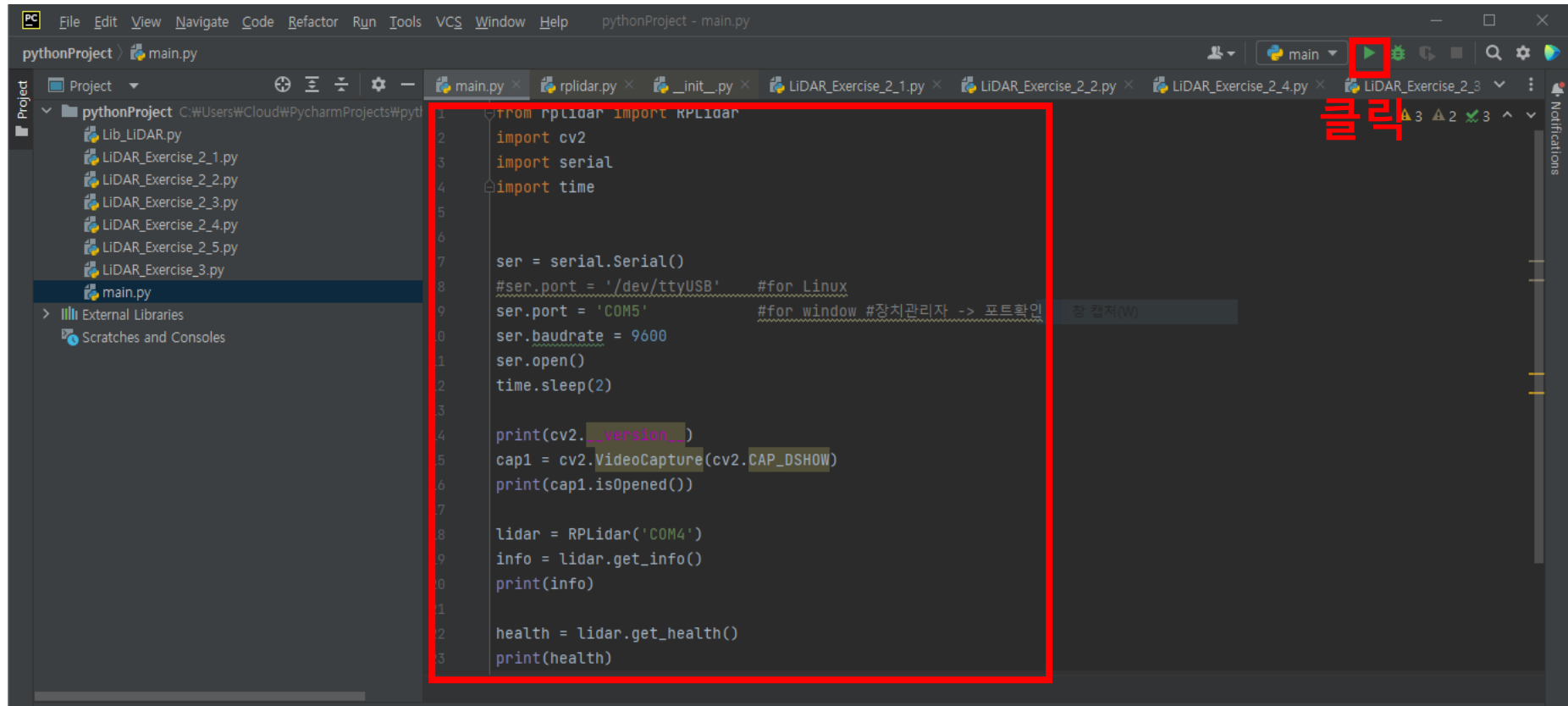


설치 성공 메시지 확인



# Exercise

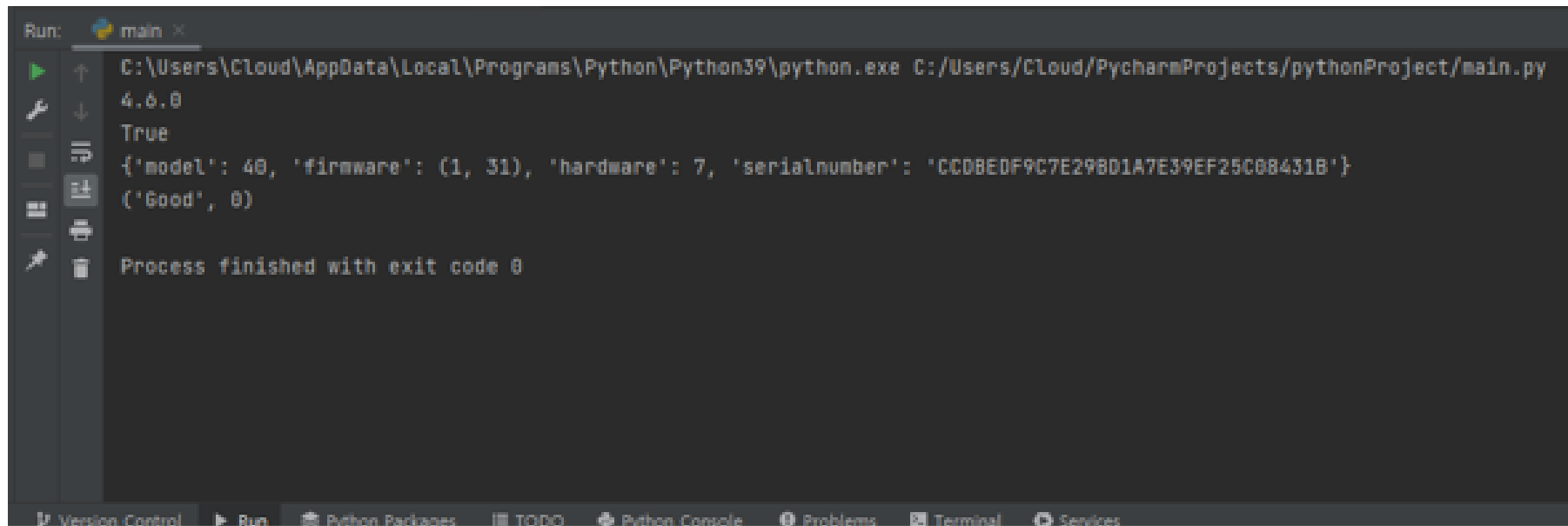
## ■ 라이브러리 및 장치 설치 확인



Test Code 돌려보기

# Exercise

## ■ 라이브러리 및 장치 설치 확인



```
Run: main x
C:\Users\Cloud\AppData\Local\Programs\Python\Python39\python.exe C:/Users/Cloud/PycharmProjects/pythonProject/main.py
4.6.0
True
{'model': 40, 'firmware': (1, 31), 'hardware': 7, 'serialnumber': 'CCDBEDF9C7E298D1A7E39EF25C08431B'}
('Good', 0)
Process finished with exit code 0
```

다음과 같은 문구 출력 시  
라이브러리 및 장치 올바르게 설치

# Thank You!

*Embedded System Lab.*

