



# SPEECH TO TEXT WITH OPENVINO

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# What is OpenVINO?

- OpenVINO™ 툴킷의 Intel® Distribution of OpenVINO™ 툴킷은 인간의 비전을 본뜬 애플리케이션과 솔루션을 신속하게 개발하기 위해 만들어진 툴킷입니다.
- CNN(Convolutional Neural Networks)을 기반으로 하는 툴킷은 인텔® 하드웨어 전반에서 CV 워크로드를 확장하여 성능을 극대화한 것이고, 엣지에서 클라우드로 구현된 고성능, AI 및 딥러닝 추론을 통해 애플리케이션 가속화합니다.
- OpenVINO™ 툴킷은 엣지에서 클라우드로 심층 학습 추론이 가능하고, 사용하기 쉬운 CV 기능 및 미리 최적화된 커널 라이브러리를 통해 시간을 단축합니다. 또한 OpenCV\* 및 OpenCL™를 포함하여 CV 표준에 대한 최적화된 호출을 포함합니다.

<https://software.intel.com/en-us/articles/OpenVINO-RelNotes>

# 순서

1. OpenVINO를 설치해줍니다.

- OpenVINO의 완전한 설치를 위해서는 추가적으로

- **Microsoft Visual Studio with C++ 2019 2017, or 2015 with MSBuild**
- **Cmake 3.4 or higher 64-bit**
- **Python 3.6.5 64-bit**

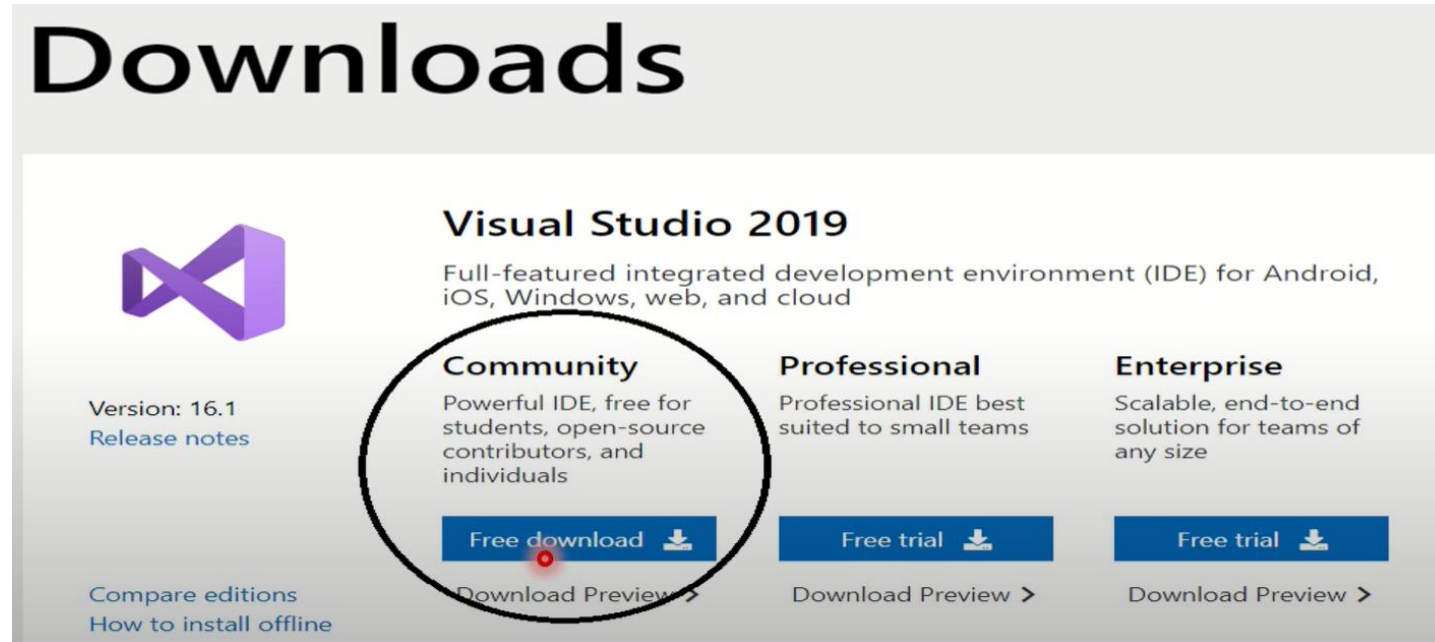
위 세가지를 설치해야합니다.

2. OpenVINO를 실행하여 Speech to Text demo를 실행해줍니다.

# 1. Microsoft Visual Studio 설치

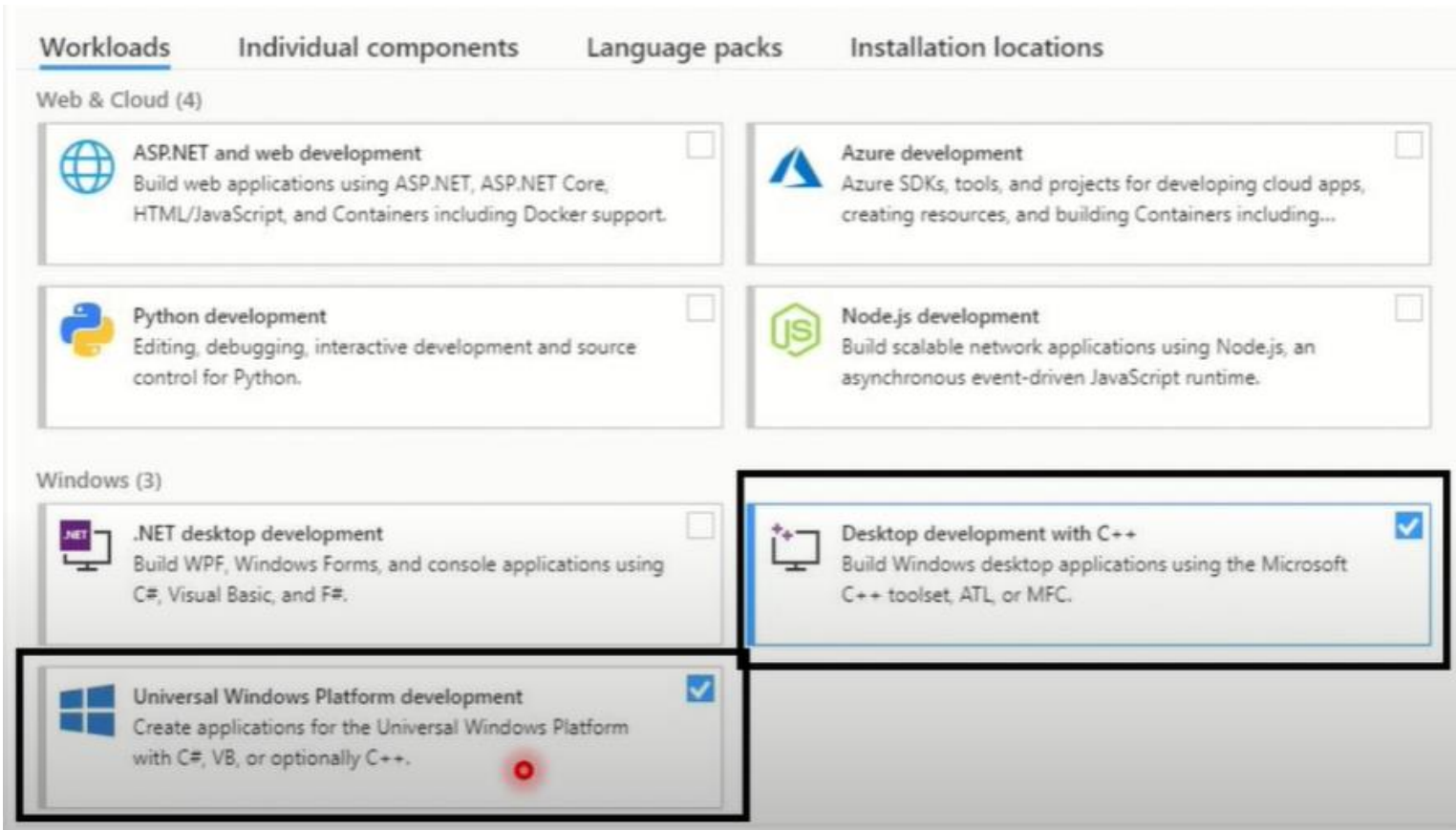
1. OpenVINO 설치를 위해서 먼저 Microsoft Visual Studio를 설치해주어야 합니다.  
아래 링크에 들어가 Visual Studio 2019 버전 Community 를 다운로드 해줍니다.

<https://visualstudio.microsoft.com/ko/downloads/>



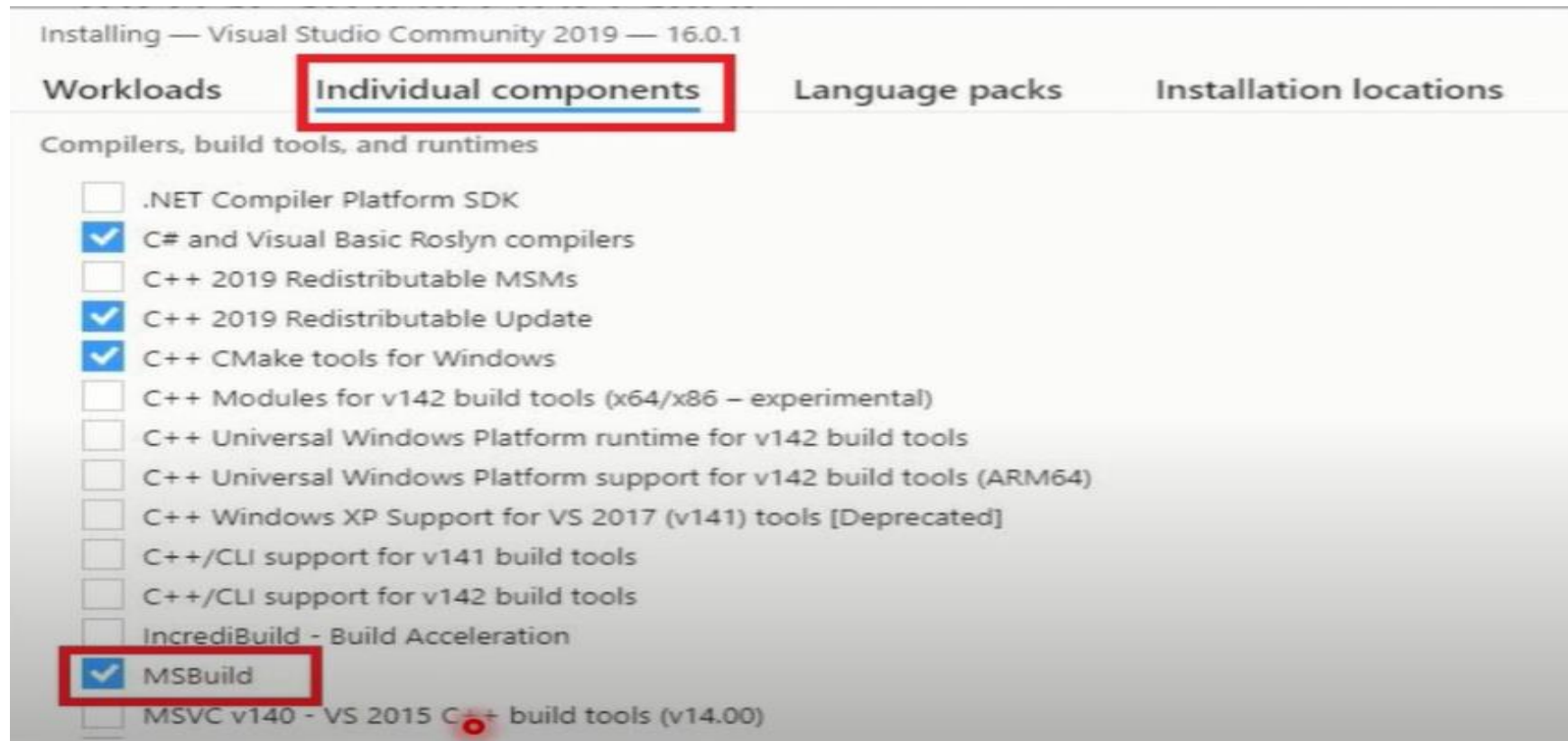
# 1. Microsoft Visual Studio 설치

2. Workloads 탭에서 Universal Windows Platform development, Desktop development with C++ 를 체크해줍니다.



# 1. Microsoft Visual Studio 설치

3. Individual components 탭에서 아래 내용을 체크해줍니다. (이 때 MSBuild 는 매우 중요하기 때문에 꼭 체크해줍니다.)
4. Microsoft Visual Studio Community 2019 버전을 설치완료 해줍니다.



## 2. CMake 설치

1. 아래 링크에 접속해 Cmake 를 설치해줍니다.

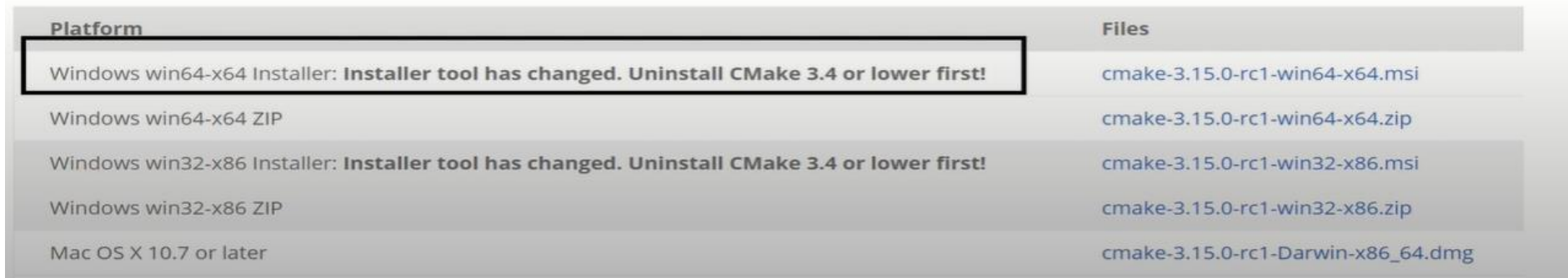
<https://cmake.org/download/>



The screenshot shows the CMake website's download page. At the top, there is a navigation bar with the CMake logo and links for 'About', 'Resources', 'Developer Resources', and 'Download'. Below the navigation bar is a table with two columns: 'Platform' and 'Files'. The table lists source code distributions for Unix/Linux and Windows. The Windows source code is highlighted with a light yellow background.

Platform	Files
Unix/Linux Source (has \n line feeds)	<a href="#">cmake-3.15.0-rc1.tar.gz</a> <a href="#">cmake-3.15.0-rc1.tar.Z</a>
Windows Source (has \r\n line feeds)	<a href="#">cmake-3.15.0-rc1.zip</a>

Binary distributions:

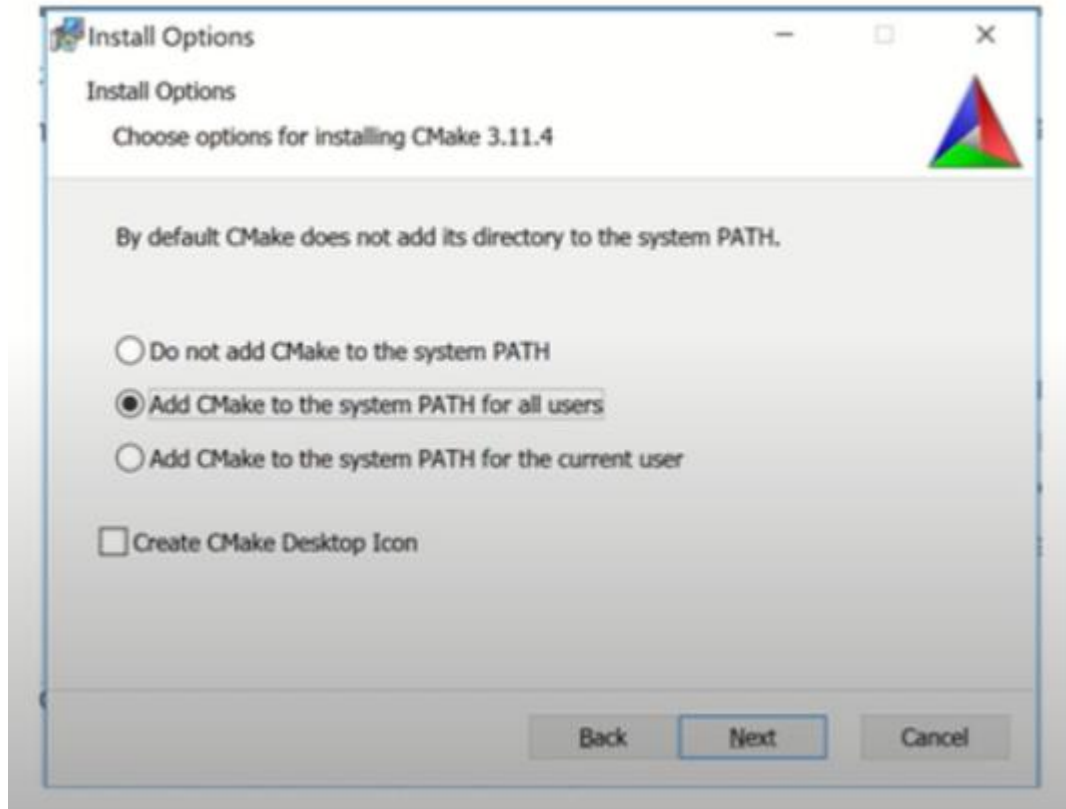


The screenshot shows the 'Binary distributions' section of the CMake website. It contains a table with two columns: 'Platform' and 'Files'. The first row for Windows win64-x64 Installer is highlighted with a red box and contains a warning message. The other rows list various binary distributions for Windows and Mac OS X.

Platform	Files
Windows win64-x64 Installer: <b>Installer tool has changed. Uninstall CMake 3.4 or lower first!</b>	<a href="#">cmake-3.15.0-rc1-win64-x64.msi</a>
Windows win64-x64 ZIP	<a href="#">cmake-3.15.0-rc1-win64-x64.zip</a>
Windows win32-x86 Installer: <b>Installer tool has changed. Uninstall CMake 3.4 or lower first!</b>	<a href="#">cmake-3.15.0-rc1-win32-x86.msi</a>
Windows win32-x86 ZIP	<a href="#">cmake-3.15.0-rc1-win32-x86.zip</a>
Mac OS X 10.7 or later	<a href="#">cmake-3.15.0-rc1-Darwin-x86_64.dmg</a>

## 2. CMake 설치

2. Add PATH를 아래와 같이 설정해주고 CMake 설치를 완료해줍니다.





# 3. Python 설치

1. 아래 링크에 접속해 Python 을 설치해줍니다.  
(버전은 꼭 3.6.5 이어야 하고 아래 64비트로 설치해줍니다.)

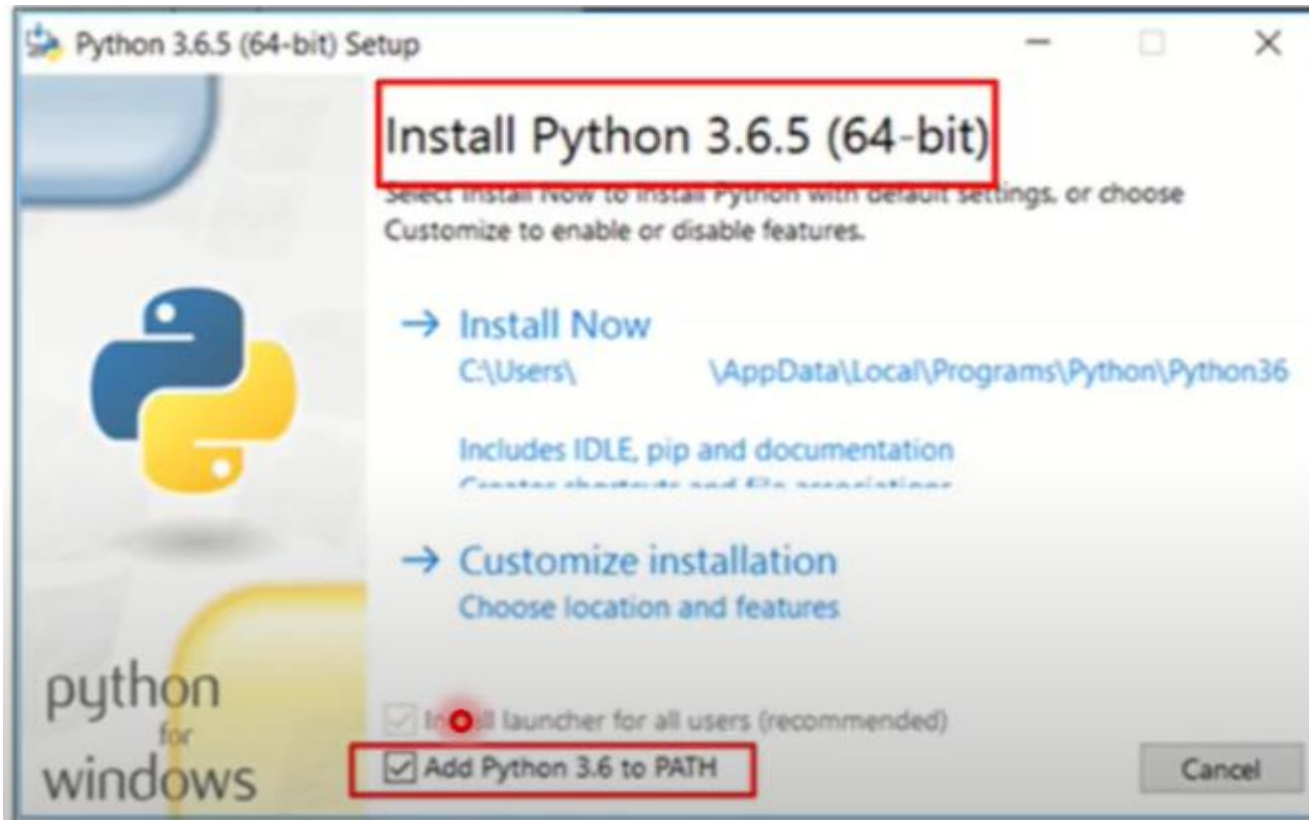
<http://www.python.org/downloads/release/python-365/>

## Files

Version	Operating System	Description	MD5 Sum	File Size	GPG
<a href="#">Gzipped source tarball</a>	Source release		ab25d24b1f8cc4990ade979f6dc37883	22994617	<a href="#">SIG</a>
<a href="#">XZ compressed source tarball</a>	Source release		9f49654a4d6f733ff3284ab9d227e9fd	17049912	<a href="#">SIG</a>
<a href="#">macOS 64-bit/32-bit installer</a>	Mac OS X	for Mac OS X 10.6 and later	bf319337bc68b52fc7d227dca5b6f2f6	28093627	<a href="#">SIG</a>
<a href="#">macOS 64-bit installer</a>	Mac OS X	for OS X 10.9 and later	37d891988b6aeedd7f03a70171a8420d	26987706	<a href="#">SIG</a>
<a href="#">Windows help file</a>	Windows		be70202d483c0b7291a666ec66539784	8065193	<a href="#">SIG</a>
<a href="#">Windows x86-64 embeddable zip file</a>	Windows	for AMD64/EM64T/x64	04cc4f6f6a14ba74f6ae1a8b685ec471	7190516	<a href="#">SIG</a>
<a href="#">Windows x86-64 executable installer</a>	Windows	for AMD64/EM64T/x64	9e96c934f5d16399f860812b4ac7002b	31776112	<a href="#">SIG</a>
<a href="#">Windows x86-64 web-based installer</a>	Windows	for AMD64/EM64T/x64	640736a3894022d30f7babff77391d6b	1320112	<a href="#">SIG</a>
<a href="#">Windows x86 embeddable zip file</a>	Windows		b0b099a4fa479fb37880c15f2b2f4f34	6429369	<a href="#">SIG</a>
<a href="#">Windows x86 executable installer</a>	Windows		2bb6ad2ecca6088171ef923bca483f02	30735232	<a href="#">SIG</a>
<a href="#">Windows x86 web-based installer</a>	Windows		596667cb91a9fb20e6f4f153f3a213a5	1294096	<a href="#">SIG</a>

# 3. Python 설치

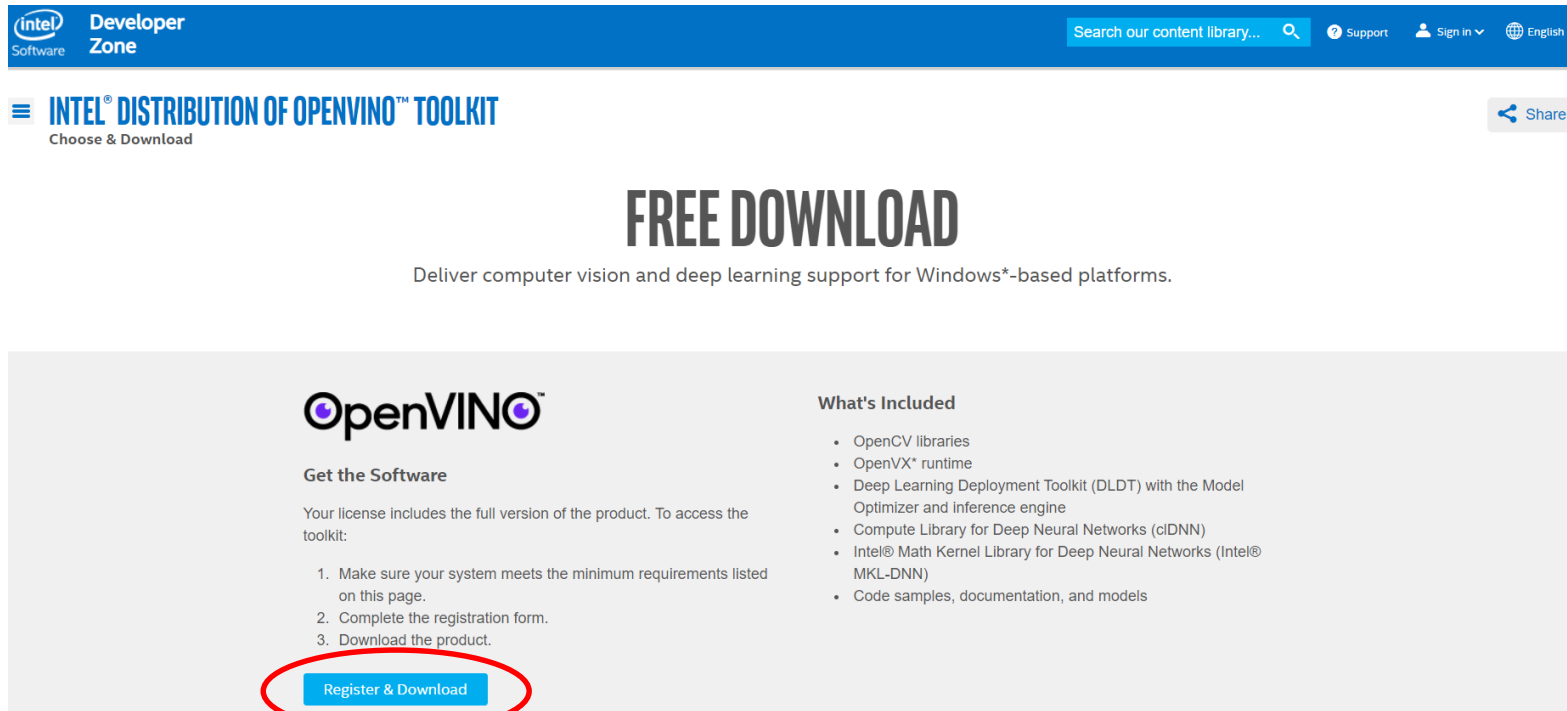
2. Add PATH 를 다음과 같이 해주고 파이썬 설치를 완료해줍니다.



# 4. OpenVINO 설치

1. 아래 링크에 들어가 “Register & Download”를 눌러줍니다.

<https://software.intel.com/en-us/openvino-toolkit/choose-download/free-download-windows>



intel Software Developer Zone

Search our content library... Support Sign in English

INTEL® DISTRIBUTION OF OPENVINO™ TOOLKIT  
Choose & Download

Share

## FREE DOWNLOAD

Deliver computer vision and deep learning support for Windows\*-based platforms.

### OpenVINO™

#### Get the Software

Your license includes the full version of the product. To access the toolkit:

1. Make sure your system meets the minimum requirements listed on this page.
2. Complete the registration form.
3. Download the product.

**Register & Download**

#### What's Included

- OpenCV libraries
- OpenVX\* runtime
- Deep Learning Deployment Toolkit (DLDT) with the Model Optimizer and Inference engine
- Compute Library for Deep Neural Networks (cldnn)
- Intel® Math Kernel Library for Deep Neural Networks (Intel® MKL-DNN)
- Code samples, documentation, and models

# 4. OpenVINO 설치

2. “Windows” 를 선택하고 본인의 정보를 입력한 후 “Submit” 을 눌러줍니다.

Intel® Distribution of OpenVINO™ toolkit is built to fast-track development and deployment of high-performance computer vision and deep learning inference applications on Intel® platforms—from security surveillance to robotics, retail, AI, healthcare, transportation, and more.

- **Accelerate Performance** – Speed computer vision workloads, and enable easy execution across multiple types of Intel® processors and accelerators: CPU, GPU/Intel® Processor Graphics, VPU, and FPGA.
- **Streamline Deep Learning Deployment** – Unleash CNN-based deep learning inference using a common API, 30+ pre-trained models, and code samples. The toolkit supports more than 100 public and custom models.
- **Extend and Customize** – Use OpenCL® kernels and tools to add your own code into the workload pipeline; customize layers without the overhead of frameworks.
- **Save Time, Increase Productivity** – Develop faster with optimized OpenCV®, OpenVX®, and media encode/decode functions; 15+ samples; and more.
- **Innovate Artificial Intelligence** – Extend AI within your applications with the included Intel® Deep Learning Deployment Toolkit – optimize AI at the edge all the way to cloud.

[Learn More.](#)

[Licensing Details.](#)

For more complete information about compiler optimizations, see our

Required Fields(\*)

Please choose the operating system for your download \*

☒ Windows\*

☐ Linux\*

☐ Linux\* for FPGA

☐ macOS\*

First Name \*

First Name

Last Name \*

Last Name

Business Email Address \*

Email Address

Company \*

Company

Country/Region \*

Please Select...

Profession \*

Please Select...

Submit

## 4. OpenVINO 설치

3. 2020.1 버전을 선택하고 Full Package 다운로드를 눌러 오픈비노를 다운로드해줍니다.  
(이 데모는 오픈비노 새 버전(2020.2)이 아닌 2020.1 버전에서만 가능하므로 2020.1 버전을 다운로드 해줍니다.)
4. 다운로드가 완료되면 Next를 계속 눌러 OpenVINO 설치를 완료해줍니다.

You have signed up for the **Intel® Distribution of OpenVINO™ toolkit for Windows\***.  
You will receive an email with the serial number listed below and the download location for future reference.

**Serial number : CZL3-CFS8WFP6**

- Save this serial number. You may need it to activate your product in the installer.
- For your reference, you will receive an email that includes your serial number and download instructions.

**Choose a Version**

2020.1

Build date: 31 Jan 2020

[Release Notes](#) | [Installation Guide](#)

**Choose a Download Option**

I want to download only the components I need. Time and space are important to me. While I'm connected to the internet, I can install the components I choose. Initial download 18 MB, max download 190 MB based on component selection.

Customizable Package

I prefer a single large install package with all components. I can install offline after downloading the entire package. Download size 190 MB.

Full Package

**Intel(R) Distribution of OpenVINO™ toolkit  
2020.1 for Windows\***

C:\OpenVINO\

Destination Directory cannot be changed, because Intel(R) Distribution of OpenVINO™ toolkit 2019 R2 for Windows\* is already installed there.

Component Name	Size
<input checked="" type="checkbox"/> Intel(R) Distribution of OpenVINO™ toolkit 2020.1 for Windows*	931MB
<input checked="" type="checkbox"/> Inference Engine	638MB
<input checked="" type="checkbox"/> Inference Engine Development Kit	21MB
<input checked="" type="checkbox"/> Inference Engine Runtime for Intel® CPU	126MB
<input checked="" type="checkbox"/> Inference Engine Runtime for Intel® Processor Graphics	91MB
<input checked="" type="checkbox"/> Inference Engine Runtime for Intel® Movidius™ VPU	56MB
<input checked="" type="checkbox"/> Inference Engine Runtime for Intel® Gaussian Neural...	16MB
<input checked="" type="checkbox"/> Inference Engine Runtime for Intel® Vision Accelerator...	47MB
<input checked="" type="checkbox"/> Model Optimizer	8.8MB
<input checked="" type="checkbox"/> Open Model Zoo	52MB
<input checked="" type="checkbox"/> OpenCV	233MB

Required: 891MB, Available: 34GB

[Select Recommended](#)  
[Select All](#)

By clicking "Next", I acknowledge that I accept the  
[End User License Agreement \(EULA\)](#).

Back

Next

Cancel

## 5. OpenVINO 환경설정

1. OpenVINO 설치가 완료된 후 가장 중요한 단계인 환경설정 단계입니다.  
OpenVINO 가 설치되어 있는 경로로 들어가 “setupvars.bat” 을 통해 환경변수를 세팅해줍니다.  
(혹시 아래 경로에 오픈비노가 설치되어 있지 않다면 아까 설치한 파일을 아래 경로로 변경해주어야 합니다.)

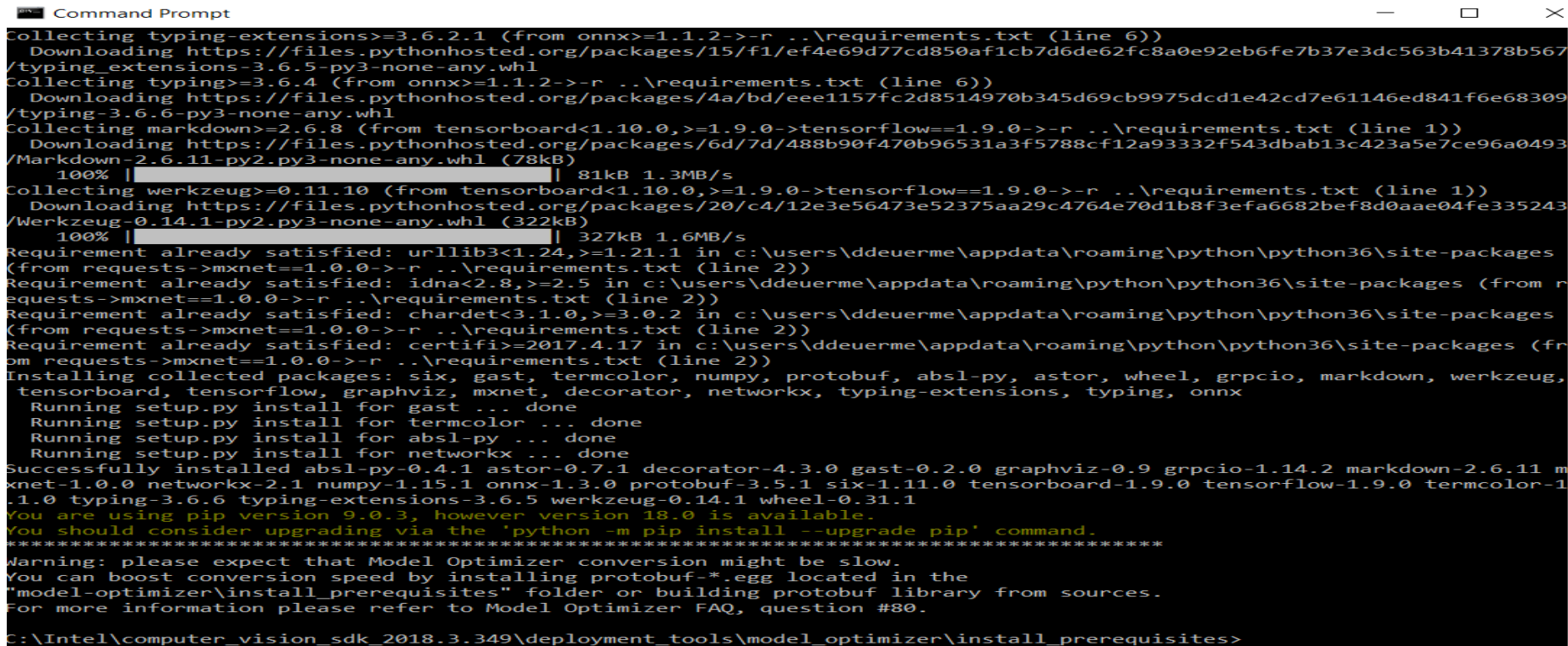
```
cd C:/Program Files (x86)/IntelSWTools/opencvino/bin/  
setupvars.bat
```

```
C:\Program Files (x86)\IntelSWTools\opencvino\bin>setupvars.bat  
Python 3.6.8  
ECHO is off.  
PYTHONPATH=C:\Program Files (x86)\IntelSWTools\opencvino\deployment_tools\open_model_zoo\tools\accuracy_checker;C:\Program Files (x86)\IntelSWTools\opencvino\python\python3.6;C:\Program Files (x86)\IntelSWTools\opencvino\python\python3;C:\Program Files (x86)\IntelSWTools\opencvino\deployment_tools\model_optimizer;  
[setupvars.bat] OpenVINO environment initialized
```

# 5. OpenVINO 환경설정

2. Configure the model optimizer 단계입니다. 아래 경로로 들어가서 install\_prerequisites.bat을 해줍니다.

```
cd C:/Program Files (x86)/IntelSWTools/opencvino/deployment_tools/model_optimizer/install_prerequisites
install_prerequisites.bat
```



```
Command Prompt
Collecting typing_extensions>=3.6.2.1 (from onnx>=1.1.2->-r ..\requirements.txt (line 6))
  Downloading https://files.pythonhosted.org/packages/15/f1/ef4e69d77cd850af1cb7d6de62fc8a0e92eb6fe7b37e3dc563b41378b567
/typing_extensions-3.6.5-py3-none-any.whl
Collecting typing>=3.6.4 (from onnx>=1.1.2->-r ..\requirements.txt (line 6))
  Downloading https://files.pythonhosted.org/packages/4a/bd/eee1157fc2d8514970b345d69cb9975dcd1e42cd7e61146ed841f6e68309
/typing-3.6.6-py3-none-any.whl
Collecting markdown>=2.6.8 (from tensorboard<1.10.0,>=1.9.0->tensorflow==1.9.0->-r ..\requirements.txt (line 1))
  Downloading https://files.pythonhosted.org/packages/6d/7d/488b90f470b96531a3f5788cf12a93332f543dbab13c423a5e7ce96a0493
/Markdown-2.6.11-py2.py3-none-any.whl (78kB)
100% |#####| 81kB 1.3MB/s
Collecting werkzeug>=0.11.10 (from tensorboard<1.10.0,>=1.9.0->tensorflow==1.9.0->-r ..\requirements.txt (line 1))
  Downloading https://files.pythonhosted.org/packages/20/c4/12e3e56473e52375aa29c4764e70d1b8f3efa6682bef8d0aae04fe335243
/Werkzeug-0.14.1-py2.py3-none-any.whl (322kB)
100% |#####| 327kB 1.6MB/s
Requirement already satisfied: urllib3<1.24,>=1.21.1 in c:\users\ddeuerme\appdata\roaming\python\python36\site-packages
(from requests->mxnet==1.0.0->-r ..\requirements.txt (line 2))
Requirement already satisfied: idna<2.8,>=2.5 in c:\users\ddeuerme\appdata\roaming\python\python36\site-packages (from r
equests->mxnet==1.0.0->-r ..\requirements.txt (line 2))
Requirement already satisfied: chardet<3.1.0,>=3.0.2 in c:\users\ddeuerme\appdata\roaming\python\python36\site-packages
(from requests->mxnet==1.0.0->-r ..\requirements.txt (line 2))
Requirement already satisfied: certifi>=2017.4.17 in c:\users\ddeuerme\appdata\roaming\python\python36\site-packages (fr
om requests->mxnet==1.0.0->-r ..\requirements.txt (line 2))
Installing collected packages: six, gast, termcolor, numpy, protobuf, absl-py, astor, wheel, grpcio, markdown, werkzeug,
tensorboard, tensorflow, graphviz, mxnet, decorator, networkx, typing_extensions, typing, onnx
Running setup.py install for gast ... done
Running setup.py install for termcolor ... done
Running setup.py install for absl-py ... done
Running setup.py install for networkx ... done
Successfully installed absl-py-0.4.1 astor-0.7.1 decorator-4.3.0 gast-0.2.0 graphviz-0.9 grpcio-1.14.2 markdown-2.6.11 m
xnet-1.0.0 networkx-2.1 numpy-1.15.1 onnx-1.3.0 protobuf-3.5.1 six-1.11.0 tensorflow-1.9.0 termcolor-1
.1.0 typing-3.6.6 typing_extensions-3.6.5 werkzeug-0.14.1 wheel-0.31.1
You are using pip version 9.0.3, however version 18.0 is available.
You should consider upgrading via the 'python -m pip install --upgrade pip' command.
Warning: please expect that Model Optimizer conversion might be slow.
You can boost conversion speed by installing protobuf-*.egg located in the
"model_optimizer\install_prerequisites" folder or building protobuf library from sources.
For more information please refer to Model Optimizer FAQ, question #80.
C:\Intel\computer_vision_sdk_2018.3.349\deployment_tools\model_optimizer\install_prerequisites>
```



## 6. Speech to Text demo

1. 아래 경로로 들어가 demo\_speech\_recognition.bat을 실행시켜줍니다.  
(조금 시간이 걸릴 수 있으니 기다려주세요.)

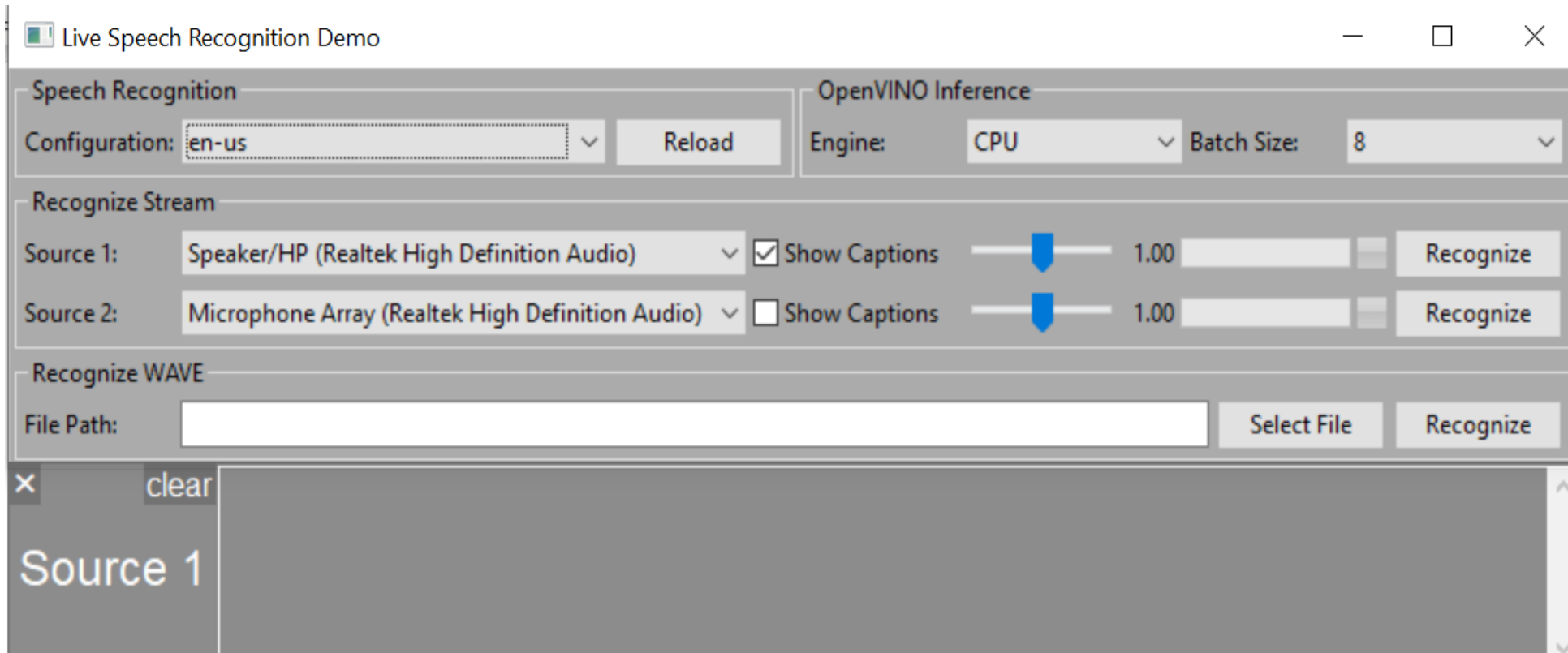
```
cd C:/Program Files (x86)/IntelSWTools/opencvino/deployment_tools/demo/  
demo_speech_recognition.bat
```

```
C:\Program Files (x86)\IntelSWTools\opencvino\deployment_tools\demo>demo_speech_recognition.bat  
target_precision = FP32  
Python 3.6.8  
ECHO is off.  
PYTHONPATH=C:\Program Files (x86)\IntelSWTools\opencvino\deployment_tools\open_model_zoo\tools\accuracy_checker;C:\Program Files (x86)  
\IntelSWTools\opencvino\python\python3.6;C:\Program Files (x86)\IntelSWTools\opencvino\python\python3;C:\Program Files (x86)\IntelSWT  
ools\opencvino\deployment_tools\model_optimizer;C:\Program Files (x86)\IntelSWTools\opencvino\deployment_tools\open_model_zoo\tools\ac  
curacy_checker;C:\Program Files (x86)\IntelSWTools\opencvino\python\python3.6;C:\Program Files (x86)\IntelSWTools\opencvino\python\pyt  
hon3;C:\Program Files (x86)\IntelSWTools\opencvino\deployment_tools\model_optimizer;  
[setupvars.bat] OpenVINO environment initialized  
INTEL_OPENVINO_DIR is set to C:\Program Files (x86)\IntelSWTools\opencvino  
Python 3.6.8  
ECHO is off.  
Requirement already satisfied: pyyaml in c:\users\haeyoung\appdata\roaming\python\python36\site-packages (from -r C:\Program Files (x86)\IntelSWTools\opencvino\deployment_tools\open_model_zoo\tools\downloader\requirements.in (line 1)) (5.3)  
Requirement already satisfied: requests in c:\users\haeyoung\appdata\roaming\python\python36\site-packages (from -r C:\Program Files (x86)\IntelSWTools\opencvino\deployment_tools\open_model_zoo\tools\downloader\requirements.in (line 2)) (2.18.4)
```



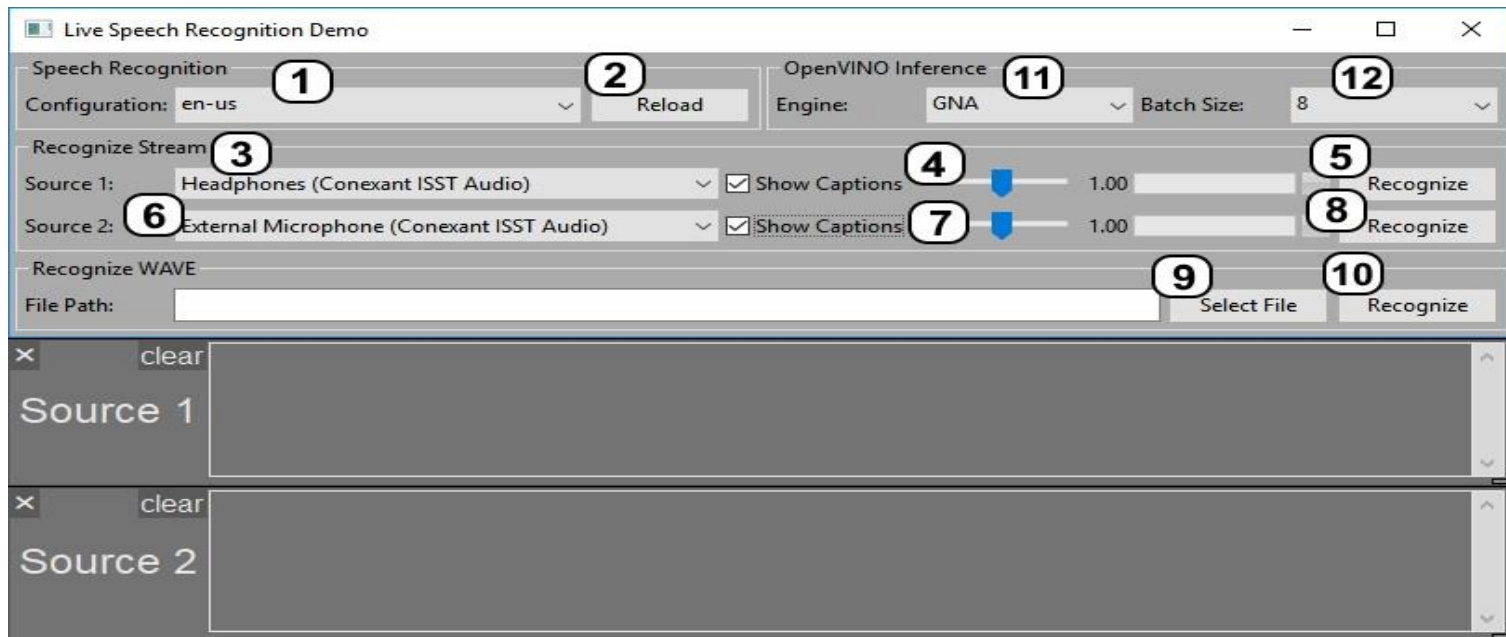
## 6. Speech to Text demo

- 아래와 같은 화면이 뜨면 원하는 음성파일을 넣거나 마이크를 통해 직접 말해본 후 실시간으로 음성을 텍스트로 변환해봅니다.



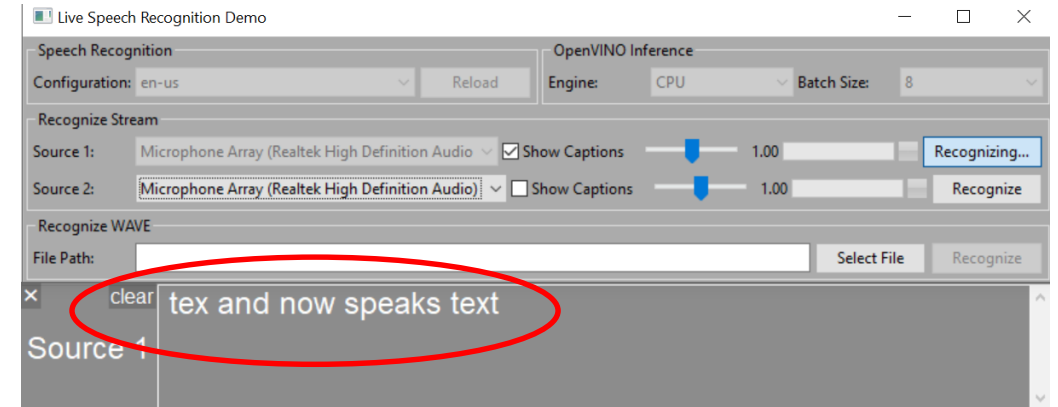
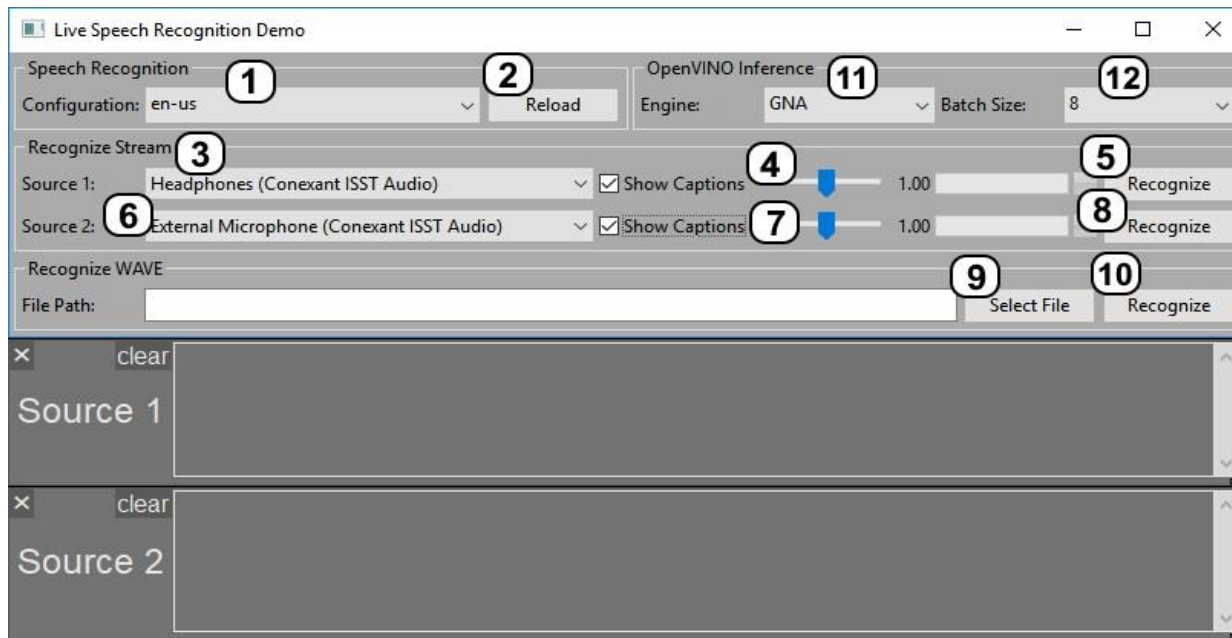
## 6. Speech to Text demo

3. 가지고 있는 음성파일을 넣어 텍스트로 변환하고 싶을 때는 (9) Select File 을 눌러 오디오 파일을 가져와줍니다.  
(이 때 오디오파일은 WAV 형식이어야 합니다.)
4. (10) Recognize를 눌러주면 Source 1 box에 변환이 된 텍스트가 뜹니다.



## 6. Speech to Text demo

5. 마이크를 통해 실시간으로 음성을 텍스트로 변환하고 싶을 때는  
(3) 에서 Microphone으로 변경을 해주고 (5) Recognize 버튼을 누른 후 말을 하면 실시간으로 변환이 됩니다.





**THANK YOU**