

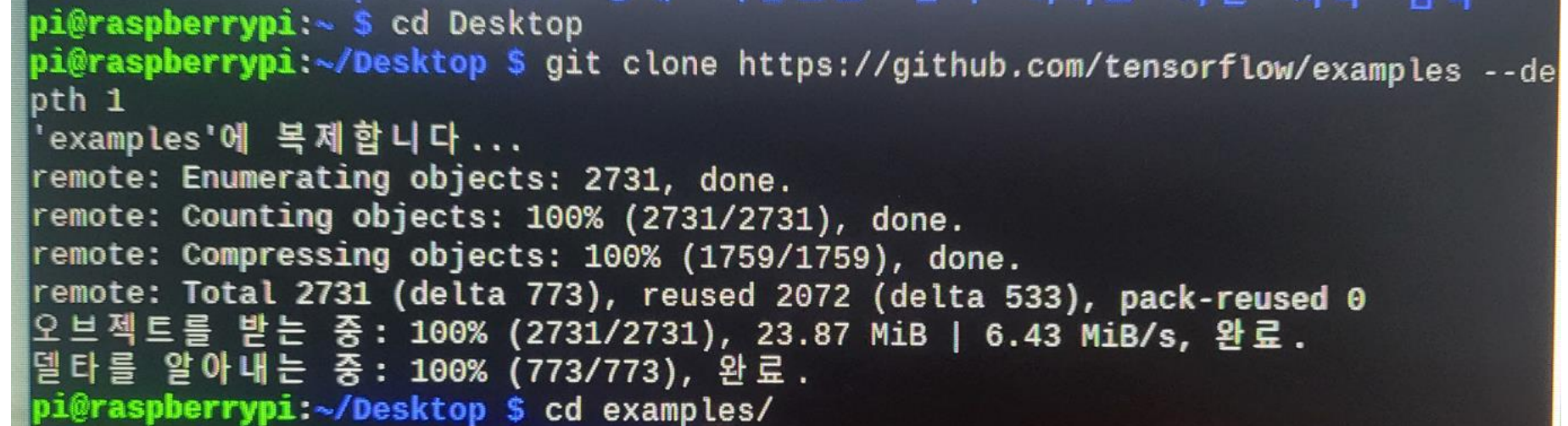
Tensorflow Lite for Object Detection

(참고: <https://www.youtube.com/watch?v=kX6zWqMP9U4>)

```
$ cd Desktop
```

```
$ git clone https://github.com/tensorflow/examples --depth 1
```

```
$ cd examples/
```

A terminal window on a Raspberry Pi showing the execution of git clone. The prompt is pi@raspberrypi:~. The user enters \$ cd Desktop. The prompt changes to pi@raspberrypi:~/Desktop. The user enters \$ git clone https://github.com/tensorflow/examples --depth 1. The terminal shows the progress of cloning, including enumerating, counting, and compressing objects. It also shows progress in Korean: 'examples'에 복제합니다..., 오브젝트를 받는 중: 100% (2731/2731), 23.87 MiB | 6.43 MiB/s, 완료., and 델타를 알아내는 중: 100% (773/773), 완료.. The final prompt is pi@raspberrypi:~/Desktop \$ cd examples/.

```
pi@raspberrypi:~ $ cd Desktop
pi@raspberrypi:~/Desktop $ git clone https://github.com/tensorflow/examples --de
pth 1
'examples'에 복제합니다...
remote: Enumerating objects: 2731, done.
remote: Counting objects: 100% (2731/2731), done.
remote: Compressing objects: 100% (1759/1759), done.
remote: Total 2731 (delta 773), reused 2072 (delta 533), pack-reused 0
오브젝트를 받는 중: 100% (2731/2731), 23.87 MiB | 6.43 MiB/s, 완료.
델타를 알아내는 중: 100% (773/773), 완료.
pi@raspberrypi:~/Desktop $ cd examples/
```

\$ python3 -m pip install virtualenv

```
pi@raspberrypi:~/Desktop/examples $ python3 -m pip install virtualenv
Defaulting to user installation because normal site-packages is not writeable
Looking in indexes: https://pypi.org/simple, https://www.piwheels.org/simple
Collecting virtualenv
  Downloading virtualenv-20.25.1-py3-none-any.whl (3.8 MB)
    | 3.8 MB 4.7 MB/s
WARNING: Retrying (Retry(total=4, connect=None, read=None, redirect=None, status=None)) after connection broken by 'ProtocolError('Connection aborted.', RemoteDisconnected('Remote end closed connection without response'))': /simple/importlib-metadata/
Collecting importlib-metadata>=6.6; python_version < "3.8"
  Downloading importlib_metadata-6.7.0-py3-none-any.whl (22 kB)
Collecting distlib<1, >=0.3.7
  Downloading distlib-0.3.8-py2.py3-none-any.whl (468 kB)
    | 468 kB 11.0 MB/s
Collecting platformdirs<5, >=3.9.1
  Downloading platformdirs-4.0.0-py3-none-any.whl (17 kB)
Collecting filelock<4, >=3.12.2
  Downloading filelock-3.12.2-py3-none-any.whl (10 kB)
Collecting typing-extensions>=3.6.4; python_version < "3.8"
  Downloading typing_extensions-4.7.1-py3-none-any.whl (33 kB)
Collecting zipp>=0.5
  Downloading zipp-3.15.0-py3-none-any.whl (6.8 kB)
Installing collected packages: typing-extensions, zipp, importlib-metadata, distlib, platformdirs, filelock, virtualenv
Successfully installed distlib-0.3.8 filelock-3.12.2 importlib-metadata-6.7.0 platformdirs-4.0.0 typing-extensions-4.7.1 virtualenv-20.25.1 zipp-3.15.0
WARNING: You are using pip version 20.1.1; however, version 24.0 is available.
You should consider upgrading via the '/usr/local/bin/python3 -m pip install --upgrade pip' command.
pi@raspberrypi:~/Desktop/examples $
```

\$ clear

\$ python3 --version

\$ python3.7 -m venv tf

```
pi@raspberrypi:~/Desktop/examples $ python3 --version
Python 3.9.2
pi@raspberrypi:~/Desktop/examples $ python3.7 -m venv tf
bash: python3.7: 명령어를 찾을 수 없음
```

(위와 같이 에러가 날 경우, 다음 순서에 따라 python 3.7 버전 설치)

===== Python 3.7 설치 (시간이 많이 걸림. 수 십분)

(참고:<https://velog.io/@everglow83/Raspberry-Pi-4-%ED%8C%8C%EC%9D%B4%EC%8D%AC-%EC%84%A4%EC%B9%98>)

패키지 관리자 업데이트

```
sudo apt update
sudo apt upgrade
```

의존성 패키지 설치

```
sudo apt install \
build-essential \
libncursesw5-dev \
libgdbm-dev \
libc6-dev \
zlib1g-dev \
libsqlite3-dev \
```

```
tk-dev \
libssl-dev \
openssl \
libffi-dev
```

Python 3.7 소스 코드 다운로드

```
cd /usr/bin
sudo wget https://www.python.org/ftp/python/3.7.12/Python-3.7.12.tgz
sudo tar -xvf Python-3.7.12.tgz
```

빌드 및 설치

```
cd Python-3.7.12
sudo ./configure --enable-optimizations
sudo make -j4
sudo make install
```

Python 3.7 확인

```
python3.7 -version
```



```
75 sudo apt update
76 sudo apt upgrade
77 sudo apt install build-essential libncursesw5-dev libgdbm-dev libc6-dev
zlib1g-dev libsqlite3-dev tk-dev libssl-dev openssl libffi-dev
78 cd /usr/bin
79 sudo wget https://www.python.org/ftp/python/3.7.12/Python-3.7.12.tgz
80 sudo tar -xvf Python-3.7.12.tgz
81 cd Python-3.7.12
82 ./configure --enable-optimizations
83 sudo ./configure --enable-optimizations
84 sudo make -j4
85 sudo make install
```

```
    $ensurepip --root=/ ; \
fi
Looking in links: /tmp/tmpxqnieydl
Processing /tmp/tmpxqnieydl/setuptools-47.1.0-py3-none-any.whl
Processing /tmp/tmpxqnieydl/pip-20.1.1-py2.py3-none-any.whl
Installing collected packages: setuptools, pip
Successfully installed pip-20.1.1 setuptools-47.1.0
pi@raspberrypi:/usr/bin/Python-3.7.12 $ python3.7 --version
Python 3.7.12
pi@raspberrypi:/usr/bin/Python-3.7.12 $
```

\$ cd

\$ cd Desktop

```
pi@raspberrypi:/usr/bin/Python-3.7.12 $ cd  
pi@raspberrypi:~ $ cd Desktop/
```

\$ cd examples

```
pi@raspberrypi:~/Desktop $ cd examples/
```

\$ python3 --version

\$ python3.7 -m venv tf

```
pi@raspberrypi:~/Desktop/examples $ python3 -V  
Python 3.7.12  
pi@raspberrypi:~/Desktop/examples $ python3.7 -m venv tf  
pi@raspberrypi:~/Desktop/examples $
```

\$ source tf/bin/activate

\$ cd lite/examples

```
pi@raspberrypi:~/Desktop/examples $ python3.7 -m venv tf  
(tf) pi@raspberrypi:~/Desktop/examples $ source tf/bin/activate  
(tf) pi@raspberrypi:~/Desktop/examples $ cd lite/examples  
(tf) pi@raspberrypi:~/Desktop/examples/lite/examples $
```


\$ cd object detection

\$ cd raspberry_pi/

```
pi@raspberrypi:~/Desktop/examples/lite/examples $ cd object_detection/
pi@raspberrypi:~/Desktop/examples/lite/examples/object_detection $ cd raspberry_pi/
pi@raspberrypi:~/Desktop/examples/lite/examples/object_detection/raspberry_pi $
```

\$ sh setup.sh # shell script 실행

```
(tf) pi@raspberrypi:~/Desktop/examples/lite/examples/object_detection/raspberry_pi $ sh setup.sh
Looking in indexes: https://pypi.org/simple, https://www.piwheels.org/simple
Collecting pip
  Downloading pip-24.0-py3-none-any.whl (2.1 MB)
    | 2.1 MB 3.6 MB/s
Installing collected packages: pip
  Attempting uninstall: pip
    Found existing installation: pip 20.1.1
    Uninstalling pip-20.1.1:
      Successfully uninstalled pip-20.1.1
Successfully installed pip-24.0
Looking in indexes: https://pypi.org/simple, https://www.piwheels.org/simple
Collecting argparse (from -r requirements.txt (line 1))
  Downloading https://www.piwheels.org/simple/argparse/argparse-1.4.0-py2.py3-none-any.whl (23 kB)
WARNING: Retrying (Retry(total=4, connect=None, read=None, redirect=None, status=None)) after connection b
ken by 'ProtocolError('Connection aborted.', RemoteDisconnected('Remote end closed connection without resp
se'))': /simple/numpy/
Collecting numpy>=1.20.0 (from -r requirements.txt (line 2))
  Downloading numpy-1.21.6-cp37-cp37m-manylinux_2_17_aarch64.manylinux2014_aarch64.whl.metadata (2.1 kB)
Collecting opencv-python~=4.5.3.56 (from -r requirements.txt (line 3))
  Downloading opencv_python-4.5.3.56-cp37-cp37m-manylinux2014_aarch64.whl.metadata (17 kB)
Collecting tflite-support>=0.4.2 (from -r requirements.txt (line 4))
  Downloading tflite_support-0.4.4-cp37-cp37m-manylinux2014_aarch64.whl.metadata (2.4 kB)
Collecting protobuf<4,>=3.18.0 (from -r requirements.txt (line 5))
  Downloading protobuf-3.20.3-cp37-cp37m-manylinux2014_aarch64.whl.metadata (698 bytes)
Collecting absl-py>=0.7.0 (from tflite-support>=0.4.2->-r requirements.txt (line 4))
```

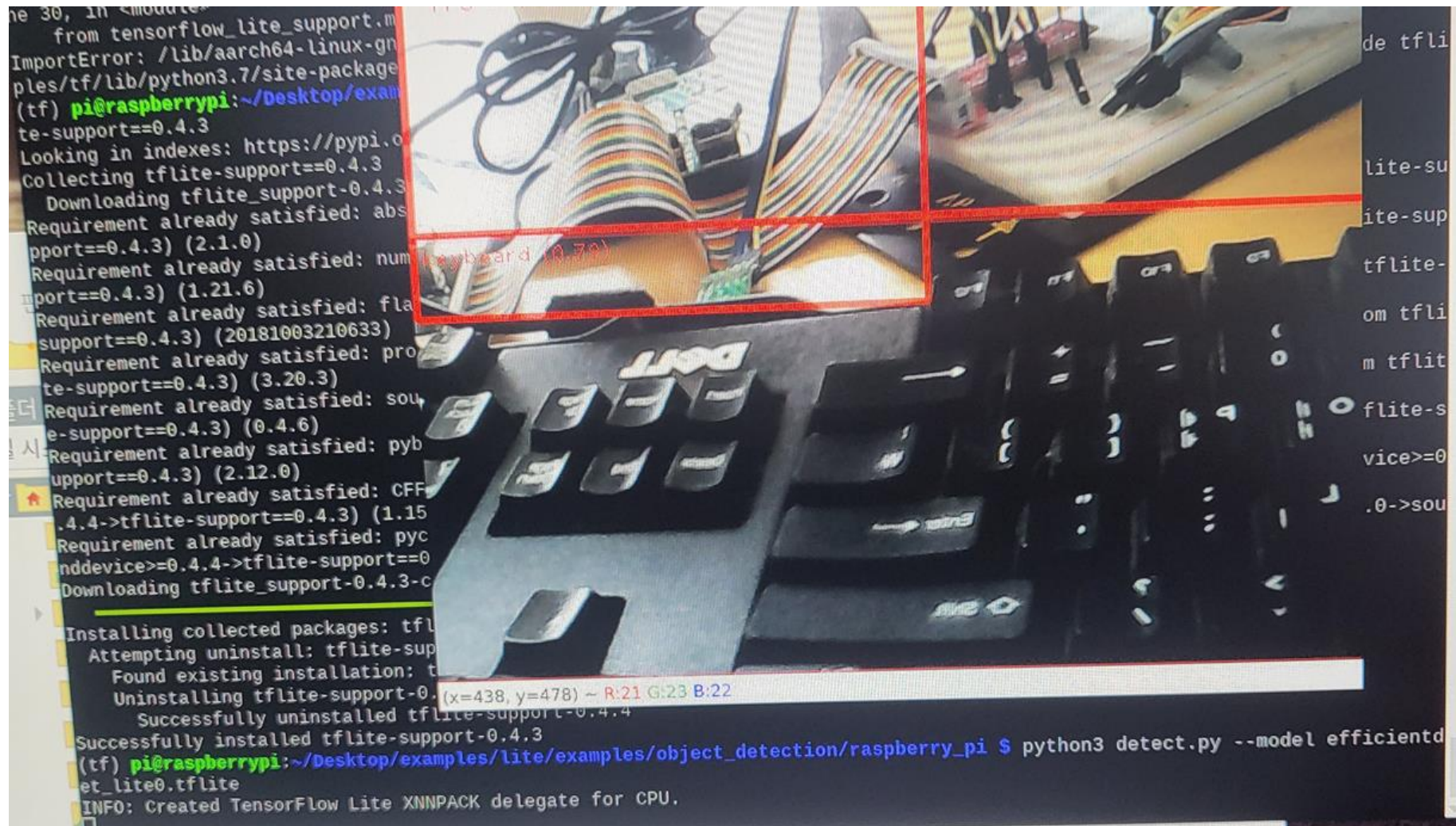
(중략)


```

ImportError: /lib/aarch64-linux-gnu/libstdc++6: cannot open shared object file: No such file or directory
ples/tf/lib/python3.7/site-packages/tensorflow_lite_support/metadata/cc/python/_pywrap_metadata_v0_4_3.so: cannot open shared object file: No such file or directory
(tf) pi@raspberrypi:~/Desktop/examples/lite/examples/object_detection/raspberry_pi $ python -m pip install --upgrade tflite-support==0.4.3
Looking in indexes: https://pypi.org/simple, https://www.piwheels.org/simple
Collecting tflite-support==0.4.3
  Downloading tflite_support-0.4.3-cp37-cp37m-manylinux2014_aarch64.whl.metadata (2.4 kB)
Requirement already satisfied: absl-py>=0.7.0 in /home/pi/Desktop/examples/tf/lib/python3.7/site-packages (from tflite-support==0.4.3) (2.1.0)
Requirement already satisfied: numpy>=1.20.0 in /home/pi/Desktop/examples/tf/lib/python3.7/site-packages (from tflite-support==0.4.3) (1.21.6)
Requirement already satisfied: flatbuffers>=2.0 in /home/pi/Desktop/examples/tf/lib/python3.7/site-packages (from tflite-support==0.4.3) (20181003210633)
Requirement already satisfied: protobuf<4,>=3.18.0 in /home/pi/Desktop/examples/tf/lib/python3.7/site-packages (from tflite-support==0.4.3) (3.20.3)
Requirement already satisfied: sounddevice>=0.4.4 in /home/pi/Desktop/examples/tf/lib/python3.7/site-packages (from tflite-support==0.4.3) (0.4.6)
Requirement already satisfied: pybind11>=2.6.0 in /home/pi/Desktop/examples/tf/lib/python3.7/site-packages (from tflite-support==0.4.3) (2.12.0)
Requirement already satisfied: CFFI>=1.0 in /home/pi/Desktop/examples/tf/lib/python3.7/site-packages (from sounddevice>=0.4.4->tflite-support==0.4.3) (1.15.1)
Requirement already satisfied: pycparser in /home/pi/Desktop/examples/tf/lib/python3.7/site-packages (from CFFI>=1.0->sounddevice>=0.4.4->tflite-support==0.4.3) (2.21)
Downloading tflite_support-0.4.3-cp37-cp37m-manylinux2014_aarch64.whl (43.8 MB)
 43.8/43.8 MB 1.4 MB/s eta 0:00:00
Installing collected packages: tflite-support
  Attempting uninstall: tflite-support
    Found existing installation: tflite-support 0.4.4
    Uninstalling tflite-support-0.4.4:
      Successfully uninstalled tflite-support-0.4.4
Successfully installed tflite-support-0.4.3
(tf) pi@raspberrypi:~/Desktop/examples/lite/examples/object_detection/raspberry_pi $

```

\$ python3 detect.py --model efficientdet_lite0.tflite



* 'ERROR: Unable to read from webcam. Please verify your webcam settings.' 가 나올 경우
(USB 카메라가 아니고, 파이카메라경우. 라즈베리파이400에는 파이카메라용 CSI단자가 없어서 USB 카메라 써야 함.)

(참고: <https://gist.github.com/khanhlyg/bbeb5e4ccfca6cbcf18508a44f5964be>)

[@cedricbaril](#) [@EnziinSystem](#) - you can fix this issue by modifying the /boot/config.txt file as there is an issue with OpenCV/V4L2:

```
sudo nano /boot/config.txt
```

```
start_x=1
```

```
gpu_mem=128
```

Comment out the camera_auto_detect=1 - this is currently a valid flag.

```
#camera_auto_detect=1
```

```
#Save the file and reboot
```

```
#Everything should be up and running.
```