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# Visual SLAM Install Instructions

## I. Description

This project is to develop a SLAM algorithm running on Raspberry Pi with camera. The SLAM algorithm does both mapping and localization (location and orientation) at the same time using only a camera. In addition, colored landmarks can be recognized during navigation.

## II. Environment

Linux Ubuntu 18.04
g++ 7.3.0
OpenCV 2.4.13.6 (Required at least 2.4.3)
Eigen 3.3.4 (Required at least 3.1.0)

## III. Dependencies

1. C++ compiler is prerequisite
2. Required development tools:
```
sudo apt-get install cmake
sudo apt-get install libpython2.7-dev
sudo apt-get install libblas-dev liblapack-dev libglew-dev
```

3. Required dependencies
   a. **OpenCV** (Download)
   *Installing required packages:*
```
sudo apt-get install build-essential
sudo apt-get install cmake git libgtk2.0-dev pkg-config
libavcodec-dev libavformat-dev libswscale-dev
sudo apt-get install python-dev python-numpy libtbb2
libtbb-dev libjpeg-dev libpng-dev libtiff-dev libjasper-dev
libdc1394-22-dev
```

   *Downloading OpenCV sources and installing it:*
```
cd ~/opencv
mkdir release
cd release
cmake -D CMAKE_BUILD_TYPE=RELEASE –D
CMAKE_INSTALL_PREFIX=/usr/local ..
make
sudo make install
```

   b. **Eigen3**
   *Installing Eigen3:*
```
sudo apt-get install libeigen3-dev
```

c. **Pangolin** (Download)
*Downloading Pangolin sources and installing it:*

```
cd ~/Pangolin
mkdir build
cd build
cmake ..
cmake –build .
```

d. **DBoW2** (in project libs)
*Installing DBoW2:*

```
cd DBoW2
mkdir build
cd build
cmake .. -DCMAKE_BUILD_TYPE=Release
make
```

e. **G2o** (in project libs)
*Installing g2o:*

```
cd g2o
mkdir build
cd build
cmake .. -DCMAKE_BUILD_TYPE=Release
make
```

**Note: Some errors might be occurring due to different environments. Common errors fixing:**

- Pangolin error – deprecated constants
  => Adjust code in ffmpeg.cpp as here
- DBoW2 error: 'stdint-gcc.h' file not found
  => Replace 'stdint-gcc.h with stdint.h (Reference)
- G2o error: ‘tr1/unordered_map’ file not found
  => Remove all the tr1 references (Reference)

# IV. Visual SLAM

ORB-SLAM2 is a C++ Visual SLAM algorithm library used in this project.
Github link: https://github.com/raulmur/ORB_SLAM2

*Downloading project sources from Github and building it:*

```
cd config
tar -xf ORBvoc.txt.tar.gz
cd ..
mkdir build
cd build
cmake .. -DCMAKE_BUILD_TYPE=Release
make
```

“main” file will be generated in build folder after building.

**Note: Some errors might be occurring due to different environments. Common errors fixing:**

- Error: ‘usleep’ was not declared in this scope

=> Include <unistd.h> in System.h (Reference)

- Error: static_assert failed "Allocator::value_type must be same type as value_type"
  => Replace const KeyFrame* with KeyFrame* const (Reference)
- Error: No rule to make target
  => Replace libDBoW2.so and libg2o.so with libDBow.dylib and libg2o.dylib (Reference)

# V. Camera Calibration

Camera Calibration is necessary before running the project

*Building it:*

```
cd camera-calibration
mkdir build
cd build
cmake ..
make
```

“camera-calibration” file will be generated in build folder after building.