2020/06/20

Open Dynamics Engine(ODE) Installation Manual (ver.2.7)

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1. Setup for Windows

・Development Environment： GCC or Visual Studio

1−1. Visual Studio

(A) How to Download Visual Studio 2019 Community

Please download Visual Studio 2019 Community by free following URL.

https://visualstudio.microsoft.com/downloads/ (English)

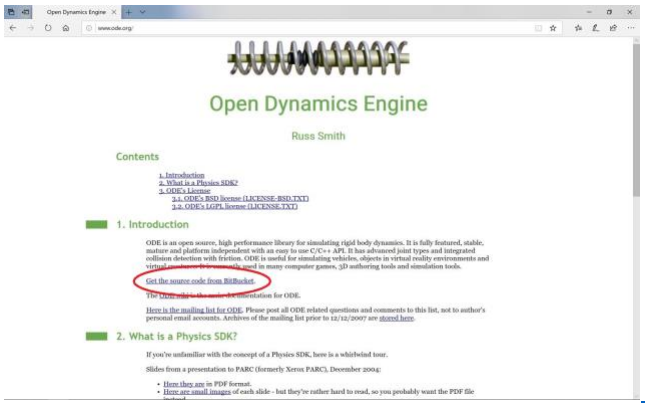
https://visualstudio.microsoft.com/ja/downloads/ (Japanese)

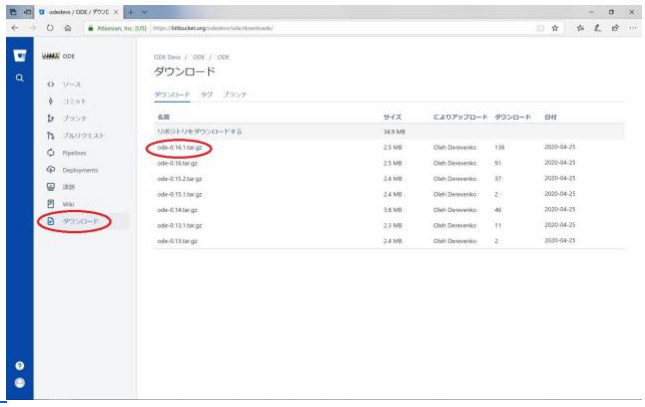
(B) Download Open Dynamics Engine (ODE)：

Please download ODE source file “ode-0.16.1.tar.gz”following URL， unarchive on C:¥ by folder name of “ode”.

(1) Access to following URL， select and download ode-0.16.1.tar.gz

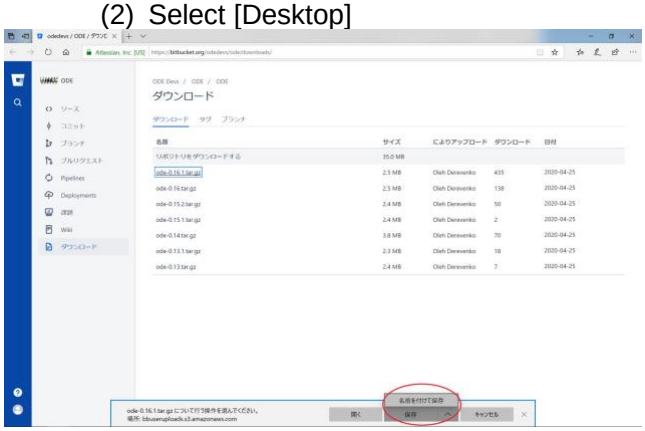
http://www.ode.org/ -> https://bitbucket.org/odedevs/ode/downloads/

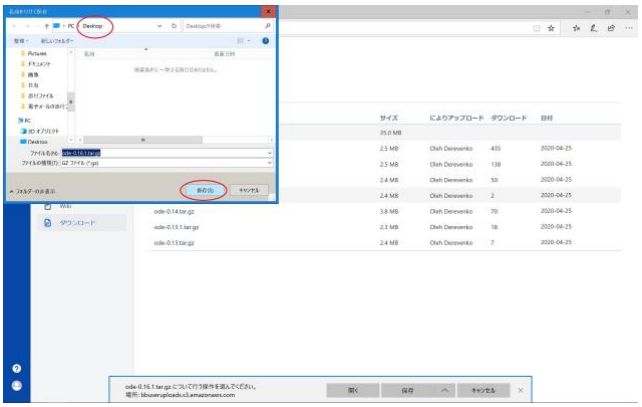




(2014: Ver.0.13 (Russ Smith) 2020: Ver.0.16.1 (Oleh Derevenko))

(2) Select [Desktop]



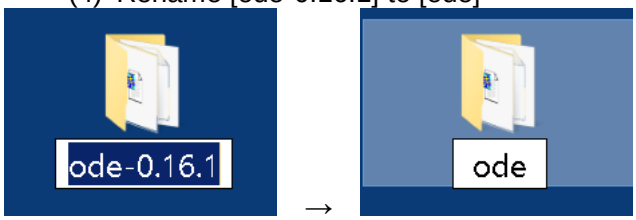


(3) Unarchive ode-0.16.1.tar.gz

*.tar.gz can unarchive by 7-Zip (https://sevenzip.osdn.jp/) or

Lhaplus (https://forest.watch.impress.co.jp/library/software/lhaplus/) etc....

(4) Rename [ode-0.16.1] to [ode]



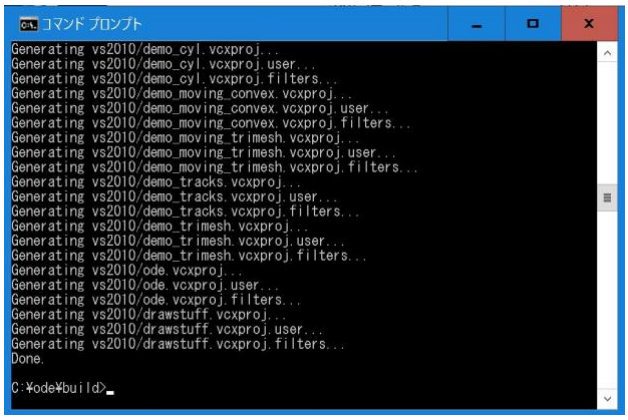
(5) Right click ODE folder and select [cut] in menu (or Ctrl + x in selecting ODE folder).
(6) Select [Explorer] and move C:¥, right click in Explorer window and select [paste]in menu (or Ctrl + v in selecting C:¥ in Explorer window). ODE folder following manual is C:¥ode.

Note: In the initial setting of Explorer, file extension is not shown. Please change the setting to show file extension. Select [view] menu in upper of Explorer, check ☑ [Filename extensions] .

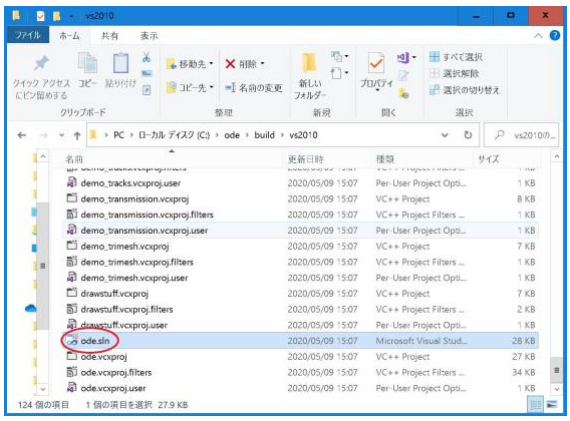
(C) How to Execute ODE installer
Please move directory to C:¥ode¥build by Command Prompt and execute premake4 in the folder.
Type “cmd” on search box in Windows.
Type following command in Command Prompt (be careful to type [Space]).

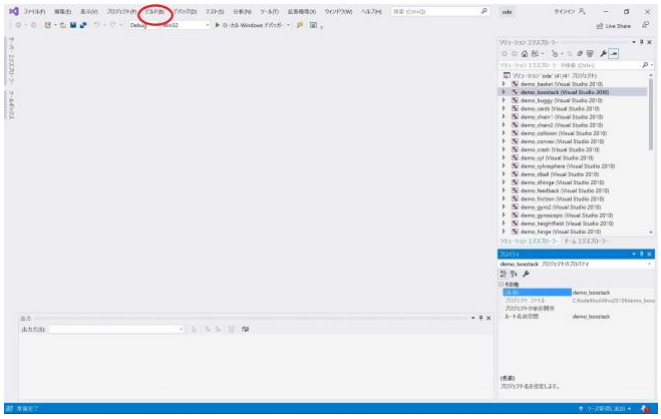
```
C:¥User¥user> cd ¥ode¥build
C:¥ode¥build> premake4 --only-double --only-static --with-demos --with-libccd vs2010
                ↑          ↑          ↑          ↑          ↑
                        There is a space at the arrow
```

After messages on the installation progress are shown in the Command Prompt, installation is finished. Close Command Prompt.



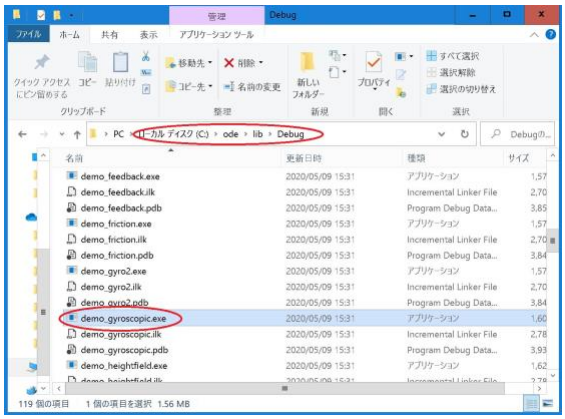
(D) How to Conduct Setup of ODE
Run Visual Studio. Open (ODE folder) ¥build¥vs2010¥ode.sln.
In [Visual Studio conversion wizard] window, check [No (O)], click [Next(N)].
In [Ready to Convert], click [Finish(F)].
In [Conversion Complete], click [Close].
Select [Debug (D)] → [Build Solution(B)] in menu bar on Visual Studio and finish build of solution.
In Visual Studio 2019, Select [Build (D)] → [Build Solution (B)] in the menu bar on Visual Studio and finish build of solution.
If the error about of v100 is shown, select [Project (P)] → [Retarget solution], and build of solution.

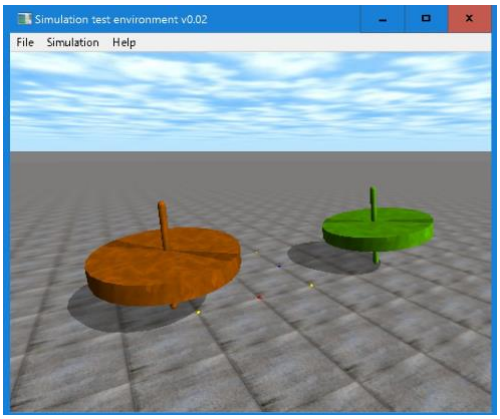

vs2010
ファイル
ホーム
共有
表示
PC › ローカル ディスク (C:) › ode › build › vs2010
名前
更新日時
種類
サイズ
demo_tracks.vcxproj.user 2020/05/09 15:07 Per-User Project Opti... 1 KB
demo_transmission.vcxproj 2020/05/09 15:07 VC++ Project 8 KB
demo_transmission.vcxproj.filters 2020/05/09 15:07 VC++ Project Filters ... 1 KB
demo_transmission.vcxproj.user 2020/05/09 15:07 Per-User Project Opti... 1 KB
demo_trimesh.vcxproj 2020/05/09 15:07 VC++ Project 7 KB
demo_trimesh.vcxproj.filters 2020/05/09 15:07 VC++ Project Filters ... 1 KB
demo_trimesh.vcxproj.user 2020/05/09 15:07 Per-User Project Opti... 1 KB
drawstuff.vcxproj 2020/05/09 15:07 VC++ Project 7 KB
drawstuff.vcxproj.filters 2020/05/09 15:07 VC++ Project Filters ... 2 KB
drawstuff.vcxproj.user 2020/05/09 15:07 Per-User Project Opti... 1 KB
ode.sln 2020/05/09 15:07 Microsoft Visual Stud... 28 KB
ode.vcxproj 2020/05/09 15:07 VC++ Project 27 KB
ode.vcxproj.filters 2020/05/09 15:07 VC++ Project Filters ... 34 KB
ode.vcxproj.user 2020/05/09 15:07 Per-User Project Opti... 1 KB
124 個の項目
1 個の項目を選択 27.9 KB



(E) How to Confirm the installation of ODE (Run demo program)

.exe file of demo program is made in (ODE folder) ¥lib¥Debug. If you execute (double click) demo_... .exe (e.g. demo_gyroscopic.exe) and start ODE program, you can confirm the success of ODE installation.





[Reference]

- If you debug an ODE program in Visual Studio, please set [Solution Configuration] to [Debug], [Solution Platform] to [x86] in upper of Visual Studio window.
- References

https://kayastyle.jp/install-visualstudio-community-2015/
https://imagingsolution.net/program/visualstudio/download-old-version-visual-studio/
https://demura.net/robot/9ode/9928.html
http://hara.jpn.com/_default/ja/Software/Build_ODE_with_MSVC.html
https://qiita.com/ymsk_sky/items/ef71a6b00ae719c7ae6d

- Directory Configuration of Sample Solution

```
LocoRoboSim
├── Debug
│   ├── LocoRoboSim.exe
│   ├── LocoRoboSim.ilk
│   └── LocoRoboSim.pdb
├── LocoRoboSim
│   ├── Debug
│   ├── LocoRoboSim.vcxproj
│   ├── LocoRoboSim.vcxproj.filters
│   ├── LocoRoboSim.vcxproj.user
│   ├── drawstuff
│   ├── drawstuffd.dll
│   ├── include
│   ├── lib
│   ├── Loco-data.txt
│   ├── main.cpp
│   └── ode_doubled.dll
├── LocoRoboSim.VC.db
└── LocoRoboSim.sln
```

1−2. GCC

(A) How to Install GCC

Install MinGW.

Download MinGWGet installer setup file, mingw-get-setup.exe following URL.
http://www.mingw.org/ → https://osdn.net/projects/mingw/releases/68260
(2020: Ver.0.6.3beta)
Run mingw-get-setup.exe, install MinGWGet installer.
In the default setting, MinGW is installed in the C drive.
Run MinGWGet installer. In [Basic Setup],
Check [mingw-development-toolkit-bin], [mingw32-base-bin], [mingw32-gcc-g++-bin],
[msys-base-bin], in context menu, select [Mark for Installation], select [Installation] → [Apply Changes] in upper menu bar.
In Explorer, Computer → System Properties → Advanced → Environment Variables → System Variables → Path,
Add [MinGW folder name] ¥bin.
In the command prompt, please type gcc –help and confirm finish of GCC install.

(B) How to Install make Environment
make Environment is install at (A), as [msys-base-bin].
In Explorer, Computer → System Properties → Advanced → Environment Variables → System Variables → Path,
add [MinGW folder name] ¥msys¥1.0¥bin.
In the command prompt, please type make --help and confirm finish of GCC install.

(C) Download Open Dynamics Engine (ODE)
Refer to 1.1-1, (C).
Type the following command in the Command Prompt (be careful to type [Space]).

```
> cd ¥ode¥build
> premake4 --cc=gcc --only-double --only-static --os=windows --platform--x32 --with-demos --with-libccd gmake
```

or

```
> cd ¥ode¥build
> premake4 --cc=gcc --only-double --only-static --os=windows --platform--x64 --with-demos --with-libccd gmake
```

(D) How to Execute make
Move to [ODE folder] ¥build¥gmake directory by Command Prompt and exexute Makefile as following.

```
> cd ¥ode¥build¥gmake
> make -f Makefile CC=gcc
```

(E) How to Confirm the success of installation
.exe file, liboded.a, libdrawstuffd.a are output in [ODE folder] ¥lib¥Debug. If you execute (double click) demo_... .exe [ex:demo_gyroscopic.exe] and start ODE program, you can confirm finish of ODE install.

(F) How to Copy ODE related files
Copy liboded.a, libdrawstuffd.a in [ODE folder] ¥lib¥Debug to [MinGW folder] ¥lib and [MinGW folder] ¥mingw32¥lib, [MinGW folder] ¥lib¥gcc¥mingw32¥9.2.0.

(G) How to Install glut
Install freeglut.
http://www.transmissionzero.co.uk/software/freeglut-devel/ → [Download freeglut 3.0.0 for MinGW] (Ver.3.0.0)
In Zip file,
Copy libfreeglut.a, libfreeglut_static.a in ¥freeglut¥lib to [MinGW folder] ¥lib and [MinGW folder] ¥mingw32¥lib and [MinGW folder] ¥lib¥gcc¥mingw32¥9.2.0.
Copy ¥freeglut¥include¥GL folder to [MinGW folder] ¥include and [MinGW folder]

¥lib¥gcc¥mingw32¥9.2.0¥include.
Copy ¥freeglut¥bin freeglu.dll [and x64 ver] to C:¥WINDOWS¥system and system32.

(H) How to make resources.o
Move to [ODE folder] ¥drawstuff¥src directory by Command Prompt and output resources.o as following.

```
> cd ¥ode¥drawstuff¥src
 > windres resources.rc -o resources.o
```

(I) How to Add System Variables to Path
In Explorer, Computer → System Properties → Advanced → Environment Variables → System Variables → Path,
Add [ODE folder] ¥lib¥Debug.

(J) How to Prepare to Compile
Create a directory to put your ODE source code in the ODE directory. Program ODE source code.
e.g.: If you name directory as [myprog1], C:¥ode¥myprog1¥hello.cpp

(K) How to Compile
Move to the above folder by Command Prompt. Compile the source code as following.
g++ -IC:¥(ODE Folder)¥include/ -LC:¥ (ODE Folder)¥lib¥Debug/ -o (Output File Name) (Source Code Name).cpp -loded -ldrawstuffd -lfreeglut -lglu32 -lopengl32 -lwinmm -lgdi32 C:¥ (ODE Folder) ¥drawstuff¥src¥resources.o

e.g. : When there is ODE directly in C:¥

```
 > g++ -IC:¥ode¥include/ -LC:¥ode¥lib¥Debug/ -o hello hello.cpp -loded -ldrawstuffd -lfreeglut -lglu32 -lopengl32 -lwinmm -lgdi32 C:¥ode¥drawstuff¥src¥resources.o
```

[Reference]
- Web page
https://algorithm.joho.info/programming/c-language/windows10-mingw-gcc-install/
https://blog.t-semi.org/?p=44

1−3. Q&A

Q1) There is an error “can't open image file ~ sky.ppm”.
A1) Comfirm the path of the drawstuf directory.
If the directory is in the same place as the code "drawstuff/textures"
If the directory is in the two level before place as the code " ../../drawstuff/textures"
Q2) I can't find the source code or executable file that I created or output.
A2). The default setting of Windows is turn off the display of extensions. Please set the extension to be displayed as following method.

2. Setup for Mac

[Terminal] is an application (App) for Mac in Application/Utility. It can be used as command-level execution like Linux. We create a source code by using Xcode. Please download Xcode in advance. When you download Xcode, You need Apple ID to install apps from App Store.

2−1. Terminal Basic Commands

- ls: list directory
  e.g. : naoyukikubota@NaoyukinoMacBook-Air ~ % ls
  Desktop Music Documents …
- cd: change directory
  cd Desktop → change Desktop directory
  cd ../ → change above directory
  cd ~ → change home directory
  e.g. : username @MacBook-Air ~ % cd ..
  username @MacBook-Air /Users % cd ~
  username @MacBook-Air ~ % cd Documents
  username @MacBook-Air Documents %
- mkdir: make directory
  e.g. : mkdir sample → make “sample” directory
- tar tape file archiver
  e.g. : tar xzf xxx.tar →unarchive xxx.tar
- cp: copy
  e.g. : cp xxx.c sample → copy “xxx.c” in “sample” directory
- sudo: superuser do
  e.g. : sudo cp …
- make: execute make

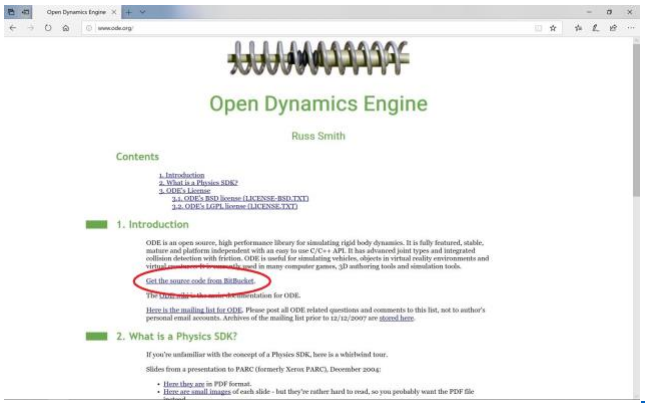
[Reference]
http://www.ysr.net.it-chiba.ac.jp/data/unix2.html
https://hydrocul.github.io/wiki/commands/

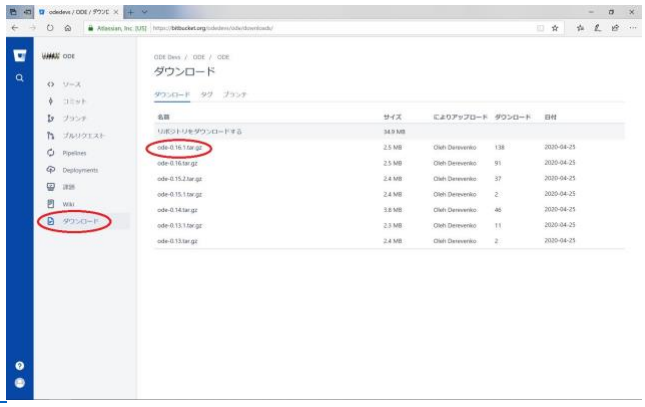
2−2. Xcode

(A) How to Download Open Dynamics Engine (ODE)

Access to the following URL, select and download ode-0.16.1.tar.gz

http://www.ode.org/ → https://bitbucket.org/odedevs/ode/downloads/





(2014: Ver.0.13 (Russ Smith) 2020 Ver.0.16.1 (Oleh Derevenko))

After the download, unarchive ode-0.16.1.tar.gz in Download folder.

```
tar xzf ode-(version).tar.gz
```

(B) How to Move to ODE directory

Run Terminal and move to ODE directory.

```
cd ode-(version)
```

(C) How to Prepare to Create Makefile

Type as following and create Makefile from script.

```
./configure --enable-double-precision
```

(D) How to Create Makefile

Type as following and create Makefile and compile.

```
make
```

(E) How to Install ODE

Type as following and install ODE.

```
sudo make install
```

(F) How to Copy ODE related files (A)

The installed ODE folder is added to /usr/local/. To add a file related to drawstuff, type as following and copy drawstuff include files.

```
cd include
sudo cp -r drawstuff /usr/local/include/
```

(G) How to Copy ODE related files (B)

Type as following and copy drawstuff library file.

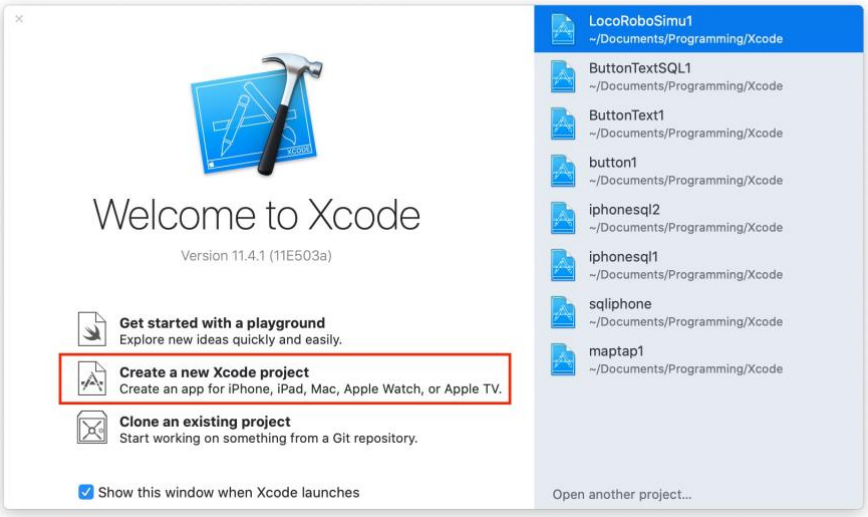
```
cd ../drawstuff/src/.libs
sudo cp * /usr/local/lib/
```

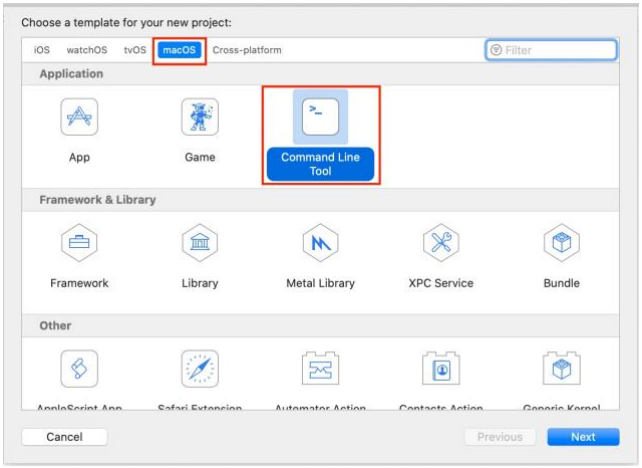
(H) How to Install Xcode

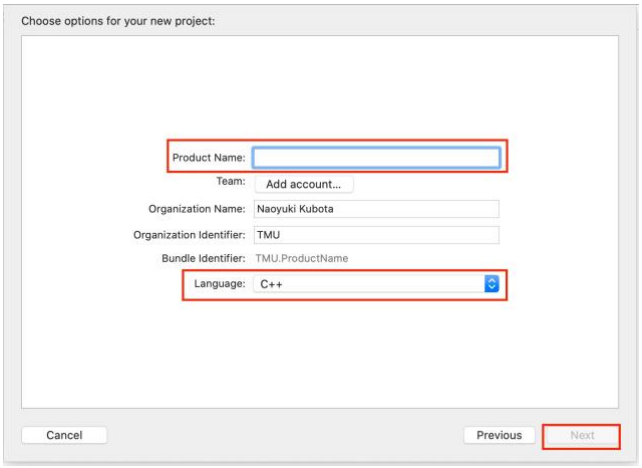
Run App Store, search Xcode, and install [Xcode]. When you download Xcode from App Store, you need your Apple ID.

(I) How to Run Xcode

Run Xcode, select [Create a new Xcode project] from [macOSX] tub, select [Command Line Tool], click [Next]. Fill [Product Name], select [C++] in [Language], select [Next].



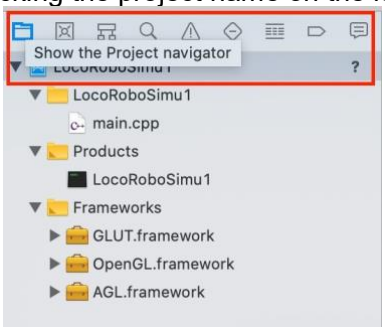




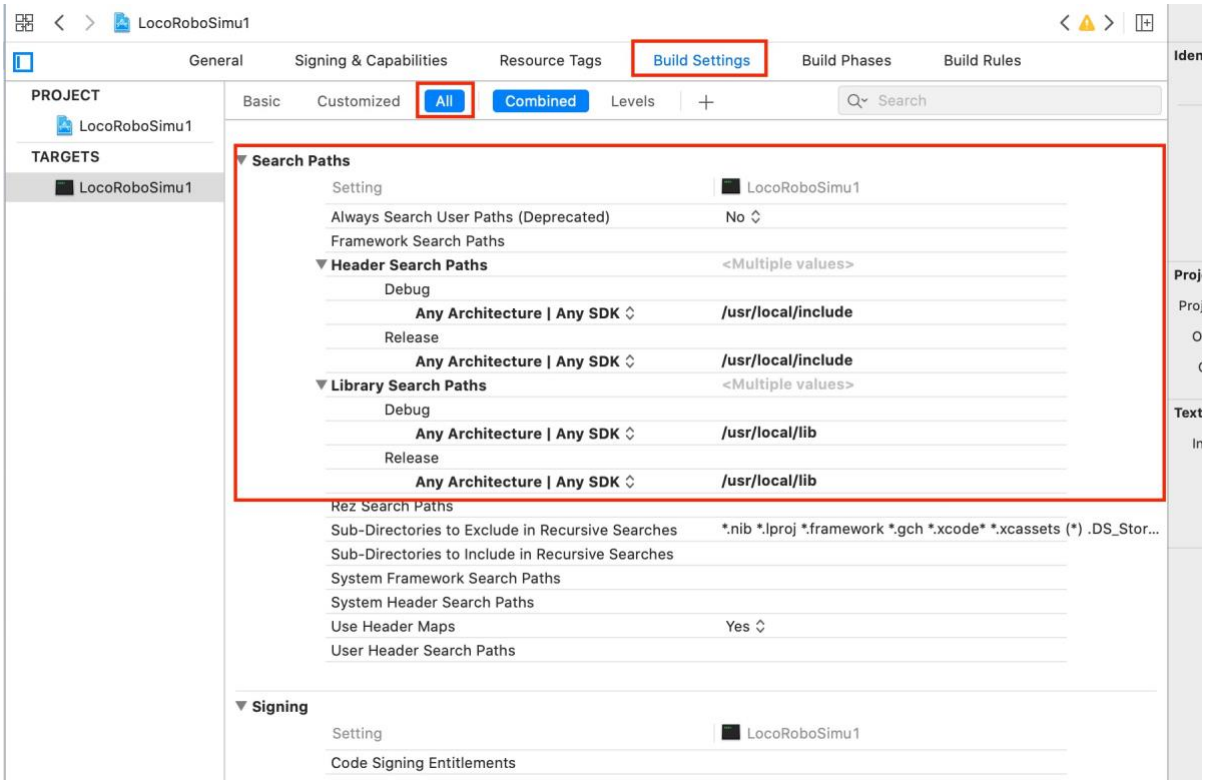
(J) How to Configure Xcode Project file

After doing the above ODE installation method, set the following in the Xcode project.

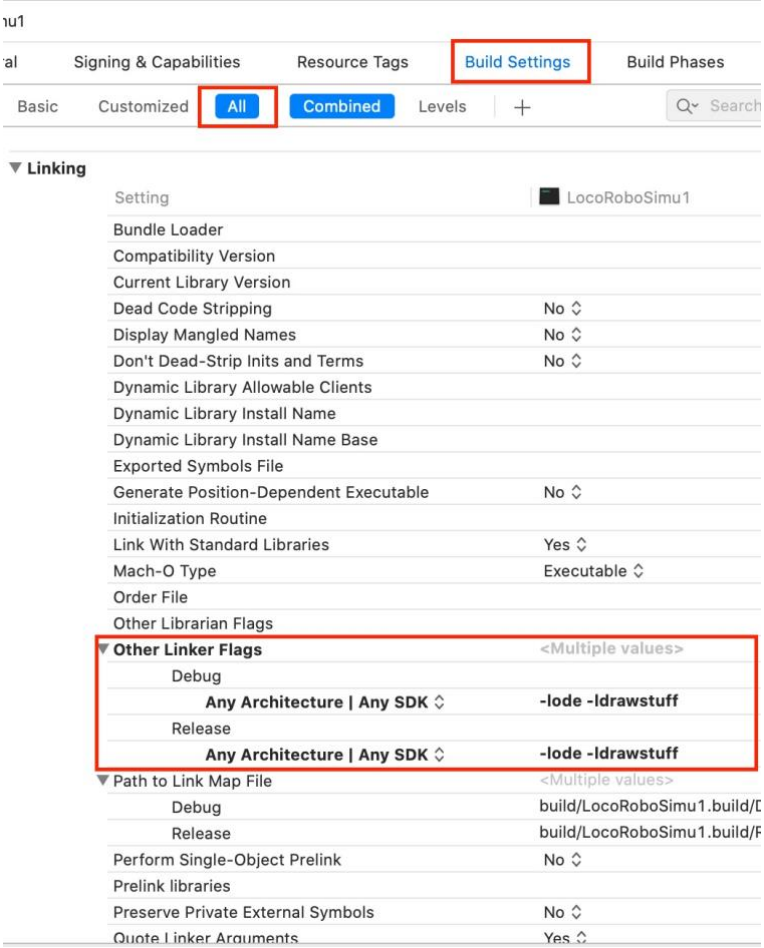
- Open the Project Navigator by clicking the project name on the left side of the screen.



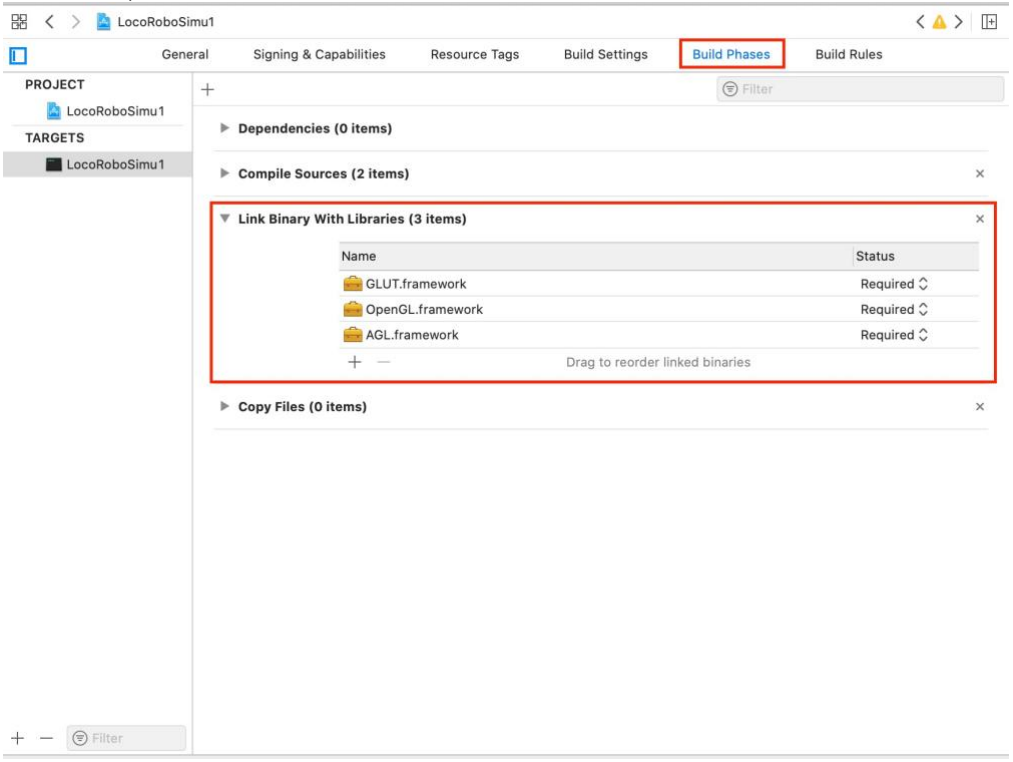
TARGETS Build Settings, All, Search Path Header Search Paths add “/usr/local/include”
TARGETS Build Settings, All, Search Paths Library Search Paths add “/usr/local/lib”

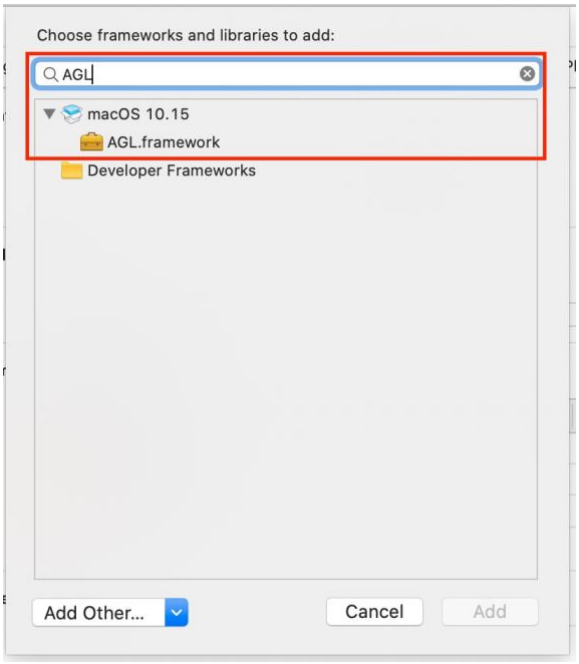

LocoRoboSimu1
General
Signing & Capabilities
Resource Tags
Build Settings
Build Phases
Build Rules
PROJECT
LocoRoboSimu1
TARGETS
LocoRoboSimu1
Basic
Customized
All
Combined
Levels
Search
Search Paths
Setting
LocoRoboSimu1
Always Search User Paths (Deprecated)
No
Framework Search Paths
Header Search Paths
<Multiple values>
Debug
Any Architecture | Any SDK
/usr/local/include
Release
Any Architecture | Any SDK
/usr/local/include
Library Search Paths
<Multiple values>
Debug
Any Architecture | Any SDK
/usr/local/lib
Release
Any Architecture | Any SDK
/usr/local/lib
Rez Search Paths
Sub-Directories to Exclude in Recursive Searches
*.nib *.lproj *.framework *.gch *.xcode* *.xcassets (*) .DS_Stor...
Sub-Directories to Include in Recursive Searches
System Framework Search Paths
System Header Search Paths
Use Header Maps
Yes
User Header Search Paths
Signing
Setting
LocoRoboSimu1
Code Signing Entitlements

TARGETS Build Settings, All, Linking Other Linker Flags add -lode -ldrawstuff

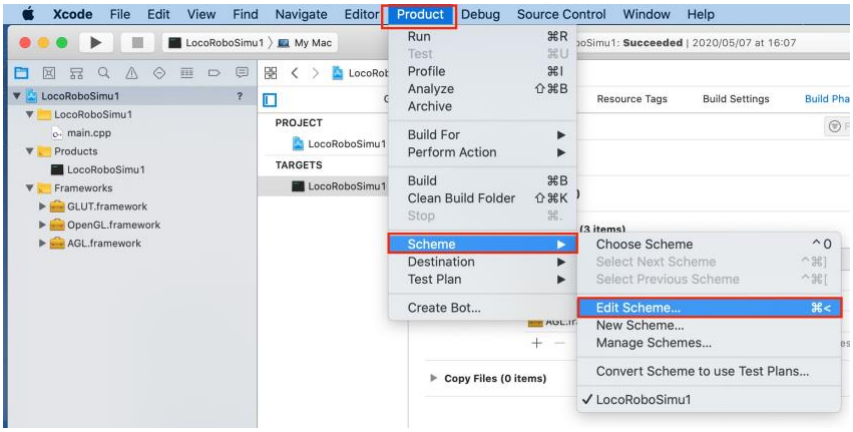


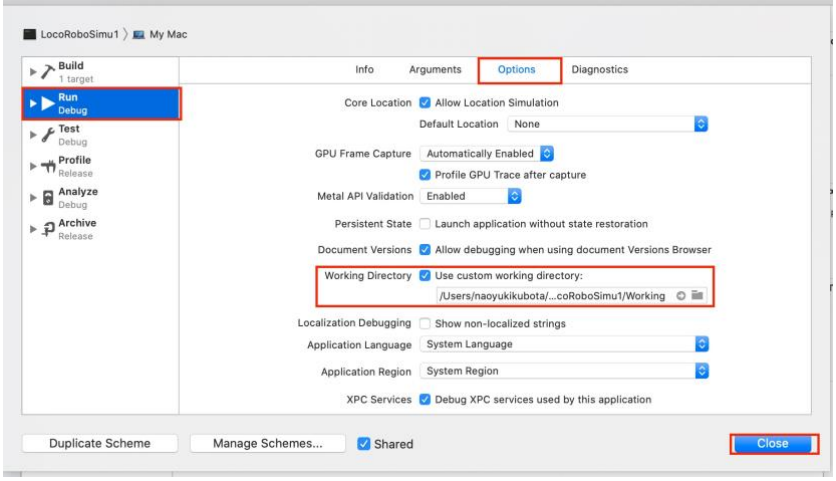
TARGETS Build Phases Link Binary with Libraries add AGL.framework, OpenGL.framework, GLUT.framework





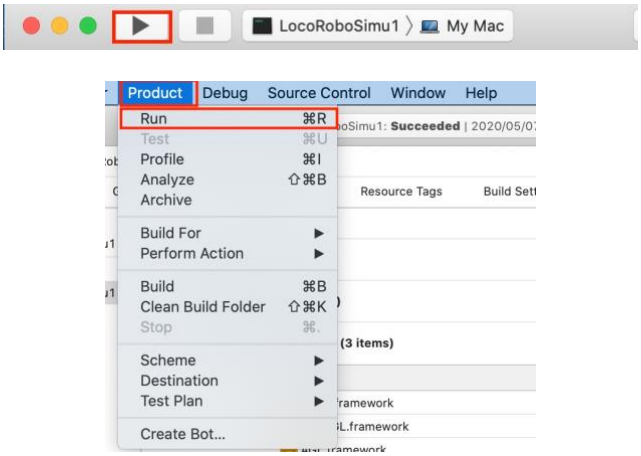
- Select Product → Scheme → Edit Scheme… from the menu bar at the top of the screen
  Run Options Working Directory check “Use custom working directory”, specify the working directory in the project source folder. In working directory, put in textures folder from ode-(version) /drawstuff, Loco-data.csv, Loco-data.txt, and so on. (See [Reference] Directory Configuration of Sample Solution)





(K) How to Build and Run

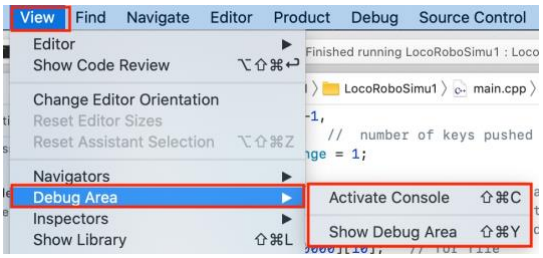
After modifying the source code, do build and run by select Run button (▶) on the upper of the window or select from menu bar [Product] → [Run] or shortcut Command⌘＋r. If [Build Succeeded] show in the window, build of program is succeeded and run the program. If [Build Failed] is shown in the window, [build of program] is failed and you cannot run the program, then check the source code project configure.

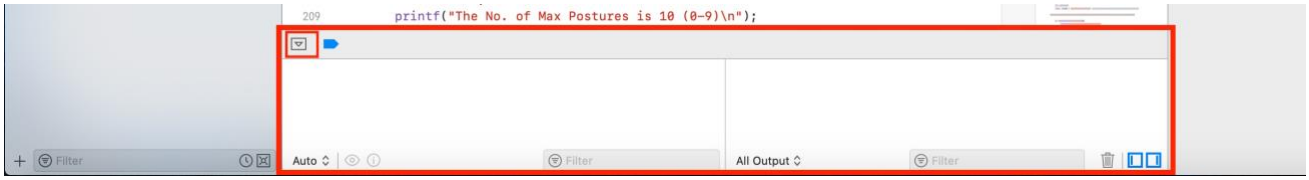


When the build is successful and the program is executed, if the window is shown in the screen, select “OK”.

If you want to quit the program, select stop button （■）on the upper of the window or select from menu bar [Product] → [Stop] or shortcut Command ⌘＋. or [Command⌘]+[q] on ODE simulator window.

If you want to see debug and output message, click the button on the bottom of the window [A button with a triangle in a square, in following fig.] or select [View] → [Debug Area] → [Activate Console] or [Show Debug Area] on menu bar or shortcut Shift+Command⌘+c or Shift+Command⌘+y.



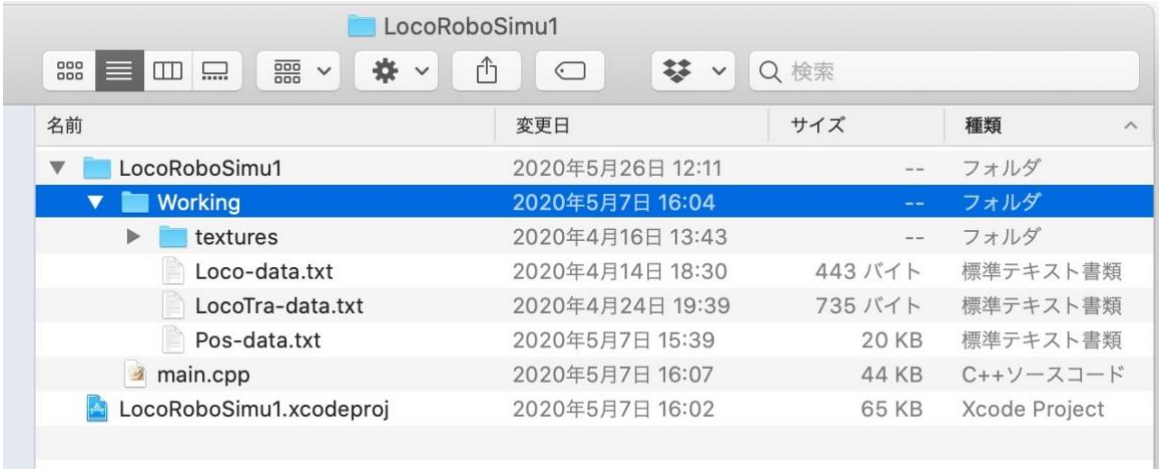


[Reference]
https://studio-kikoro.appspot.com/blog/20141130_ode.html
https://w.atwiki.jp/kencyo/pages/14.html
http://seiya-kumada.blogspot.com/2012/09/open-dynamics-enginemac.html
https://rage.at.webry.info/200909/article_5.html

- Directory Configuration of Sample Solution
∗The project name can be arbitrary. In following fig, project name is “LocoRoboSimu1”.

*Project name

| ※Project name
— | Working
— — | Loco-data.txt
— — └── textures
— └── main.cpp
└── ※Project name.xcodeproj



2−3. Terminal

(A) How to Setup Open Dynamics Engine (ODE)

Refer to the section of [2-1 Xcode], through (A) to (G) and do.

(B) How to Make Working Directory

Make working directory where you can put the ODE source code, etc., as it can be anywhere such as your home directory or documents folder. In the folder, put the “textures” folder that is copied from ode-(version name)/drawstuff and walking motion data (Loco-data.csv, Loco-data.txt, etc.).

(C) How to Compile on Terminal

To compile on the terminal, enter as follows.

g++ -I/usr/local/include -L/usr/local/lib -lode -ldrawstuff -lm -framework GLUT -framework OpenGL -o a.out (source code file name).cpp

e.g.:

```
g++ -I/usr/local/include -L/usr/local/lib -lode -ldrawstuff -lm -framework GLUT –framework OpenGL -o a.out main.cpp
```

* You can create an arbitrary file name with "a.out" such as (alphanumeric name).out.

(D) How to Run program

You can run the compiled program by entering ./a.out (./(alphanumeric name).out) on the terminal.

Forcibly termination command the running program is "[Ctrl] + [c]" on the terminal screen or "[Command]+[q]" on the ODE simulator window screen.

```
./a.out
```

2—4. Q&A

Q1) In MacOSX, if I compile and run the program that was made, the simulator is displayed small in the lower left of the window.

A1) There seems to be a bug in GLUT on MacOSX. Please run with a small screen.

Q2) If I execute 2-2.(3), it shows in that [xcode-select: note: no developer tools were found at '/Applications/Xcode.app', requesting install. Choose an option in the dialog to download the command line developer tools.], and Process is interrupted.

A2) Please install Xcode from AppStore and try the instrallion again.

[Reference]

- You can execute ODE program from terminal by copying a.out etc from somewhere even if Xcode or ODE is not installed.

- Web pages

https://studio-kikoro.appspot.com/blog/20141130_ode.html
https://w.atwiki.jp/kencyo/pages/14.html
http://seiya-kumada.blogspot.com/2012/09/open-dynamics-enginemac.html
https://rage.at.webry.info/200909/article_5.html

3. Setup for Linux

Please refer to 2-1. Mac Terminal Basic Command.

3−1. Install ODE

(A) How to Install packages

Start the terminal and enter the following command to install the X11 and GLU, glut package.

```
sudo apt-get update
sudo apt-get install libgl1-mesa-dev libx11-dev libglu1-mesa-dev
```

or

```
sudo apt-get update
sudo apt-get install libglu1-mesa-dev freeglut3-dev mesa-common-dev
```

(B) How to Install Open Dynamics Engine (ODE)

Refer to the section of [2-1. Xcode], through (A) to (E) and do them in such a way.

(C) How to Make working directory

Move to the one under the directory of the directory where ODE was unzipped. Make working directory (directory name can be any name if it is alphabetic)

```
cd ..
mkdir (working directory)
```

(D) How to Copy ODE files

Copy /ODE/drawstuff/textures in the working directory.

```
cd ode-(version)
cd drawstuff
cp -r drawstuff (working directory)
```

(E) Ho to Compile

Make ODE program source code, enter the following command and compile the program in the working directory.

g++ -DHAVE_CONFIG_H -I. -I~/ (ODE directory path)/ode/src -I~/ (ODE directory path)/include -I~/(ODE directory path)/include -DDRAWSTUFF_TEXTURE_PATH="¥"~/(working directory path) /textures¥"" -DdTRIMESH_ENABLED -g -O2 -MT （output file name）.o -MD -MP -MF .deps/（output file name）.Tpo -c -o (output file name).o (source code file name).cpp

after that,

g++ -g -O2 -o (output file name) (output file name).o ~/ (ODE directory path)/drawstuff/src/.libs/libdrawstuff.a -lX11 ~/ (ODE directory path)/ode/src/.libs/libode.a -lGLU -lGL -lrt -lm -lpthread

e.g. :

```
g++ -DHAVE_CONFIG_H -I. -I~/Downloads/ode-0.16.1/ode/src -I~/Downloads/ode-0.16.1/include -I~/Downloads/ode-0.16.1/include -DDRAWSTUFF_TEXTURE_PATH="¥"~/Downloads/new/textures¥"" -DdTRIMESH_ENABLED -g -O2 -MT mainEX08.o -MD -MP -MF .deps/mainEX08.Tpo -c -o mainEX08.o mainEX08.cpp
```

```
g++ -g -O2 -o mainEX08 mainEX08.o ~/Downloads/ode-0.16.1/drawstuff/src/.libs/libdrawstuff.a -lX11 ~/Downloads/ode-0.16.1/ode/src/.libs/libode.a -lGLU -lGL -lrt -lm –lpthread
```