

```
dronedojo@dronedojo: ~
File Edit View Search Terminal Help
dronedojo@dronedojo:~$ sudo apt install python-opencv=3.2.0+dfsg-4ubuntu0.1
[sudo] password for dronedojo:
Reading package lists... Done
Building dependency tree
Reading state information... Done
python-opencv is already the newest version (3.2.0+dfsg-4ubuntu0.1).
The following packages were automatically installed and are no longer required:
  libbim-glib4 libbim-proxy libqmi-glib5 libqmi-proxy usb-modeswitch
  usb-modeswitch-data
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 489 not upgraded.
dronedojo@dronedojo:~$ sudo apt install gazebo9 libgazebo9-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libbim-glib4 libbim-proxy libqmi-glib5 libqmi-proxy usb-modeswitch
  usb-modeswitch-data
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  autotools-dev default-libmysqlclient-dev dh-python fonts-lato freeglut3
  freeglut3-dev gazebo9-common gazebo9-plugin-base gir1.2-harfbuzz-0.0
  hdf5-helpers icu-devtools libaec-dev libarmadillo-dev libarpack2-dev
  libavcodec-dev libavcodec57 libavdevice-dev libavdevice57 libavfilter-dev
```

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Processing triggers for libc-bin (2.27-3ubuntu1.2) ...
dronedojo@dronedojo:~$ lsb_release -a
No LSB modules are available.
Distributor ID: Ubuntu
Description:   Ubuntu 18.04.5 LTS
Release:      18.04
Codename:     bionic
dronedojo@dronedojo:~$ gazebo
[Err] [REST.cc:205] Error in REST request

libcurl: (51) SSL: no alternative certificate subject name matches target host name 'api.ignitionfuel.org'
^C
dronedojo@dronedojo:~$
dronedojo@dronedojo:~$
dronedojo@dronedojo:~$ sudo vi .ignition/fuel/config.yaml
[sudo] password for dronedojo:
dronedojo@dronedojo:~$ cd courseroot
bash: cd: courseroot: No such file or directory
dronedojo@dronedojo:~$ cd courseroot/
bash: cd: courseroot/: No such file or directory
dronedojo@dronedojo:~$ cd courseRoot/
dronedojo@dronedojo:~/courseRoot$ ls
apm dk env src
dronedojo@dronedojo:~/courseRoot$ mkdir qgroundcontrolLogs
dronedojo@dronedojo:~/courseRoot$ ls
apm dk env qgroundcontrolLogs src
dronedojo@dronedojo:~/courseRoot$ git clone https://github.com/dronedojo/ardupilot_gazebo
Cloning into 'ardupilot_gazebo'...
remote: Enumerating objects: 417, done.
remote: Counting objects: 100% (140/140), done.
remote: Compressing objects: 100% (47/47), done.
remote: Total 417 (delta 109), reused 93 (delta 93), pack-reused 277 (from 1)
Receiving objects: 100% (417/417), 16.36 MiB | 3.78 MiB/s, done.
Resolving deltas: 100% (164/164), done.
dronedojo@dronedojo:~/courseRoot$ ls
apm ardupilot_gazebo dk env qgroundcontrolLogs src
dronedojo@dronedojo:~/courseRoot$ cd ardupilot_gazebo/
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo$ ls
CMakeLists.txt include LICENSE.md media models README.md src worlds
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo$ mkdir build
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo$ cd build/
```

```
dronedajo@dronedajo:~/courseRoot/ardupilot_gazebo$ cd build/
dronedajo@dronedajo:~/courseRoot/ardupilot_gazebo/build$ cmake ..

Command 'cmake' not found, but can be installed with:

sudo snap install cmake # version 3.18.2, or
sudo apt install cmake

See 'snap info cmake' for additional versions.

dronedajo@dronedajo:~/courseRoot/ardupilot_gazebo/build$ sudo ap install cmake
[sudo] password for dronedajo:
sudo: ap: command not found
dronedajo@dronedajo:~/courseRoot/ardupilot_gazebo/build$ sudo ap install cmake
sudo: ap: command not found
dronedajo@dronedajo:~/courseRoot/ardupilot_gazebo/build$ sudo apt install cmake
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libmbin-glib4 libmbin-proxy libqmi-glib5 libqmi-proxy usb-modeswitch usb-modeswitch-data
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  cmake-data librhash0 libuv1
Suggested packages:
  cmake-doc ninja-build
The following NEW packages will be installed:
  cmake cmake-data librhash0 libuv1
0 upgraded, 4 newly installed, 0 to remove and 445 not upgraded.
Need to get 4,626 kB of archives.
After this operation, 24.6 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us.archive.ubuntu.com/ubuntu bionic-updates/main amd64 cmake-data all 3.10.2-1ubuntu2.18.04.2 [1,332 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 librhash0 amd64 1.3.6-2 [78.1 kB]
Get:3 http://us.archive.ubuntu.com/ubuntu bionic/main amd64 libuv1 amd64 1.18.0-3 [64.4 kB]
Get:4 http://us.archive.ubuntu.com/ubuntu bionic-updates/main amd64 cmake amd64 3.10.2-1ubuntu2.18.04.2 [3,152 kB]
Fetched 4,626 kB in 4s (1,033 kB/s)
Selecting previously unselected package cmake-data.
(Reading database ... 209575 files and directories currently installed.)
Preparing to unpack ../cmake-data_3.10.2-1ubuntu2.18.04.2_all.deb ...
Unpacking cmake-data (3.10.2-1ubuntu2.18.04.2) ...
Selecting previously unselected package librhash0:amd64.
Preparing to unpack ../librhash0_1.3.6-2_amd64.deb ...
Unpacking librhash0:amd64 (1.3.6-2) ...
Selecting previously unselected package libuv1:amd64.
Preparing to unpack ../libuv1_1.18.0-3_amd64.deb ...
Unpacking libuv1:amd64 (1.18.0-3) ...
Selecting previously unselected package cmake.
Preparing to unpack ../cmake_3.10.2-1ubuntu2.18.04.2_amd64.deb ...
Unpacking cmake (3.10.2-1ubuntu2.18.04.2) ...
Setting up libuv1:amd64 (1.18.0-3) ...
Setting up cmake-data (3.10.2-1ubuntu2.18.04.2) ...
Setting up librhash0:amd64 (1.3.6-2) ...
Setting up cmake (3.10.2-1ubuntu2.18.04.2) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for libc-bin (2.27-3ubuntu1.2) ...
dronedajo@dronedajo:~/courseRoot/ardupilot_gazebo/build$
```

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Processing triggers for libc-bin (2.27-3ubuntu1.2) ...
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ cd ..
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo$ cd build
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ cmake ..

Command 'cmkae' not found, did you mean:

  command 'cmake' from snap cmake (3.18.2)
  command 'cmake' from deb cmake

See 'snap info <snapname>' for additional versions.

dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ cmake ..
-- The C compiler identification is GNU 7.5.0
-- The CXX compiler identification is GNU 7.5.0
-- Check for working C compiler: /usr/bin/cc
-- Check for working C compiler: /usr/bin/cc -- works
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Detecting C compile features
-- Detecting C compile features - done
-- Check for working CXX compiler: /usr/bin/c++
-- Check for working CXX compiler: /usr/bin/c++ -- works
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Detecting CXX compile features
-- Detecting CXX compile features - done
-- Found PkgConfig: /usr/bin/pkg-config (found version "0.29.1")
-- Checking for module 'bullet>=2.82'
--   Found bullet, version 2.87
-- Found Simbody: /usr/include/simbody
-- Looking for pthread.h
-- Looking for pthread.h - found
-- Looking for pthread_create
-- Looking for pthread_create - not found
-- Looking for pthread_create in pthreads
-- Looking for pthread_create in pthreads - not found
-- Looking for pthread_create in pthread
-- Looking for pthread_create in pthread - found
-- Found Threads: TRUE
-- Boost version: 1.65.1
-- Found the following Boost libraries:
```

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-- Generating done
-- Build files have been written to: /home/dronedojo/courseRoot/ardupilot_gazebo/build
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ make -j4
Scanning dependencies of target ArduCopterIRLockPlugin
Scanning dependencies of target ArduPilotPlugin
[ 25%] Building CXX object CMakeFiles/ArduCopterIRLockPlugin.dir/src/ArduCopterIRLockPlugin.cc.o
[ 50%] Building CXX object CMakeFiles/ArduPilotPlugin.dir/src/ArduPilotPlugin.cc.o
[ 75%] Linking CXX shared library libArduPilotPlugin.so
[ 75%] Built target ArduPilotPlugin
[100%] Linking CXX shared library libArduCopterIRLockPlugin.so
[100%] Built target ArduCopterIRLockPlugin
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo make install
[ 50%] Built target ArduPilotPlugin
[100%] Built target ArduCopterIRLockPlugin
Install the project...
-- Install configuration: "RelWithDebInfo"
-- Installing: /usr/lib/x86_64-linux-gnu/gazebo-9/plugins/libArduCopterIRLockPlugin.so
-- Set runtime path of "/usr/lib/x86_64-linux-gnu/gazebo-9/plugins/libArduCopterIRLockPlugin.so" to ""
-- Installing: /usr/lib/x86_64-linux-gnu/gazebo-9/plugins/libArduPilotPlugin.so
-- Set runtime path of "/usr/lib/x86_64-linux-gnu/gazebo-9/plugins/libArduPilotPlugin.so" to ""
-- Up-to-date: /usr/share/gazebo-9/models/./models
-- Installing: /usr/share/gazebo-9/models/./models/iris_with_ardupilot
-- Installing: /usr/share/gazebo-9/models/./models/iris_with_ardupilot/model.sdf
-- Installing: /usr/share/gazebo-9/models/./models/iris_with_ardupilot/model.config
-- Up-to-date: /usr/share/gazebo-9/models/./models/sun
-- Installing: /usr/share/gazebo-9/models/./models/sun/model.sdf
-- Installing: /usr/share/gazebo-9/models/./models/sun/model.config
-- Installing: /usr/share/gazebo-9/models/./models/sun/model-1_4.sdf
-- Installing: /usr/share/gazebo-9/models/./models/sun/model-1_3.sdf
-- Installing: /usr/share/gazebo-9/models/./models/sun/model-1_2.sdf
-- Installing: /usr/share/gazebo-9/models/./models/camera
-- Installing: /usr/share/gazebo-9/models/./models/camera/model.sdf
-- Installing: /usr/share/gazebo-9/models/./models/camera/model.config
-- Installing: /usr/share/gazebo-9/models/./models/camera/model-1_4.sdf
-- Installing: /usr/share/gazebo-9/models/./models/camera/model-1_3.sdf
-- Installing: /usr/share/gazebo-9/models/./models/camera/model-1_2.sdf
-- Installing: /usr/share/gazebo-9/models/./models/iris_with_standoffs
-- Installing: /usr/share/gazebo-9/models/./models/iris_with_standoffs/model.sdf
-- Installing: /usr/share/gazebo-9/models/./models/iris_with_standoffs/model.config
-- Installing: /usr/share/gazebo-9/models/./models/iris_with_standoffs/meshes
-- Installing: /usr/share/gazebo-9/models/./models/iris_with_standoffs/meshes/iris_prop_cw.dae
-- Installing: /usr/share/gazebo-9/models/./models/iris_with_standoffs/meshes/iris_prop_ccw.dae
-- Installing: /usr/share/gazebo-9/models/./models/iris_with_standoffs/meshes/iris.dae
-- Installing: /usr/share/gazebo-9/models/./models/coke_can
-- Installing: /usr/share/gazebo-9/models/./models/coke_can/materials
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-- Installing: /usr/share/gazebo-9/models/./models/arm_part/materials/textures/parts.png
-- Installing: /usr/share/gazebo-9/models/./models/arm_part/materials/scripts
-- Installing: /usr/share/gazebo-9/models/./models/arm_part/materials/scripts/arm_part.material
-- Installing: /usr/share/gazebo-9/models/./models/arm_part/model.sdf
-- Installing: /usr/share/gazebo-9/models/./models/arm_part/model.config
-- Installing: /usr/share/gazebo-9/models/./models/arm_part/meshes
-- Installing: /usr/share/gazebo-9/models/./models/arm_part/meshes/arm.dae
-- Installing: /usr/share/gazebo-9/models/./models/caffe_table
-- Installing: /usr/share/gazebo-9/models/./models/caffe_table/materials
-- Installing: /usr/share/gazebo-9/models/./models/caffe_table/materials/textures
-- Installing: /usr/share/gazebo-9/models/./models/caffe_table/materials/textures/Wood_Floor_Dark.jpg
-- Installing: /usr/share/gazebo-9/models/./models/caffe_table/materials/textures/Maple.jpg
-- Installing: /usr/share/gazebo-9/models/./models/caffe_table/model.sdf
-- Installing: /usr/share/gazebo-9/models/./models/caffe_table/model.config
-- Installing: /usr/share/gazebo-9/models/./models/caffe_table/model-1_4.sdf
-- Installing: /usr/share/gazebo-9/models/./models/caffe_table/meshes
-- Installing: /usr/share/gazebo-9/models/./models/caffe_table/meshes/caffe_table.dae
-- Installing: /usr/share/gazebo-9/models/./models/bus
-- Installing: /usr/share/gazebo-9/models/./models/bus/materials
-- Installing: /usr/share/gazebo-9/models/./models/bus/materials/textures
-- Installing: /usr/share/gazebo-9/models/./models/bus/materials/textures/bus.png
-- Installing: /usr/share/gazebo-9/models/./models/bus/model.sdf
-- Installing: /usr/share/gazebo-9/models/./models/bus/model.config
-- Installing: /usr/share/gazebo-9/models/./models/bus/meshes
-- Installing: /usr/share/gazebo-9/models/./models/bus/meshes/bus.obj
-- Installing: /usr/share/gazebo-9/models/./models/bus/meshes/bus.mtl
-- Installing: /usr/share/gazebo-9/models/./models/ambulance
-- Installing: /usr/share/gazebo-9/models/./models/ambulance/materials
-- Installing: /usr/share/gazebo-9/models/./models/ambulance/materials/textures
-- Installing: /usr/share/gazebo-9/models/./models/ambulance/materials/textures/ambulance.png
-- Installing: /usr/share/gazebo-9/models/./models/ambulance/model.sdf
-- Installing: /usr/share/gazebo-9/models/./models/ambulance/model.config
-- Installing: /usr/share/gazebo-9/models/./models/ambulance/meshes
-- Installing: /usr/share/gazebo-9/models/./models/ambulance/meshes/ambulance.mtl
-- Installing: /usr/share/gazebo-9/models/./models/ambulance/meshes/ambulance.obj
-- Up-to-date: /usr/share/gazebo-9/models/./worlds
-- Installing: /usr/share/gazebo-9/models/./worlds/taco_delivery.world
-- Installing: /usr/share/gazebo-9/models/./worlds/iris_arducopter_cmac.world
-- Installing: /usr/share/gazebo-9/models/./worlds/2_arucos.world
-- Installing: /usr/share/gazebo-9/models/./worlds/iris_arducopter_runway.world
-- Installing: /usr/share/gazebo-9/models/./worlds/aruco_landing.world
-- Installing: /usr/share/gazebo-9/models/./worlds/parking_lot.world
dronedodojo@dronedodojo:~/courseRoot/ardupilot_gazebo/build$ sudo ~/.bashrc
sudo: /home/dronedodojo/.bashrc: command not found
dronedodojo@dronedodojo:~/courseRoot/ardupilot_gazebo/build$ sudo gedit ~/.bashrc

```

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# enable programmable completion features (you don't need to enable
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
  if [ -f /usr/share/bash-completion/bash_completion ]; then
    . /usr/share/bash-completion/bash_completion
  elif [ -f /etc/bash_completion ]; then
    . /etc/bash_completion
  fi
fi
export courseRoot=/home/$USER/courseRoot
export apm=/home/$USER/courseRoot/apm
export PATH="/home/$USER/courseRoot/apm/ardupilot/Tools/autotest":$PATH

export GAZEBO_RESOURCE_PATH="/home/dronedodojo/courseRoot/ardupilot_gazebo":"/home/dronedodojo/
courseRoot/ardupilot_gazebo/worlds":"/usr/share/gazebo-9/"
export GAZEBO_MODEL_PATH="/home/dronedodojo/courseRoot/ardupilot_gazebo/worlds":"/usr/share/gazebo-9/
models"

source /usr/share/gazebo-9/setup.sh

```

```

dronedodojo@dronedodojo:~$ cd courseRoot/ardupilot_gazebo/
dronedodojo@dronedodojo:~/courseRoot/ardupilot_gazebo$ ls
build      include   media     README.md worlds
CMakeLists.txt LICENSE.md models    src
dronedodojo@dronedodojo:~/courseRoot/ardupilot_gazebo$ pwd
/home/dronedodojo/courseRoot/ardupilot_gazebo
dronedodojo@dronedodojo:~/courseRoot/ardupilot_gazebo$

```

```
export GAZEBO_MASTER_URI=http://localhost:11345
export GAZEBO_MODEL_DATABASE_URI=http://gazebo-sim.org/models
export GAZEBO_RESOURCE_PATH=/usr/share/gazebo-9:${GAZEBO_RESOURCE_PATH}
export GAZEBO_PLUGIN_PATH=/usr/lib/x86_64-linux-gnu/gazebo-9/plugins:${GAZEBO_PLUGIN_PATH}
export GAZEBO_MODEL_PATH=/usr/share/gazebo-9/models:${GAZEBO_MODEL_PATH}
export LD_LIBRARY_PATH=${LD_LIBRARY_PATH}:/usr/lib/x86_64-linux-gnu/gazebo-9/plugins
export OGRE_RESOURCE_PATH=/usr/lib/x86_64-linux-gnu/OGRE-1.9.0
```

```
export GAZEBO_MASTER_URI=http://localhost:11345
export GAZEBO_MODEL_DATABASE_URI=http://gazebo-sim.org/models
export GAZEBO_PLUGIN_PATH=/usr/lib/x86_64-linux-gnu/gazebo-9/plugins:${GAZEBO_PLUGIN_PATH}
export LD_LIBRARY_PATH=${LD_LIBRARY_PATH}:/usr/lib/x86_64-linux-gnu/gazebo-9/plugins
export OGRE_RESOURCE_PATH=/usr/lib/x86_64-linux-gnu/OGRE-1.9.0
```

```
-- Installing: /usr/share/gazebo-9/models/./worlds/parking_lot.world
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo ~/.bashrc
sudo: /home/dronedojo/.bashrc: command not found
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo gedit ~/.bashrc

** (gedit:13427): WARNING **: 23:09:53.982: Set document metadata failed: Setting attribute metadata:
:gedit-spell-language not supported

** (gedit:13427): WARNING **: 23:09:53.983: Set document metadata failed: Setting attribute metadata:
:gedit-encoding not supported

** (gedit:13427): WARNING **: 23:11:26.480: Set document metadata failed: Setting attribute metadata:
:gedit-position not supported
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo vi /usr/share/gazebo-9/setup.sh
[sudo] password for dronedojo:
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo sh -c 'echo "deb http://packages.ros.or
g/ros/ubuntu $(lsb_release -sc) main"
"deb: 1: "deb: 'echo: not found
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo sh -c 'echo "deb http://packages.ros.or
g/ros/ubuntu $(lsb_release -sc) main"
"deb: 1: "deb: 'echo: not found
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo sh -c 'echo "deb http://packages.ros.or
g/ros/ubuntu $(lsb_release -sc) main" > /etc/apt/sources.list.d/ros-latest.list'
bash: /etc/apt/sources.list.d/ros-latest.list: Permission denied
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo ~/.bashrc
sudo: /home/dronedojo/.bashrc: command not found
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo gedit ~/.bashrc

** (gedit:13655): WARNING **: 23:21:27.507: Set document metadata failed: Setting attribute metadata:
:gedit-position not supported
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo vi /usr/share/gazebo-9/setup.sh
```

```
-- Installing: /usr/share/gazebo-9/models/./worlds/parking_lot.world
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo ~/.bashrc
sudo: /home/dronedojo/.bashrc: command not found
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo gedit ~/.bashrc

** (gedit:13427): WARNING **: 23:09:53.982: Set document metadata failed: Setting attribute metadata:
:gedit-spell-language not supported

** (gedit:13427): WARNING **: 23:09:53.983: Set document metadata failed: Setting attribute metadata:
:gedit-encoding not supported

** (gedit:13427): WARNING **: 23:11:26.480: Set document metadata failed: Setting attribute metadata:
:gedit-position not supported
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo vi /usr/share/gazebo-9/setup.sh
[sudo] password for dronedojo:
dronedojo@dronedojo:~/courseRoot/ardupilot_gazebo/build$ sudo sh -c 'echo "deb http://packages.ros.or
g/ros/ubuntu $(lsb_release -sc) main"
"deb: 1: "deb: 'echo: not found
```

