Set up your laptop in Ubuntu

Zheng Rong @ Dec. 5 2014

---

install Ubuntu

```
sudo apt-get update
sudo apt-get upgrade
```

---

input method

language support
text entry setting
preference setting

---

set up the bash

REF

```
gedit ~/.bashrc
```

uncomment the line
from
#force_color_prompt=yes
to
force_color_prompt=yes

---

install logitech unifying

```
sudo add-apt-repository ppa:daniel.pavel/solaar
sudo apt-get update
sudo apt-get install solaar
```

install ROS

ROS

install vim

```
sudo apt-get install vim
```

set up the vim

- create (or edit) the .vimrc file:
  vim ~/.vimrc
- paste the configuration below into the file.

```
set tabstop=4       " The width of a TAB is set to 4.
                    " Still it is a \t. It is just that
                    " Vim will interpret it to be having
                    " a width of 4.
set shiftwidth=4    " Indents will have a width of 4
set softtabstop=4   " Sets the number of columns for a TAB
set expandtab       " Expand TABs to spaces
" set nu
syntax on
set autoindent      " auto indent
```

- restart vim

install sublime-text-3

```
sudo add-apt-repository ppa:webupd8team/sublime-text-3
sudo apt-get update
sudo apt-get install sublime-text-installer
```

install others

```
sudo apt-get install tex-live
sudo apt-get install tex-maker
sudo apt-get install skype
sudo apt-get install dropbox
sudo apt-get install everpad
sudo apt-get install Gparted
sudo apt-get install partitionmanager
sudo apt-get install retext
```

retext is a editor based on Markdown how to use retex

follow Ellen's note

install packages

```
sudo apt-get install swig
sudo apt-get install openjdk-7-jdk
sudo apt-get install flex
sudo apt-get install libboost-all-dev libboost-dev
sudo apt-get install libgsl0-dev
sudo apt-get install libeigen3-dev
sudo apt-get install libatlas-dev
sudo apt-get install libatlas-base-dev
sudo apt-get install libatlas3gf-base
```

install Armadillo

…by downloading it from the website, not via apt-get, and follow the instructions in the readme. Make sure to do all the –devs and parallel stuff it mentions.

http://arma.sourceforge.net/download.html

Update: Do NOT install OpenBLAS. OpenBLAS has a multi-threading affinity which results in the creation of threads when solving certain classes of problems. Unfortunately, this results in high overhead as the system rapidly creates, clones, and yields numerous threads. This issue is linux specific.

install yaml-cpp package

Again, download “yaml-cpp_0.5.1.tar.gz” from their website and install using the readme.

https://code.google.com/p/yaml-cpp/

install bison

Go to gnu project archives
download the “bison-2.5.tar.gz”

```
sudo apt-get install m4
```

go into bison-2.5/lib, open stdio.in.h, and find the following lines:

```
/* It is very rare that the developer ever has full control of
stdin, so any use of gets warrants an unconditional warning.
Assume it is always declared, since it is required by C89.  */
#if defined gets
#undef gets
_GL_WARN_ON_USE (gets, "gets is a security hole - use fgets
instead");
#endif
```

Comment out or delete the above lines. Finally,

```
./configure
make
```

```
sudo make install
```

install IPC

Download IPC & unpack it. IPC

Change IPC flag

set -fPIC flag as described on ipc_bridge doc

Find the ipc-3.9.1/etc/GNUmakefile.defs file.

Go to line 371.

Change:

```
$(CFLAGSM_$(DBMALLOC)) $(CFLAGS_EXT)
```

to be

```
$(CFLAGSM_$(DBMALLOC)) $(CFLAGS_EXT) -fPIC
```

Now, Install IPC

```
sudo make
```

(There are some errors displayed earlier in the make, but these do not appear to break the components we need)

manually copy some files to new folders

ipc3.9./{bin/Linux, lib/Linux*, include} to /opt/ipc/{bin,lib,include}

NOTE:
Do NOT add "LINUX*" directory in the destination directory when copying files from ipc

```
ipc3.9.*/{bin/Linux*, lib/Linux*, include}
```

to

```
/opt/ipc/{bin,lib,include}
```

install Matlab

---

install gperftools

google performance tools

---

setup printer in FRC.RI.CMU

If you have an SCS account there are several ways to print:

The prefered method is here.
In linux (Ubuntu):
Go to System -> Administration -> Printing
Click 'Add' Expand 'Network Printer'
Select 'LPD/LPR Host or Printer'
change the Host and Queue fields. Queue is the name of the printer.

Printer IP FQDN Model Location Host

```
boulder
128.2.177.195
boulder.prt.cs.cmu.edu
HP Color Laserjet 5550N
NSH 1100 (near FRC mailboxes)
cyan.srv.cs.cmu.edu

lightning
128.2.177.194
lightning.prt.cs.cmu.edu
HP Laserjet 9000N
NSH 1200 (near e-lab)
cyan.srv.cs.cmu.edu

mulch
128.2.177.211
mulch.prt.cs.cmu.edu    HP Laserjet 4350n
NSH 2200 (near FRC grad student offices and water cooler)
cyan.srv.cs.cmu.edu

prismCOLOR
128.2.177.208
prismcolor.prt.cs.cmu.edu
HP Color Laserjet 5550DN
NSH 1509 (near NSH 1st floor copy room and RoboLounge)
cyan.srv.cs.cmu.edu
```

---

install system monitor

```
sudo add-apt-repository ppa:fossfreedom/indicator-sysmonitor
sudo apt-get update
sudo apt-get install indicator-sysmonitor
sudo apt-get remove indicator-sysmonitor # to remove indicator sysmoni
sudo apt-get install indicator-multiload
```

---

use GitHub

ssh key

```
ls -al ~/.ssh
ssh-keygen -t rsa -C "your_email@example.com"
```

start the ssh-agent in the background eval "$(ssh-agent -s)" ssh-add ~/.ssh/id_rsa

command set

```
git add file-name
git commit -m "commit message"
git push

git rm file-name
git commit -m "remove a file"
git push

modify file-1
git commit file-1 -m "modify this file"
git push

git add file-names
git commit -a -m "creat"
git push
```

Wiki of px4

px4 quick start

NuttShell (NSH) via Seiral using the kermit:

Ref

```
sudo apt-get install ckermit
*Set your default settings to the correct settings for px4:*
echo "SET LINE /dev/ttyUSB0
SET SPEED 57600
SET CARRIER-WATCH OFF
SET FLOW-CONTROL NONE" > ~/.kermrc

~/.kermrc
ls /dev/ttyUSB*
sudo kermit
connect
enter
```

command:

```
ls
free
cd
```

quit:

```
Ctrl+\
C
quit
```

build and flash the firmware

```
cd ~/src
git clone https://github.com/PX4/Firmware
cd Firmware
*GitLab special start*
git clone git@nmichael.frc.ri.cmu.edu:px4/px4_patches.git
git checkout -b cmu_develop `cat px4_patches/px4_master_hash`
git apply --ignore-space-change --ignore-whitespace px4_patches/px4_ma
rm -fr src/modules/cmu_rc_command src/modules/cmu_pwm_command src/modu
git submodule add git@nmichael.frc.ri.cmu.edu:px4/cmu_rc_command.git s
git submodule add git@nmichael.frc.ri.cmu.edu:px4/cmu_voltage_monitor.
git submodule add git@nmichael.frc.ri.cmu.edu:px4/cmu_attitude_estimat
git clone https://github.com/PX4/NuttX
*GitLab special end*

git submodule init
git submodule update

*GitLab special*
vim makefiles/config_px4fmu-v1_default.mk

change line 129:
From:
MODULES                 += modules/cmu_pwm_command
To:
#MODULES                 += modules/cmu_pwm_command

cd ~/src/Firmware
make distclean
make archives
make
sudo usermod -a -G dialout $USER
Log out and log in in linux for changes to take effect. (Very Importan
make upload px4fmu-v1_default
```

The result should be:

working in [...]/Firmware/Images
Attempting to flash PX4FMU board via USB
Loaded firmware for 5,0, waiting for the bootloader...

When you see “waiting for the bootloader” press the “reset” button on the side of the PX4FMU. If the board is now connected & reset, the new firmware will be flashed.

Found board 5,0 on /dev/tty...
erase...
program...
verify...
done, rebooting.

Troubleshooting

Board not found (Affects mostly Ubuntu 12.10 users)

In case the board is not found, make sure you remove the modem-manager by:
sudo apt-get remove modemmanager

Permission Denied

If you have no permissions for /dev/ttyACM0 , make sure the user is in group dialout (as described above).

```
sudo usermod -a -G dialout $USER
```

Log out and log in in linux for changes to take effect. (Very Important!)

To find out the device name (if not /dev/ttyACM0), do a

```
ls /dev/tty*
```

when the bootloader is loading (first 5 seconds after reset).

install Qground control

Qgroundcontrol

github

installation instruction

px4 serial port mapping

ttyS (definition in the px4/microSD/etc/rc.txt) HW (defined in the px4 hardware user manual)

```
ttyS0 <==> HW-UART1
ttyS1 <==> HW-UART2
ttyS2 <==> HW-UART5
ttyS3 <==> HW-UART6

UART_1 --- FTDI
pin3 --- black--ground
pin7 --- yellow
pin8 --- orange
```

odroid cmu_mavlink

```
git clone cmu_mavlink
./update --devel
```

trouble shooting

Ref
odroid sandbox update failed like this: [12%] Performing download step (git clone) for 'mavlink'
Cloning into 'mavlink'...
fatal: unable to access 'https://github.com/mavlink/mavlink.git/': server certificate verification failed. CAfile: /etc/ssl/certs/ca-certificates.crt CRLfile: none
solution:
git config --global http.sslverify false

after the update:
catkin_make the dry; catkin_make the wet;

modify: vim cmu_mavlink/cmu_mavlink_only.launch
baudrate:230400
serialport:/dev/ttyUSB0

```
roslaunch cmu_mavlink cmu_mavlink_only.launch
rostopic list
rostopic hz /mavlink/att
rostopic echo /mavlink/att
```

Feedback control using Simulation via Matlab and IPC

download cmu_quad_matlab to sandbox

```
git clone
./update  --devel
```

compile the packages

solve the problem in vicon-mocap
goto: cmu-quad-matlab/dry/src/vicon_mocap/libvicon_driver/

Change the following line:

Line 24:

from:

```
set(USE_OLD_YAML_CPP_API TRUE CACHE BOOL "Use the old YAML-CPP API")
```

to:

```
set(USE_OLD_YAML_CPP_API FALSE CACHE BOOL "Use the old YAML-CPP API")
```

catkin_make wet, it depends on some packages in dry, so before the compile we should source dry directory. (solution to problem "can't find mavlink".)

. workon

mehtod_1: manually source: firstly souce dry, then source wet source ${TOP_DIR}/dry/install_isolated/setup.bash source ${TOP_DIR}/wet/devel/setup.bash
method_2: use workon add --extend to the second source line to make sure it works correctly. there is a space between . and workon in command line

let ROS talk to IPC-bridge

```
/opt/ipc/bin/central –u
```

run Matlab.simple_io_test.m

```
cd /cmu_quad_matlab/wet/src/matlab_quadrotor_example/matlab
```

NOTE
Be careful when trying to print out some information, which can greatly slow the processing speed.

run launch file

```
cd cmu_quad_matlab/wet/src/matlab_quadrotor_example/launch
roslaunch matlab_quadrotor_example simulation_test.launch
rostopic list
rostopic hz topic-name
rostopic echo topic-name
```

trouble shooting

rostopic echo /test/pd_cmd

ERROR: Cannot load message class for [quadrotor_msgs/PDCommand]. Are your messages built?

solution: source the directory using . workon in current terminal

---

Install mvBlueFOX camera driver on PC or Odroid

Matrix Vision mvBlueFOX Ref

Driver for odroid

Driver for Linux

install expat-2.1.0

```
mkdir build                 in the expat-2.1.0 project folder
cd build
cmake ..
make
sudo make install

./configure
make
sudo make install
```

install Linux camera driver mvBlueFOX-xxxxxxxxx

download 2 files and run the following command: chmod a+x install_mvBlueFOX.sh
./install_mvBlueFOX.sh

test using wxPropView

reboot
test via wxPropView

---

install ROS-camera driver matrixvision_camera on PC

1. git clone matrixvision_camera from ethz Github export ROS_PACKAGE_PATH=${ROS_PACKAGE_PATH}:~/ros_code/matrixvision_camera/
2. rosmake
3. add files and modify some code from Ke's matrixvision Gitlab
4. rosmake
5. modify the launch file in mv_camera (camera ID)
6. roslaunch launchfile-name
7. rostopic list make sure the stereo camera are publishing:

   /stereo/left/image_raw /stereo/left/camera_info /stereo/right/image_raw /stereo/right/camera_info
8. rostopic hz topic-name
9. rosrun image_view image_view image:=/stereo/left/image_raw

Difference between Ke and ethz: 1. copy from Ke to ethz: mv_camera/
{
CMakeLists.txt
launch
Makefile
manifest.xml
}
mv_camera/src
{
modify_camera_settings.cpp
stereo_time_reporter.cpp
}
2. comment some code: mv_camera/src/modify_camera_settings.cpp
comment the last 4 sessions(set master and slave mode)

copy camera calibration file test image_view test stereo_view

Install ROS-camera driver on Odroid

Before this step, we should install mvBlueFOX driver firstly.
1. git clone matrixvision_camera from ethz Github export ROS_PACKAGE_PATH=${ROS_PACKAGE_PATH}:~/ros_code/matrixvision_camera/
2. modify the make.sh file in the mv_driver folder ---Arkin see attached
3. copy 4 folder from mv_driver/mvIMPACT_acquire to /opt/ros/indigo/include DriverBase, mvDeviceManager, mvIMPACT_CPP, mvPropHandling sudo cp -r source-directory dest-directory
Note: the folder mv_driver/mvIMPACT_acquire will not exist until we rosmake it in directory matrixviaion_camera, but this rosmake will have some error.
4. rosmake it again, then it passed.
5. modify the code according to Ke's code component 6. rosmake
7. install ros-indigo-image-view package
8. modify the launch file in the mv_camera for the two cameras UID
9. roslaunch launchfile
10. rostopic list
11. rosrun image_view image_view image:=/stereo/left/image_raw

Difference between Ke and ethz: 1. copy from Ke to ethz: mv_camera/
{
CMakeLists.txt
launch

Makefile
manifest.xml
}
mv_camera/src
{
modify_camera_settings.cpp
stereo_time_reporter.cpp
}
2. comment some code: mv_camera/src/modify_camera_settings.cpp
comment the last 4 sessions(set master and slave mode)

make.sh

```
#!/bin/bash
#This make.sh is for Odroid armv7l. Zheng Rong Nov 10 2014

set -e

PACKAGE_DIR=$(rospack find mv_driver)
echo "### downloading and unpacking drivers to" $PACKAGE_DIR "###"

BLUEFOX_URL="http://www.matrix-vision.com/industries-reader/embedd

API=mvIMPACT_acquire

LINKER_PATHS=$PACKAGE_DIR/linker_paths
COMPILER_FLAGS=$PACKAGE_DIR/compile_flags

BLUEFOX_NAME=mvBlueFOX
TARGET=armv7l
BLUEFOX_VERSION=2.6.3
BLUEFOX_TARNAME=$BLUEFOX_NAME-$TARGET-$BLUEFOX_VERSION

# cleanup first
rm -rf $BLUEFOX_NAME* $API* tmp $LINKER_PATHS $COMPILER_FLAGS
rm -rf download
#### download driver archives ####
mkdir -p download
cd download
wget -O $BLUEFOX_TARNAME.tgz -nc $BLUEFOX_URL/$BLUEFOX_TARNAME.tgz

#### bluefox runtime ####
# unpack
mkdir -p $PACKAGE_DIR/tmp/$BLUEFOX_NAME
cd $PACKAGE_DIR/tmp/$BLUEFOX_NAME
tar -xf $PACKAGE_DIR/download/$BLUEFOX_TARNAME.tgz --overwrite

# copy blueFOX runtime libs
mkdir -p $PACKAGE_DIR/$BLUEFOX_NAME"_runtime/lib/"$TARGET
cp $PACKAGE_DIR/tmp/$BLUEFOX_NAME/$API-$TARGET-$BLUEFOX_VERSION/li

# copy udev rule
mkdir -p $PACKAGE_DIR/$BLUEFOX_NAME"_scripts"
cp $PACKAGE_DIR/tmp/$BLUEFOX_NAME/$API-$TARGET-$BLUEFOX_VERSION/Sc

echo -L$PACKAGE_DIR/$BLUEFOX_NAME"_runtime/lib/"$TARGET >> $LINKER
```

```
##### mvIMPACT (device independent stuff) #####===============  Ar
cd $PACKAGE_DIR
mv $PACKAGE_DIR/tmp/$BLUEFOX_NAME/$API-$TARGET-$BLUEFOX_VERSION $P
echo -L$PACKAGE_DIR/$API/lib/$TARGET >> $LINKER_PATHS
echo -I$PACKAGE_DIR/$API >> $COMPILER_FLAGS

#### clean up ####
rm -rf $PACKAGE_DIR/tmp

#### note down that this is done ####
touch $PACKAGE_DIR/downloadandinstall
```

Sychronization of the stereo camera

Here are the connections we have for stereo cameras

The pin number follows the link

Left: Master
Right: Slave

L7 -> L10 L9 -> R12 L8 -> R8 & R11

L: left, R:right (left camera is the one on your left when you stand behind the stereo camera pairs).

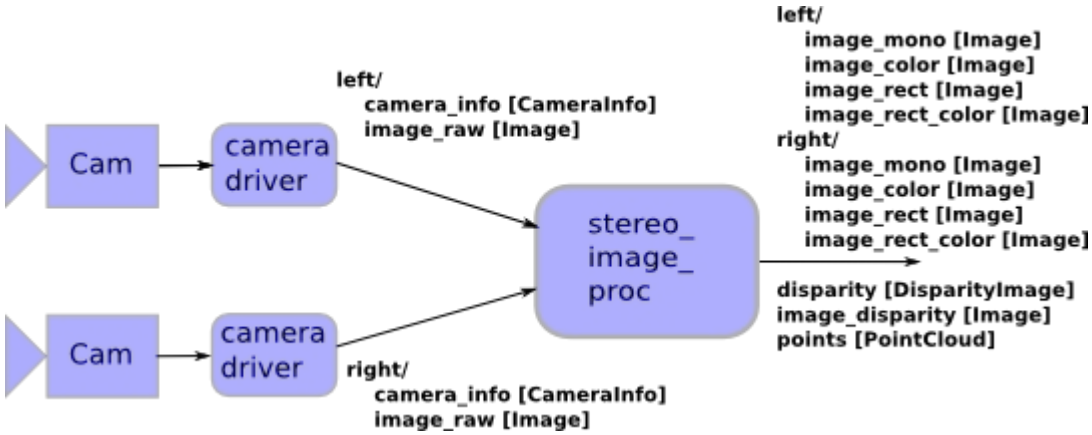
In the camera driver mv_camera: The cpp file "modify_camera_settings" should contain the stereo camera sync code(master and slave).

---

using Stereo Image proc & Image proc

Packages: Image view, Stereo image proc, Image proc

After running the camera driver (mv_stereo.launch, in matrixvision_camera/mv_camera):



1. rostopic list make sure the stereo camera are publishing:

   /stereo/left/image_raw /stereo/left/camera_info /stereo/right/image_raw /stereo/right/camera_info

2. start stereo_image_proc in another terminal:
   ROS_NAMESPACE=stereo rosrun stereo_image_proc stereo_image_proc
   _approximate_sync:=True

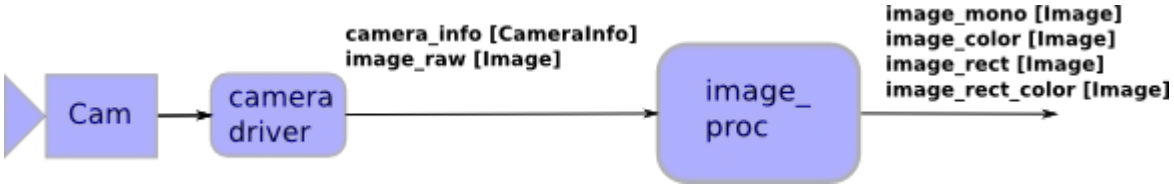
3. rostopic list
4. rostopic hz topic-name

5. see the iamge:
   image_view has 3 nodes: image_view, stereo_view, disparity_view

   rosrun image_view image_view image:=/stereo/left/image_raw
   rosrun image_view stereo_view stereo:=/stereo image:=image_raw
   _approximate_sync:=True
   rosrun image_view stereo_view stereo:=/stereo image:=image_rect
   _approximate_sync:=True
   rosrun image_view disparity_view image:=/stereo/disparity

Image_proc is for mono camera, and has 1 node: image_proc.

function: remove camera distortion, convert format



make sure the camera driver is running.

```
rostopic list | grep image_raw
ROS_NAMESPACE=stereo/left rosrun image_proc image_proc
rosrun image_view image_view image:=stereo/left/image_raw
rosrun image_view image_view image:=stereo/left/image_rect
```

Calibration for Stereo /Mono Camera

1. make sure the installation of camera_calibration
   rosdep install camera_calibration rosmake camera_calibration

2. run the mv_stereo to start the stereo camera
   export
   ROS_PACKAGE_PATH=${ROS_PACKAGE_PATH}:~/ros_code/matrixvision_camera/
   roslaunch mv_camera.launch

3. check the topic
   rostopic list

4. run the calibration node

   Stereo

   rosrun camera_calibration cameracalibrator.py --size 8x6 --square 0.152 --
   approximate=0.01 right:=/stereo/right/image_raw left:=/stereo/left/image_raw
   right_camera:=/stereo/right left_camera:=/stereo/left

   Mono

rosrun camera_calibration cameracalibrator.py --size 8x6 --square 0.152 image:=/stereo/left/image_raw camera:=/stereo/left

5. camera check

   rosrun camera_calibration cameracheck.py --size 8x6 stereo:=/wide_stereo image:=image_rect

   rosrun camera_calibration cameracheck.py --size 8x6 monocular:=/forearm image:=image_rect

6. check the stereo camera synchronization
   rosrun mv_camera stereo_time_reporter

Record dataset as bagfile for SVO

In the SVO package launch folder, there are several launch files:

```
svo_bag.launch              *use dataset to test SVO algorithm and out
svo_imu_stereo_bag.launch   *record dataset as bagfile*
svo_imu_stereo.launch       *camera driver for stereo configuration*
svo_online.launch           *online svo*
svo_stereo_proc.launch      *start stereo image processing*
```

1. run the camera driver

   ```
   roslaunch svo_imu_stereo.launch
   The node "cam_configurer" should be under the group with namespace
   In the matrixvision_camera/mv_camera/src/, the cpp file "modify_ca
   in the stereo_visual_odometry/wet/src/stereo_visual_odometry/confi
   ```

2. run stereo image proc

   ```
   roslaunch svo_stereo_proc.launch
   ```

3. run recording process

   ```
   roslaunch svo_imu_stereo_bag.launch bagfile:=pc_svo_nov17_6
   ```

You can specify the folder path of the bagfile output.

In the stereo_visual_odometry/wet/src/stereo_visual_odometry/config/oscar_camera_parameters.yaml, the projection matrices should be modified to match with the camera calibration result.

In the svo/src/visualOdometry.cpp choose if dispaly the visual_feature_tracking

---

Run sandbox/stereo_visual_odometry using bag-file

1. mkdir sandbox

```
cd sandbox
git clone URL
git branch -a
git checkout -d branchname
git branch
git diff
git fetch
git pull
git status
cd stereo_visual_odometry
./update --devel
```

2. set ROS_PACKAGE_PATH

   cd wet
   source devel/setup.bash
   env | grep ROS

   bug solution

   unset ROS_PACKAGE_PATH
   remove the build folder
   rebuild

   other methods

   . workon
   export ROS_PACKAGE_PATH=${ROS_PACKAGE_PATH}:~/sandbox/svo/wet

3. make
   catkin_make -DCMAKE_BUILD_TYPE=Release

4. roslaunch
   modify the launch file to fit for the bag file
   sandbox/svo/wet/src/svo/launch/
   roslaunch launch_name

5. rostopic rostopic list
   rostopic hz topic_name
   rostopic echo topic_name

6. rosnode rosbag info bag_name
   rosnode list
   rosnode info node_name

7. rosrun rosrun rviz rviz -d xxx.rviz

---

use the CPU_monitor to get CPU usage information on Odroid

1. download the package cpu_monitor and put it in the package collection folder cd sandbox/svo/wet/src git clone URL

2. install needed glibtop library
   sudo apt-get install libglib2.0-dev libgtop2-dev

3. make it
   catkin_make --pkg cpu_monitor #just make the specified package
4. modify the launch file
5. roslaunch svo_bag.launch output:=... input:=...

   rosbag info test_2014-11-14-11-15-33.bag rosbag play test_2014-11-14-11-15-33.bag
   rostopic echo /oscar/cpu_monitor/cpu_status
6. use Matlab slam_test_suite to plot the CPU usage.

---

use the google performance tool gperftools

1. download gperftools-2.1.tar.gz
2. install libunwind

   ./configure

   Error when making libunwind:
   /usr/include/bits/setjmp2.h:26: error: 'longjmp' aliased to undefined symbol '_longjmp'

   Solution: modify the makefile
   libunwind-1.0.1/src/Makefile
   add U_FORTIFY_SOURCE for the CPPFLAGS on line 608.

   before: CPPFLAGS = -D_GNU_SOURCE -DNDEBUG
   after: CPPFLAGS = -D_GNU_SOURCE -DNDEBUG -U_FORTIFY_SOURCE

   Ref
3. install gperftools

   install command sequence:
   ./configure
   make
   make install
   export LD_LIBRARY_PATH=${LD_LIBRARY_PATH}:/usr/local/lib

4. use

Example from Nate :-)

1. In CMakeLists, add link flags "profiler" and "tcmalloc"

```
target_link_libraries(${PROJECT_NAME) ${catkin_LIBRARIES} ... prof
```

2. In the entry point of your programme(i.e. stereo_visual_odometry_bag_process.cc)

```
#include <gperftools/profiler.h>
```

3. Wrap the entire node with: (should use the top level cc file)

```
int main(int argc, char** argv)
{
    ProfilerStart("output_file_name");
```

```
    ....
    ProfilerStop();
    return EXIT_SUCCESS;
}
```

4. Recompile with flag -DCPUPROFILE_FREQUENCY=1000

   ```
   catkin_make -DCPUPROFILE_FREQUENCY=1000
   ```

5. roslaunch the launch file and wait for completion
6. you will find the output_file_name.prof

   ```
   cd ~/.ros/
   ```

7. text output of the CPU analysis result

   ```
   pprof --text ~/ros_code/sandbox/stereo_visual_odometry/wet/devel/l
   ```

8. graphical output you can do

   ```
   pprof --gv ~/ros_code/sandbox/stereo_visual_odometry/wet/devel/lil
   ```

Add link flags rosbuild_add_link_flags() http://wiki.ros.org/rosbuild/CMakeLists/Examples

rosbuild_add_link_flags(target flags) :
http://wiki.ros.org/rosbuild/CMakeLists#rosbuild_add_link_flags

ROS_LINK_FLAGS: http://wiki.ros.org/rosbuild

Set up ROS connection between two computers through ssh

Master <= ROS => Slave

Note: all the operation can be done on the laptop.

- Laptop:

  ```
  ssh odroid@192.168.10.101(eth0) 200(wlan0)
  ```

- Odroid terminal: (Master)

  ```
  roscore
  export ROS_IP=192.....
  export ROS_HOSTNAME=${ROS_IP}
  export ROS_MASTER_URI=http://${ROS_IP}:11311
  ```

- Laptop terminal:

  ```
  export ROS_IP=laptop's IP
  export ROS_HOSTNAME=${laptop's ROS_IP}
  ```

```
export ROS_MASTER_URI=http://${odroid's ROS_IP}:11311
```

- In ssh connection:

  use scy command to copy file

  ```
  scp source_file odroid@192.168.10.101:~/.ros/camera_info/
  ```

---

write launch file

Vicon

NOTE:

the remap name from "~vicon" in "vicon_odom" must be the same with the name of topic "vicon" publishes. This will connect node "vicon" with node "vicon_odom". "vicon" publish the topic /vicon/base_obj with the type of vicon/subject "vicon_odom" should subscribe the /vicon/base_obj and then "vicon_odom" can publish the topic /vicon/odom with the type of nav_msg/Odometry

```
<!-- Vicon system, publish /vicon/base_obj -->
<node   pkg="vicon"
        type="vicon"
        name="vicon"
        output="screen">
<param name="vicon_server" value="192.168.10.1"/>
</node>
<!-- publish /vicon/base_obj -->

<!-- Specify a Vicon object -->

<node   pkg="vicon_odom"
        type="vicon_odom"
        name="$(arg baseline)_vicon_odom"
        output="screen">
<param name="frame_id/fixed" value="vicon"/>
<param name="frame_id/base" value="$(arg baseline)/base"/>
<remap from="~vicon" to="/vicon/base_obj"/>
<remap from="~odom" to="/vicon/odom"/>
</node>
```