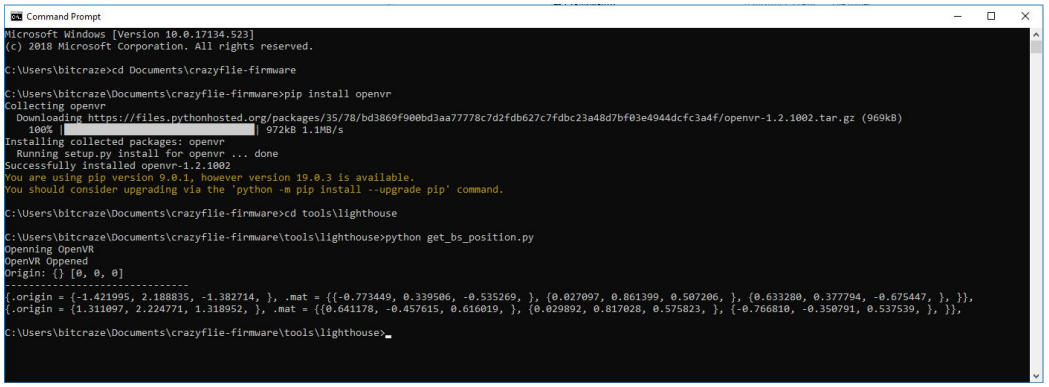
Setup

Bitcraze explanation: https://wiki.bitcraze.io/doc:lighthouse:setup

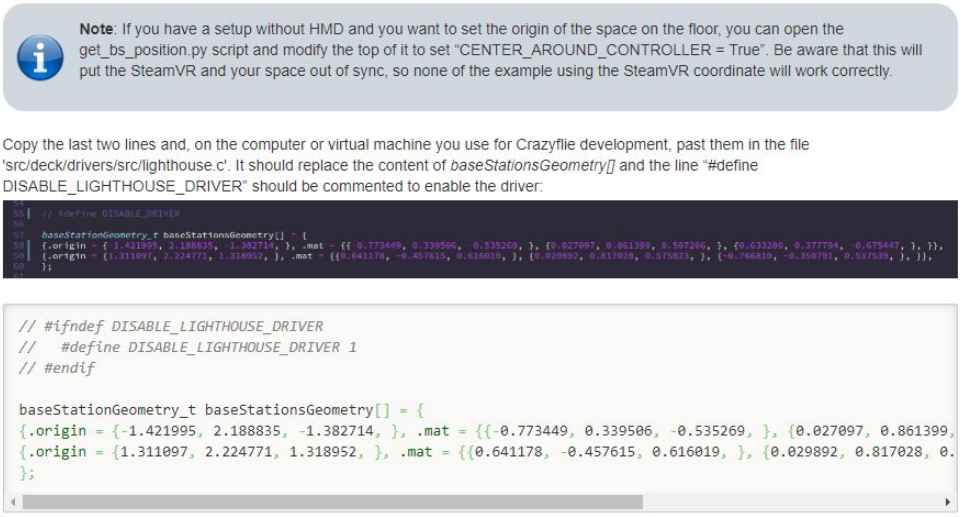
- Mount base stations in opposite corners of the flight space, angled ~30-40 degrees down at least 2 meters apart.
    - Set one base station to mode *b* and one to *c* by clicking the button on the back. Both stations should display a solid green light when working.
- Connect USB, power and video to computer and HMD through the Vive link box
    - Mini-HDMI-adapter for the Lenovo is found on the HDMI cable in the Vive box
- Launch SteamVR and make sure both base stations and HMD are solid green and tracking. The HMD must be set up as an extended display in Windows display settings.
- Position the HMD at the desired origin of the space. The X-axis of the space will be facing forward out of the HMD, and the origin will be ~40 cm above the HMD. Raise the display ~1.5-2 cm to align the Z-axis correctly.

- Open SteamVR settings -> developer
    - Hit quick calibrate to set the coordinate system.
    - Ensure the system is working correctly by opening Room Overview and moving the headset/controllers about.
    - Keep SteamVR running for the upcoming script
- Short version of compiling:
    - Open cygwin and navigate to this repo
    - Run *bash setup.sh* (with SteamVR running)
    - As soon as *"make: Går till…"* has been printed, close SteamVR to speed up compilation
- Long version of compiling:
    - Navigate to *crazyflie-firmware/tools/lighthouse*
    - Run the following python script (requires SteamVR running):
        - `python3 get_bs_position.py`

- The python script will give you the position of the base stations. Copy the two lines of coordinates starting with {.origin = …. , see figure below



- Close SteamVR
- Open the file *crazyflie-firmware/src/deck/drivers/src/lighthouse.c*
  - Paste the new coordinates and rotations in place of the old ones
  - Comment the line #define DISABLE_LIGHTHOUSE_DRIVER if that is not already done. See picture below



  - Save the file and compile the new firmware by running *make*
    - Full compilation can be done through the bitcraze VM or by following the instructions on https://github.com/bitcraze/crazyflie-firmware
    - This requires that python2 and python3 are available as commands pointing to their respective versions of python.
- Plug in the CrazyRadio (you can unplug the VR kit)
- Launch the Crazyflie Windows Client and upload the compiled file *crazyflie-firmware/cf2.bin* to all drones
  - Start the Crazyflie in bootloader mode by holding the on-switch until the blue light starts to flash (about 1,5 seconds).
  - Enter the current Crazyflie uri (0xE7E7E7E70n for drone n)
    - You can find/change uris through the Crazyflie Windows Client
  - Through the Crazyflie Client, click Connect -> Bootloader
  - Initiate bootloader cold boot
  - Load the *cf2.bin* and hit program (if this somehow fails, just rerun)
  - Restart in firmware mode once the binary has been uploaded

    - Restart drone again for good measure...
- Test coordinate system using Crazyflie client
    - Align the drone coordinate system to the global one when restarting
    - Connect to drone
    - Go into plotter (enable tab through View-Tabs-LOG/Plotter)
    - Select “Lighthouse” from the drop-down
    - Positions from stateEstimate X Y Z should correspond to global X Y Z.

To start the control software, open PyCharm and run the *GUI* configuration as debug

First time setup

- Install Steam
    - Install SteamVR
- Install python 3.7.X x86 (32 bit)
    - Make a copy of python.exe and name it python3.exe
    - Crazyradio will not work using python 64 bit, make sure environment path points to 32 bit version
    - “which python” should return this directory
- Install python 2.7
    - Add to environment path
    - Make a copy of python.exe and name it python2.exe
- Install cygwin with packages git and make (make sure python does not install)
- Install PIP for python3 installation using get-pip.py
- Install packages through pip:
    - cflib
    - numpy
    - scipy
    - openvr
- Install Zadig from https://zadig.akeo.ie/
- Install radio driver using Zadig
    - Options -> List all devices
    - Choose Crazyradio PA USB Dongle
    - *libusbK* should work, otherwise try *libusb-win32*
- Initialize all the submodules of this repo
    - *git submodules init*
    - *git submodules update*
- Prepare for compilation by following the platform-specific instruction in https://github.com/bitcraze/crazyflie-firmware