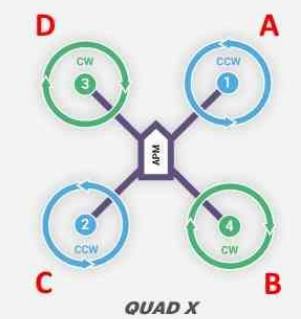
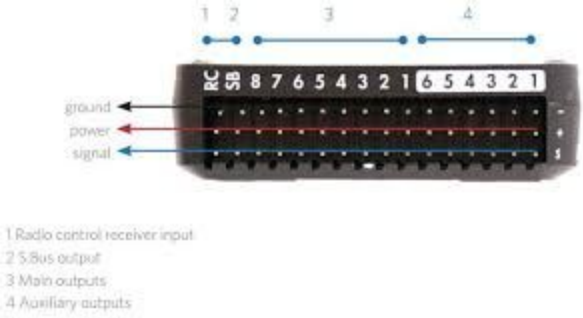
Hardware Setup:
Connections:
https://www.youtube.com/watch?v=y5oy5K89pRo





Transmitter Receiver:
https://www.youtube.com/watch?v=1IYg5mQdLVI
https://www.youtube.com/watch?v=oJXETHp2IsE

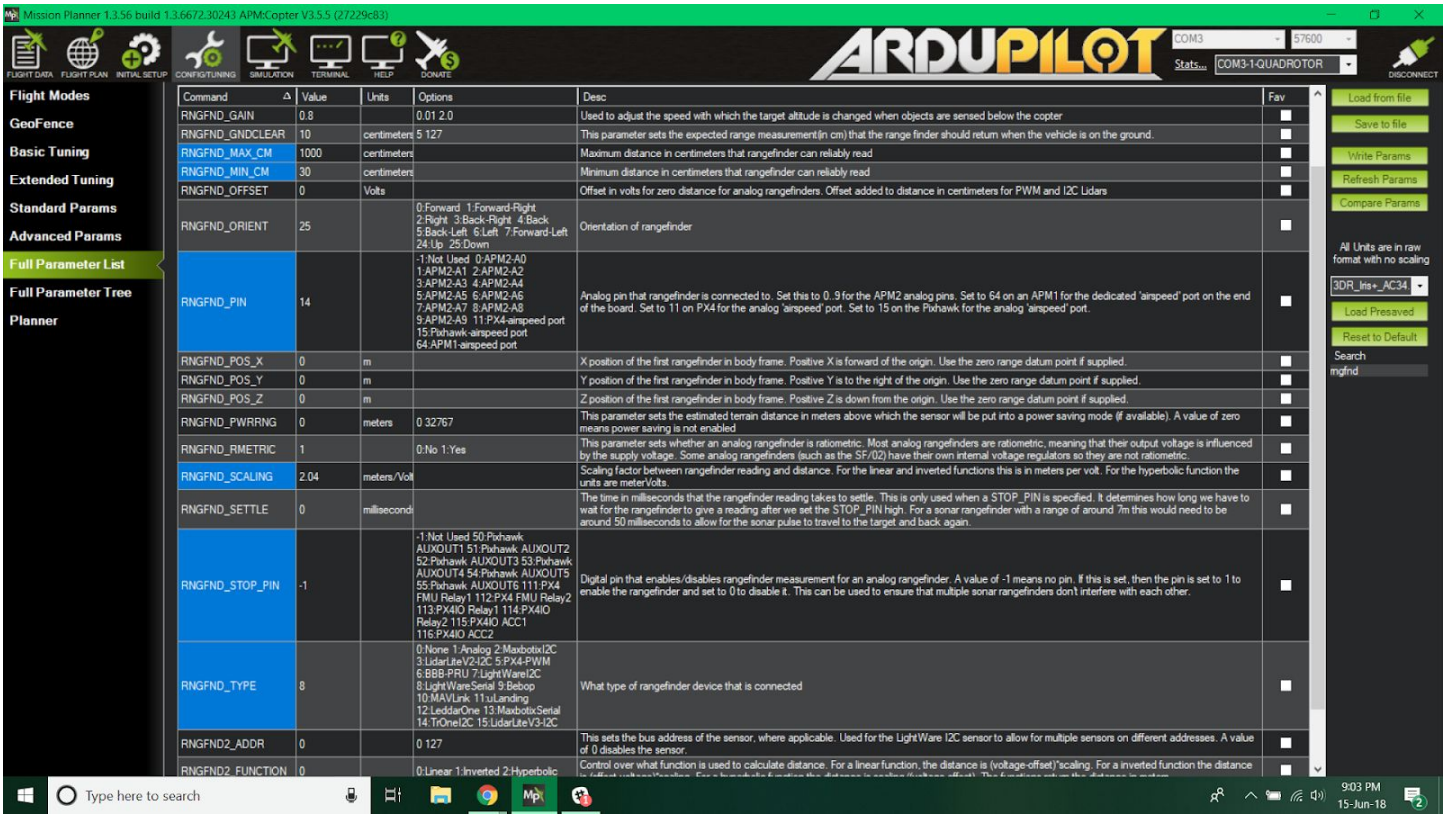
ESC calibration:
https://www.youtube.com/watch?v=fqShXmxInpk

Sonar:
https://www.youtube.com/watch?v=FUT-ZsKGtxI
(documentation as well)

Maxbotix Sonar:
Connections: http://ardupilot.org/copter/docs/common-rangefinder-maxbotixi2c.html

LIDAR Lite v3:
http://static.garmin.com/pumac/LIDAR_Lite_v3_Operation_Manual_and_Technical_Specifications.pdf
(Connections are correct)
http://ardupilot.org/copter/docs/common-rangefinder-lidarlite.html (Connections are wrong, refer for parameters)
Connections: Brown is group in three-jumper (AUX6), orange is ground & brown (AUX5)

TF Mini:
http://www.instructables.com/id/Benewake-LiDAR-TFmini-Complete-Guide/



Command	Value	Units	Options	Desc	Fav
RNGFND_GAIN	0.8		0.01 2.0	Used to adjust the speed with which the target altitude is changed when objects are sensed below the copter	
RNGFND_GNDCLEAR	10	centimeters	5 127	This parameter sets the expected range measurement(in cm) that the range finder should return when the vehicle is on the ground.	
RNGFND_MAX_CM	1000	centimeters		Maximum distance in centimeters that rangefinder can reliably read	
RNGFND_MIN_CM	30	centimeters		Minimum distance in centimeters that rangefinder can reliably read	
RNGFND_OFFSET	0	Volts		Offset in volts for zero distance for analog rangefinders. Offset added to distance in centimeters for PWM and I2C Lidars	
RNGFND_ORIENT	25		0:Forward 1:Forward-Right 2:Right 3:Back-Right 4:Back 5:Back-Left 6:Left 7:Forward-Left 24:Up 25:Down	Orientation of rangefinder	
RNGFND_PIN	14		-1:Not Used 0:APM2-A0 1:APM2-A1 2:APM2-A2 3:APM2-A3 4:APM2-A4 5:APM2-A5 6:APM2-A6 7:APM2-A7 8:APM2-A8 9:APM2-A9 11:PX4-airspeed port 15:Pixhawk-airspeed port 64:APM1-airspeed port	Analog pin that rangefinder is connected to. Set this to 0..9 for the APM2 analog pins. Set to 64 on an APM1 for the dedicated 'airspeed' port on the end of the board. Set to 11 on PX4 for the analog 'airspeed' port. Set to 15 on the Pixhawk for the analog 'airspeed' port.	
RNGFND_POS_X	0	m		X position of the first rangefinder in body frame. Positive X is forward of the origin. Use the zero range datum point if supplied.	
RNGFND_POS_Y	0	m		Y position of the first rangefinder in body frame. Positive Y is to the right of the origin. Use the zero range datum point if supplied.	
RNGFND_POS_Z	0	m		Z position of the first rangefinder in body frame. Positive Z is down from the origin. Use the zero range datum point if supplied.	
RNGFND_PWRRNG	0	meters	0 32767	This parameter sets the estimated terrain distance in meters above which the sensor will be put into a power saving mode (if available). A value of zero means power saving is not enabled	
RNGFND_RMETRIC	1		0:No 1:Yes	This parameter sets whether an analog rangefinder is ratiometric. Most analog rangefinders are ratiometric, meaning that their output voltage is influenced by the supply voltage. Some analog rangefinders (such as the SF/02) have their own internal voltage regulators so they are not ratiometric.	
RNGFND_SCALING	2.04	meters/Volt		Scaling factor between rangefinder reading and distance. For the linear and inverted functions this is in meters per volt. For the hyperbolic function the units are meterVolts.	
RNGFND_SETTLE	0	milliseconds		The time in milliseconds that the rangefinder reading takes to settle. This is only used when a STOP_PIN is specified. It determines how long we have to wait for the rangefinder to give a reading after we set the STOP_PIN high. For a sonar rangefinder with a range of around 7m this would need to be around 50 milliseconds to allow for the sonar pulse to travel to the target and back again.	
RNGFND_STOP_PIN	-1		-1:Not Used 50:Pixhawk AUXOUT1 51:Pixhawk AUXOUT2 52:Pixhawk AUXOUT3 53:Pixhawk AUXOUT4 54:Pixhawk AUXOUT5 55:Pixhawk AUXOUT6 111:PX4 FMU Relay1 112:PX4 FMU Relay2 113:PX4IO Relay1 114:PX4IO Relay2 115:PX4IO ACC1 116:PX4IO ACC2	Digital pin that enables/disables rangefinder measurement for an analog rangefinder. A value of -1 means no pin. If this is set, then the pin is set to 1 to enable the rangefinder and set to 0 to disable it. This can be used to ensure that multiple sonar rangefinders don't interfere with each other.	
RNGFND_TYPE	8		0:None 1:Analog 2:MaxbotixI2C 3:LidarLiteV2-I2C 5:PX4-PWM 6:BBB-PRU 7:LightWareI2C 8:LightWareSerial 9:Bebop 10:MAVLink 11:uLanding 12:LeddarOne 13:MaxbotixSerial 14:TrOneI2C 15:LidarLiteV3-I2C	What type of rangefinder device that is connected	
RNGFND2_ADDR	0		0 127	This sets the bus address of the sensor, where applicable. Used for the LightWare I2C sensor to allow for multiple sensors on different addresses. A value of 0 disables the sensor.	
RNGFND2_FUNCTION	0		0:Linear 1:Inverted 2:Hyperbolic	Control over what function is used to calculate distance. For a linear function, the distance is (voltage-offset)*scaling. For a inverted function the distance	

Parameters: https://docs.px4.io/en/sensor/rangefinders.html
Connections: http://ardupilot.org/copter/docs/common-benewake-tfmini-lidar.html

Erle Brain Pains:
No orange light on startup:http://forum.erlerobotics.com/t/apm-does-not-auto-launch-at-bootup/2562/7
http://forum.erlerobotics.com/t/erle-brain-3-esc-calibration/2503/8

MP warnings:
Bad AHRS
Error pos vert variance EK2_HGT_USE=50
EKF primary changed :1
Error terain alt variance: EK2_HGT_USE=50
Throttle below failsafe: Power receiver or Disable failsafe
Prearm checkrangefinder: Lift quad to a height after powering

Software:
PID:
http://robotsforroboticists.com/pid-control/
https://robotics.stackexchange.com/questions/167/what-are-good-strategies-for-tuning-pid-loops

PX4Flow:

https://discuss.ardupilot.org/t/px4-flow-bad-health-problem/25524/4
https://discuss.ardupilot.org/t/px4-flow-bad-health-problem/25524/13
https://discuss.ardupilot.org/t/help-link-is-broke-i-cant-download-px4flow-klt-px4flow-klt-06dec2014-px4-firmware/26348/2
https://pixhawk.org/dev/px4flow

Arducopter:
http://ardupilot.org/copter/docs/parameters.html

USB_CAM:
https://answers.ros.org/question/197651/how-to-install-a-driver-like-usb_cam/

WiFI Transfer:
http://wiki.ros.org/ROS/NetworkSetup
http://wiki.ros.org/ROS/Tutorials/MultipleMachines

MAVROS:
rosrun mavros mavsys rate --all 10
rosservice call /mavros/set_stream_rate 0 10 1

Gazebo:
https://dev.px4.io/en/simulation/ros_interface.html
http://docs.erlerobotics.com/simulation/vehicles/erle_copter/tutorial_3
http://forum.erlerobotics.com/t/compiling-ros-packages-that-use-mavros/178/9
https://github.com/ArduPilot/MAVProxy/issues/11

param load /home/tinkerers-lab/simulation/ardupilot/Tools/Frame_params/Erle-Copter.param

Odroid:
https://github.com/jurobystricky/Netgear-A6210/issues/98
https://github.com/mavlink/mavros/issues/929
https://github.com/mavlink/mavros/issues/944
nmap -sn 192.168.0.0/24
Auto-login: https://forum.odroid.com/viewtopic.php?f=136&t=22272

Error:
https://community.emlid.com/t/no-data-published-on-mavros/7468/2
http://forum.erlerobotics.com/t/failing-to-compile-ros-erle-takeoff-land-ros-package/3098/2

Pixhawk Instructions:

1. Install firmware

2. Do calibration
    a. Accelerometer
    b. Compass
    c. Radio
    d. Change modes
3. Change parameters:
    a. Lidar Lite v3
        i. RNGFND_TYPE = 5
        ii. RNGFND_STOP_PIN = 55
        iii. BRD_PWM_COUNT = 4
        iv. RNGFND_SCALING = 1
        v. RNGFND_OFFSET = 0
        vi. EK2_RNG_HGT_USE = 50
    b. PX4Flow
        i. opt_flow: Enable
        ii. ek2_gps_type: 3
        iii. imu_mask_aid: 7 (For PH2)

N3:

- ESC: Should be 400 Hz
- Check which receivers can be used with it. Mostly any, confirm. (DJI Lightbridge 2)
- Can the GNSS module be removed?
  Intelligent Landing Gear
- Fake GPS in N3?

  Intelligent Flight Modes (using the Remote Controller)

  Intelligent Flight Modes make it easier to operate the aircraft. If you are not using a Lightbridge 2 remote controller, you will need to configure a 3-position switch on the remote controller as the Intelligent Flight Modes Switch, with each switch position corresponding to one of the following modes: Off, Course Lock, or Home Lock.
-
- DJI Credits

- https://developer.dji.com/onboard-sdk/documentation/sample-doc/sample-setup.html#ros-onboard-computer
- http://developer.dbeta.me/onboard-sdk/documentation/development-workflow/environment-setup.html
- http://developer.dbeta.me/onboard-sdk/documentation/guides/component-guide-flight-control.html
- Mobile, Onboard SDK
- https://github.com/dji-sdk/Onboard-SDK
- https://developer.dji.com/onboard-api-reference/index.html

- https://github.com/dji-sdk/Onboard-SDK-ROS/blob/3.1/dji_sdk_doc/Appendix.md
- ZMART Github
    - https://github.com/newbie-zju/DJI-SDK-ROS-zmart/blob/master/dji_sdk_lib/src/DJI_Follow.cpp
    - https://github.com/newbie-zju/DJI-SDK-ROS-zmart/blob/master/dji_sdk_doc/whatToKnowI.md
    - https://github.com/dji-sdk/Onboard-SDK-ROS/blob/3.1/dji_sdk_doc/Appendix.md

- Keep checking:
    - https://gitter.im/dji-sdk/Onboard-SDK
    - DJI Forum
    - https://answers.ros.org/question/305425/send-gps-data-to-from-computer/
    - http://forum.erlerobotics.com/t/how-can-i-send-gps-data-converted-from-3d-slam-to-erle-copter/1903/2

http://ardupilot.org/dev/docs/ros-slam.html
https://answers.ros.org/question/65381/serial-communication/

http://www.catb.org/gpsd/gpsfake.html
http://www.catb.org/gpsd/

QGroundControl:
https://docs.qgroundcontrol.com/en/getting_started/download_and_install.html

- error while loading shared libraries: libSDL2-2.0.so.0: cannot open shared object file: No such file or directory
    - https://github.com/red-eclipse/base/issues/634

MAVROS installation:
https://dev.px4.io/en/ros/mavros_installation.html

- catkin: command not found
    - sudo apt-get install python-catkin-pkg python-catkin-tools
- This script require root privileges!
    - write sudo before command

https://dev.px4.io/en/ros/external_position_estimation.html

Compilation error related to mavros package:
Add mavros_msgs in find_package in CMakeLists
export CMAKE_PREFIX_PATH=/home/trishant/mavros_ws/devel/:$CMAKE_PREFIX_PATH

Building the code: https://dev.px4.io/en/setup/building_px4.html
https://github.com/PX4/Firmware/issues/9863
https://github.com/neovim/neovim/issues/2248