**Nerdies Droids and Drones**

**Instructions for Flight**

Friday July 18, 2014

Frame build instructions:

Please follow the frame building instructions found in the documents provided. In particular, refer to FrameBuildInstructions.pdf. The online reference <http://www.martin-gardner.co.uk/x525-quadcopter-build-setup-test/#quadcopterkit> is also a great resource as it lists items commonly purchased with the drone.

Following is the steps to get the drone ready for flight. **Do not put the propellers on until immediately before flight! Do not apply LiPo battery power without Nerdies mentor or adult supervision!**

Electronics programming:

* Plug the 6 pin (2 x 3) female header into the 6 pin male header on the KK board (please see the Pictorial Tutorial diagram). A blue light should blink when the power is connected. If not, reverse the direction of the header. Choose the blackboard with the ATMEGA168 with 16K memory. Make sure that USBasp is chosen as the programmer. Flash the KK board with the KK4.7 flight firmware. The log should return that flashing was successful.
* Load the Arduino program “bluetooth\_at\_commands” to program the name and speed of the Bluetooth module. The first time you run the program, make sure that the baud rate is correctly chosen. If it has never been programmed before, the baud rate should be 9600 for the Bluetooth connection. Once the program is loaded onto the Arduino, chose “Tools” from the menu and then “Serial Monitor.” You should see a response “OK.” Type “AT+NAMEMYNAME” without the quotes and replace MYNAME with your name. Next, type “AT+BAUD6” without the quotes to set the baud rate to 34800. After this, you will not be able to communicate with your Bluetooth module unless you modify the baud rate of the Arduino program to communicate at 34800 instead of 9600.
* Load the nerdiesArduino program onto your Arduino. You will have had to installed Arduino 1.0.5 on your computer beforehand.
* Load the nerdiesAndroid program onto your Android device. If you changed the deviceID in the Arduino program, change it accordingly in the Android program. The default value is 32. You will have had to installed Processing 2.0.3 on your computer. Remember that this also requires the Ketai\_v8 and oscP5 libraries. You can load the oscP5 library by adding libraries in Processing but the Ketai library has to be manually placed in the Processing library folder under the (my) documents folder. Also, you will need to select and download API 10 of Android in the Android SDK. Please refer to the Processing for Android wiki for further Processing installation instructions. Please refer to the Ketai Google Code installation instructions for further Ketai installation instructions.
* Run the Android program and search for the Bluetooth module. You should have already paired to the Bluetooth module on your phone (pin 1234).

Calibrating the ESCs:

* Before flight, each ESC will need to be calibrated so they know the full range of the transmitter. To calibrate the ESC with your Android mobile device, do as you would with a regular transmitter by turning the throttle to max before you apply the LiPo battery power. Disconnect all wires from Arduino to KK board. Attach the throttle signal pin from the Arduino to the ESC signal pin. Also connect the ESCs 5V and ground pins to the corresponding Arduino pins. When you plug in the LiPo, you should hear two beeps from the motors. At this point, you can bring the throttle all the way down. The ESC will respond with acknowledging beeps (like “dee dee deeeet…[pause]…deet”).
* After the calibration of the ESCs, you will need to calibrate them again through the KK board. Adjust your yaw gain to zero (usually all the way CW after flashing the KK board firmware). Attach the ESCs to the KK board appropriately (see “Pictorial Tutorial” instructions). Before attaching the LiPo battery, connect your Arduino to an external power source (probably a computer) and connect the Bluetooth module to the Android program and have the throttle at maximum. You should attach the GND wire to your Arduino but not the 5V wire (or else the KK board will come on). Plug the LiPo in and you should see two blinks on the KK board. After this, bring the throttle to a minimum. Test to see if the motors spin up at the same time. If not, then repeat the ESC calibration steps as much as necessary to do so. At this time, you can also see if the motors are spinning in the correct direction (see “Pictorial Tutorial” instructions).

Flight:

Disconnect power and set the yaw back to the center. Attach the 5V pin from the KK board to the Arduino. You are now ready for flight! Attach the propellers and connect the battery under Nerdies mentor or adult supervision only. Run the Android program and connect to the Bluetooth module. Holding the phone flat with respect to the ground, arm the drone by placing the sphere in the lower right corner of the box on the screen of the Android device. If armed, a blue light should be lit on the KK board. Next, slowly apply throttle power by moving the sphere away from you and maneuver your drone by tilting the Android device for pitch and roll control. The yaw can be trimmed by moving the sphere to the left or right during flight. To disarm the drone move the sphere to the lower left corner of the box on the Android display.

Additional Notes:

Much more information can also be found in the comments of the nerdiesArduino and nerdiesAndroid programs. Read these comments, understand them, fly the drone, edit the programs, fly the drone again, and publish the results on your website or blog! You’re on your way to becoming a programming and drone genius!