KAPtery SkyPod Kit

This kit can be assembled into a data logger which will save GPS coordinates (lat, lon, altitude), barometric pressure, and temperature data to a microSD card. It comes complete with everything needed to start logging data (except four AAA batteries). See more info and a link to assembly notes at http://kaptery.com/guides.

Parts List:

- u-blox NEO 7M GPS breakout board and antenna
- Arduino Nano compatible microcontroller
- microSD module
- microSD card
- BMP280 barometric pressure and temperature sensor (3.3v only)
- switched case for four AAA batteries
- USB cable for leading sketches onto Arduino Nano
- 3D printed SkyPod housing
- lots of 24 awg stranded wire (various colors)
- heat shrink tubing
- Velcro for securing the GPS antenna to the SkyPod housing
- machine screw for securing the Nano in its slot
- 2 screws for attaching the housing to a camera rig
- cotter pin to secure the GPS and SD boards to the housing
- cotton ball for protecting the sensor

Assembly:

Follow the wiring diagram to connect the printed circuit boards (PCBs) with the included wires. To start, place the PCBs into the SkyPod housing to determine how long each wire should be. Some wires can be as short as 6 cm, and some should be about 10 cm.

A. The Arduino Nano should have the USB port toward the front where the "SkyPod" imprint is.
B. The GPS board must have the wire connection holes toward the back.
C. The GPS antenna is attached to the top of the housing with adhesive-backed Velcro.
D. The microSD board has a connection header at the back and the SD card can be accessed from the front of the housing (press to release card).
E. Sensors are inserted from the open back of the sensor pod. The included 3.3v BMP280 sensor must be wired to the 3v3 (3.3 volt) pin (not the 5V pin) on the Nano.
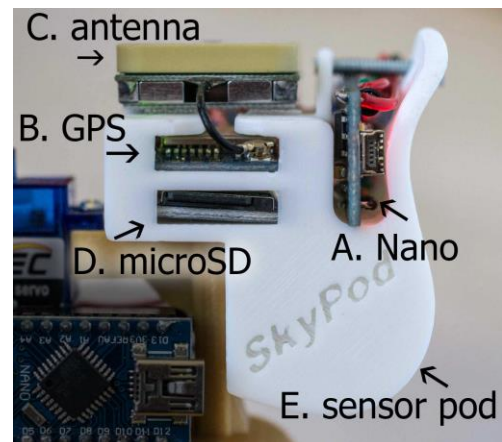
Soldering tips:

Place the four PCBs in their proper slots to determine how long each wire should be. Extra wire can loop around behind the SkyPod housing, so the lengths do not have to be exact, but make sure they are long enough to allow each PCB to be inserted properly.

There are no header pins on the Nano or GPS board and wires should be soldered directly to the holes in the PCBs. Insert and solder all wires on the top side of the Nano and trim the wire ends if needed after soldering to improve the fit in the housing. Header pins are present on the microSD board and wires can be soldered to the pins. Use the included heat shrink tubing on each pin to cover the exposed metal.

Two or three of the pin holes on the Nano (5V, GND, and/or the other GND) will have more than one wire soldered to them.

Wires connected to the Nano must be bent close to the PCB so it will fit into the housing.

Assembly tips:

The SkyPod housing can be attached to the corner of a camera rig with two small screws. Use a small Phillips head screwdriver with a long, thin shaft. This must be done when the PCBs are not in the housing, so solder everything together first, then remove the wired PCBs and screw the housing to the rig.

Cover the bottom of the GPS antenna with adhesive backed Velcro. Adhere strips of mating Velcro on either side of the slot on top of the housing for attaching the antenna. The antenna can be plugged in to the GPS PCB before or after the PCB is slid into the housing.

When the GPS and microSD PCBs are in place, a cotter pin (included) can be inserted from the top of the housing down through holes in the front corner of both PCBs. This will lock the PCBs in place.

To hold the Nano in place, insert the flathead machine screw so it passes over the Nano and threads into the hole in the plastic tab at the top of the housing. Take care not to strip the threads—the screw does not have to be tight.

A cotton ball is included for plugging the opening to the sensor pod. This can prevent wind from introducing noise to the pressure and temperature data.

Power:

The Arduino Nano can be powered with 6 to 12 volts. Four AAA batteries supply ample power for several hours of logging data.

Testing:

A sketch has been loaded onto the Nano. When the SkyPod components are connected properly, they will start logging data as soon as the power is turned on. It will take a couple of minutes for the GPS to find satellites and start providing real location data. A clear view of the sky is required to get signals from the satellites. A green LED on the GPS board will flash when the board has a fix on satellites.

Data from the GPS and from the pressure/temperature sensor will be saved to the microSD card about every four seconds. To check operation, turn off the power, remove the microSD card, and use a computer to examine the contents of the file named "gpsbmp.txt."

Modifying the sketch:

To edit the sketch, a copy can be downloaded here: http://kaptery.com/guides/. You will need the Arduino IDE or web based editor, both available free here: https://www.arduino.cc/en/Main/Software. To load your new sketch onto the Arduino Nano, connect the Arduino Nano to a computer with the supplied USB cable.