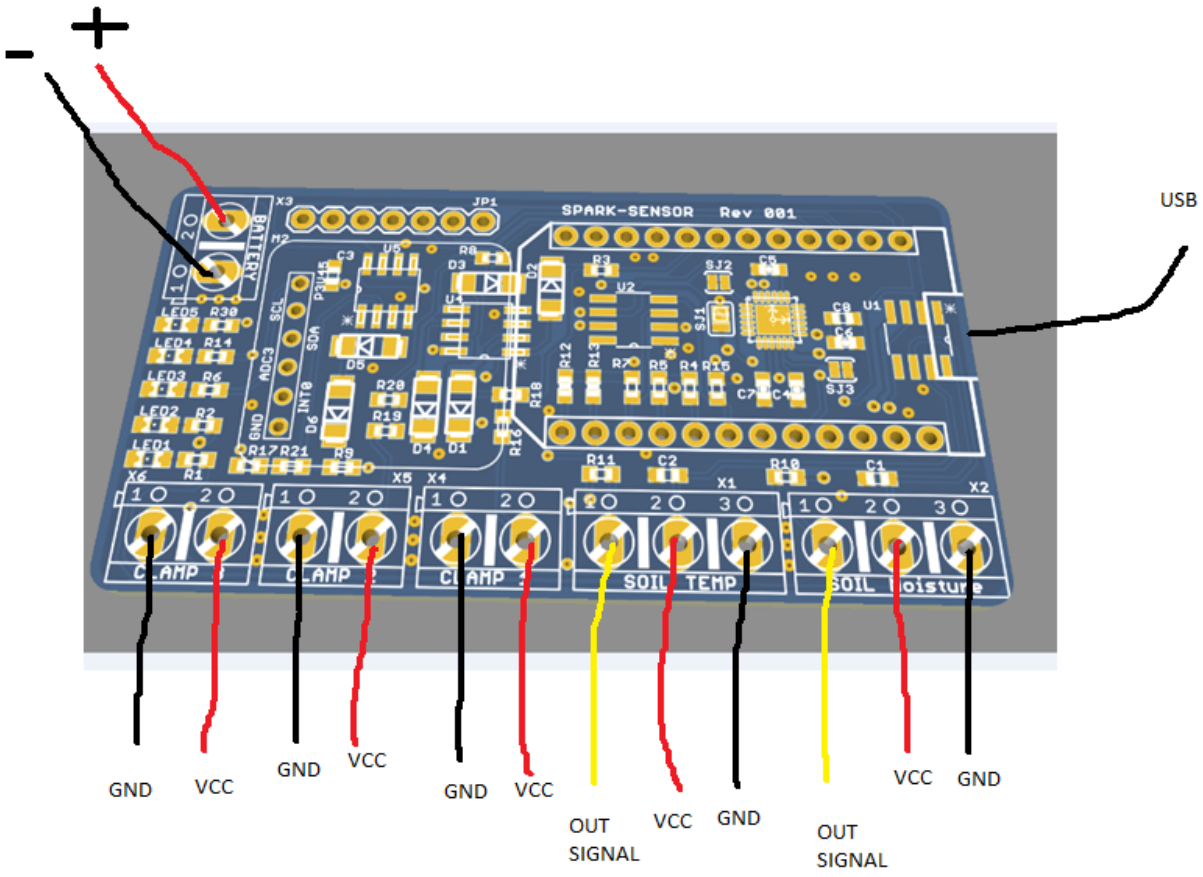
RUSK-r001 Usage Notes



Battery/Power

Battery Connector “X3” 3.3V to 5.5V DC max power source.

1.) Remove or disconnect USB cable from the SparkIO when battery connector is used. They cannot be connected simultaneously.
2.) Two independent power supply. 1st from USB cable, 2nd from battery through Battery connector X3.

Electrical Induction Clamps 1, 2, 3

For CR3100 type induction clamps (See: http://www.crmagnetics.com/pdf/3110.pdf and http://people.ece.cornell.edu/land/courses/eceprojectsland/STUDENTPROJ/2009to2010/csm44/DESIGN_REPORT.pdf). Connect two wires from the clamps to CLAMP1/2/3 (see chart above) and read the 12-bit representation of the analog input. You will need to apply the described formulas to calculate values.

SOIL Temperature

For Vegetronix Soil Temperature Sensor Probes (THERM200: http://vegetronix.com/Products/THERM200/). You will need to connect the THREE wires to SOIL TEMP (see chart below): BARE = GND, RED = VCC, BLACK = OUT SIGNAL

SOIL Moisture

For Vegetronix Soil Temperature Sensor Probes (VH400: http://vegetronix.com/Products/VH400/). You will need to connect the THREE wires to SOIL Moisture (see chart above): BARE = GND, RED = VCC, BLACK = OUT SIGNAL

Sensor Enable Pins

You can control the power provided to each sensor by setting the Digital IOs from Spark Core to write out “digitally” (power readings are always enabled as they derive power from the induction clamps, not the RUSK):

CUSTOM LED = A5

SOIL TEMP = D4

SOIL Moisture = D3

WEATHER BOARD = D2

ACCELEROMETER = D5;

Communications Interface

Weather and MPU-6050 are connected in I2C to communicate with the Spark IO. Other sensors use analog inputs which report with a 12-bit value (0-4095) which you scale to match ~0-3.3 volts.

LED Reference

LED 1 ON when VH400 Soil Moisture Sensor Probes is Powered UP

LED 2 ON when Vegetronix Soil Temperature Sensor Probes is Powered UP

LED 3 ON when Weather Board is Powered UP

LED 4 ON when MPU-6050 is Powered UP

LED 5 can be used as any indicators, most probably in the clamp circuits

JP1 –extension of UART and extra pins from Spark IO (please see implemented spec on PCB).

Firmware

Please take some time to examine the provided firmware for programming logic. The code is reasonably well commented. The needed libraries are available on Github (foxfire-online) and can be imported into the Spark IDE quite easily.

To save power for battery based operation we try to spend a lot of time “sleeping”. Sleep behaviour is controlled using these variables:

```
int SENSORDELAY = 6000; // milliseconds (runs x1)
int EVENTSDELAY = 1000; // milliseconds (runs x9)
int SLEEP_DELAY = 45; // seconds (runs x1) - should get about 24 hours on 2100mAH - 0
to disable
```

If connected via USB, you should be able to monitor activity/debug using the serial output to terminal clients like “pUTTY” (Windows) or “screen” (Linux).

Take note when reprogramming the Spark Core, updating firmware ONLY WORKS WHEN THE SYSTEM IS ACTIVE. During sleep time, the unit is disconnected and will not respond. Further, because commands take some time to trigger once connected to WiFi, you should target firmware updates “over the air” when the LED sequence first starts to provide ample time for downloading and flashing. In the absolute worst case, you can do a factory reset on the Spark Core and reflash.