1. Power Source:

PowerBank that can consistently supply of at least 5V at 1Amp draw.

If you are a knowledgeable electrical engineer, I'm looking for help designing an alternative solution for longer battery life perhaps with optional solar panel.

Meanwhile, I have found the 20000 mAh Belkin, which did not work, despite it's claims to supply 3 Amps at 5 V. The 20000 mAh Xiaomi Redmi worked as long as it was more than ½ charged. The Anker 27650mAh is being tested currently.

2. RFID Module:

- Place RFID module symbol.

- Connect **Pin1 VCC** → +5V
- Connect **Pin2 GND** → GND
- Connect **Pin3 RXD** → Arduino Pin 14 (TX)
- Connect **Pin4 TXD** → Arduino Pin 13 (RX)
- Connect **Pin5 PWEN** → Arduino Pin 3
- Connect **A1 and A2** to ends of the antenna.

3. Arduino MKR 1010:

When referring to pins here, I'm referring to as marked on the header with pins being AREF, DACO, A0 to A6, 0 to 8, SCK, MISO, SDA, 12 SCL, 13 RX, 14 TX, Reset, Gnd, VCC, VIN, and 5V.

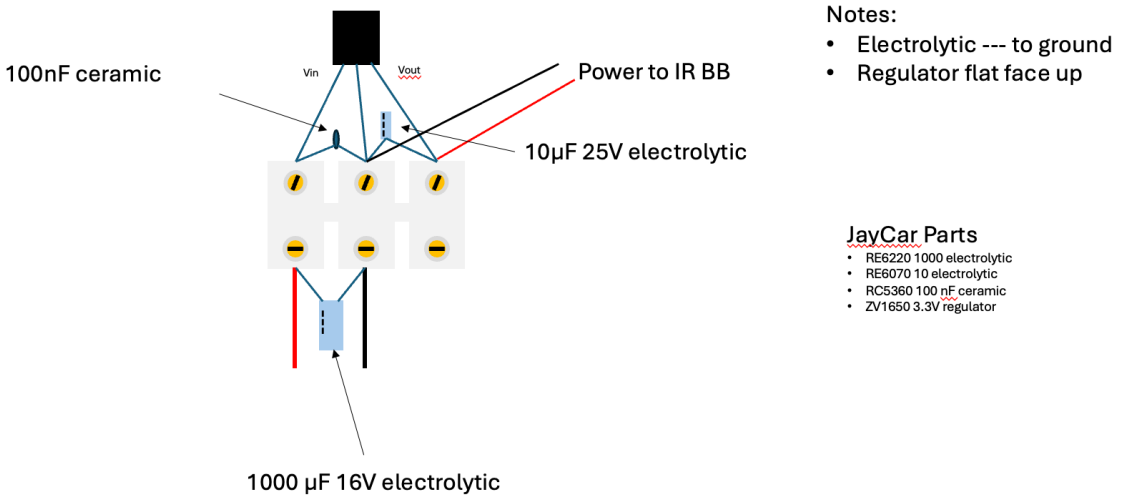
- **A1, A2, A3** connected to respective 220 Ω resistors then legs of RGB LED
- **A5 (PWM)** connected to RFID **PWEN**
- **Pin 0 to IR Breakbeam Signal 2 (if have 2)**
- **Pin 1 to IR Breakbeam Signal 1**
- **Pin -4 SD CS**
- **Pin -5 to 10 kΩ resistor to SD Card Detect**
- **Pin 6 FET-G (this is for future development/trials)**
- **Pin 7 to Momentary Button.**
- **Pin 8 MOSI - SD DI**
- **Pin 9 SCK - SD CLK**
- **Pin 10 MISO SD DO**
- **Pin 11 SDA RTC SDA**
- **Pin 12 SCL RTC SCL**
- **Pin 13 (Serial RX)** connected to RFID **PDOin4 (TXD)**.
- **Pin 14 (Serial TX)** connected to RFID **Pin3 (RXD)**.
- **.5V** → +5V
- **GND** → **GND**

4. RTC Module

- Connect **VIN** → VCC of Arduino shield
- Connect **GND** → GND
- Connect **SCL** → Arduino pin 12
- Connect **SDA** → Arduino pin 11

5. IR Breakbeam(s) (Transmitters & Receivers):

- Between IR break beam put voltage regulator and surge smoother circuit in diagram below. Instead of using the screw terminals shown in the diagram, I put them on a breadboard. The Red wire at the bottom is the incoming +5V, and the Black is the ground.



- Power (Red wires) → +3.3 from Voltage Regulator and surge soother.
- Grounds (Black wires) → GND
- Signal (typically Yellow or White wires) → Arduino pins 0 (if 2 sensors) and 1

6. Momentary Button:

- One pin → GND
- Other pin → Arduino pin 7

7. RGB Status LED: (

- Blue pin → 220 Ω Resistor Arduino → Arduino A1

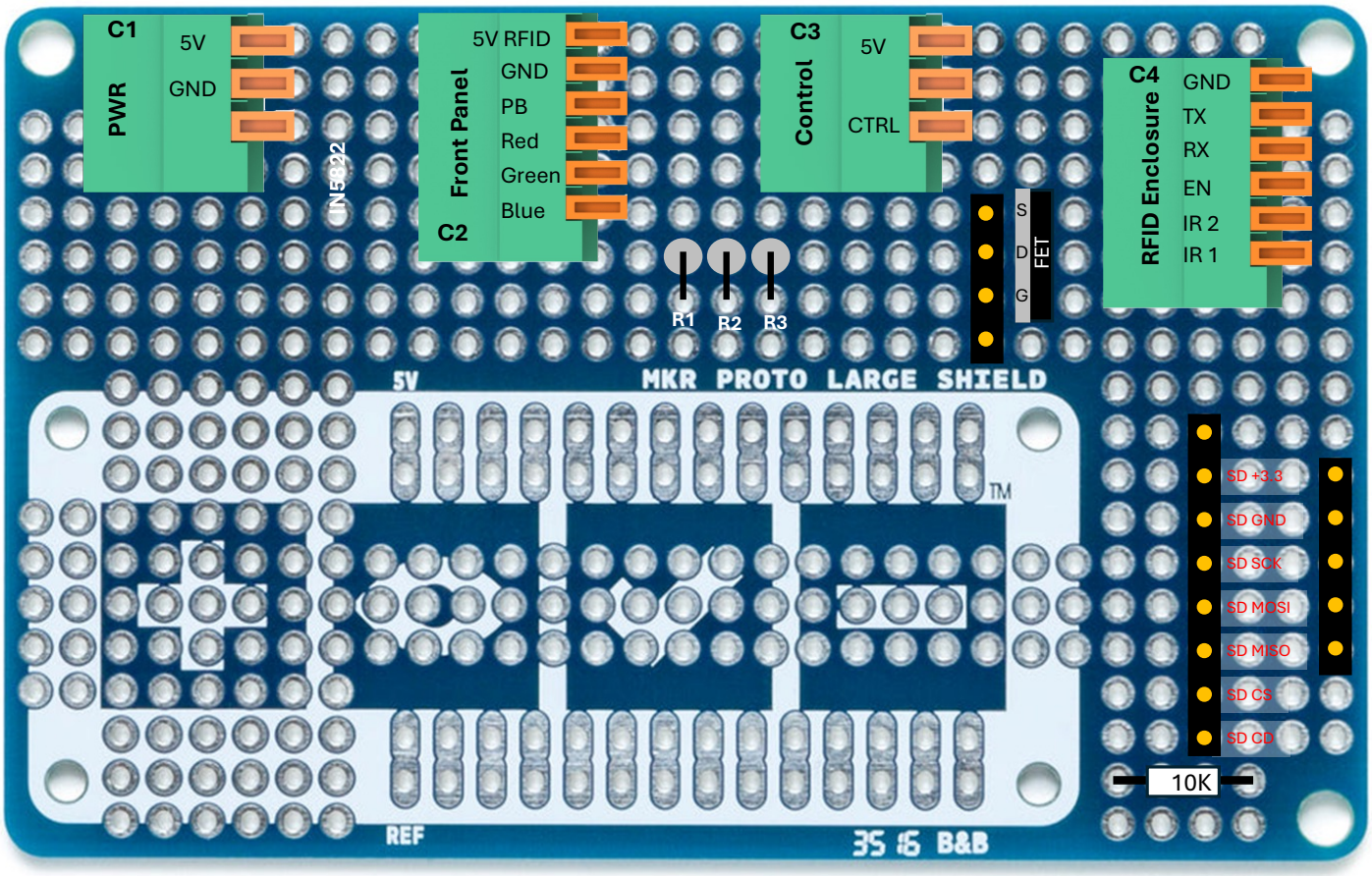
- Green pin → 220 Ω Resistor Arduino → Arduino A2
- Red pin → 220 Ω Resistor Arduino → Arduino A3
- Ground pin of RGB LED → GND

I used a MKR Large proto shield as pictured below, and modular screwless terminal blocks for connection to the connectors between the enclosures for components. I housed the RFID reader in a separate enclosure from the Arduino, SD Card and RTC to avoid interference. I used watertight polycarbonate housings obtained from Hi-Q components as they had a wider range available.

For the MKR 101, RTC and SD Card I used pin headers so that the boards be plugged in and out of the proto shield board. For ease of prototyping/development.

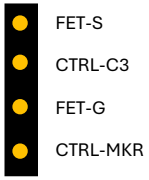
Note on the RFID Enclosure Terminal Block TX goes to Arduino TX and RFID module RX, and RX goes to Arduino RX and RFID module TX.

R1,2 &3 are 220 Ohm .5 W Resistors; the 4th resistor is marked 10KOhm .5 W Resistor



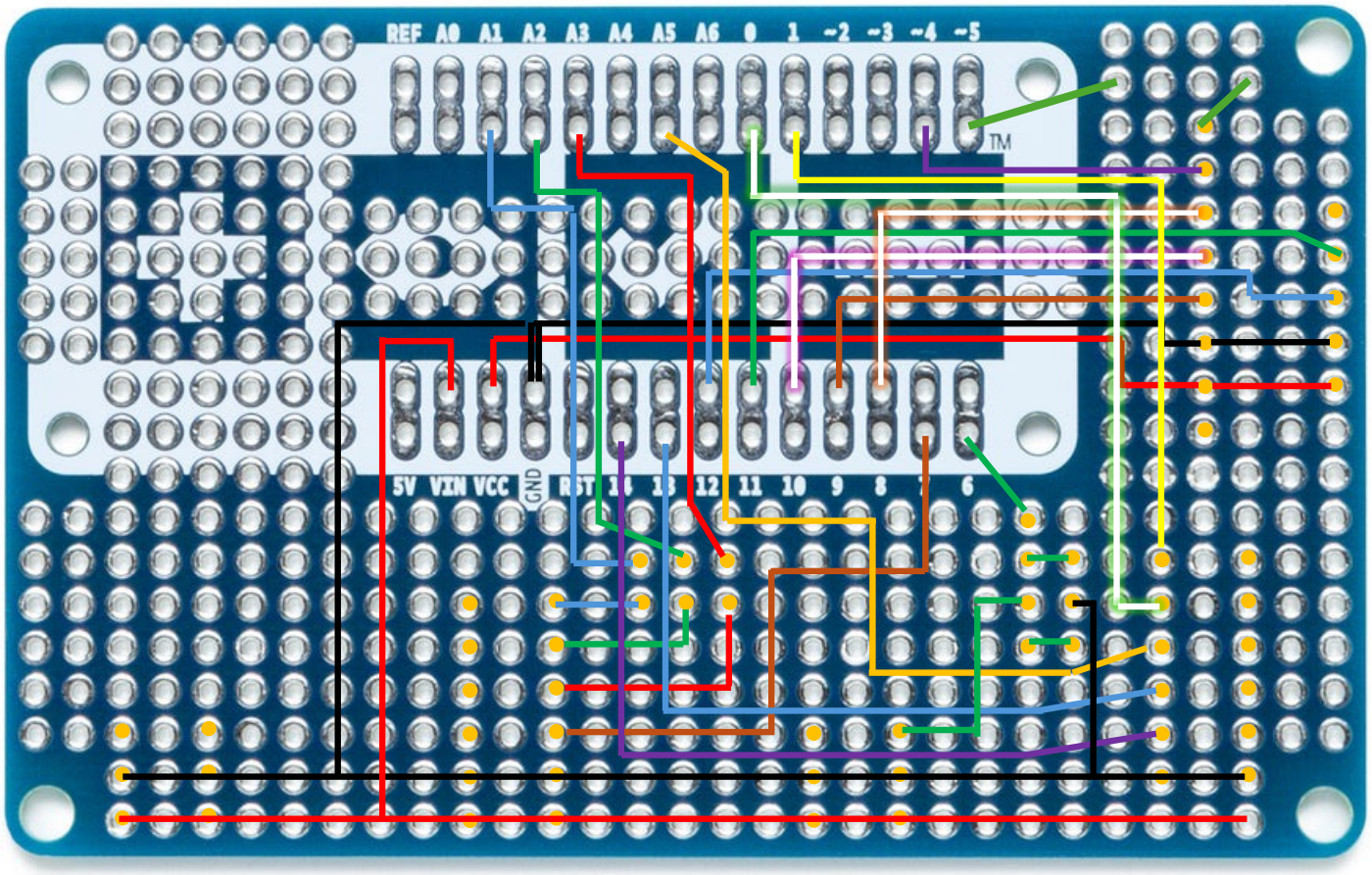
RTC +3.3
RTC GND
RTC SCL
RTC SDA

MKR	PIN	Sig	Loc
5V	14-2	5V	5V rail
GND	11-2	GND	GND rail
14	9-2	Tx	C4-TX
13	8-2	Rx	C4-RX
12	7-2	SCL	RTC-3
11	6-2	SDA	RTC-4
10	3-2	MISO	SD DO
9	4-2	SCK	SD CLK
8	5-2	MOSI	SD DI
7	2-2	PB	C2-PB
6	1-2	CTRL	FET-G
5	14-1	CD	SD CD
4	13-1	CS	SD CS
1	10-1	IR 2	C4-IR2
0	9-1	IR 1	C4-IR1
A5	7-1	RFID EN	C4-EN
A3	5-1	Red	R1
A2	4-2	Green	R2
A1	3-2	Blue	R3



Jumper Positions
FET
- FET-S to CTRL-C3
- FET-G-CTRL-MKR

CTL
- CTRL-MKR-CTR-C3


REF A0 A1 A2 A3 A4 A5 A6 0 1 ~2 ~3 ~4 ~5
5V VIN VCC GND
12 11 10 9 8 6