

# Power Draw

Battery: 1s LiPo  $\rightarrow$  3.7 V ; 500 mAh

Target battery life: 3-5 hrs

$\hookrightarrow$  Acceptable Avg. Current Draw: 100 - 160 mA

Regulator Efficiency:

Microcontroller:

MCU:

Screen:

GPS:

Lora Module:

RX: 12 mA

TX: +20 dBm: 120 mA  
+17 dBm: 87 mA  
+13 dBm: 29 mA  
+7 dBm: 20 mA

Sleep: 0.2 mA

Idle/Standby: 1.5 mA

w/o idle mode

Let  $n = \#$  paired devices

$$I_{avg} = \frac{1}{n} I_{TX} + \frac{n-1}{n} I_{RX}$$

For 3 devices:  $n=3$

$$I_{avg} = \frac{1}{3} (120 \text{ mA}) + \frac{2}{3} (12 \text{ mA})$$
$$= 48 \text{ mA @ +20 dBm}$$

w/ idle mode

Worst Case Time on Air: 400 ms

Max  $n$ : 10

$$I_{avg, active} = 48 \text{ mA}$$

$$T_{active} = n \times T_{OTA} = 10 \times 400 \text{ ms} = 4 \text{ s}$$

$$T_{idle} = \text{Update Period} - T_{active}$$
$$= 60 \text{ s} - 4 \text{ s} = 56 \text{ s}$$

$$I_{avg} = I_{active} \times \frac{T_{active}}{\text{Update Period}} + I_{idle} \times \frac{T_{idle}}{\text{Update Period}}$$
$$= 48 \text{ mA} \times \frac{4}{60} + 1.5 \text{ mA} \times \frac{56}{60}$$
$$= 4.6 \text{ mA}$$

# mcu Selection

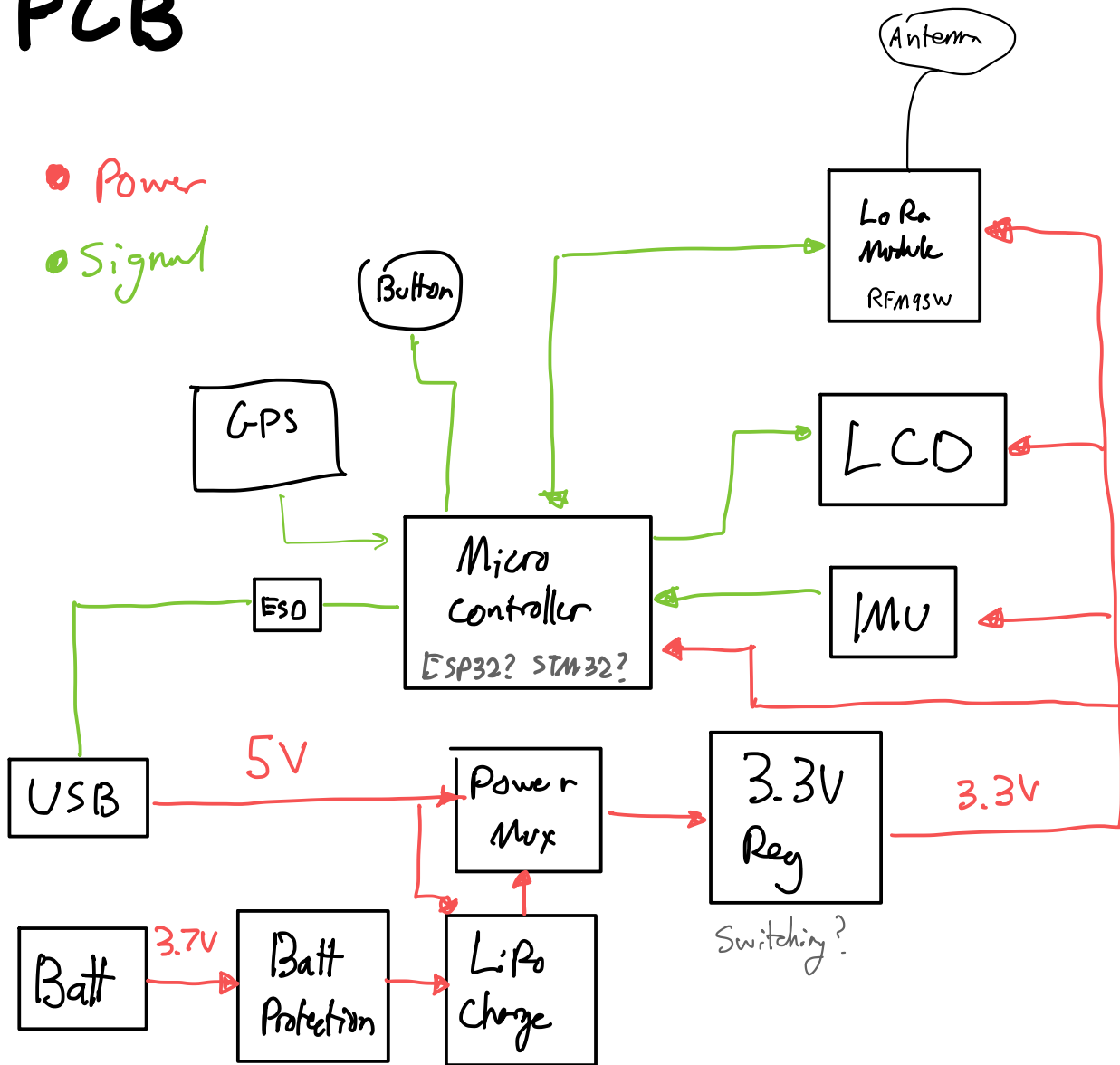
	STM32 F401RCT6TR	STM32 L476RETC	ESP32 S3-WROOM-1-N8	ESP32 C3-WROOM-02-H4	RP2040
\$	\$5.85	\$6.34	\$3.2	\$2.00	\$1.00
RAM	64k	128k	512k	400k	264k
Flash	256k	512k	8M	4M	...
Freq	84 MHz	80 MHz	240 MHz	160 MHz	133 MHz
Light sleep	2.4 $\mu$ A	120 nA	8 $\mu$ A	130 $\mu$ A	...
Typ	128 $\mu$ A / MHz	100 $\mu$ A / MHz	$\approx 208 \mu$ A / MHz	175 $\mu$ A / MHz	280 $\mu$ A / MHz
IO Count	81	114	45 (programmable)	16	30
SPI	4	3	2	3	
I <sup>2</sup> C	3	3	2	2	
WIFI/BT			X	X	

\* Req. Ext.  
flash

# PCB

• Power

• Signal



- Need LCD driver board?
- More UI devices?
- Additional supporting circuitry for K?