

## Background

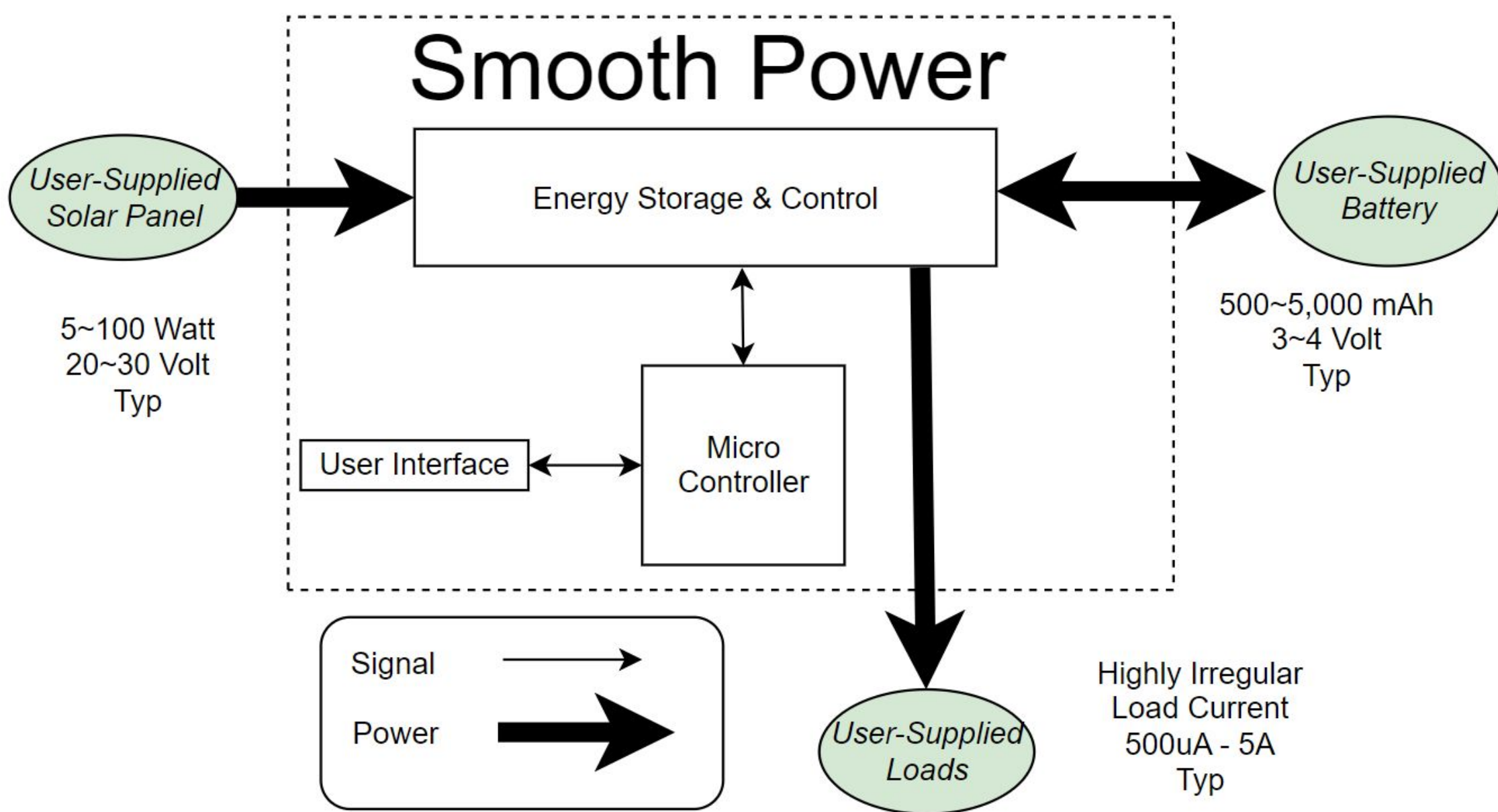
*“The problem we are exploring addresses scientists collecting data electronically in remote areas over long periods of time. Batteries have a limited lifespan and our project aims to increase battery longevity”*

## Objective

*“To increase battery longevity through a reduction of stress inherent in rapid charge and discharge of batteries.”*

## Results

## Methods

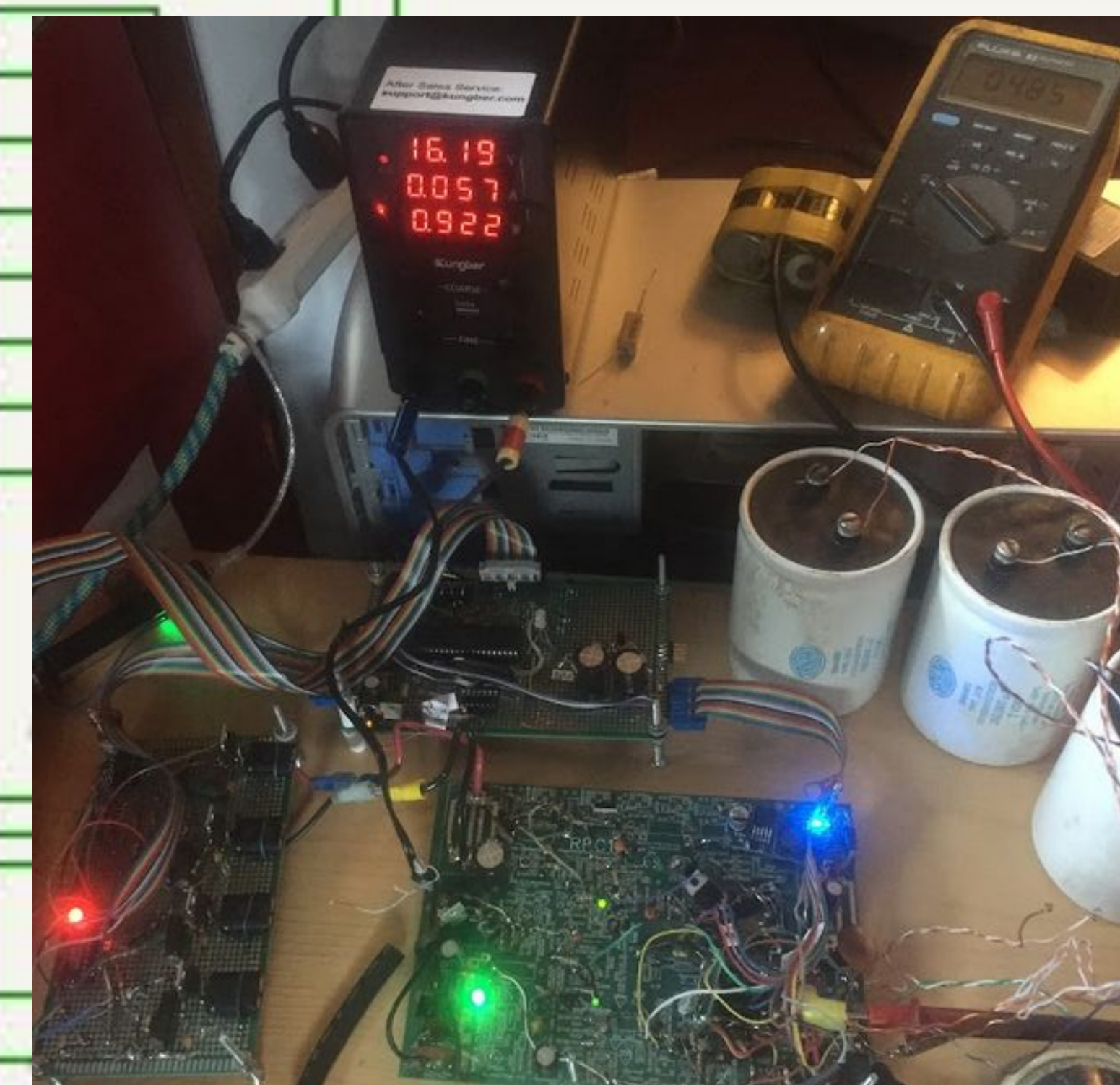


Block Diagram

## Coding in C for Microchip's PIC18F45K20

```
506 void CalcSupercapVolts(void) { //calibrates
507   float divFactorC[4]={57.7, //node 4, 28
508   32.62, //node 3, 1
509   21.16, //node 2, 1
510   15.71}; //node 1, 1
511   SupercapVolt[0] = ((float)ADreadValue[1]
512   /divFactorC[0]);
513   SupercapVolt[1] = ((float)ADreadValue[2]
514   /divFactorC[1]);
515   SupercapVolt[2] = ((float)ADreadValue[3]
516   /divFactorC[2]);
517   SupercapVolt[3] = ((float)ADreadValue[4]
518   /divFactorC[3]);
519 }
520
521 #define Batt_bulk_volt 3.8
522 #define Batt_float_volt 3.6
523 #define Batt_rebuck 3.2
524
525 void PowerControl(void) {
526   //Battery Charge Mode - rec
527   //solar_volt > SupercapSum + 1 ||
528   // && Batt_volt < Batt_rebuck
529   {BattChargeMode = 1;}
530 }
```

## Displaying Supercap, Battery, Solar and Debug Information

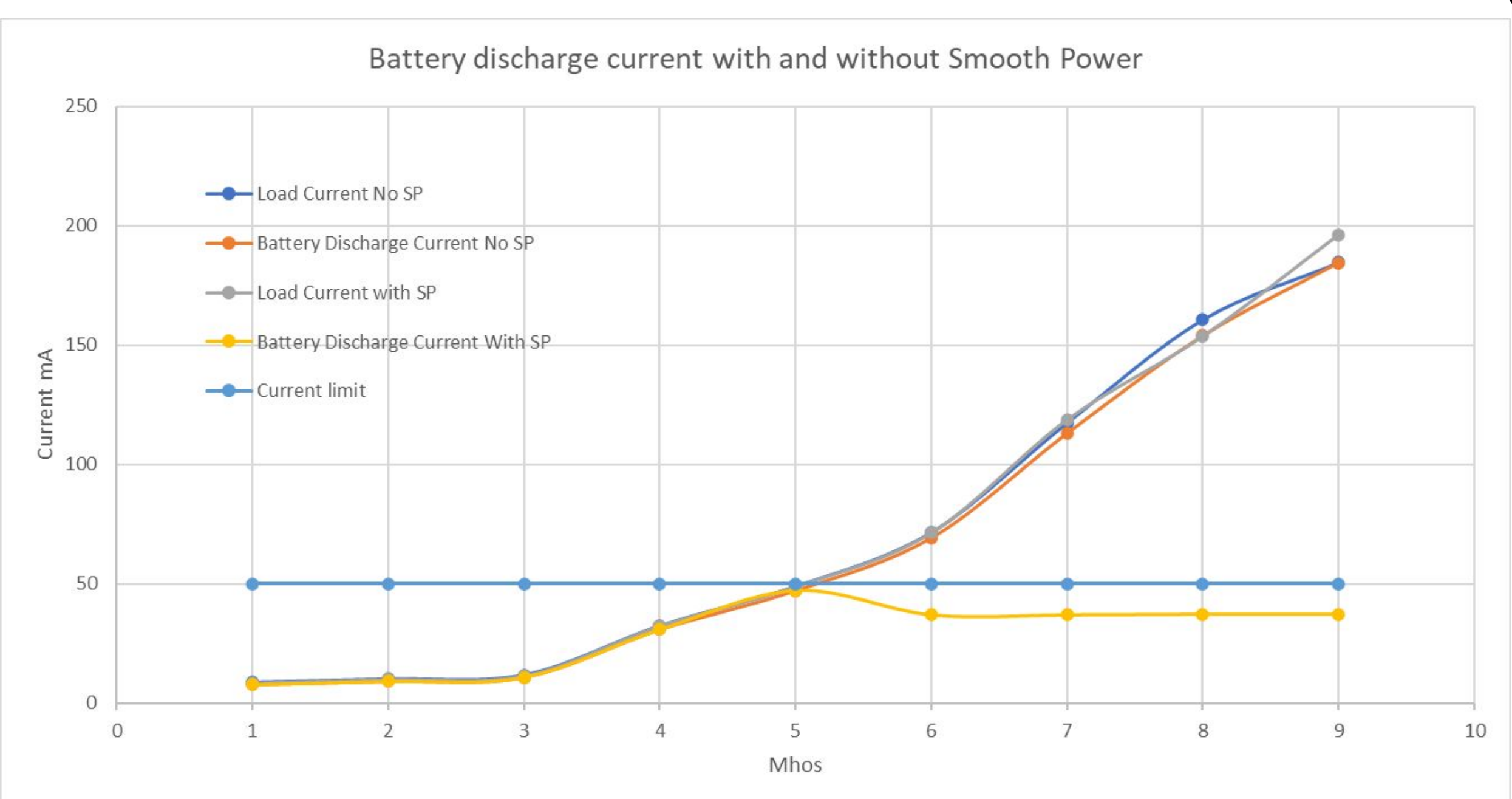


## Testing Battery Charge & Solar Voltage Limits

## Linear Amp controls offset current

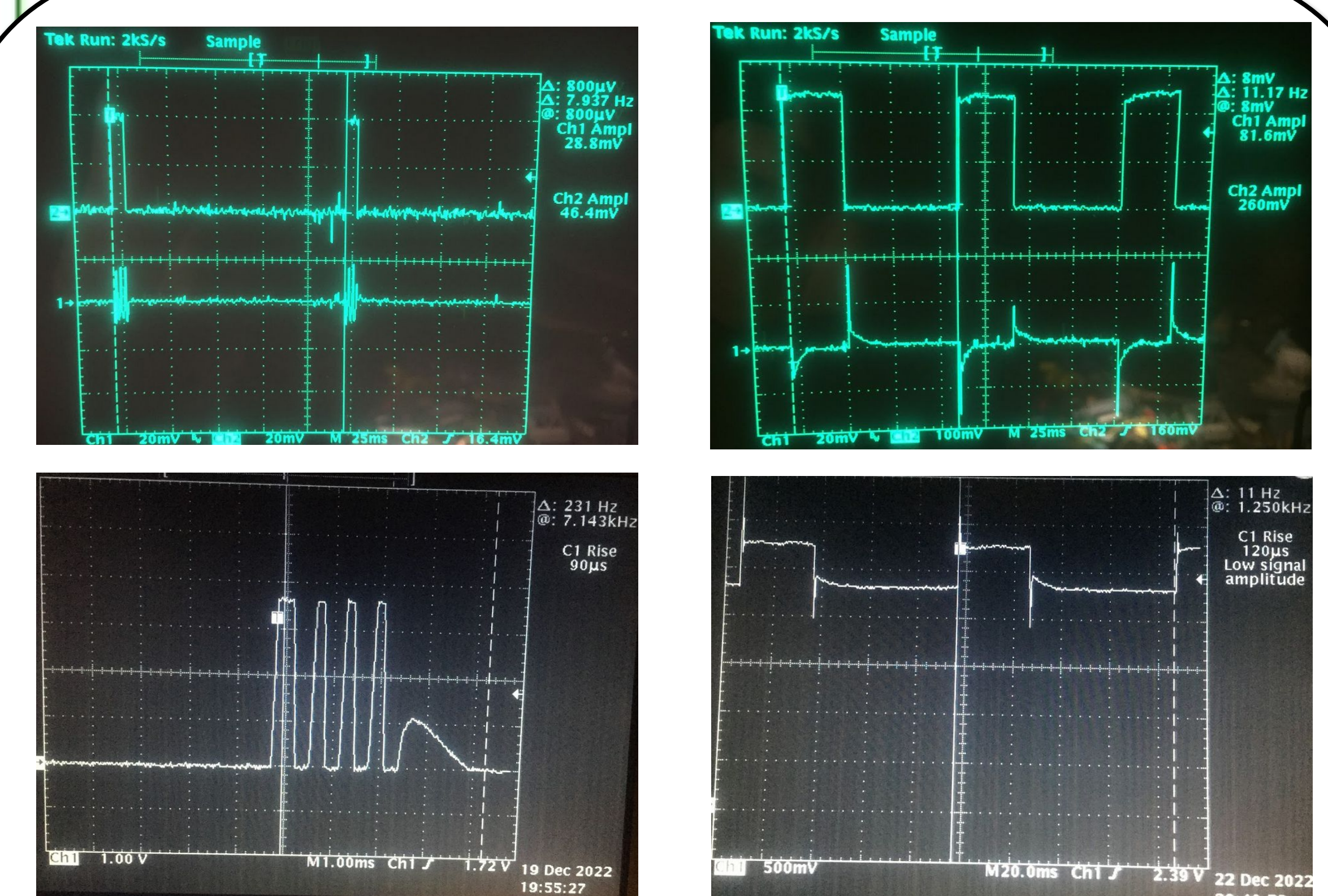
## Current Detect Signals

## Linear Amp Output Signals

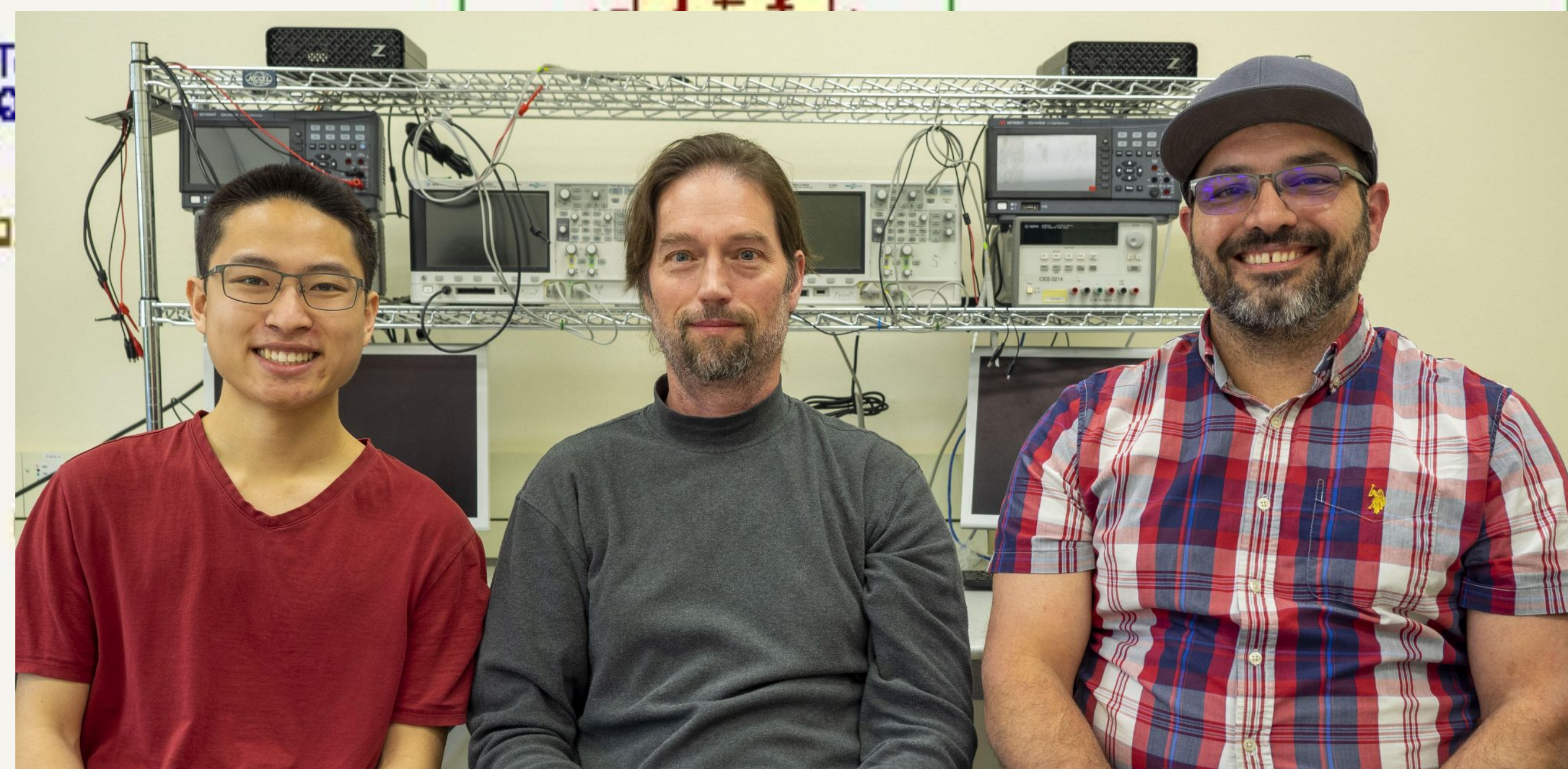


Battery current as a function of load

**Smooth Power ON vs. OFF**  
With Smooth Power ON, the battery discharge current increases up to OpAmp detection threshold then discharge current is offset by solar charged supercaps.



Tuning the current-offset feedback



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