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Block 2 Check Off

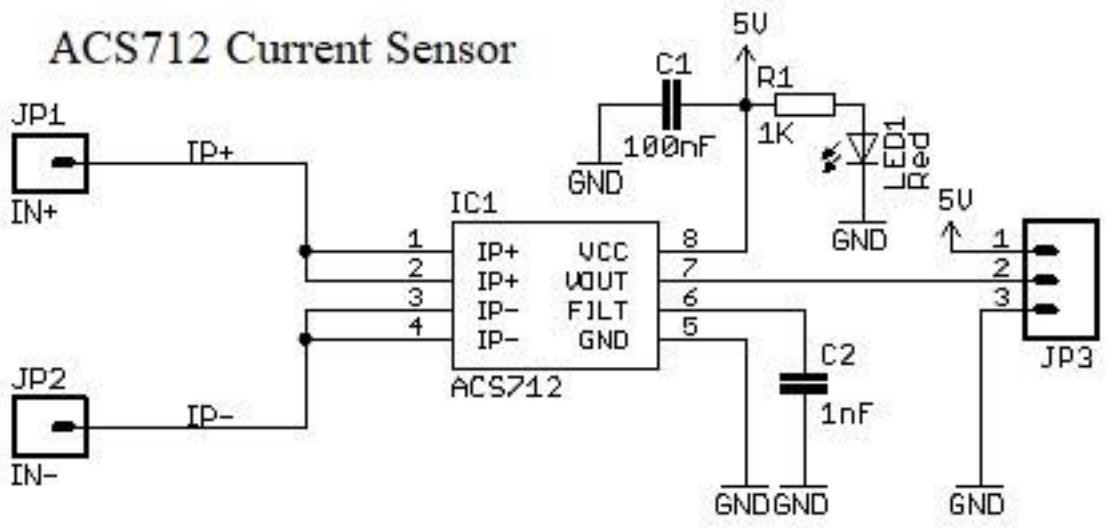
Solar 04

Code

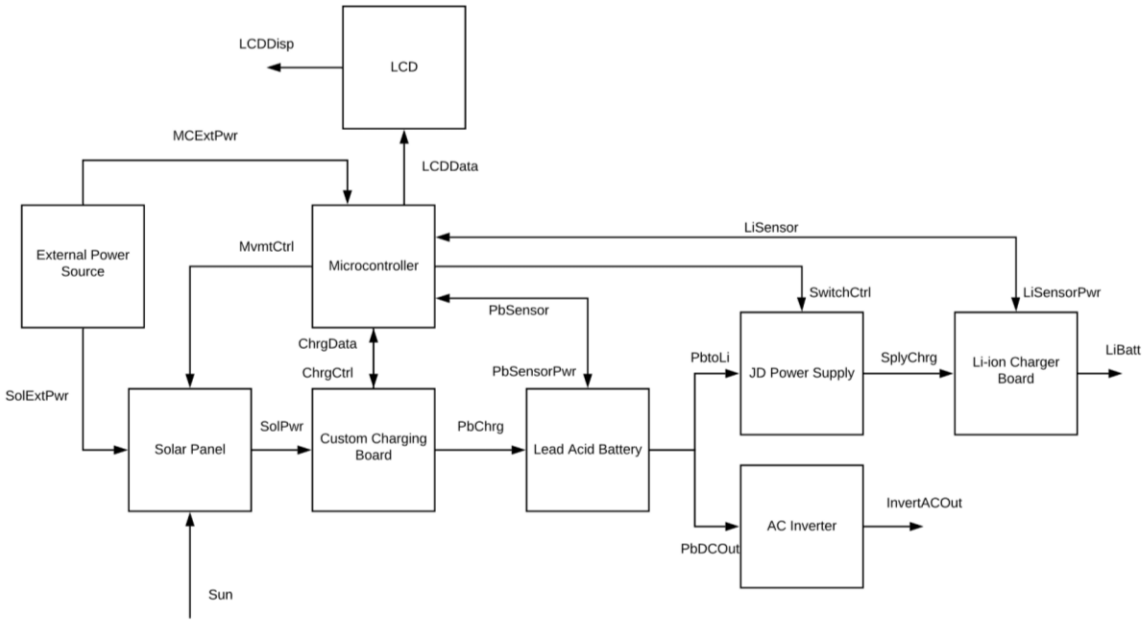
```
// USED CODE FROM https://learn.adafruit.com/tmp36-temperature-sensor/using-a-temp-sensor FOR TEMP SENSOR
// USED CODE FROM https://www.electronicshub.org/interfacing-acs712-current-sensor-with-arduino/ FOR CURRENT SENSOR

//TMP36 Variables
const int tempPin = A0;

//ACS712 Variables
const int currentPin = A1;
int ACSsensitivity = 100;
int ACSValue= 0;
int offsetVoltage = 2500;
double ACSVoltage = 0;
double currentValue = 0;

//MOSFET Switch variables
const int MOSFETPin = 8;
const int maxTempF = 80;
const int maxCurrent = 1;

void setup()
{
  Serial.begin(9600);
  pinMode(MOSFETPin, OUTPUT);
  digitalWrite(MOSFETPin, HIGH);
}

void loop()
{

  //TEMP SENSOR ----------------------------------------------------

   int reading = analogRead(tempPin);
   float voltage = reading * 5.0;
   voltage /= 1024.0;
   Serial.print(voltage); Serial.println(" volts");

   float temperatureC = (voltage - 0.5) * 100 ;

   Serial.print(temperatureC); Serial.println(" degrees C");

   float temperatureF = (temperatureC * 9.0 / 5.0) + 32.0;
   Serial.print(temperatureF); Serial.println(" degrees F");

   //CURRENT SENSOR -------------------------------------------------
```

```
    ACSValue = analogRead(currentPin);
    ACSVoltage = (ACSValue / 1024.0) * 5000;
    currentValue = ((ACSVoltage - offsetVoltage) / ACSsensitivity);

    Serial.print("\n Raw Sensor Value = " );
    Serial.print(ACSValue);

    Serial.print("\t Voltage(mV) = ");
    Serial.print(ACSVoltage,3);

    Serial.print("\t Current = ");
    Serial.println(currentValue,3);

    //MOSFET Switch Control ---------------------------------------------

    if (temperatureF > maxTempF || currentValue > maxCurrent) {
     digitalWrite(MOSFETPin, LOW);
    }
    else {
     digitalWrite(MOSFETPin, HIGH);
    }

    delay(2500);

}
```

Schematics



Top Level Block Diagram



Interface Definitions

Interface Name	Interface Type	Specifications
MCExtPwr	dcpwr	Operating Voltage: 5V Recommended Voltage: 7-12V Max Voltage: 6-20V
SolExtPwr	dcpwr	Operating Voltage: 12V Operating Current: 500 mA
MvmtCtrl	dsig	Input photoresistor values: 20Ω - 1.2MΩ Output 5V PWM to motor
Sun	envin	Avg. Power Output: 3.846×10^{26} W Avg. Potential Power Received: 1,000 W/m^2
SolPwr	dcpwr	MC4 Connector Short-Circuit Current: 5.14A Open-Circuit Voltage: 43.8VDC
LCDData	data	Voltage and Current read from 10-bit ADC

LCDDisp	usrout	16x2 LCD Response Time: 500ms - 600ms Input Voltage: 0-7.0V Operating Temp: 0-50°C Storage Temp: -10-60°C
PbChrg	dcpwr	Output 14.4-14.7VDC Output 1.5A max
PbSensor	asig	TMP36 temperature sensor • Sensitivity: 10mV/°C • Accuracy: ±2°C • Operating temp.: -40°C to +125°C • Max temp.: +150°C ACS712 current sensor • Sensitivity: 100mV/A • Output Error: ±1.5% • Max Current: 20A
PbSensorPwr	dcpwr	TMP36 temperature sensor • Operating Voltage: 2.7-5.5VDC ACS712 current sensor • Operating Voltage: 5VDC • Max Voltage: 8VDC
PbtoLi	dcpwr	Operating Voltage: 8-15VDC Peak Current: 1.5A
SwitchCtrl	dsig	Operating Voltage: 0-4VDC Nominal Current: 0A Max Current: 40mA
SplyChrg	dcpwr	Operating Voltage: 5VDC Operating Current: 0.5-1A
LiBatt	envout	Charging Voltage: 4.2VDC Over-charge Voltage: 4.25±0.05VDC Over-discharge Voltage: 2.45±0.05VDC Peak Current: 5A 18650 Li-ion rechargeable battery • 3.7VDC • 9Wh
LiSensor	asig	TMP36 temperature sensor • Sensitivity: 10mV/°C • Accuracy: ±2°C • Operating temp.: -40°C to +125°C • Max temp.: +150°C ACS712 current sensor • Sensitivity: 100mV/A • Output Error: ±1.5%

		• Max Current: 20A
LiSensorPwr	dcpwr	TMP36 temperature sensor • Operating Voltage: 2.7-5.5VDC ACS712 current sensor • Operating Voltage: 5VDC • Max Voltage: 8VDC
PbDCOut	dcpwr	Max Voltage: 12.8VDC Max Current: 18A
InvertACOut	acpwr	NEMA 5-15 Output: 115VAC, 60Hz USB 2.0 Output: 5VDC, 2.1A Max Power Out: 200W