// Pin numbers for inputs and outputs

const int solarPin = 2; // Solar power source

const int gridPin = 3; // Grid power source

const int batteryPin = 4; // Battery power source

const int peakPin = 5; // Peak power flag

const int voltagePin = A0; // Battery voltage via voltage divider

const int solarIrradiancePin = A1; // Solar panel voltage via voltage divider

// Priority output LEDs

const int highPriorityPin = 6;

const int normalPriorityPin = 7;

const int lowPriorityPin = 8;

// Energy source indicators

const int solPin = 9;

const int griPin = 10;

const int batPin = 11;

void setup() {

// Configure input pins

pinMode(solarPin, INPUT);

pinMode(gridPin, INPUT);

pinMode(batteryPin, INPUT);

pinMode(peakPin, INPUT);

// Configure output pins

pinMode(highPriorityPin, OUTPUT);

pinMode(normalPriorityPin, OUTPUT);

pinMode(lowPriorityPin, OUTPUT);

pinMode(solPin, OUTPUT);

pinMode(griPin, OUTPUT);

pinMode(batPin, OUTPUT);

}

void loop() {

// Read digital input values

int solar = digitalRead(solarPin);

int grid = digitalRead(gridPin);

int battery = digitalRead(batteryPin);

int peak = digitalRead(peakPin);

// Read and convert solar panel voltage

int solarADC = analogRead(solarIrradiancePin);

float solarVoltage = solarADC \* (5.0 / 1023.0);

// Read and convert battery voltage

int batteryADC = analogRead(voltagePin);

float batteryVout = batteryADC \* (5.0 / 1023.0);

// Solar Mode (solarPin is HIGH and sufficient solar voltage)

if (solar == 1 && solarVoltage >= 2.5) {

digitalWrite(solPin, HIGH);

digitalWrite(griPin, LOW);

digitalWrite(batPin, LOW);

if (solarVoltage >= 4.5) {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, HIGH);

digitalWrite(lowPriorityPin, HIGH);

} else if (solarVoltage >= 3.5) {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, HIGH);

digitalWrite(lowPriorityPin, LOW);

} else {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, LOW);

digitalWrite(lowPriorityPin, LOW);

}

}

// Solar Mode with low solar voltage

else if (solar == 1 && solarVoltage < 2.5) {

if (grid == 1) { // Switch to grid power if solar is insufficient

digitalWrite(solPin, LOW);

digitalWrite(batPin, LOW);

digitalWrite(griPin, HIGH);

if (peak == 1) {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, HIGH);

digitalWrite(lowPriorityPin, LOW);

} else {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, HIGH);

digitalWrite(lowPriorityPin, HIGH);

}

}

else if (battery == 1) { // Switch to battery power if solar is insufficient

digitalWrite(solPin, LOW);

digitalWrite(griPin, LOW);

digitalWrite(batPin, HIGH);

if (batteryVout >= 4.5) {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, HIGH);

digitalWrite(lowPriorityPin, LOW);

} else {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, LOW);

digitalWrite(lowPriorityPin, LOW);

}

}

else { // No power source available

digitalWrite(highPriorityPin, LOW);

digitalWrite(normalPriorityPin, LOW);

digitalWrite(lowPriorityPin, LOW);

digitalWrite(solPin, LOW);

digitalWrite(griPin, LOW);

digitalWrite(batPin, LOW);

}

}

// Grid Power Only (battery is off)

else if (grid == 1 && battery == 0) {

digitalWrite(solPin, LOW);

digitalWrite(batPin, LOW);

digitalWrite(griPin, HIGH);

if (peak == 1) {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, HIGH);

digitalWrite(lowPriorityPin, LOW);

} else {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, HIGH);

digitalWrite(lowPriorityPin, HIGH);

}

}

// Battery Power Only (grid is off)

else if (grid == 0 && battery == 1) {

digitalWrite(solPin, LOW);

digitalWrite(griPin, LOW);

digitalWrite(batPin, HIGH);

if (batteryVout >= 4.5) {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, HIGH);

digitalWrite(lowPriorityPin, LOW);

} else {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, LOW);

digitalWrite(lowPriorityPin, LOW);

}

}

// Grid + Battery Power

else if (grid == 1 && battery == 1) {

digitalWrite(solPin, LOW);

digitalWrite(griPin, HIGH);

digitalWrite(batPin, LOW);

if (peak == 1) {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, HIGH);

digitalWrite(lowPriorityPin, LOW);

} else {

digitalWrite(highPriorityPin, HIGH);

digitalWrite(normalPriorityPin, HIGH);

digitalWrite(lowPriorityPin, HIGH);

}

}

// No Power Source Available

else {

digitalWrite(highPriorityPin, LOW);

digitalWrite(normalPriorityPin, LOW);

digitalWrite(lowPriorityPin, LOW);

digitalWrite(solPin, LOW);

digitalWrite(griPin, LOW);

digitalWrite(batPin, LOW);

}

delay(1000); // Delay for 1 second before the next loop

}