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USER EXPERIENCE

Arduino Solar Tracking Project

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🌞 Arduino Solar Tracking System – User Manual

📦 Package Contents

- Arduino UNO (or compatible board)
- Dual-axis servo mount (pan-tilt mechanism)
- 2x Servo motors (SG90 or MG995 recommended)
- 2x Light Dependent Resistors (LDRs)
- Resistors (10kΩ) – 2 pcs
- Solar panel
- Jumper wires
- Breadboard or PCB
-

⚙️ Overview

The Arduino Solar Tracking System is a smart device designed to automatically align your solar panel with the direction of the most intense sunlight using real-time feedback from LDRs. This helps maximize solar energy efficiency throughout the day.

🔧 Calibration Tips

- Test each LDR using analogRead() in a separate sketch to confirm it's working.
- Adjust servo limits (0–180) if they move too far or not enough.
- Use Serial.print() to debug real-time LDR values.

🔋 Power Supply

- Arduino via USB or 9V adapter.
- Servo motors via separate 5V/6V power supply for better torque and stability.

🧪 Testing Procedure

1. Upload the code to the Arduino.
2. Power the system.
3. Shine a flashlight from various directions to test LDR detection and servo movement.
4. Place under sunlight and observe alignment.

💡 Troubleshooting

Issue	Cause	Fix
Servo not moving	Low power or wrong pin	Check external power and wiring
Panel oscillates	Too sensitive	Increase delay or threshold in code
LDRs not responsive	Damaged sensor or incorrect wiring	Replace/check connections

🧼 Maintenance

- Clean LDRs and panel surfaces regularly.
- Protect the circuit from rain/dust with a weatherproof enclosure.

🧠 Project Upgrade Ideas

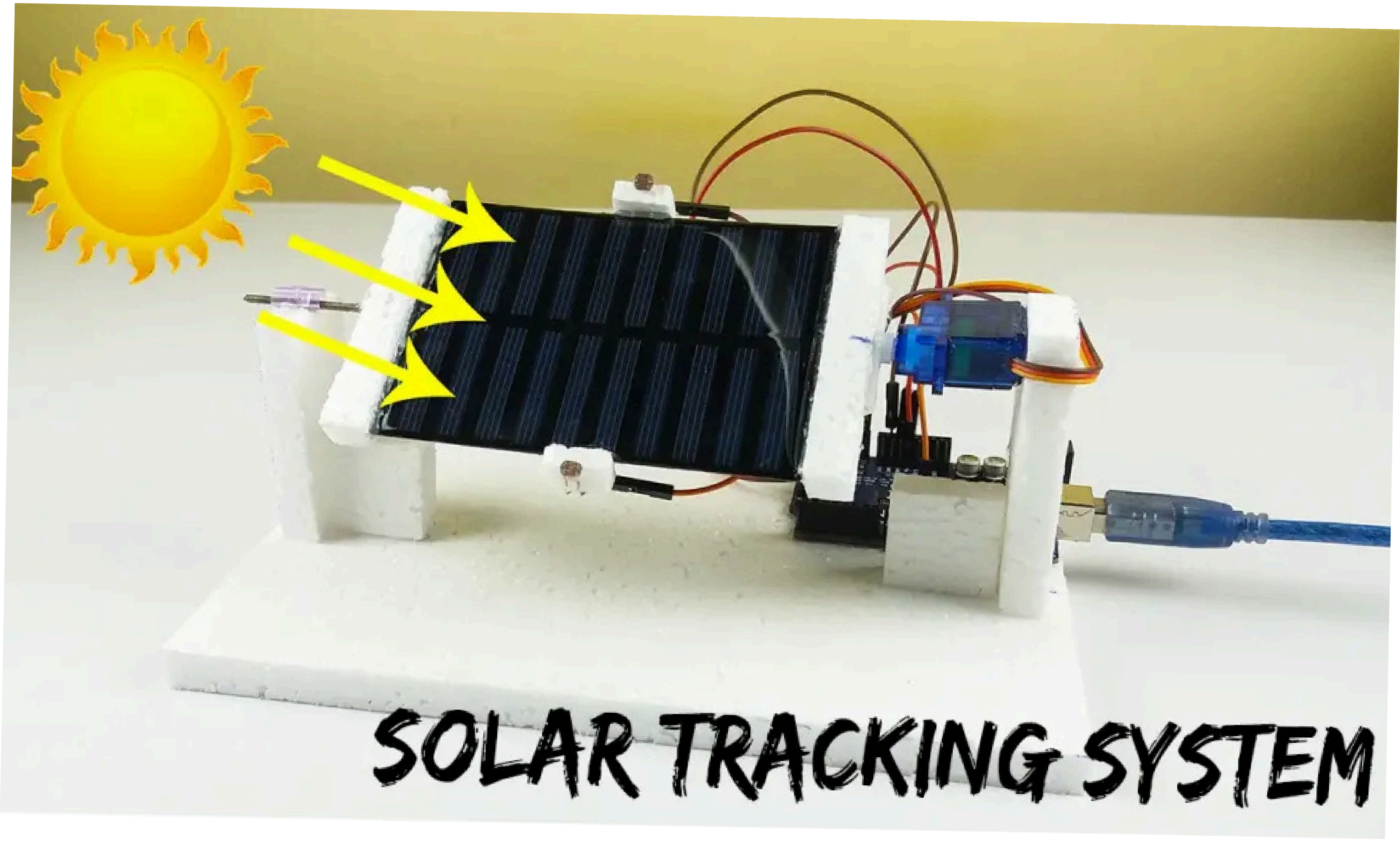
- Add OLED display for LDR values.
- Implement real-time clock (RTC) for hybrid tracking.
- Integrate data logging or remote monitoring.

Working Principle

- LDRs detect the intensity of sunlight from different directions.
- The Arduino reads LDR values and compares them.
- If sunlight is stronger on one side, the servo motor moves the panel toward that direction.
- This process ensures maximum exposure to sunlight throughout the day.

Circuit Connection

- Connect LDR 1 & LDR 2 to A0 & A1 of Arduino.
- Connect Servo Signal Pin to D9 of Arduino.
- Power the circuit using 5V from Arduino or an external source.

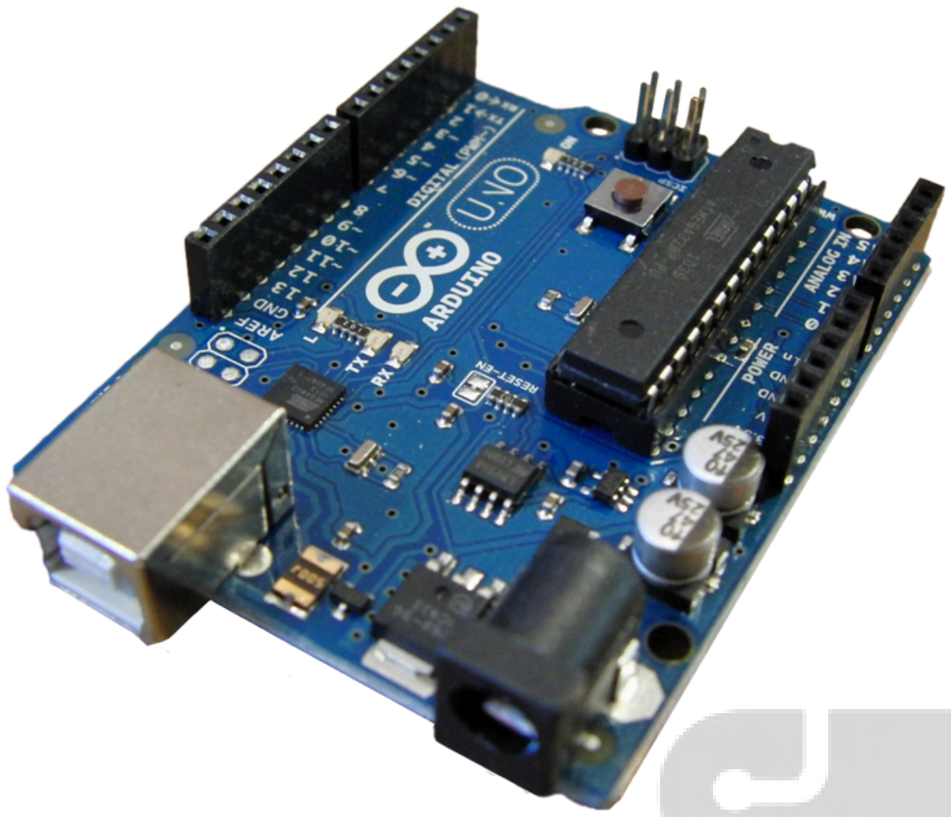

SOLAR TRACKING SYSTEM

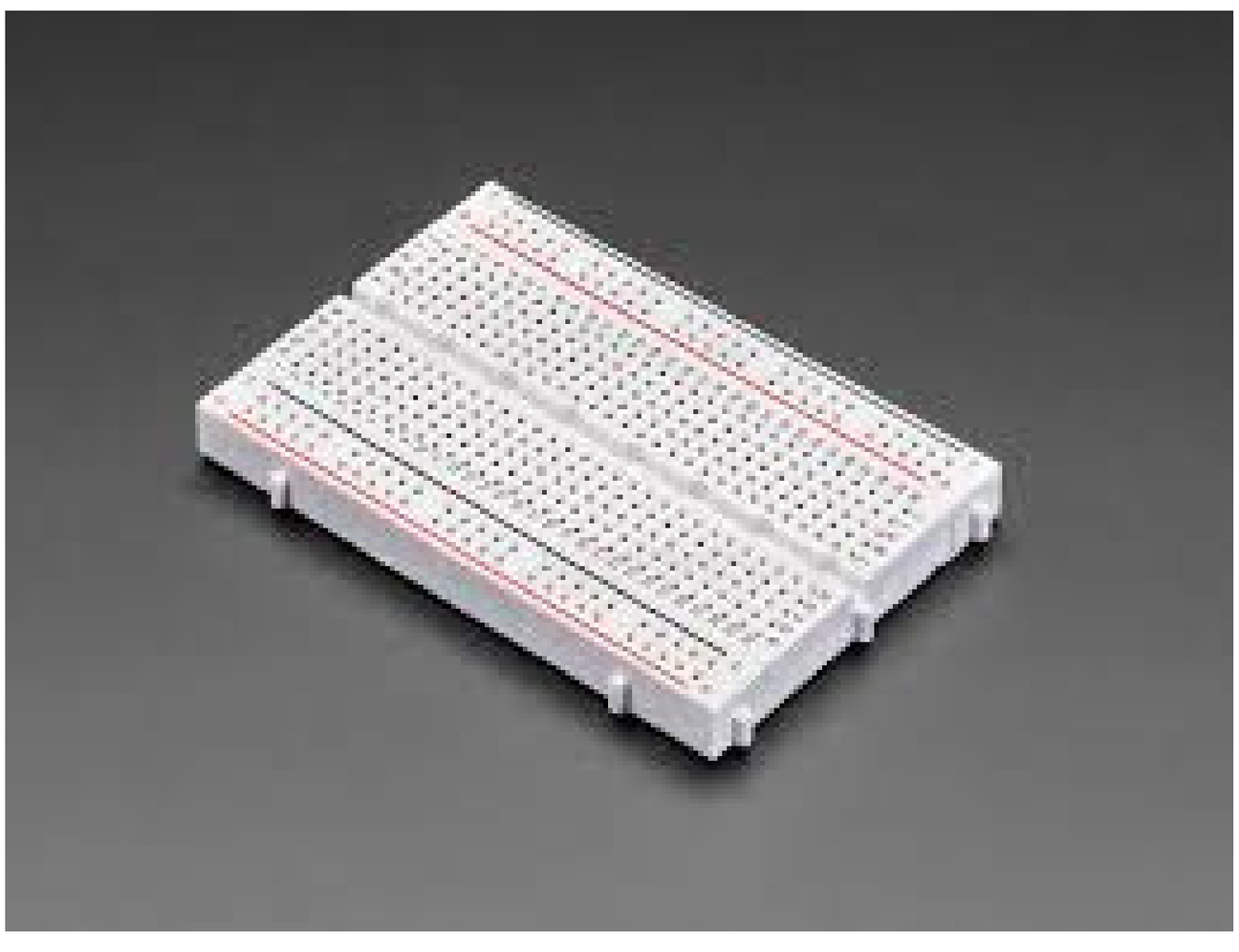
```
/*Solar tracking system

*/
//Include the servo motor library
#include <Servo.h>
//Define the LDR sensor pins
#define LDR1 A0
#define LDR2 A1
//Define the error value. You can change
it as you like
#define error 10
//Starting point of the servo motor
int Spoint =  90;
//Create an object for the servo motor
Servo servo;
```

```
void setup() {
//Include servo motor PWM pin
 servo.attach(11);
//Set the starting point of the servo
 servo.write(Spoint);
 delay(1000);
}

void loop() {
//Get the LDR sensor value
 int ldr1 = analogRead(LDR1);
//Get the LDR sensor value
 int ldr2 = analogRead(LDR2);

//Get the difference of these values
 int value1 = abs(ldr1 - ldr2);
 int value2 = abs(ldr2 - ldr1);

//Check these values using a IF condition
if ((value1 <= error) || (value2 <= error)) {
```

```
} else {
 if (ldr1 > ldr2) {
 Spoint = --Spoint;
 }
 if (ldr1 < ldr2) {
 Spoint = ++Spoint;
 }
 }
//Write values on the servo motor
 servo.write(Spoint);
 delay(80);
}
```

Component Used





Component Used