

The 11th International, Invention, Innovation & Design 2022



*Ushering in the Age of Endemic*

**THE 11TH INTERNATIONAL INNOVATION,  
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**EXTENDED ABSTRACTS BOOK**



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## **AUTOMATIC SOLAR TRACKER FOR POULTRY FARM**

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### **ABSTRACT**

The poultry farm is one of the industries that use a lot of electricity, and this could lead to global warming and greenhouse effects. Numerous poultry farmers have used solar power to operate their farms. The solar panel that they install is a fixed installation at a certain angle. This has caused the amount of energy absorbed by the solar panel to be lessened making the entire potential of the solar panel wasted. A solar tracker that could automatically track the sunlight is needed to not waste the potential of this renewable energy. The main goal of this project is to produce a design that could automatically track the sunlight with the help of LDR sensors. When the LDR sensors sense the sunlight, it will cause the solar panel to turn to face the sunlight and trap as much sunlight as it can before the lipo charger battery module converts the energy to electrical energy and stores it in the Li-ion battery. This project has a total of 6 inputs (solar panel, lipo battery charger module, Li-ion battery, switch button, LDR sensors, and temperature sensor) and 4 outputs (servo motor, motor driver, DC motor, and LEDs).

**Keyword:** *solar tracker, renewable energy, LDR sensors, DHT11 sensor, poultry farm*

### **1. INTRODUCTION**

The poultry industry is categorized as the most livestock sector and the industry has been in a continuous transformation mode towards modern production technology and feeding available (Federation of Livestock Farmers' Associations of Malaysia, n.d.). This industry requires more electricity as most of them use generators which can lead to global warming. Solar energy is one of the most widely used and in-demand resources. Automatic solar energy tracking is a crucial ability to master since getting sunlight from the right direction is just as important as getting it from the right direction. Most solar panels are now permanently installed at a specific angle. In almost all circumstances, facing solar panels south above any other direction will result in the biggest electric bill savings and the shortest payback period. This project is about Automatic Solar Tracker. This Automatic Solar Tracker is to design such an electrical project that helps poultry chicken farms receive optimal electrical energy from the solar panel provided (The Best, 2018). Solar trackers are devices that automatically align themselves in the direction of high-intensity sunlight to maximize solar power harvesting. This device will detect the presence of high-intensity light by using LDR sensors. Thus, the servo motor will move the solar panel towards the light. Then, the Lipo battery charger module will convert the light energy to electrical energy and store it in the Li-ion battery. Besides that, there is an additional system included which is to provide comfort for the chicks by placing a temperature sensor. When the temperature rises to a certain value, the DC motor will start rotating and it rotates

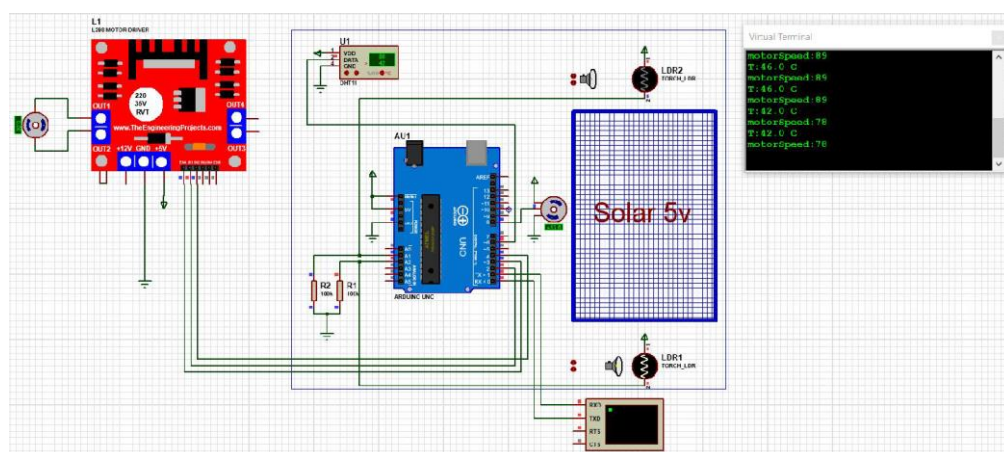
faster as the temperature rises higher. Some LEDs can light up once the switch button is switched on and when the Li-ion battery stores enough energy.

## 2. METHODOLOGY

In this project, there are 6 inputs including 2 input sensors and 4 outputs including 2 actuators. The inputs are a solar panel, lipo battery charger module, Li-ion battery, switch button, LDR sensors, and temperature sensor. Meanwhile, the outputs are the servo motor, motor driver, DC motor, and LEDs. The solar panel will absorb the sunlight. Then, the lipo battery charger module will convert the light energy to electrical energy and this energy will be stored in the Li-ion battery. LDR sensors will sense the sunlight and the temperature sensor will sense the temperature inside the farm. The switch button will act as a switch to light up the LEDs. Next, the servo motor will rotate when the LDR sensors sense sunlight. Meanwhile, the motor driver will act as a controller to control the DC motor. Lastly, the DC motor will act as an exhaust fan and start rotating when the temperature sensor senses a temperature above a certain value.

## 3. FINDINGS

Figure 3.1 shows the simulation when it runs. If the torch light is near the LDR sensors, the servo motor will rotate. The value displayed under the servo motor, which was positive value or negative value indicates the direction of rotation either clockwise or counter-clockwise respectively. The DHT11 component controls the value temperature and if it exceeds 24°C, the DC motor will rotate. The virtual monitor displayed the value of the temperature sensor and the speed rotation of the DC motor. The maximum speed DC motor can rotate was 100rpm and the minimum speed was 30rpm. The higher the value of the temperature sensor, the higher the speed of rotation. If the temperature sensor value is below 24°C, the DC motor will stop.



**Figure 1** Simulation Using Proteus Software.





**Figure 2** Lipo Battery Converter Module with Li-ion Battery.

Solar panels absorb solar energy, which converts into electrical energy using the Lipo battery charger converter and stored in a Li-ion battery. The Li-ion battery is also connected with LEDs through the switch button. Figure 1 shows the red light on the Lipo battery charger converter which indicates that the Li-ion battery is charging and if the battery is fully charged it will turn blue light.



**Figure 3** Turned-on LEDs.

Arduino Uno is connected to the LDR sensors, temperature sensor, servo motor, and DC motor. LDR sensors are linked with the servo motor as the sensor detects the intensity of light and the servo motor was a program to rotate at a certain angle which was the highest intensity of light occur. The DC motor was a program to rotate as the temperature sensor detects the heat at a certain temperature which helps to maintain the humidity and comfort in the poultry farm. Figure 3 shows the LEDs output lights up when the switch button is ON using the electrical energy stored in the Li-ion battery. Unfortunately, the DC motor is not fully functional due to the old DC motor used in this project.

#### 4. CONCLUSION

In conclusion, with the increasing world's energy demand, solar energy is becoming more popular as it is a potential source of renewable energy. Pollution can be minimized with a solar system. This project created a solar system that can trap more sunlight and the converted sunlight into electrical energy will be used by the poultry farm to light up the LEDs during the night-time or whenever the switch button is switched on. This project also installed an additional system that is comfortable for the chicks by placing a temperature sensor inside the poultry farm. This is to sense the temperature and remove the heat using a DC motor which acts as the exhaust fan once the temperature rises to a certain temperature.

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