

Audrino Controlled Solar Panel

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ABOUT THE PROJECT

- AIM

The purpose of this project is to examine how a system of light sensors can be used as a solar tracker for a solar panel. The goal is to capture as much sun energy as possible and to maximise the efficiency.

- Components

- **Arduino Uno**-It is an open-source microcontroller board based on Atmega328 microchip. It has 14 digital pins to connect output and 6 analog pins to connect input(sensors). There is a Power supply for giving power to input and output components. It has a Power jack which gives power to Arduino. USB port to upload program. Reset button to restart the program.
- **Servo motors**: A servo motor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity, and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servo motors. Servo motors are specifically used for periodic motion due to their position feedback and control property.
- **Solar panel**: Solar panel are used to absorb the radiation of the sun and converted it into the electric power.
- **LDR sensor**: LDR SENSORS are light sensors when its light, their resistance is approx 1kohm and when dark it goes up to 10K ohm.
- Bread board: A thin plastic board used to hold electronic components like resistors and LEDs.
- Jumper wires and FM wires
- LEDs.
- Push buttons
- Resistors (1K, 10k, 220)

- Software IDEs

Arduino software IDE - The **Arduino** Integrated Development Environment - or **Arduino** Software (**IDE**) - contains a text editor for writing code, a message area, a text

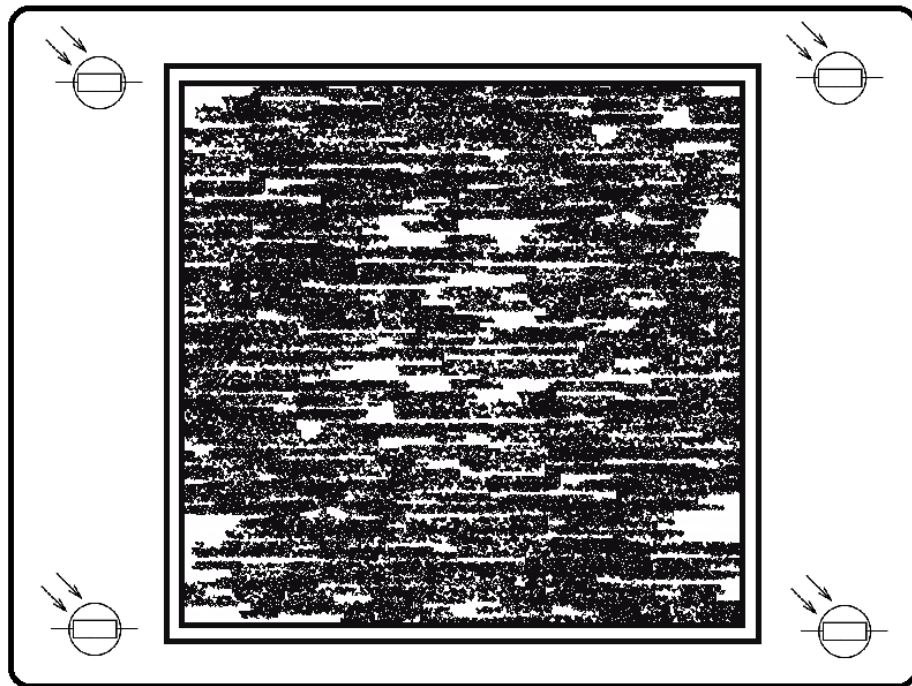
console, a toolbar with buttons for common functions and a series of menus. It connects to the **Arduino** and Genuino hardware to upload programs and communicate with them.

• Procedure

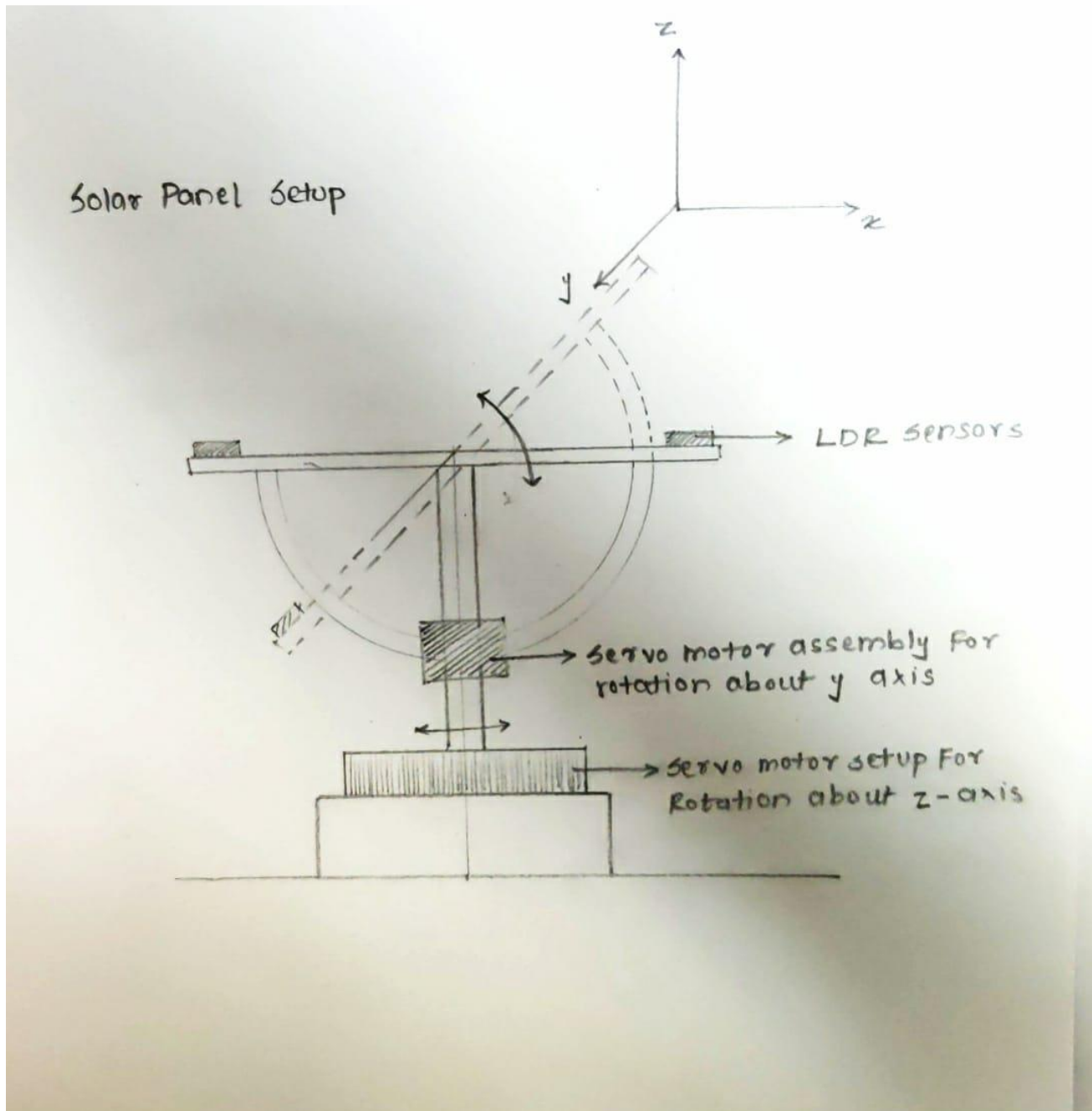
The LDR detects the falling sunlight. These generate analogue signals, which are sent to the Arduino board. The Arduino board calculates as to where the intensity (Efficiency) is maximum, then accordingly the servo motors position the solar panels so that the plane of the solar panel is perpendicular to the incoming light rays. Thus, the intensity is maximized.

Diagrams-

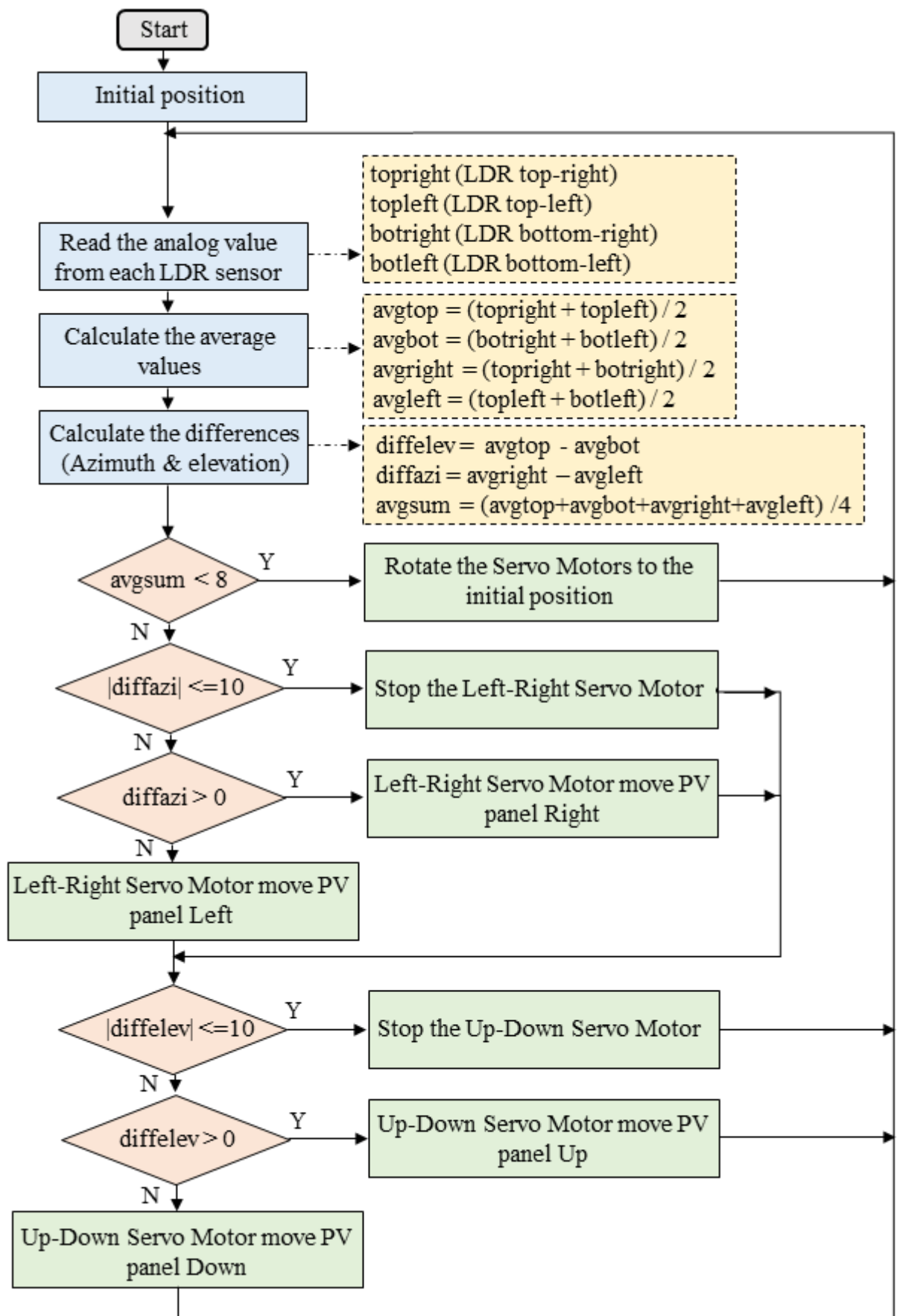
1. LDR Sensor Assembly



2. Solar Panel Setup



3. Algorithm



Further Innovations and Developments

The research question "How much more energy will be produced if solar tracking is implemented?" could be expanded into if it's possible to get more energy out of the solar panel with regard to the extra energy taken from the tracker system. If any project of this kind will be taken to the consumer market, this question is central for the prospects of such a project. One could think it would be interesting to increase the scale of this project. In that case one would certainly have to redo the construction of the stepper motors. One way to redo it would be to put both stepper motors on the bottom plate. The stepper motors could transfer the momentum with a belt attached to the axis of respective plate. In this way the problem of the stepper motors being too weak could be removed with the transmission of these belts. Further on the stepper motors could be changed into DC motors. With a low gearing and the fact that the sun moves very slowly over the sky, a DC motor run at a relative slow pace would be well adapted to the system. A possible twist to this project is to direct a solar collector to point in the sun's direction instead of a solar panel. Unlike the solar panel, there is no physical limit of how much energy a solar collector could pick up as long as there is something to heat up. This kind of project would of course include a set of other difficulties to solve such as how to design a dynamic water to panel connection. However, this might be a better application for the solar tracking system.