



## Research Project



# Project Completion Report

**Funding Agency: Pakistan Engineering Council (PEC)**

## 2. Research Project Summary.

Principal Investigator (PI)	Dr. Arslan Afzal
Title of the Research Project	Development and construction of a off-grid PV For small scale house electricity production.
Project Start Date	16 December 2022
Duration	6-9 months
Reporting Period	2-3 months
Approved Budget	2,00,000 (Rs.)
Department	Energy Systems Engineering
University / Institute	PMAS Arid Agriculture University, Rawalpindi

## 2. What were the specific research objectives?

1. Circulate the knowledge about the increase of green energy using off-grid PV
2. To provide an alternative source of energy that is best suited to the stakeholders (students, researchers, end-users etc.)

## 3. Status of Research Activities.

Activities Proposed	Present Status
To get Maximum output (efficiency) from the PV panel using solar cooling and tracking system	Successfully Completed
Disseminate the knowledge about the use of green energy by off-grid PV panels	Successfully Completed

# Successfully Completed Dual Axis Tracking and Cooling of an off-grid PV system

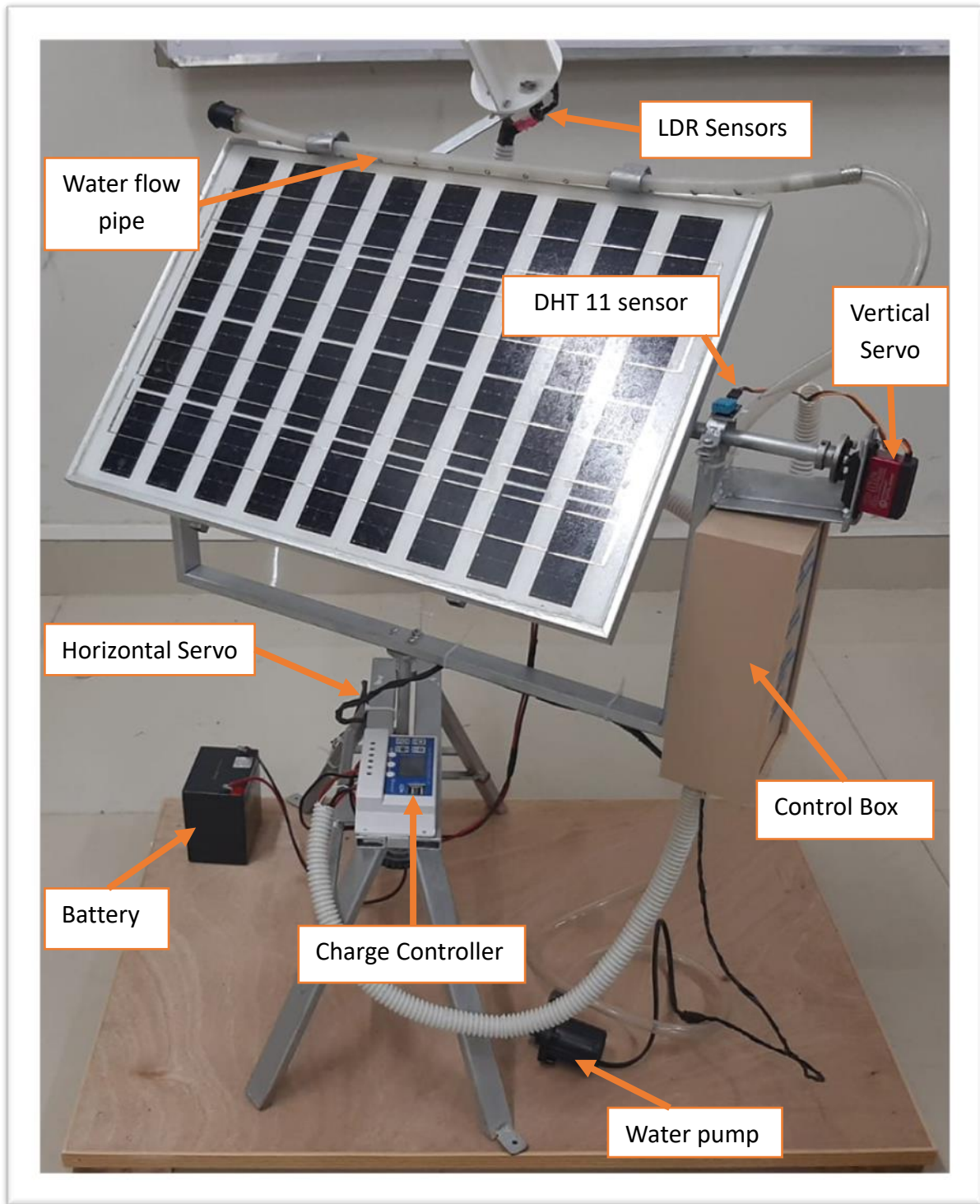


Figure 1 Prototype of Dual Axis solar Tracking and Cooling of an Off-Grid PV System

#### 4. Outputs.

<b>Expected Outputs</b>	<b>Present Status</b>
Construction and development of PV cooling and dual axis tracking system.	Successfully Completed
To get maximum output from cooling and dual axis tracking system.	Successfully Completed
The buyer will focus on using Solar tracking system because it will reduce no of plates and hence less roof space covered	Future Prediction

#### 5. Overall Assessment of Progress towards Achieving Objectives.

- Increased output from PV panel
- Information about angle on which PV gives maximum output with respect to time
- Identification of ambient temperature on which panel has reduced output
- Disseminating and making off-grid PV system common
- Job opportunities in energy sector to the students
- Skill development of students/trainers/end-users by technical enhancement in design & development
- Reduction in the cost of energy production

#### 6. Summary of Work Completed.

Dr. Arslan Afzal is the Project Supervisor and Principal Investigator PI (PhD research from USA & Germany) in the final year design project proposal. The students in this project purchased, designed and developed the Lab Equipment/Machines/Apparatus with these items' names. (Dual Axis Tracking Frame, Solar Tracking System using Arduino and Sensors, Solar Panel, Dry Battery, Charge Controller, Automatic Water-Cooling system using temperature sensor, Servo Motors, Buck Convertor, Relay and Wires). All research items were successfully purchased. During development of our project, we collected data regarding tracking system and developed our own sensor-based tracking with simple sensors and by doing coding using Arduino uno.

#### Research group

Two students worked under the supervision of Dr. Arslan Afzal in fall-spring semester 2022-2023. They have completed the study work (Project study report, presentation and development research). Now the construction work of solar cooling and dual axis tracking system is completed. The detail names and arid no of students is given below.

Sr. No	Name	Arid no	Semester
1	Mohammad Sadaan Khan Niazi	19-Arid-2337	8 <sup>th</sup>
2	Hurara Ahmed	19-Arid-2333	8 <sup>th</sup>

### **Sustainability:**

The cooling and tracking system of a photovoltaic (PV) system plays a crucial role in optimizing the overall efficiency and longevity of the system. Cooling system regulate the temperature of the solar panels, which can significantly impact their performance. Tracking system allows solar panels to follow the sun's path, maximizing the amount of sunlight they receive throughout the day and also creating the required angle with the sun rays to get maximum production of electricity.

### **Vision:**

- By Solar Cooling and tracking we can increase the output yield
- Getting more output by using less panels hence reducing space coverage
- Inviting private sector entrepreneurs to assist training programs
- Finding ways and means to transfer technology to grassroots level
- Minimizing the carbon production
- Free, sustainable and environmentally friendly source of energy

### **7. LIST OF PUBLICATIONS.**

Publication work is in progress.

### **8. LIST OF PERMANENT EQUIPMENT PURCHASED UNDER THIS PROJECT.**

Permanent Equipment/Machines/Apparatus purchased		
Sr. No.	Name of Equipment/Machines/Apparatus	Result
1	Dual Axis Tracking Frame	Successfully Designed and Constructed
2	Solar Tracking System using Arduino and Sensors	Successfully Constructed
3	Solar Panel, Dry Battery, Charge Controller	Successfully Purchased
4	Automatic Water-Cooling system using temperature sensor	Successfully Completed

5	Servo Motors, Buck Convertor, Relay and Wires	Successfully Purchased
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