ATME College of Engineering

21EEP584
Renewable Energy Projects

Presented by,
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Electrical and Electronics Engineering
ATME College of Engineering, Mysuru

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1: **Demonstrate** a technical knowledge of the selected project topic. [L2]

CO2: **Outline** problem identification, formulation and solution. [L2]

CO3: **Develop** engineering solutions to Renewable Energy based projects[L6]

CO4: **Summarize** and Communicate the project work with both engineers and the Society. [L2]

RENEWABLE ENERGY PROJECTS

Course Code	**:**	**21EEP584**	**CIE**	**:**	**50**
Hours/ Week	:	03	Exam Hours	:	03
Total Hours	:	45	SEE	:	50

RENEWABLE ENERGY PROJECTS

Project No.	Name of the Project	COs
1	Automatic solar tracking system.	CO1,CO2,CO3,CO4
2	Solar based small traffic control system	CO1,CO2,CO3,CO4
3	Solar mobile charger.	CO1,CO2,CO3,CO4
4	Vertical axis wind turbine system	CO1,CO2,CO3,CO4
5	Solar powered Smart irrigation system.	CO1,CO2,CO3,CO4
6	Renewable energy based home automation system	CO1,CO2,CO3,CO4
7	Domestic illumination using solar.	CO1,CO2,CO3,CO4
8	Solar grass cutter.	CO1,CO2,CO3,CO4
9	Solar UPS.	CO1,CO2,CO3,CO4

Introduction

Energy is the primary and most universal measure of all kinds of work by human beings and nature. Every thing what happens in the world is the expression of flow of energy in one of its forms.

Energy Resources

1. Based on usability of energy.

- Primary Resources: derived directly from natural reserve (solar, wind, nuclear, geothermal, hydropower).
- Secondary Resources (usable form of energy obtained by suitable energy conversion techniques).

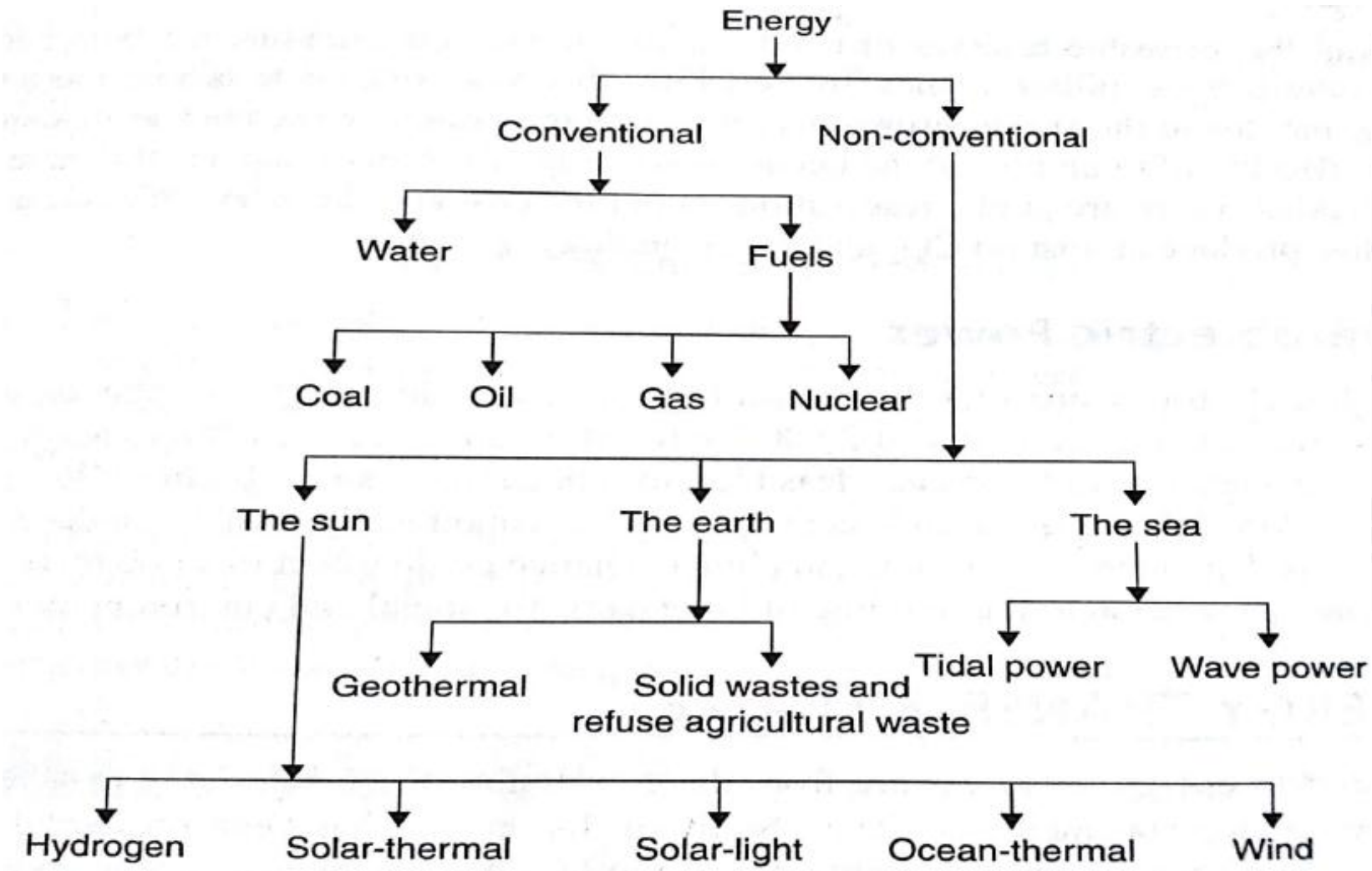
2. Based on Traditional use : Conventional and Non Conventional.

3. Based on Long term Availability: Non Renewable and Renewable.

4. Based on Commercial Application: Commercial and Non Commercial energy Resources.

5. Based on Origin: Fossil fuel, Nuclear, Hydro, Solar, Wind, Biomass, Geo Thermal, Ocean Thermal, Ocean Wave. Tidal.

Classification of Energy Resources



Solar energy

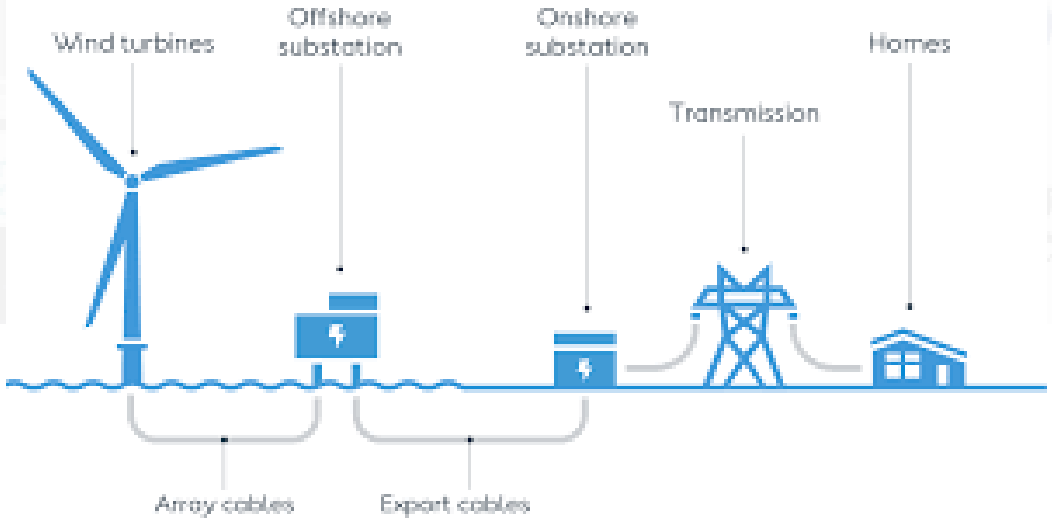
- In general, the energy produced and radiated by the sun, more specifically the term refers to the sun's energy that reaches the earth.
- Solar energy, received in the form of radiation, can be converted directly or indirectly into other forms of energy, such as heat and electricity, which can be utilized by man.
- Since the sun is expected to radiate at an essentially constant rate for a few billion years, it may be regarded as an inexhaustible source of useful energy.

The major drawbacks to the extensive application of solar energy are:

1. The intermittent and variable manner in which it arrives at the earth's surface and
2. The large area required to collect the energy at a useful rate.

Wind energy

The terms "wind energy" and "wind power" both describe the process by which the wind is used to generate mechanical power or electricity. This mechanical power can be used for specific tasks (such as grinding grain or pumping water) or a generator can convert this mechanical power into electricity.



Solar panel, a component of a photovoltaic system that is made out of a series of photovoltaic cells arranged to generate electricity using sunlight.

Solar cells

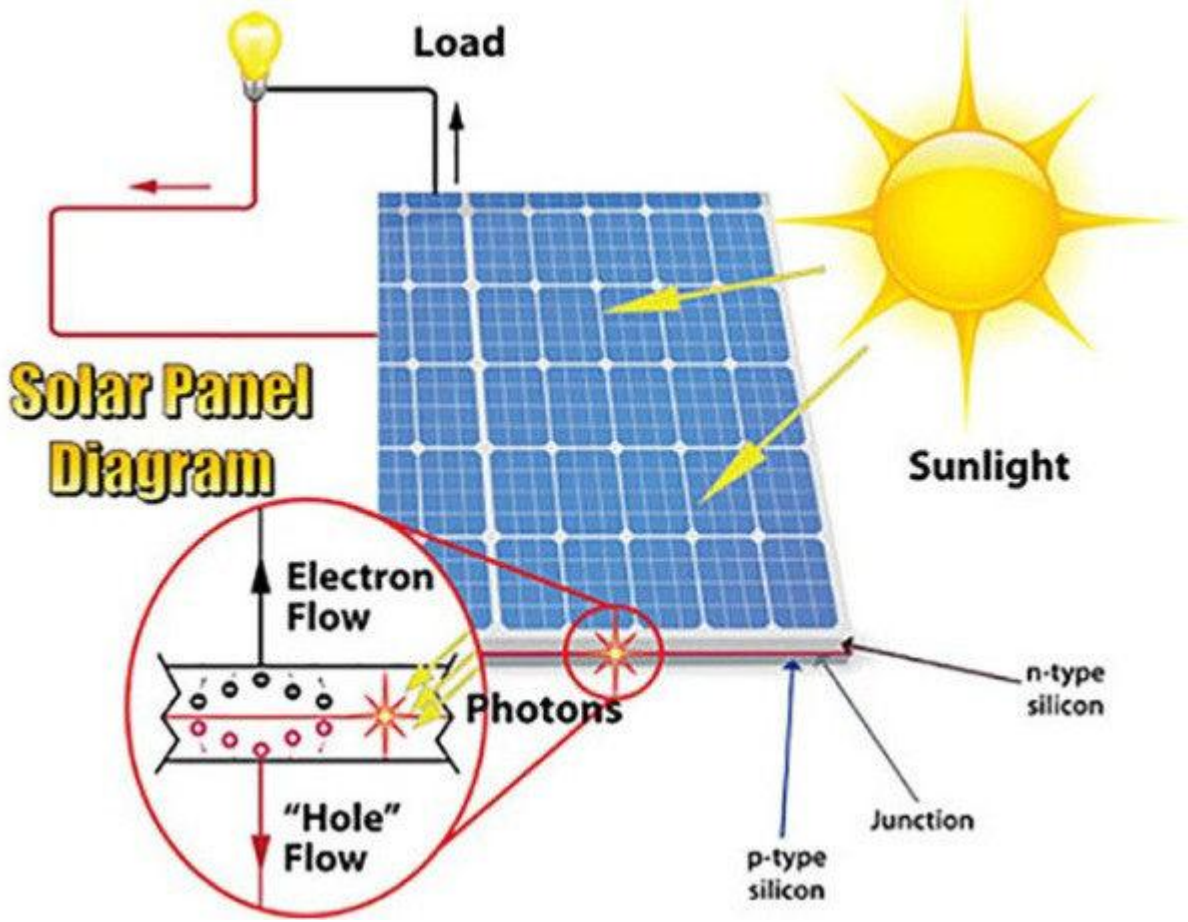
The main component of a solar panel is a solar cell, which converts the Sun's energy to usable electrical energy. The most common form of solar panels involve crystalline silicon-type solar cells. These solar cells are formed using layers of elemental silicon and elements such as phosphorus and boron. The elements added to the silicon layers form an n-type layer, which has an excess of electrons, and a p-type layer, which has a deficit of electrons. These two layers form a p-n junction.

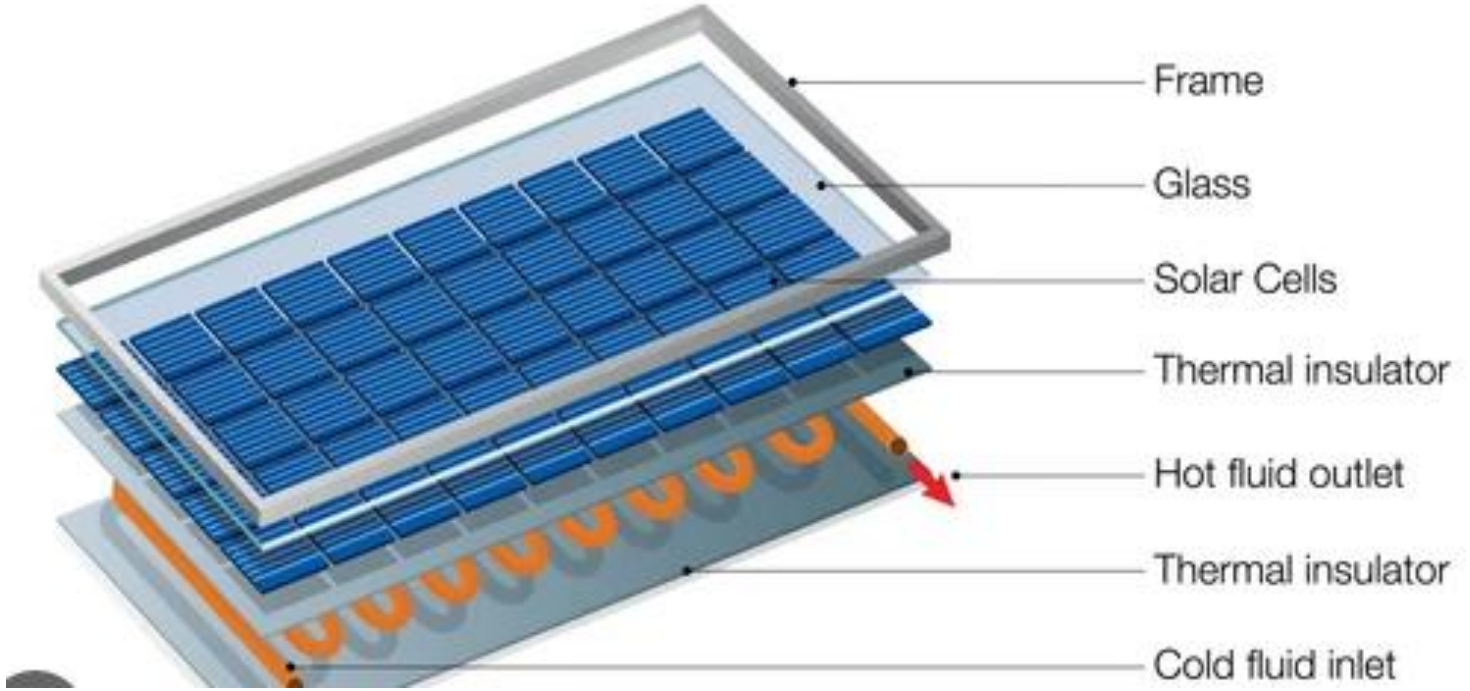
- When light falls on a solar cell, electrons are excited from a lower-energy ground state, in which they are bound to specific atoms in the solid, to a higher excited state, in which they can move through the solid.
- In the absence of the junction-forming layers, these free electrons are in random motion, and so there can be no oriented direct current.
- The addition of junction-forming layers, however, induces a built-in electric field that produces the photovoltaic effect.
- In effect, the electric field gives a collective motion to the electrons that flow past the electrical contact layers into an external circuit where they can do useful work.

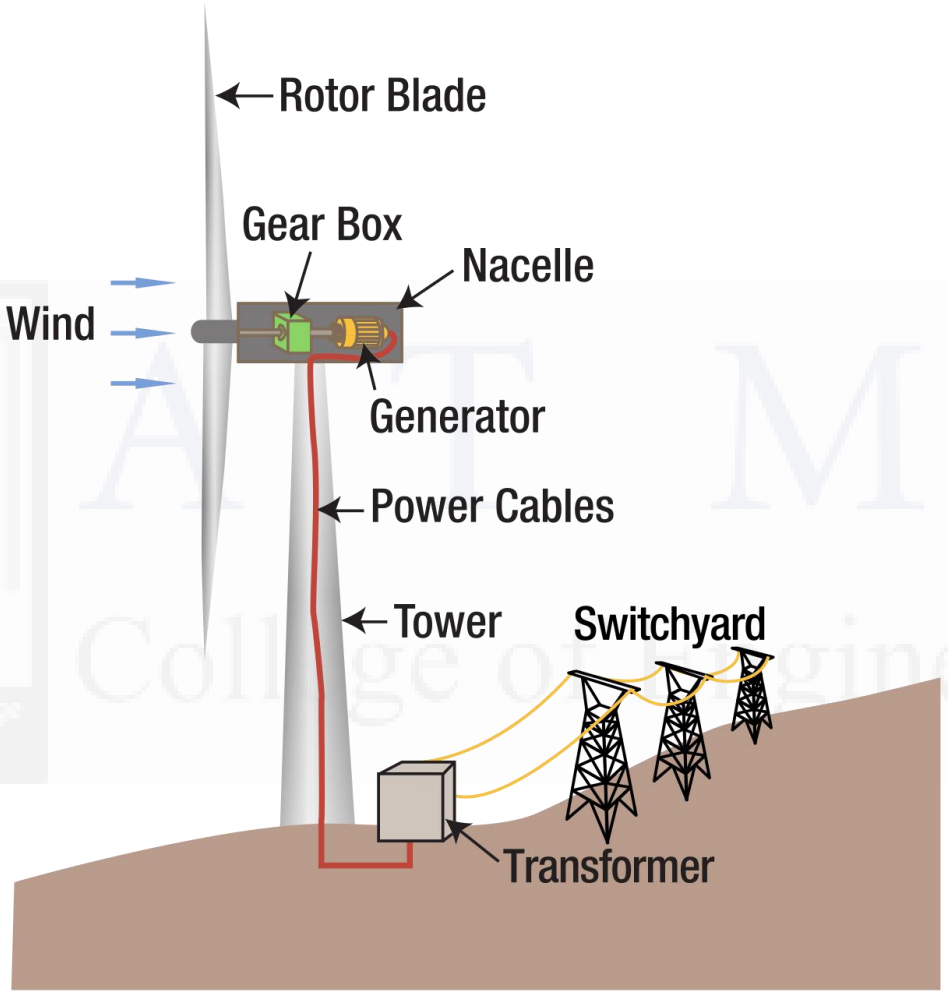
Design

- Most solar cells are a few square centimetres in area and protected from the environment by a thin coating of glass or transparent plastic.
- Because a typical 10 × 10-cm (4 × 4-inch) solar cell generates only about two watts of electrical power (15 to 20 percent of the energy of light incident on their surface), cells are usually combined in series to boost the voltage or in parallel to increase the current.
- A solar, or photovoltaic, module generally consists of 36 interconnected cells laminated to glass within an aluminum frame. In turn, one or more of these modules may be wired and framed together to form a solar panel.

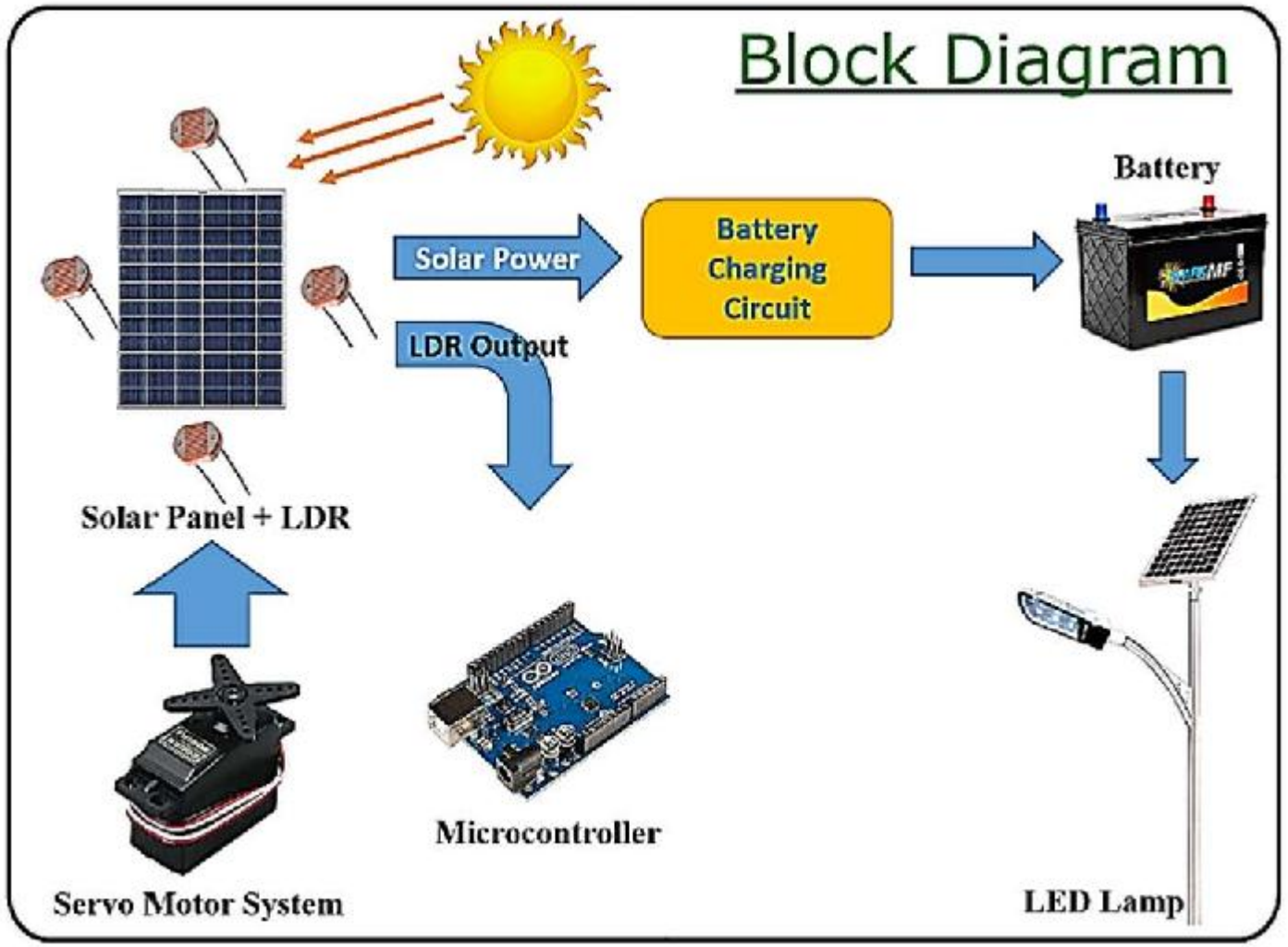
https://www.britannica.com/technology/electrical-and-electronics-engineering

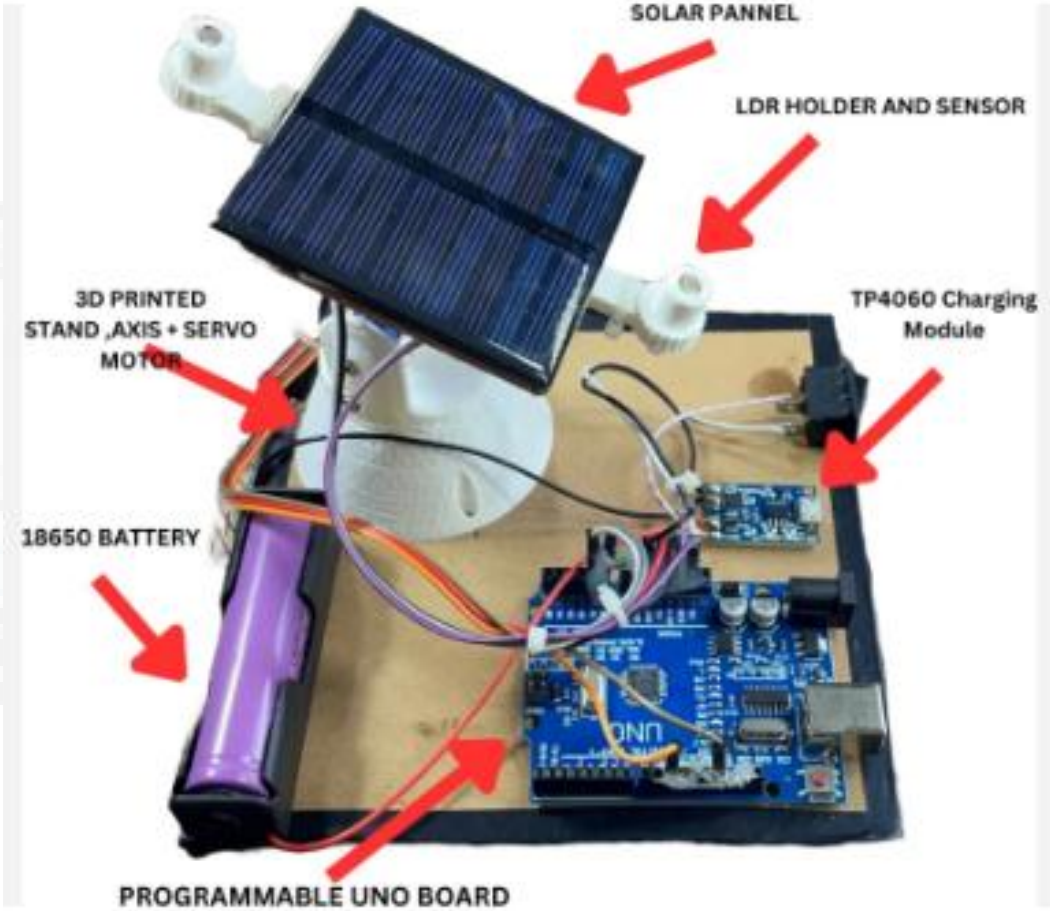

Load
Solar Panel Diagram
Sunlight
Electron Flow
Photons
"Hole" Flow
n-type silicon
Junction
p-type silicon


Frame
Glass
Solar Cells
Thermal insulator
Hot fluid outlet
Thermal insulator
Cold fluid inlet

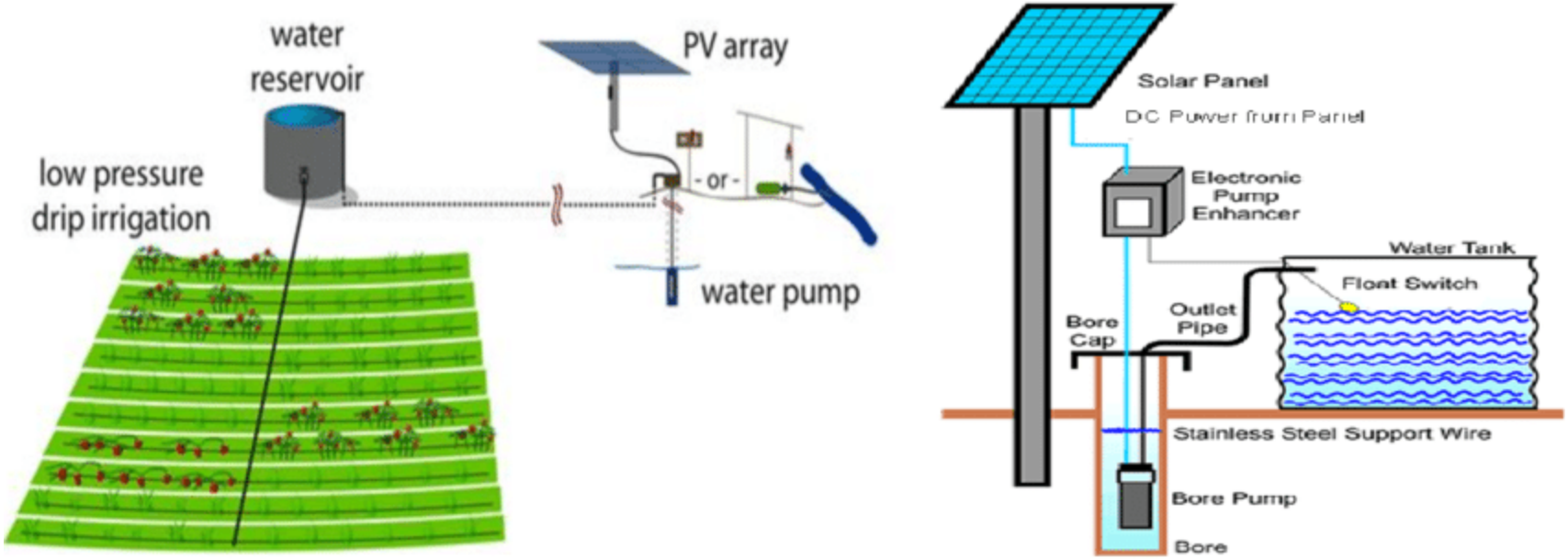

Rotor Blade
Gear Box
Nacelle
Wind
Generator
Power Cables
Tower
Switchyard
Transformer

Solar Tracker

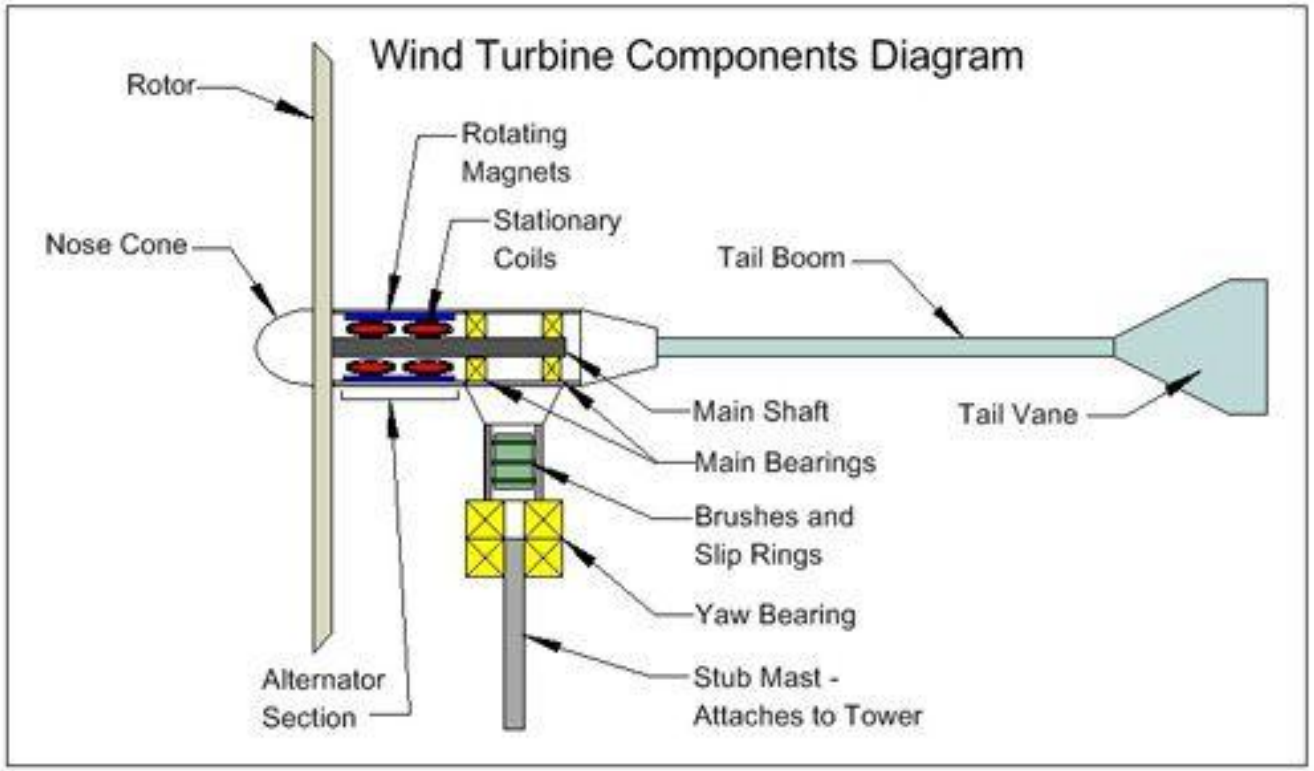


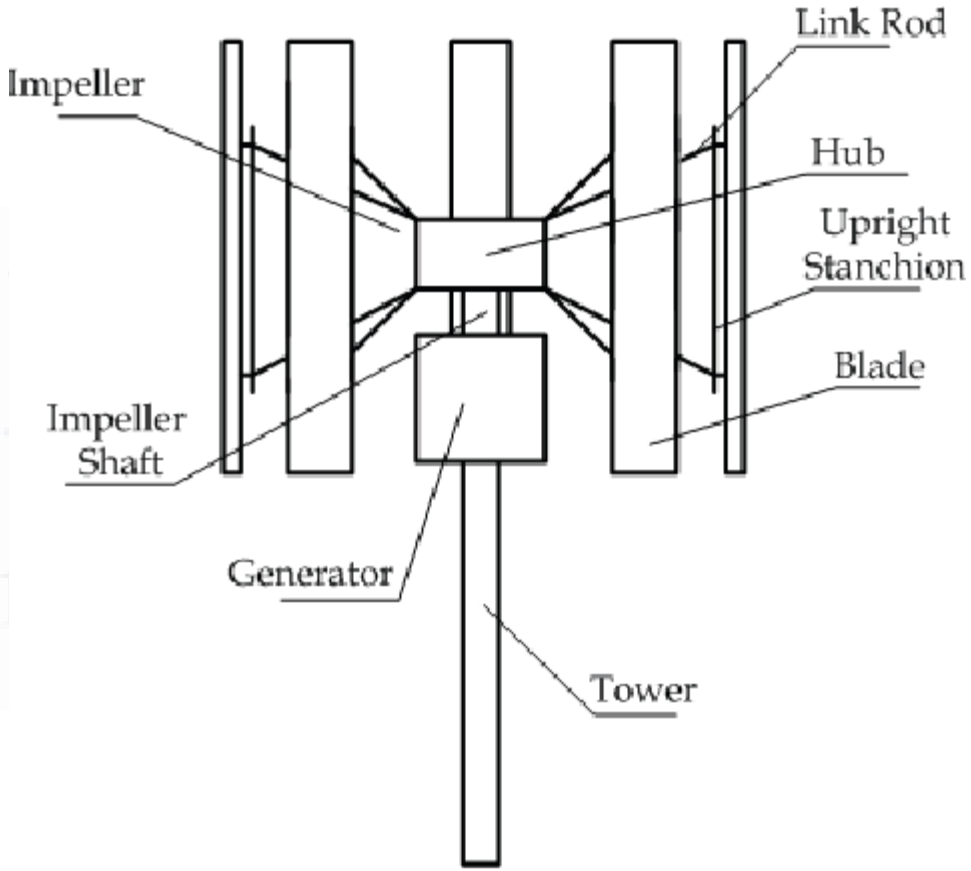

SOLAR PANNEL
LDR HOLDER AND SENSOR
3D PRINTED
STAND ,AXIS + SERVO
MOTOR
TP4060 Charging
Module
18650 BATTERY
PROGRAMMABLE UNO BOARD

Solar Irrigation System



Solar Smart Home Automation System


Wind Turbine Components Diagram
Rotor
Rotating Magnets
Stationary Coils
Nose Cone
Tail Boom
Main Shaft
Tail Vane
Main Bearings
Brushes and Slip Rings
Yaw Bearing
Alternator Section
Stub Mast - Attaches to Tower


Link Rod
Impeller
Hub
Upright Stanchion
Blade
Impeller Shaft
Generator
Tower

MODEL NO
530

ELECTROSAL

SOLAR GRASS CUTTING
USING MICRO-CONTROLLER

Project Idea Links

Project No.	Name of the Project	Reference Link
1	Automatic solar tracking system.	https://www.instructables.com/Solar-Tarcker/
2	Solar based small traffic control system	https://www.idosi.org/mejsr/mejsr24(2)16/4.pdf
3	Solar mobile charger.	https://www.instructables.com/Solar-Mobile-Charger-With-Powerbank/
4	Vertical axis wind turbine system	https://www.instructables.com/Portable-Savonius-Wind-Turbine-With-Deflectors/

Project Idea Links

Project No.	Name of the Project	Reference Link
5	Solar powered Smart irrigation system.	https://www.hackster.io/genereein/solar-powered-irrigation-with-timer-142748
6	Renewable energy based home automation system	https://ieeexplore.ieee.org/abstract/document/9792706/
7	Domestic illumination using solar.	https://www.instructables.com/Shed-12v-Solar-Lighting-System/
8	Solar grass cutter.	https://www.mdpi.com/2673-4591/12/1/105
9	Solar UPS.	https://www.instructables.com/HYBRID-SOLAR-UPS/

THANK YOU