Sensors

Sensors are devices that can detect and respond to different types of signals or stimuli in the environment. OR A sensor is a device which converts physical parameter of a quantity into corresponding electrical output. Some examples of sensors include temperature sensors, pressure sensors, motion sensors, motion sensors, proximity sensors, light sensors. Each type of sensors has a specific function and operates using different machines. For example, Temperature sensors measures variation in temperature by converting heat into electrical signals, while proximity sensors detect the presence of nearby objects by emitting and receiving electromagnetic waves.

Sensors play an essential role in many applications from monitoring and controlling industrial processes, for detecting diseases in medical diagnostics. They enable machin to sense & respond to their surrounding with greater accuracy & effeciency leading to improved performance, safety and productivity.

However, there are some limitations and challanges associated with sensors, such as accuracy and relability issues environmental sensisivity power consumption. signal interferance, and compatibility with

different Systems. Therefore it is important to choose the right type of sensors for specific application.

overall, sensors are vital components in modern technology and heave a significant impact on our daily life. As technology continues to advance, the development and use of sensors will undoubtly keep growing and evolving. (*) include content of (pag③ here.

Applications : Sensors are widely used in various fields such as electronics devices, ~~auto~~ in the field of automobile, robotics, aerospace, and biomedical engineering.

Types of Sensors

① Temperature Sensors, → Converts variation of temp into electrical signals.

② Proximity Sensors → detect the presence of nearby objects by emitting & receiving electromagnetic waves.

③ Accelerometer → ~~Spe~~ Converts speed into electrical signals.

④ IR Sensor → Detect the variation IR radiation in the environment & Converts it into electrical signals.

⑤ Light Sensor → Detect variation of light & converts it into electrical signals.

⑤ Ultrasonic Sensor → Detect

⑥ Smoke gas & alcohol Sensor → Detect smoke, alcohol &

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(*) Most Sensors work by using a physical properties of a material to creat an electrical signal. For example, a temperature Sensor might use a thermocouple, which generates a voltage when there is a temperature difference between two metal wires. A pressure sensor might use a strain gauge, which changes resistance when it is bent or compressed.

Once the electrical signal is generated, it is usually amplified and processed by the electronic circuit which can then interpret the signal and send information to a computer or other electronic device. This information can be use for a variety of purposes such as controlling machine or monitoring environmental conditions.

Photovoltaic Cell.

Photovoltaic cells also known as solar cells are devices that convert sunlight directly into electricity. These cells are made from semiconductor materials such as silicon, that are designed to absorb photons of light and release electrons. When light falls on photovoltaic cells, the energy of photons causes excitation of electrons in the semiconductors & then move. This creates electric current that can be used to power electronic devices or stored in batteries for latter use.

Photovoltaic cells have become an increasingly popular technology for generating electricity as the cost of producing them has improved. They offer a promising alternative to traditional fossil fuel sources of energy and have a potential to play important role in greenhouse gas emission & combacting climate change. (*) include content of page (5) here.

Applications :- They are used to generate electricity for variety of applications such as small calculators to large scale power plants, Solar Cars They are clean & renewable source of energy and don't produce any emissions. However ~~Limitations~~: the effeciency of the cell depend on quality of semiconductor material and angle & intensity of light.

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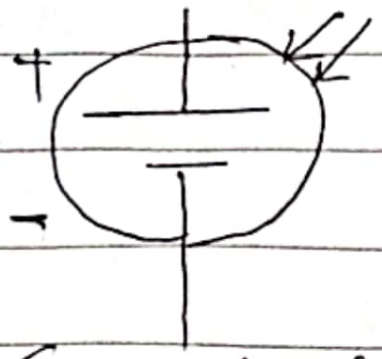
Principle behind photovoltaic cells.

Photovoltaic cells functions by using the energy of Sunlight to creat an electrical current. They are made of Semi Conductor material typically Silicon, and Consist of two layers with opposite electrical charges.

The top layer known as p-type layer (+ve hole) which contains Semi Conductor material that is doped with a material that has one less electron than the Semi Conductor material itself. This creats holes in the Semi Conductor material which can be filled by electrons from the n-type layer below, which contains Semi Conductor material that is doped with a material that has one more electron than Semi Conductor material itself. This creats excess of free electrons in the Semi Conductor material.

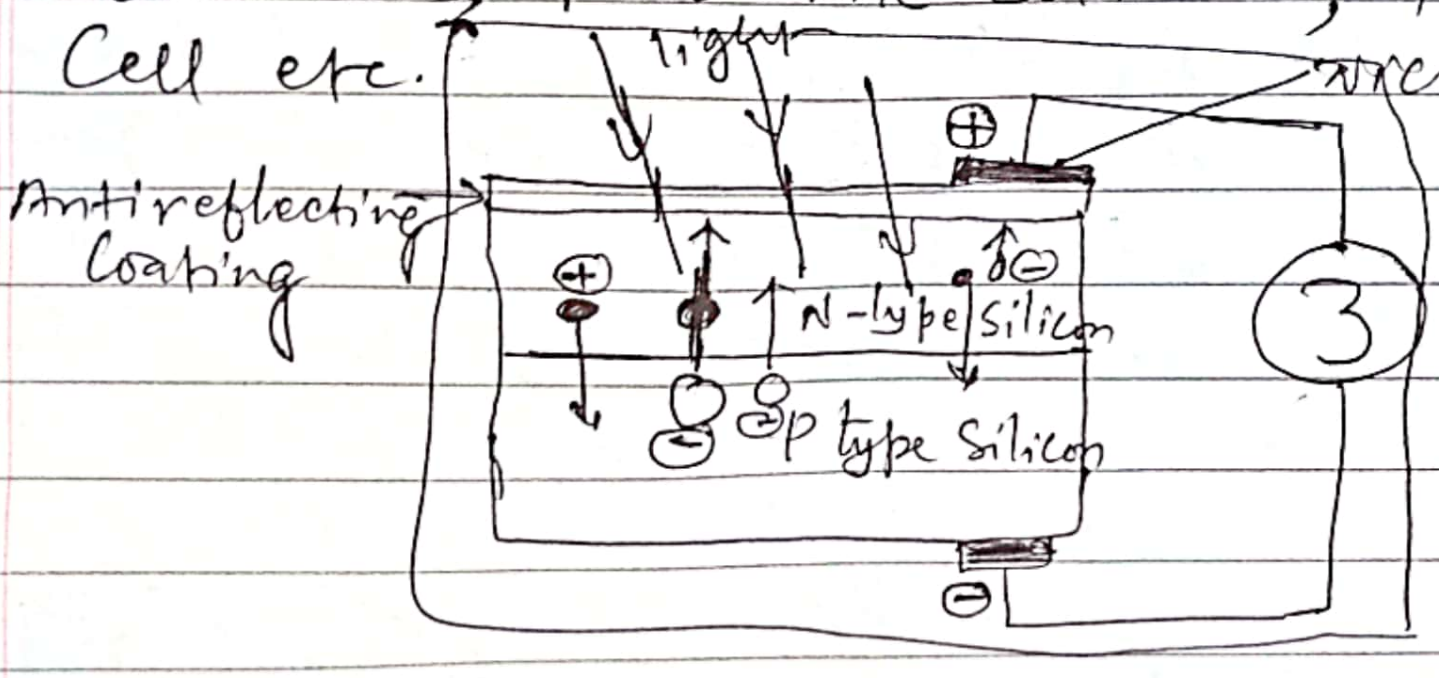
When Sunlight hits the cell, it absorbs by the Semi conductor in the top layer exciting electrons & creating electron hole pairs. The electric field between the two layers of the cells then separates the electron hole pairs, forcing the electrons to flow in one direction and the holes in opposite direction. This creats flow of electric current. (i.e flow of electrons from valence (top) to conduction (lower layer) band ocu

The electrical power generated by a single photovoltaic cell is very small, so multiple cells are connected together to form large panel



Symbol of photovoltaic cells

Examples of photovoltaic cells: P-N junction made from Silicon, organic solar cells, dye sensitized solar cells, perovskite solar cell, quantum dot solar Cell etc.



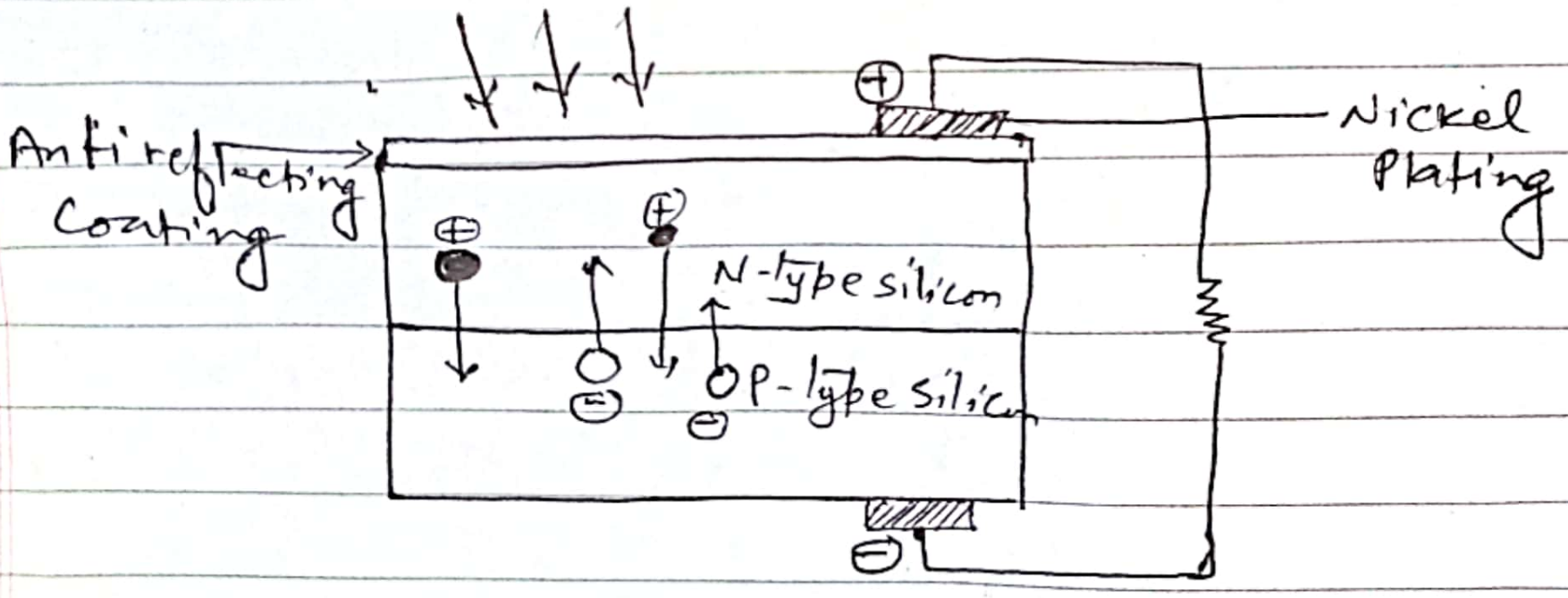


fig:- Photovoltaic cell