

# **FINAL YEAR PROJECT REPORT**

## **Energy Saving System**



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in partial fulfillment of the requirements for the degree of  
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by

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## **Abstract**

As we all know that our home land Pakistan is suffering from worst energy crisis in the history. Everyday we running out of fuels like petrol, diesel, gasoline and natural gas.

So electricity produced by these sources is also very expensive. The ideal source for Pakistan is Solar Energy. Due to this reason we chose to work on this project which can solve the problems. To make this a little better our project implements a smart algorithm in order to power a load with a solar, batteries or the wapda. For this project our goal is to power a load with minimum power from the wapda. In order to form this project, we needed to monitor the voltage and current flow from each of the sources (solar, batteries, and the wapda) and the load. We implemented these current and voltage monitors. The next step was to come up with an algorithm that would determine what source should be powering the load and when the battery should be charged. The final step was to send out data to PIC so that the data can be analyzed.

## **Dedication**

Dedicated to ALLAH who bestowed us with the ability to understand his knowledge to serve this world and our parents, teachers and friends, without their support it would not have been possible to complete this project.

## Acknowledgements

First of all, we would like to thank Al-Mighty **ALLAH** for giving us strength to complete our final year project. Then to thank our parents without their support this project was impossible to finish. We truly acknowledge the cooperation and help make by Project Advisor(Asif Hussain) and SST faculty members, University of Management and Technology and thank the Dean of School of Science and Technology, Dr. Aziz Bhatti and Chairman Dr.Sajjad Shami for his support to the final year students. They took out their precious time and helped us right from the beginning of the project. They have been a constant source of guidance throughout the course of this project. We are also thankful to our friends and families whose silent support led us to complete our project.

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## **Introduction:**

Our project implements a smart algorithm in order to power a load with a photovoltaic, batteries or the power grid. In order to form this smart home, we needed to monitor the voltage and current flow from each of the sources (photovoltaic, batteries, and the grid) .We implemented these current and voltage monitors. The next step was to come up with an algorithm that would determine what source should be powering the house and when the battery should be charged. The final step was to send out data to a load.

# Chapter 1

## Solar Energy

### 1.1 Solar Energy Overview

We have used the Sun for drying clothes and food for thousands of years, but only recently have we been able to use it for generating power. The Sun is 150 million kilometres away, and amazingly powerful. Just the tiny fraction of the Sun's energy that hits the Earth (around a hundredth of a millionth of a percent) is enough to meet all our power needs many times over. In fact, every minute, enough energy arrives at the Earth to meet our demands for a whole year - if only we could harness it properly.

### 1.2 Why Solar Energy is in Our Future

There are three main reasons for this

- Global Energy Demand
- Sources of Energy
- The Solar Resource

### 1.3 Types of Solar Energy Technologies

There are three main types of Solar Energy

1. Passive
  - Direct Solar Gain
  - Indirect Solar Gain
  - Isolated Solar Gain
2. Concentration
  - Power towers
  - Trough Collectors
3. Photovoltaic Cells

In Our project we are using Photovoltaic Cells Technology.

## **1.4 What are Photovoltaic Solar Cells?**

Photovoltaic cells are devices that produce electricity directly from sunlight. Many photovoltaic cells put together form a solar array or solar panel. These cells convert light into electricity by harnessing the energy created when photons from sunlight knock electrons into a higher state of energy, within the cell itself. Photovoltaic cells are composed of layered materials which include two types of silicon, an anti-reflective coating, and a glass cover. The technology used to produce solar panels continues to advance, and may one day provide essentially free energy to power homes and businesses.

One of the most important parts of a photovoltaic cell is the material used as the semiconductor. Silicon is the most commonly-used semiconductor, but other options are available for certain applications, which can be less expensive than silicon. When light hits the semiconductor, a portion of the light energy is absorbed, causing the release of electrons. The electric current that results is what can be used as electricity, and it is collected by the metal contact grids on the top and bottom of solar cells.

## **1.5 Types of Solar Cells**

Solar cells are usually made from silicon, the same material used for transistors and integrated circuits. The silicon is treated or "doped" so that when light strikes it electrons are released, so generating an electric current. There are three basic types of solar cell. Monocrystalline cells are cut from a silicon ingot grown from a single large crystal of silicon whilst polycrystalline cells are cut from an ingot made up of many smaller crystals. The third type is the amorphous or thin-film solar cell.

### **1.5.1 Amorphous Solar Cells**

Amorphous technology is most often seen in small solar panels, such as those in calculators or garden lamps, although amorphous panels are increasingly used in larger applications. They are made by depositing a thin film of silicon onto a sheet of another material such as steel. The panel is formed as one piece and the individual cells are not as visible as in other types.

The efficiency of amorphous solar panels is not as high as those made from individual solar cells, although this has improved over recent years to the point where they can be seen as a practical