1.1 PREFACE

The sustainability and availability of Renewable Energy Resources like solar, wind and thermal energy will play a tremendous roll in the field of power generation in the future [1-23] .Solar has no emission of pollutant gasses into the atmosphere, and can be converted using various technologies into electricity, one of this methods are Photovoltaic modules (PV). The PV systems generated electricity is not competitively enough compared to fossil fuel due to its manufacturing cost and stability. To enhance the performance of solar panel the only way is to increase the intensity of light falling on it. One of the approaches available for increasing the performance of PV system is Tracking Systems.[1-5, 7, 10, 14, 15, 17, 18, 21, 23-26]

The concept of a solar tracking platform describes the part of the system that ensures solar collector mobility and tracking control. The amount of solar energy captured is a function of the solar system orientation. Efficient solar energy harvesting can thus only occur with the aid of a solar tracking system[4, 17]. The solar tracking mobility platform plays a crucial role in the development of solar energy applications in order to maintain high levels of power output[20], a high precision sun-tracking system or solar tracking mobility platform is necessary to follow the sun on its trajectory as it moves across the sky. Trackers maximize energy production by keeping the PV panels perpendicular to the incoming sunlight through the day, addition to increase the energetic efficiency up to 40–50% in relation to fixed panels.[20]

1.2 PROBLEM STATEMENT

Solar Energy is the most essential and prerequisite resource of sustainable. The research in this field represents a priority at the international level. One way of converting Solar energy is using PV panels, the energy produced by the PV is a function on the angle between the sun and the panel. keeping the PV angle fixed will not give 100% of it functionality. As a fact that Solar Harvesting System will be often placed in a remote area so controlling it will be difficult for the user**.** the Solar Power data in Sudan and the solar map in Sudan needs updating.

1.3 PROPOSED SOLUTION

The proposed solution is designing Sun tracking mechanisms to increase the energetic efficiency by capture the maximum amount of solar light during the day.

remote controlling the PV system. Installing data base to store the Solar Cells reading to monitor the system functionality and use it in constructing Solar Map for the area where it installed.

1.4 AIMS AND OBJECTIVES

The aims of this project is to design an automated sun tracking system which can carry the solar panel and positions it in such a way that direct sunlight is always focused on the PV cells

- Simulate the PV cell using Proteus.

- measuring the PV parameters and environment temperature.
- Design GUI using matlab.
- Remotely control the system.
- Construct Database to store the measured data

1.5 METHODOLOGY

The project was achieved through the flowing stages:

- In the first stage the ALT50-12P PV panel was Simulated using Proteus.
- In the second stage the parameters of the PV panel were measured using a designed sensors system in order to keep up and real time update the PV parameters (sun radiation, panel voltage, panel current, panel power, and environment temperature).
- In the third stage the location of the sun was delineates using four light dependent resistors (LDR) as a light sensor and the data received from the sensors were processed by the microcontroller which implemented control algorithms to drive two Bidirectional Stepper motor via motors drivers to ensure solar panel perpendicular towards the Sun, all the actions were simulated under proteus program, and the angles of the panel were also measured.
- In the last stage a GUI was constructed using Matlab program, a Database was also constructed, and all the parameters from the second and the first and second stage were sent to the GUI using virtual serial terminal.

1.6 THESIS OUT LINES

Chapter Two: describes the Solar Power Fundamentals and the way of simulating the Solar cell as well as the effects of the I-V curve and the temperature on the performance of the PV panel. Also this chapter introduce the background of the sun tracking as well as the related works in the field.

Chapter Three: System Design: this chapter represent the methodology of accomplishing the system and the used simulating items.

Chapter Four: the chapter present Result and Discussion, the proteus sheets and the GUI, and the way they interact with each other.

Chapter Five: Conclusion and scope of further work is presented.