CHAPTER 4

RESULT AND ANALYSIS

4.1 Introduction

In this chapter, to test this whole project there should be two tests. first test the battery charge by taking voltage and battery level data at a 25-degree solar penal angle. Second test the battery discharge by taking voltage and battery level data using a 30-Watt Ac lamp load. The purpose of this test is to find out how long the used battery can be fully charged and to find out how long the battery can produce energy for a predetermined load.

In this test we took three days. The first test takes two days and the second test takes one day. Why for the first test should take two days because in the solar system the most suitable time to get a light intensity of 1000 W/m2 from 11.00 am to 4.00 pm.

4.2 Test System

Figure 4.1 Control System and Output 220 V Ac

Figure 4.2 Connection Control System with Solar Penal 50 watt

4.3 Data Analysis

4.3.1 Battery Charge Test Analysis

angle	Voltage (V)	Level Battery (%)	time (h)
25	18.2 V	2%	10.00 AM
25	20.4 V	18%	11.00 AM
25	21.3 V	29%	12.00 PM
25	23.4 V	45%	1.00 PM
25	22.7 V	58%	2.00 PM
25	22.3 V	63%	3.00 PM
25	21.4 V	79%	4.00 PM

Table 4.1 Battery charge test analysis with solar system the first day

angle	Voltage (V)	Level Battery (%)	time (h)
25	20.3 V	79%	10.00 AM
25	23.3 V	89%	11.00 AM
25	23.7 V	100%	12.00 PM

Table 4.2 Battery charge test analysis with solar system the second day

The obtained results listed in Table 4.1 and Table 4.2 show that solar panels can generate voltage from sunlight due to the heat generated. To get the max energy from the solar penal the light intensity needs to get 1000 W/m2. Solar has a disadvantage in terms of extremely high temperatures in 75 Celsius which allows the voltage to drop sharply.

In this test also the time taken for a full charge in 8 hours by using a solar penal 50W and a battery capacity of 35 AH.

Calculation of time for battery charge

Formula: P = IV and Q = P x t

$12\ V\ \times 35\ AH = 420\ WH$

$420\ WH\ \div 50\ W = 8.4\ H$

Where,

$1\ H = 60\ minutes$

$0.4\ H = 24\ minutes$

Time of battery full charge = 8 hours 24 minutes

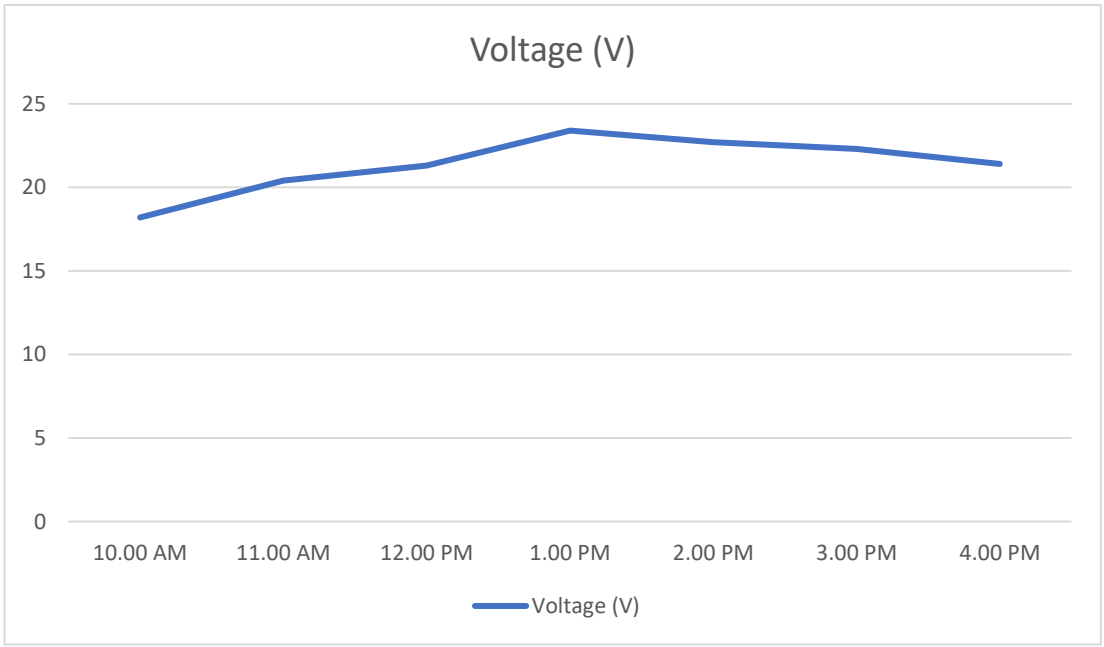

Figure 4.3 Voltage graph on the first day

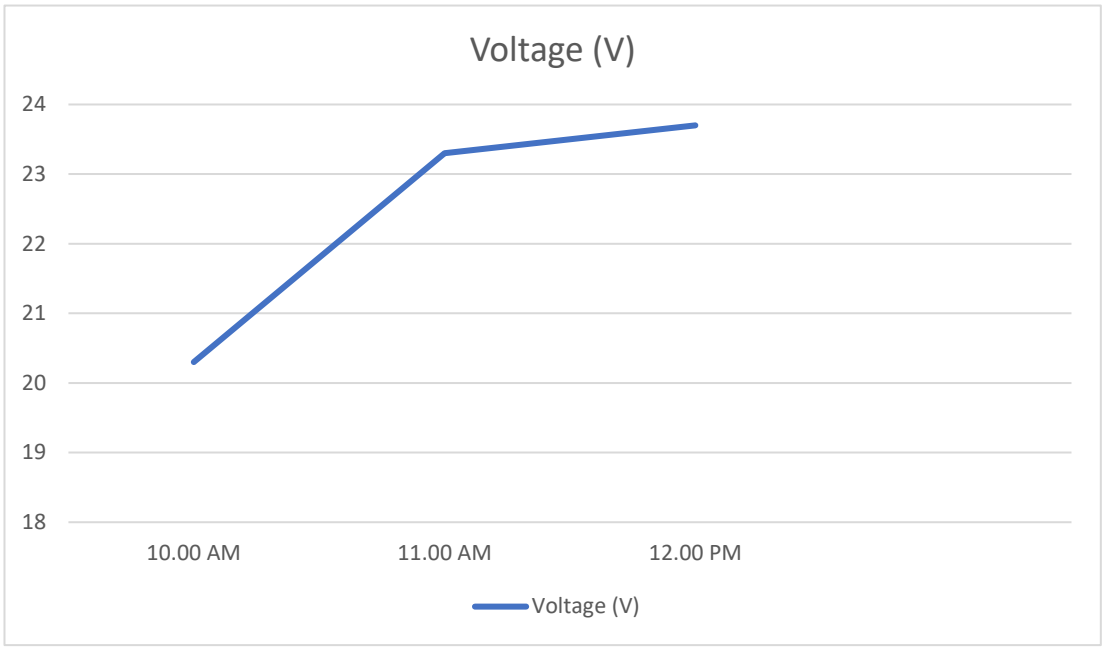

Figure 4.4 Voltage graph on the second day

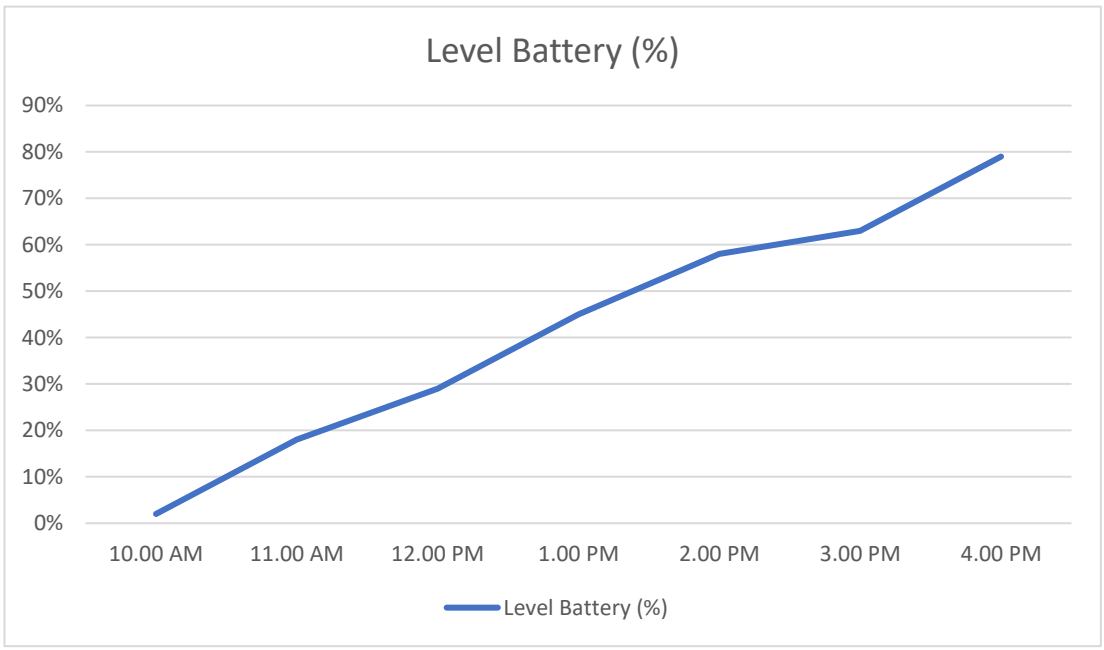

Figure 4.5 Level battery graph on the first day

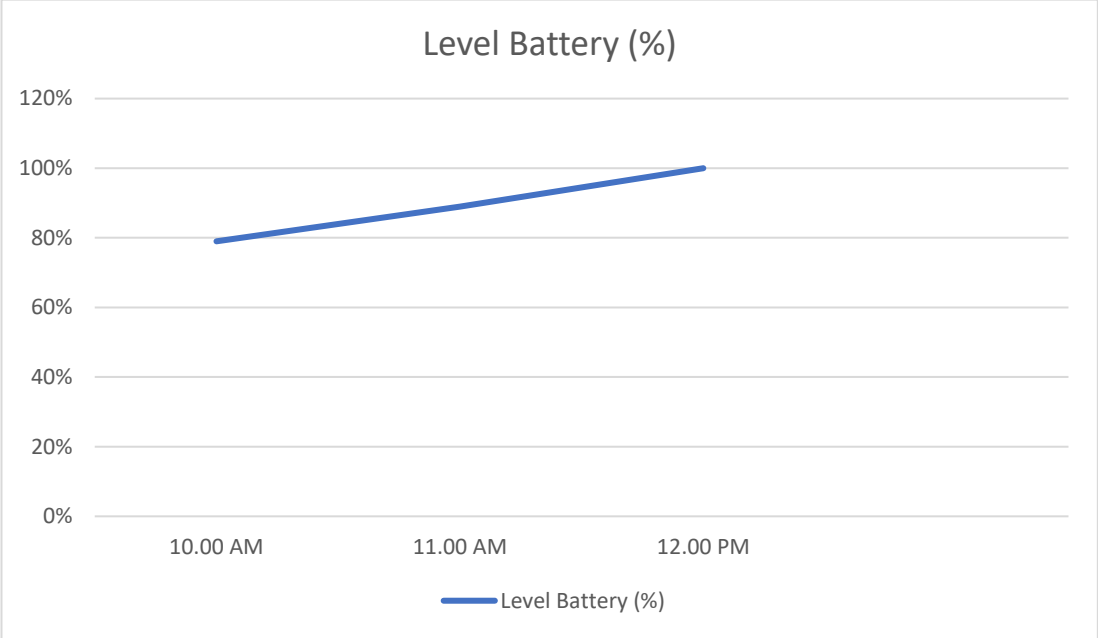

Figure 4.6 Level battery graph on the second day

4.3.2 Battery Discharge Test Analysis

Voltage (V)	Level Battery (%)	Time (h)
12.8 V	100%	8.00 pm
12.6 V	95%	9.00 pm
12.4 V	90%	10.00 pm
12.0 V	80%	11.00 pm
11.8 V	73%	12.00 am
11.6 V	68%	1.00 am
11.3 V	50%	2.00 am
11.1 V	42%	3.00 am
10.9 V	30%	4.00 am
10.7 V	12%	5.00 am
10.4 V	0%	6.00 am

Table 4.3 Battery discharge test analysis

The obtained results listed in Table 4.3 show a 12V 35AH battery discharge with a 30-Watt ac lamp load. in this test, to fully discharge the battery took 10 hours. If you follow the calculation of the time to discharge the 12V 35AH battery for more than 10 hours, in this test, it can only produce 10 hours. Although the battery capacity is 35AH, but in the battery specifications we can only use 80% of the battery capacity.

In this test as well, a lot of energy used is free because it uses an inverter to convert dc to ac. besides that in a 12 V battery system when the voltage is 10.5 V below the capacity of the battery is empty.

Calculation of time for battery discharge

Formula: P = IV and Q = P x t

$12\ V\ \times 35\ AH = 420\ WH$

$100\% = 420\ WH$

$80\% = 336\ WH$

$336\ WH\ \div 30\ W = 11.3\ H$

Where,

$1\ H = 60\ minutes$

$0.3\ H = 18\ minutes$

Time of battery total discharge = 11 hours 18 minutes

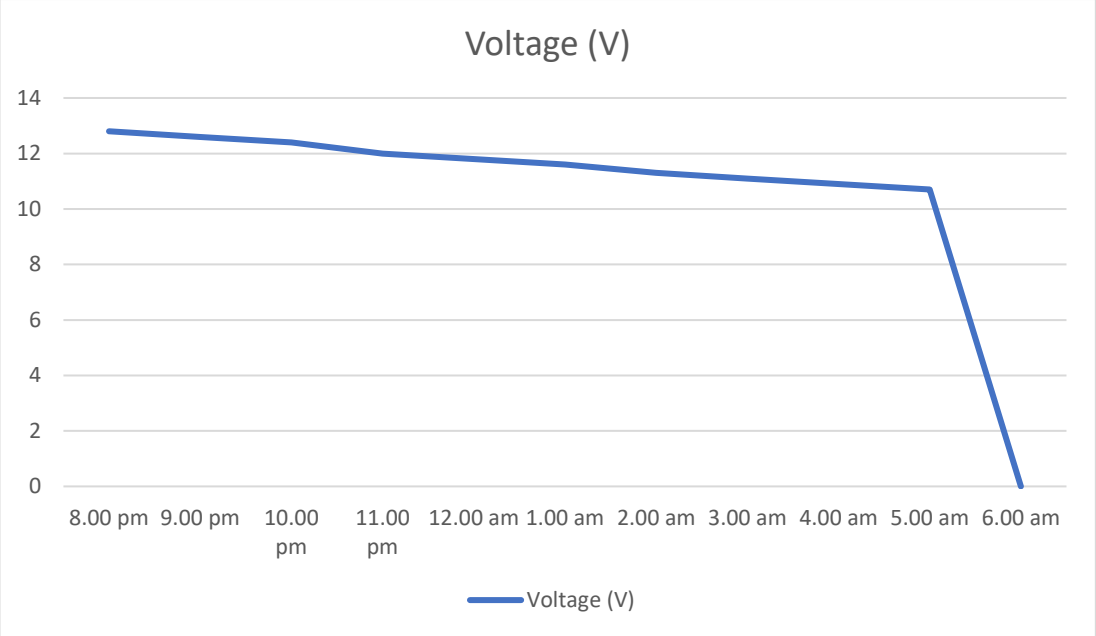

Figure 4.7 The graph shows the battery discharge voltage

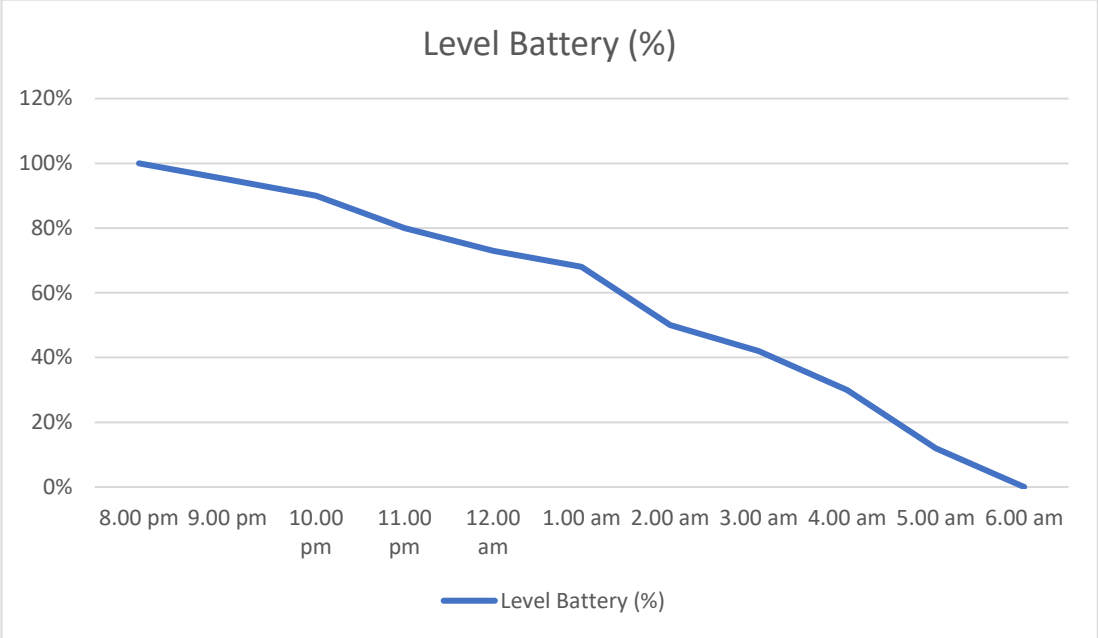

Figure 4.8 The graph shows the battery discharge battery level