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DETERMINING THE TIME DEPENDENCE OF THE CURRENT POWER AND STRENGTH OF SOLAR PANELS BASED ON THE EDIBON SCADA DEVICE

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Annotation

This article describes how to determine the time dependence of light energy on the current and voltage of solar panels based on the Edibon SCADA device.

Keywords*:* Edibon SCADA device, solar panels, light bulbs, computer, resistance converter, lux meter, thermocouple.

Introduction

This article is about obtaining electricity through sunlight using renewable energy sources. Renewable energy sources can be a variety of energy sources, including solar energy, wind energy, wave energy, biogas technology, energy from hydropower plants, and other types of energy sources. Extensive work is being done in the country to ensure the legal framework for the use of renewable energy sources. The climate of the Republic of Uzbekistan is continental, with an average of 300 in summer and 30 in winter, which allows it to use a lot of solar energy. It allows you to get a large amount of electricity from solar panels for the summer and spring and fall months. Currently, the energy demand is growing as the population of Uzbekistan grows from year to year.

More than 80 countries around the world are gradually using renewable energy sources. Today, Uzbekistan is one of these countries. Uzbekistan's climate is conducive to the efficient use of solar energy. Renewable energy sources such as solar energy, wind energy, wave energy, and biogas technology are being used wisely[2]. Due to a large number of sunny days in Uzbekistan, solar energy is used more than other types of energy. There are different ways to get electricity through solar energy. The energy coming from the sun is complex. In particular, the heat of the sun, the effect of light, and the pressure of light are among them. Light from the sun is a stream

of energy. Energy from the sun comes through radiation, which can take two forms. The first light reaches the earth in the form of a particle, which is a photon. Second, light comes in the form of waves. "Any moving particle has a wave property," so the energy of light was considered complex. We use solar panels to convert energy from the sun into electricity. A system consisting of several sets of solar cells forms a solar cell. Solar panels are made of semiconductor materials. Solar cells are often made of silicon and germanium-based semiconductor materials. As semiconductor materials, we can obtain elements from group 2 to group 6 elements in the Mendeleev periodic table[3]. We use this element a lot because silicon solar cells are cheap and common in nature. The working principle of the solar cell works based on the internal photo effect. As sunlight falls on them, the concentration of free electrons in matter begins to increase under the influence of light, resulting in an n-p transition. In semiconductors, the current-carrying function is electronic and hollow. An n-type semiconductor is a donor compound semiconductor[5]. A semiconductor with a current carrier type p is an acceptor mixed semiconductor. Solar processes follow the same pattern. Solar cells use single crystal and polycrystalline semiconductor materials. Each type of semiconductor has different characteristics. In this experiment, we worked on a solar cell based on a polycrystalline semiconductor [7].
The study aimed to determine the volt-ampere characteristics of solar panels using a solar-powered Edibon SCADA device. This device is called an EESFC device. In the EESFC device, we can detect more than 30 characteristics of solar cells[1]. From them we can determine the dependence of current on voltage, the dependence of current on time, the dependence of voltage on temperature, the dependence of voltage on time, the dependence of temperature on power, the dependence of current on power,[4] the dependence of intensity on voltage and other quantities designed. In the Edibon sac, the formulas and relationships of these quantities are interrelated by computer programs of the EESFC device. There are windows for the readings of each measuring instrument, and the results are stored in computer memory. There are enough programs on the computer to study the results in relation to other sizes, with the help of which it is possible to observe each size in a single window.

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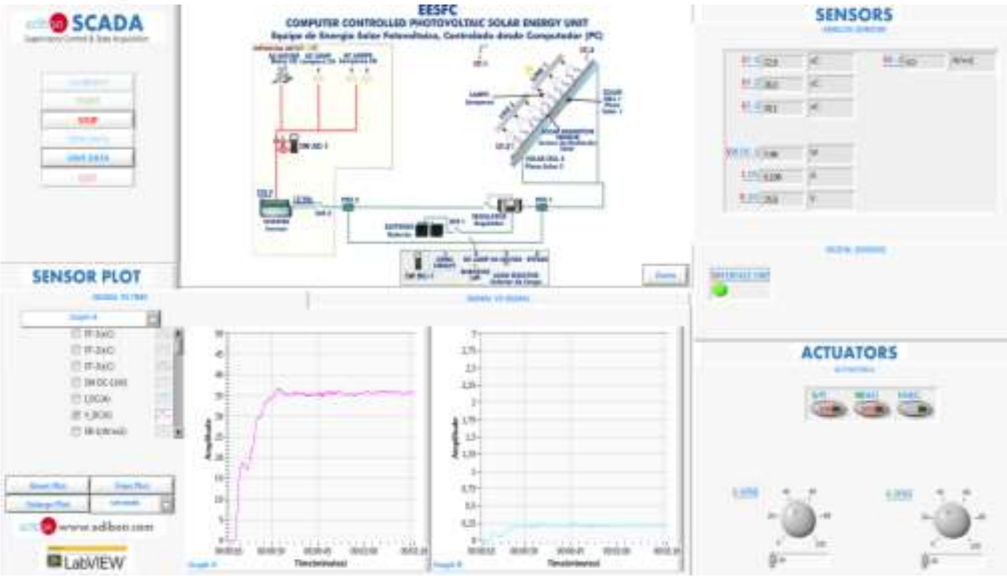

Figure 1. View of the device software work window

We determine all the sizes of solar panels in the device when connected in series and in parallel. To do this, the following tasks are performed: The external temperature of the Edibon SCADA EESFC device and the temperature of both panels are determined by means of a thermocouple. We will use two large solar panels, each consisting of 36 small solar panels of 156 * 156mm. The total area of this panel is 0.51 m^2 and consists of a lux meter that measures light intensity. It consists of 8 lamps of 400 watts illuminating the panels[1]. We control the computer to supply these lamps and keep the temperature constant. The light intensity is 40%. After the lamp with external temperature t_t = 22.9 ^oC, the temperatures of the first and second panels are as follows t_1 = 38.90C t_2 = 25^oC.

Figure 2. Connecting the solar panels in series and the operating mode of the fins.

In the picture, we can see that the solar panels are connected in series and the lights are on. We need a rheostat to get the time dependence of the current and voltage of the solar panels. The function of the rheostat is to change the resistance of the solar panel. With the following buttons, we can change the sizes on the x and y axes and see the results in large and small images.

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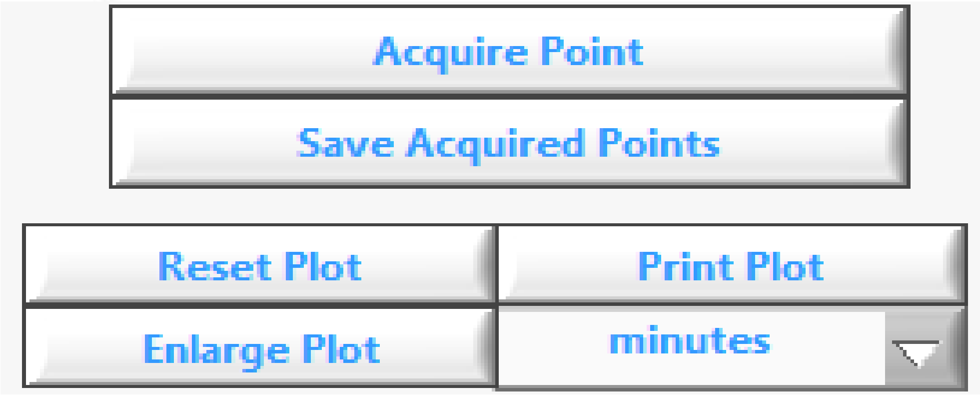

Figure 3. Front menu view.

The Save Acquired Points button saves the results and allows you to determine if other sizes are related even after the light source is turned off. The Enlarge Plot button makes the resulting graph look great [6].

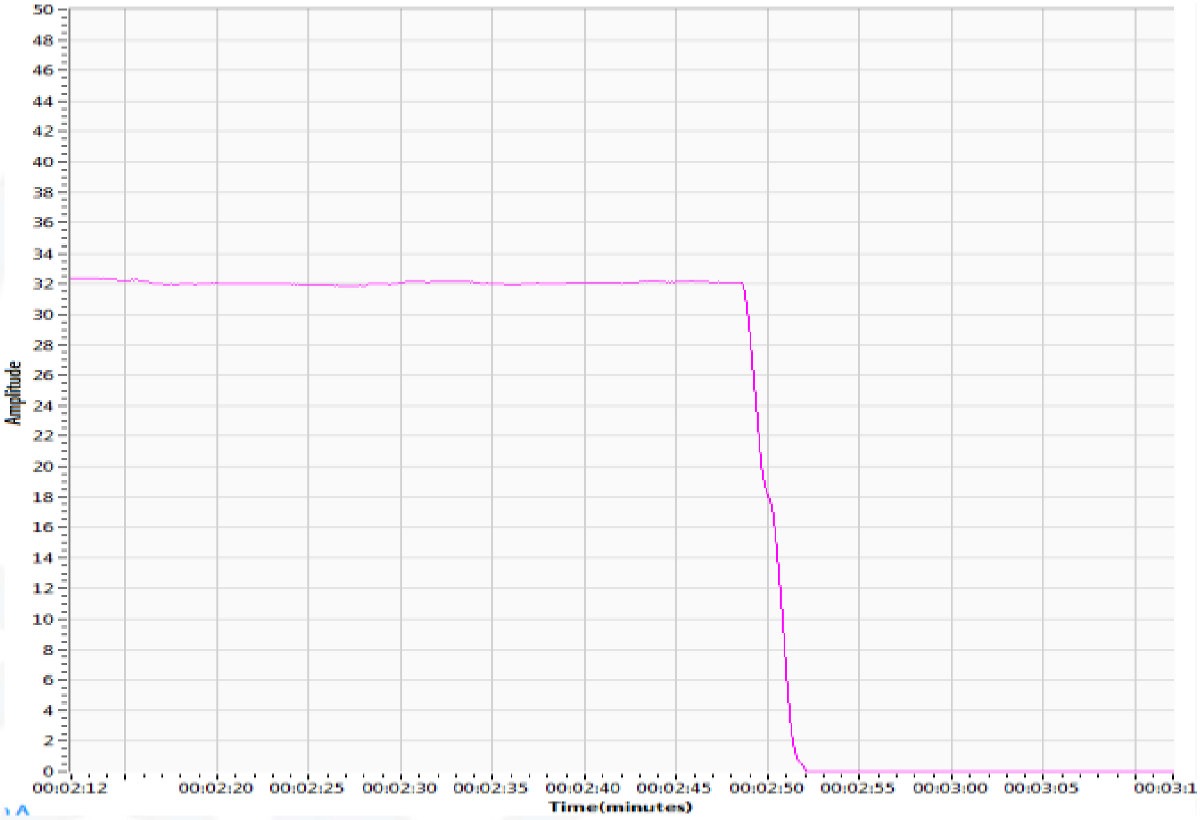

Figure 4. Graph of voltage versus time.

As you can see from this graph, the voltage depends on time. It turns out that over time, the voltage remains constant. If we turn off the light source, then the voltage drop will occur rapidly[1]. When the voltage is 32V, we can see that by switching off the light source, its value will reach 0V in 3.5 seconds.

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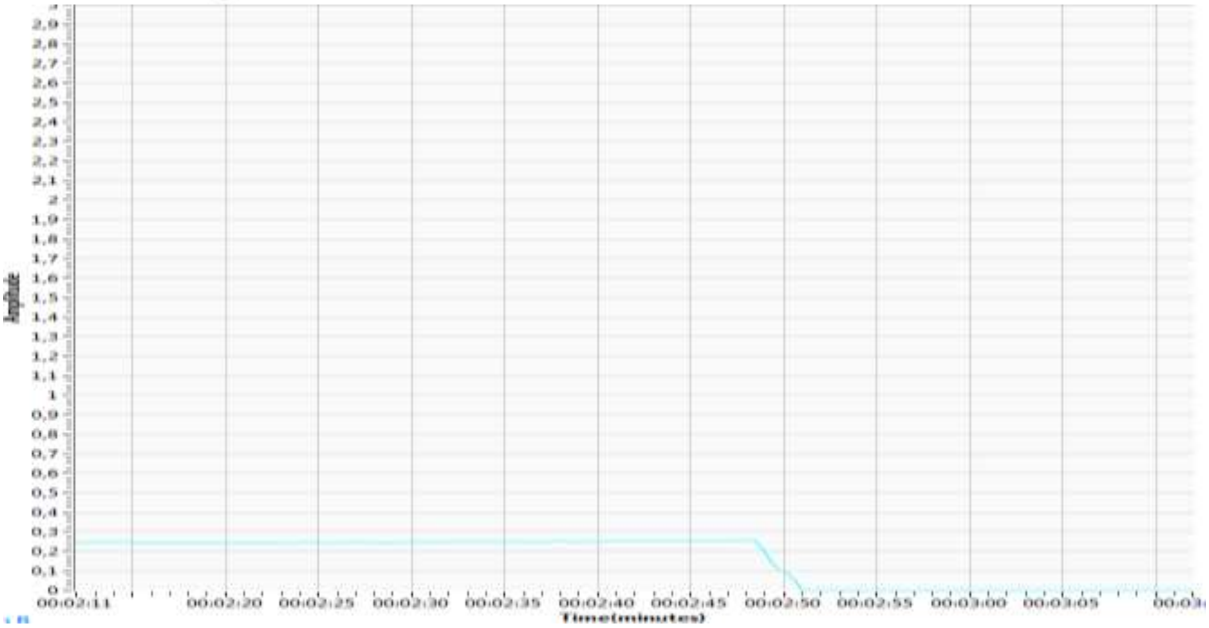

Figure 5. Graph of current dependence over time.

As you can see from this graph, the current depends on time. It turns out that over time, the current will remain constant. If we turn off the light source, then the current will decrease rapidly. When the current value is 0.25A, we can see that by switching off the light source, its value will reach 0A in 3 seconds.

References

1. Edibon scada katalogi. Ispaniya 2018 yil.
2. Pingel S, Zemen Y, Geipel T, Berghold J. Mechanical stability of solar cells within solar panels. Proc. 24th European Photovoltaic Solar Energy Conf., Hamburg, Germany; 2009, pp. 3459-3463
3. V.A. Popovich, M. Janssen, I.J. Bennett, Breakage issues in silicon solar wafers and cells, Photovoltaics International 12 (2011) 49–57.
4 F. Kaule and W. Wang and S. Schoenfelder, “Modeling and testing the mechanical strength of solar cells” in Solar Energy Materials and Solar Cells, (2014)
5. Jasurbek Gulomov, Rayimjon Aliev, Murad Nasirov and Jakhongir Ziyoitdinov (2020); MODELING METAL NANOPARTICLES INFLUENCE TO PROPERTIES OF SILICON SOLAR CELLS Int. J. of Adv. Res. 8 (Nov). 336-345.
6. Alijanov D.D., Topvoldiyev N.A. (2021). SOLAR TRACKER SYSTEM USING ARDUINO. Theoretical & Applied Science, 249-253.
7. Alijanov D.D., Topvoldiyev N.A. (2022). PHYSICAL AND TECHNICAL FUNDAMENTALS OF PHOTOELECTRIC SOLAR PANELS ENERGY. Theoretical & Applied Science, 501-505.