
# ANALYSIS OF LIGHT ACCEPTANCE LEVEL OF PHOTODIODE OPTICAL SENSOR FOR SOLAR MONITORING SYSTEM IN PROTEUS SOFTWARE.

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**Abstract:** This article provides general information about the efficiency of the development of photodiode photosensors that determine the position of the sun in solar collectors, photovoltaic modular and other devices, and generate light into an electrical signal. In addition, the article also found out that the generation process of photodiode optical sensors by changing the source of light irradiator several times is linear or non-linear.

**Key words:** sun, light, renewable energy, non-renewable energy, generation, signal, photodiode, photosensor, photovoltaic power stations, PROTEUS.

**Enter.** Humanity has always needed energy. The fact that the population is increasing day by day causes the energy demand to increase [9]. That's why world scientists are trying to increase energy production. Energy resources are naturally derived from underground fossils, and they will inevitably run out over time. All countries are looking for ways to rationally use renewable energy [10]. All countries produce and consume energy depending on their geographical location, weather conditions, plains, humidity. Extracting energy from natural resources does not solve this problem, it is necessary to obtain energy from other renewable energy sources [11]. Energy can be obtained from the sun, wind, ocean and sea waves, waste residues [3]. Solar energy is widely used in all countries. The sun constantly radiates energy to the earth [1].

The above information shows that the solar photovoltaic (PV) system is the simplest and easiest to use for generating electricity from renewable energy sources. Therefore, the scientists of our country and all over the world are conducting scientific research on increasing the efficiency of PV modules, which is becoming the most urgent issue of our day. Examples of such research include ways to increase the efficiency of silicon by introducing other elements, to obtain new structures, and to introduce a solar-facing system for existing PV modules. Currently, he is conducting research on one-axis and two-axis methods. We can control photovoltaic modules using a single-axis or dual-axis solar tracking system [2]. Both methods are effective in improving energy efficiency. According to the analytical article of researchers A.P. Edalabadkar, Pratik A. Thorat, R.B. Chadge, Anuja Ingle, the efficiency of PV modules can be increased from 15% to 45% [3] depending on the geographical location by introducing a solar tracking system. The data reviewed above show that the use of a high-precision solar tracking system in PV modules leads to an increase in module efficiency. In this paper, a study was conducted to improve the accuracy of the optical sensor for the solar observation system [17-20].

**A sensor to determine the position of the sun.**

Without an optical sensor, any solar tracking system will not provide accurate and high-quality results. Therefore, we will have to conduct a lot of experiments and scientific research on optical sensors. The experimental results on the light sensitivity of the optical photodiodes used in the solar observation system were obtained and analyzed in the PROTEUS program [21-25].

First of all, in the PROTEUS program, a combination of a light-emitting diode and a photodiode was designed (pictures 1, 2, 3) and the process of potential generation in the photodiode was studied by applying different voltages to the light-emitting diode [12-16].

Experiment 1. The circuit in Figure 1 was constructed and a 12 volt pulse was applied to the irradiator. A voltage of 0.56 volts was observed in the photodiode. It can be seen from the oscillogram that a very small signal is generated in the photodiode.

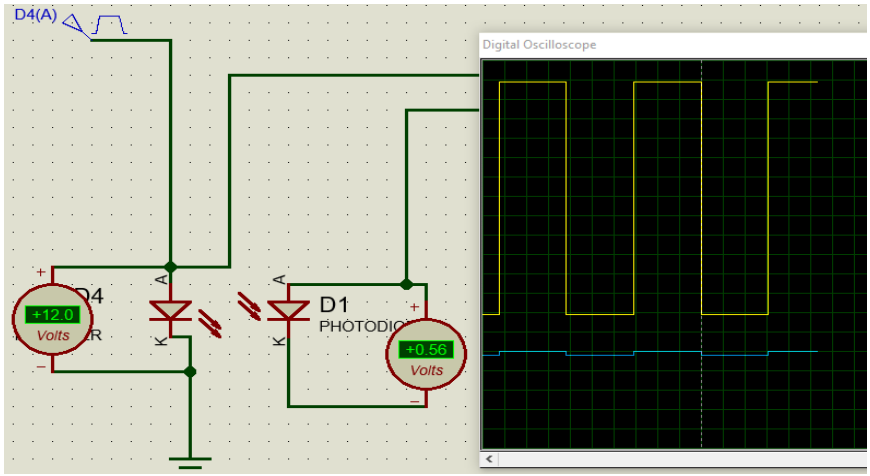


Figure 1.

Experiment 2. The receiver voltage was monitored by applying a 6-volt pulse to the emitter. A voltage of 0.54 volts was observed in the photodiode (Fig. 2).

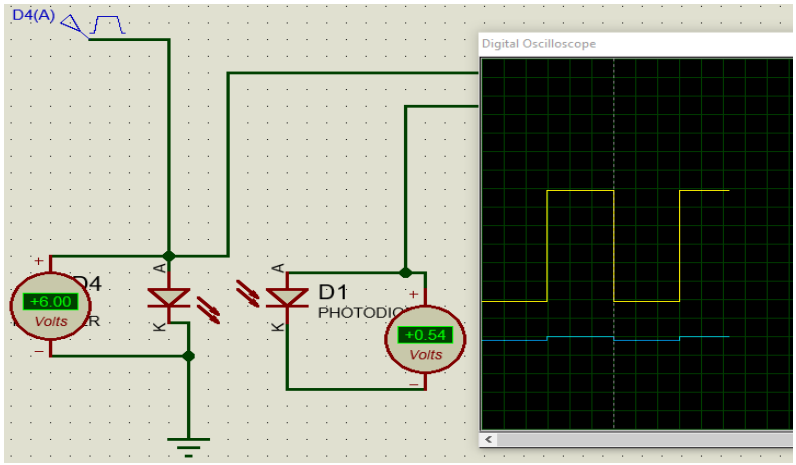


Figure 2.

Experiment 3. A 3-volt pulse was applied to the emitter and the receiver voltage was again monitored. In Figure 3, it was observed that a voltage of 0.51 volts is generated in the photodiode. From the results of the experiment, it can be seen that a sharp change in the light flux did not cause a sharp change in the potential in the photodiode.

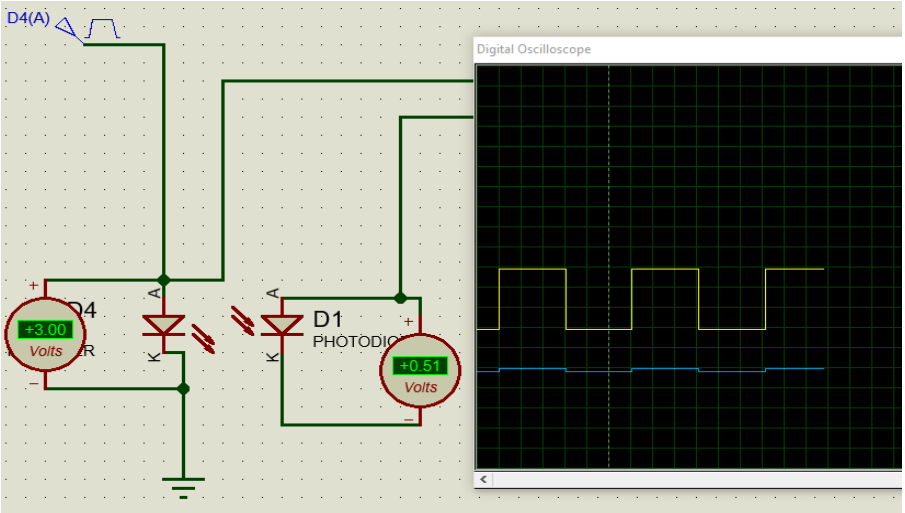


Figure 3.

The following table shows the results of the experiment, and it is shown that the potential change in the photodiode depends on the incident light current. With the help of these results, a graph of the dependence of the light source on the signal generated by the photodiode was built (Fig. 7). It is not difficult to determine from the graph that the generated signal is not linear and is very small. These results show that the use of a photodiode as an optical receiver is complicated.

table

| Experiments | Illuminator voltage, V | Photodiode voltage, V | Voltage difference, V |
|---|---|---|---|
| Experiment 1 | 12 | 0.56 | 11.44 |
| Experiment 2 | 6 | 0.54 | 11.46 |
| Experiment 3 | 3 | 0.51 | 11.49 |

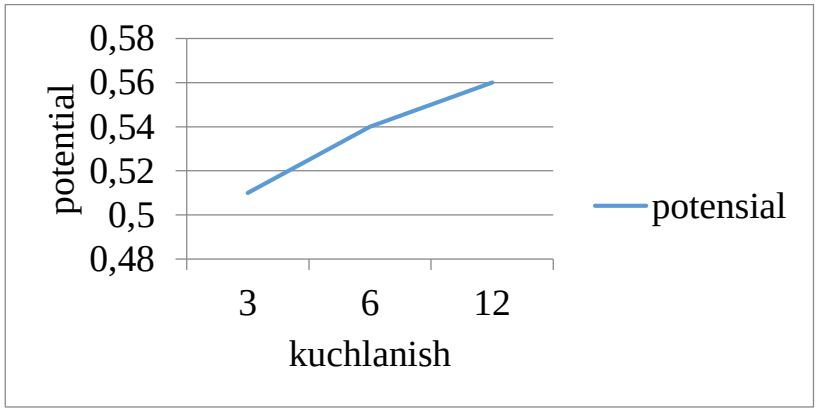


Figure 4. The graph of the dependence of the potential generated in the photodiode on the voltage applied to the irradiator.

**Summary.** In conclusion, when we studied the sensitivity of photodiode optical sensors to light, we found that they change their parameters less. Therefore, the use of photodiode sensors for the solar tracking system of PV modules is not very fruitful.

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