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AUTOMATION OF SOLAR DRYER FOR FRUITS AND VEGETABLES

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Introduction

Modern agriculture requires efficient technologies for processing and storing crops. One of the most in-demand processes is the drying of fruits and vegetables, which preserves their nutritional and biological value. Traditional solar dryers depend on weather conditions and require constant operator monitoring, which reduces their efficiency.

The aim of this work is to justify and develop an automation system for a solar dryer for fruits and vegetables.

Main part

A solar dryer is a system that operates using solar radiation and natural air circulation. To ensure a stable drying process, it is necessary to control the temperature inside the chamber, humidity levels, and the intensity of the airflow [1].

The implementation of an automated control system involves the use of the following components (figure 1):

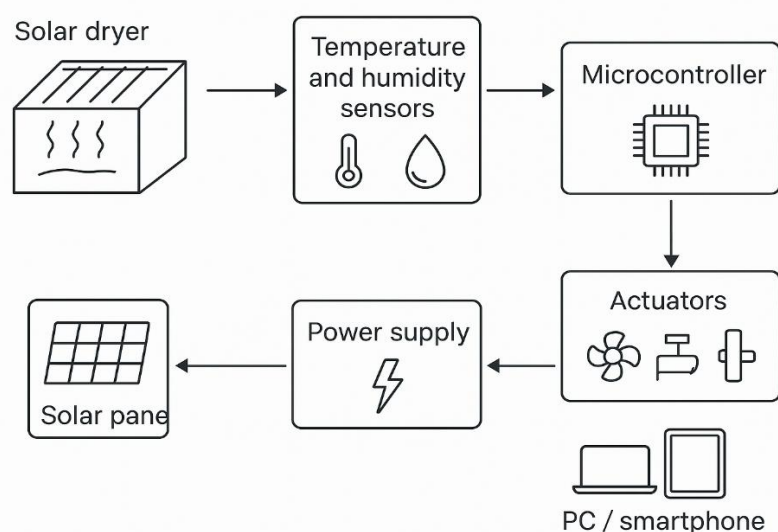


Figure 1 – Structural diagram of an automated solar dryer for fruits and vegetables

- temperature and humidity sensors for environmental monitoring;
- a microcontroller (e.g., Arduino or STM32) for signal processing;
- actuators (fans, dampers, heating elements if necessary);
- a power supply unit with the possibility of connection to solar panels.

The software allows the implementation of an algorithm to maintain the optimal temperature (40–60 °C) and humidity, which prevents overdrying or underdrying of products. Automation also enables remote monitoring of parameters through mobile applications or a personal computer. [2]

Conclusion

Thus, the automation of a solar dryer is a relevant direction in agro-industrial production. It contributes to increasing the efficiency of crop processing, preserving the nutritional properties of products, and developing energy-saving technologies.

References

1. Kozhakhmetov D.S., Smagulov A.N. Solar dryers for processing fruits and vegetables. *Bulletin of Agricultural Science*, 2022, № 3, p. 45–52.
2. Kumar A., Tiwari G.N. Solar drying of agricultural products: A review. *Renewable and Sustainable Energy Reviews*, 2019, Vol. 55, p. 346