

ABSTRACT

The drying process is a crucial stage in tapioca flour production to achieve good product quality. However, traditional drying methods that rely on sunlight face several limitations, such as dependence on weather, long drying times, and a high risk of contamination. This research aims to design and develop an automatic tapioca dryer based on PID control. The system is designed to adaptively regulate temperature and humidity using sensors, actuators, and a PID control algorithm to control the blower speed from the humidity sensor input, which functions as an actuator to distribute heat into the drying chamber.

The prototype was developed using an ESP32 microcontroller, DS18B20 temperature sensor, resistive humidity sensor, and a Delta BFB1012UH blower. PID control was applied to determine the drying rules based on temperature and humidity parameters. Experimental results show that the machine is capable of maintaining the final moisture content of the flour below 13%, in accordance with the Indonesian National Standard (SNI), with uniform heat distribution and greater efficiency compared to traditional methods.

With this automatic system, the tapioca flour industry, particularly small and medium-scale enterprises, can increase productivity and reduce dependence on weather conditions. Furthermore, this innovation is expected to contribute to the advancement of control-based food processing technology in Indonesia.

Keywords: *drying machine, tapioca, PID control, automatic control, energy efficiency*