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AUTOMATION OF DATA PROCESSING FROM SOIL MOISTURE SENSORS

Modern automation technologies open new opportunities for plant care, especially in the context of efficient resource utilization. Soil moisture control is a crucial factor in healthy plant growth. The use of the Internet of Things (IoT) and microcontrollers enables the creation of intelligent monitoring systems that simplify plant care, minimize human intervention, and improve water use efficiency.

Objective of the study to develop an innovative hardware and software complex for automating the collection, processing, and analysis of data from soil moisture sensors based on the Arduino platform, as well as to create a mobile application for real-time monitoring of received data. To achieve the set goal, the following were used:

1. Arduino Uno microcontroller – as the main device for reading and processing signals from the FC-28 moisture sensor;
2. C++ programming language – for writing the microcontroller’s program code;
3. Tinkercad environment – for modeling the electronic circuit and testing system operation algorithms;
4. Figma platform – for designing an intuitive graphical interface of the mobile application.

Based on the research results, an algorithm for data collection and processing has been developed – moisture levels are analyzed in real time and visualized as graphs. An automatic notification system has been programmed – when the moisture level drops below a critical threshold, the system sends a signal via LEDs and the mobile application. The "Happy Flowers" mobile application has been implemented – users can view moisture levels, receive plant condition notifications, and adjust irrigation settings. The system has been tested in the Tinkercad environment – the correct operation of all hardware and software components, as well as stable data transmission between the device and the application, has been confirmed.

So, the developed automated soil moisture monitoring system has proven to be effective in plant care. The use of IoT solutions significantly reduces the risks of soil overdrying or overwatering and improves overall plant care efficiency. Further research may focus on: integration of additional sensors (temperature, light intensity) for a comprehensive analysis of plant growth conditions; optimization of system power consumption for efficient use in open environments; expanding the

functionality of the mobile application (e.g., adding analytical tools for predicting plant water needs).