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Smart Farming System using Solar Power and Sensors with IoT

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Abstract: *The Portable Smart Farming System with Solar Power and Sensors leverages IoT technology to deliver an innovative, sustainable, and automated solution for modern agriculture. Built around the ESP32 microcontroller, the system integrates a two-channel relay, water pump, DC fan, LCD I2C display, DHT11 temperature and humidity sensor, soil moisture sensor, and a solar panel for renewable energy. These components work cohesively to monitor and regulate critical environmental factors such as soil moisture, ambient temperature, and humidity, ensuring optimal conditions for crop growth. By enabling real-time data collection and remote access through IoT connectivity, the system allows farmers to make informed decisions, automate irrigation and ventilation, and reduce manual intervention, thereby enhancing productivity and resource efficiency. Designed for portability and energy independence, the system's solar-powered operation makes it suitable for remote or off-grid agricultural settings, promoting eco-friendly farming practices. The ESP32 processes sensor data to activate the water pump and DC fan via the relay, maintaining precise environmental control. The LCD I2C display provides on-site visualization of sensor readings, while IoT integration supports data logging and remote management through a mobile or web-based application. This cost-effective, scalable solution empowers small-scale farmers and agricultural enthusiasts to optimize crop yields, conserve water, and adapt to varying climatic conditions, contributing significantly to sustainable agriculture and food security*

Keywords: ESP 32, Soil Moisture Sensors, DHT 11 Sensor, Two Channel Relay

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