

DESIGN AND CONSTRUCTION OF AUTOMATIC IRRIGATION SYSTEM PROTOTYPE FOR CHILI PLANTS BASED ON FUZZY LOGIC MAMDANI

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ABSTRACT

This study aims to design and build a prototype of an automatic irrigation system based on Mamdani fuzzy logic for chili plants with the help of a solar power plant supply. This system is designed to optimize water use and ensure that chili plants receive water intake according to their needs. The Mamdani fuzzy logic method is used to manage the variability of complex and dynamic environmental conditions in deciding the level of irrigation required. This prototype consists of several main components, namely resistive and capacitive soil moisture sensors, a fuzzy logic control module, and an irrigation system. The soil moisture sensor is used to measure the level of soil moisture around the chili plants, while the sunlight intensity sensor is used to assess the level of sunlight received by the chili plants. Data from both sensors are used as input for the Mamdani fuzzy logic system, which then produces output to control the irrigation system. The solar power plant is integrated to ensure the availability of sustainable electrical energy without fear of thinking about electricity from the PLN going out. By using solar energy, this system is expected to operate efficiently and environmentally friendly. Testing is carried out by observing the system's response to variations in environmental conditions and comparing it with the manual irrigation method. The results of this study are expected to contribute to chili farmers regarding the development of smart and sustainable irrigation systems for chili plants, thereby increasing productivity and efficiency of resource use.

Keywords: *Solar Energy, Fuzzy Logic, Irrigation Control, Resistive Sensor; Capacitive Sensor; Chili Plants*