

**LAPORAN SKRIPSI**

**DESIGN AND IMPLEMENTATION OF A FUZZY LOGIC-  
BASED AUTOMATIC HYDROPONIC SYSTEM WITH  
ADAPTIVE CONTROL BASED ON PLANT TYPE AND AGE**



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**ARTIFICIAL INTELLIGENCE AND BIG DATA**

**ILMU KOMPUTER**

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**PROJECT REPORT**  
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## ABSTRACT

*Hydroponic systems have gained popularity in modern agriculture for their effectiveness in saving land and water resources. Precise and consistent control of water and nutrients, however, remains a challenge, and it is critical for the growth and yield of the plants. Nutrient control in manual hydroponic systems cannot change based on the different stages of plant growth, and therefore is susceptible to delivery errors. In order to solve these issues, this research aims to design and implement a hydroponic system with two modules: automation and adaptation based on fuzzy logic depending on plant age and type. This system combines time-scheduled controller, control based on rules, and fuzzy logic to automate microcontroller based systems for Nutrient adjusting of hydroponics systems. TDS, temperature, And pH sensors provide real-time data which is processed using fuzzy inference system taking into account plant type and age focusing on leafy vegetables like pakcoi and lettuce. Experimental results demonstrated the learning capability of the system to sustain the nutrient levels within the set optimal threshold, while realizing a high degree of autonomy as a result of automated control. This proves that the applied adaptive control responds well to dynamic changes in the environment and the developmental stages of the plants, thereby enhancing robust plant growth and efficient maintenance. This study provided*

*Keyword: hydroponics, Microcontroller, Fuzzy Logic*

