Fuzzy Logic and PID Implementation for Maintains PH Value on Hydroponics Assistant Based on IoT

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In Partial Fulfilment of The Requirements for The Degree of Applied Bachelor of Informatics Engineering

Program Studi D4 Teknik Informatika

Applied Bachelor Program of Informatics Engineering

Politeknik Pos Indonesia

Bandung 2018

‘Jika Kamu tidak dapat menahan lelahnya belajar,
Maka kamu harus sanggup menahan perihnya Kebodohan.’
Imam Syafi’i

Acknowledgements

Pertama-tama kami panjatkan puji dan syukur kepada Allah SWT yang telah memberikan rahmat dan hidayah-Nya sehingga Buku Pedoman Tingkat Akhir ini dapat diselesaikan.

Abstract

Hydroponics is a method of planting crops through a medium of water that can live indoors or outdoors, hydroponics plants using NFT techniques (Nutrient Film Technique), where water and nutrients can circulate through plant roots. PH is the measurement of nutrient solution in acid or base state. Water pH can affect plant growth rates in hydroponic cultivation. PH cannot survive the stable value required for plant growth. In the previous study PH with value 8 make the plant dead. This research aims to design PH control using acid and base buffer solution. The PID method is the feedback mechanism control and minimizes the error value as setpoint and Fuzzy Logic used to maintain PH at values between 5.6 - 5.7. This model is used for PH in water to survive on good grades for plants. Observations show high PH values can damage plant growth. This research is used to maintain PH at the value of 5.6-5.7 for plant growth using PID and Fuzzy Logic method.

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Chapter 1

Related Works

Your related works, and your purpose and contribution which must be different as below.

1.1 Same Topics

1.1.1 Topic 1

Research of Oluwayesi Proportional-Integral-Plus (PIP) controller for optimal results based on the State-Model Dependent Parameter (SDP) was developed to control the nonlinear and variation of time that greatly varies the process of neutralization pH Since the pH invariant process is not available.[19] The pH control process involves a prototype model in which acid and base streams are mixed into a Continuous Stirring Reactor.[10] pH requires state measurement for plant implementation.[18] Measurement of pH control is very useful in different applications such as agriculture, food processing, biochemical processes and industrial applications. [2] The control objective is to regulate the pH of the outward neutral solution, by manipulating the flow of the basic solution, (NaOH), mixed with the acid solution, (HNO3), compensating for the possibility of changes in the buffer stream, (NaHCO3), which is considered an unmeasurable disturbance.[3] Strong neutralized neutralization control process simulation has been performed, and good control performance is achieved.[30] The ph-process system was developed adequately in terms of the supposed application of designing a better form of controller. the general method for obtaining dynamic equations for the neutralization process of PH in a continuous stirred tank, some point appears in developing neutralization of PH.[20] In maintaining the pH size constantly with the default rate on industrial processes. There is a difference in classification for the pH process. As we know the acid is divided into two groups, weak or strong, so a

categorization based on the weakness or strength of the acid has been used and the other one is on the output current.[8] It is important to treat these chemical wastes to acceptable pH levels, i.e., the ideal PH is in the number 7. We propose pH 5-11 as the optimum pH range for the processing, reuse, and disposal of ash samples.[24] At the plant the neutralizing process of pH is used to neutralize chemical waste products that may arise as a result of some manufacturing process before releasing them to the environment. This is primarily to protect the environment by making safe-running water for marine and agricultural applications, and by avoiding damage to corrosion-related infrastructure.[5] For direct measurements in different literature, models have been presented to illustrate the dynamic behaviour of ph processes with batch type models.[4] A PH neutralization is required to exhibit highly nonlinear behaviour and its control is challenging in the hydroponic process and can not be controlled effectively with a conventional PI controller. [1] The heavy nonlinear presence in the neutralization process of pH makes the problem of pH control difficult and challenging. Furthermore, the optimum control is very nonlinear. The system requires setting up various parameters with appropriate evolutionary algorithms (EA). This paper presents an unlimited, continuous and single genetic algorithm (GA).[21] From the idea of S. Tu PH (4.5 - 8.0) is used to understand individual and interactive effects. plants and P and As uptake are influenced by these factors. Phosphorus is inhibited As the uptake at all for the Fern crop has a PH value of 5.87.[27] Adjustment to PH was performed using 1 mol / L KOH or 1 mol / L HNO3.[16]

1.2 Same Method

1.2.1 Method 1

The fuzzy system in general basically consists of four components: membership function (fuzzification), fuzzy rule base, defuzzification and fuzzy output. In fuzzification, numerical input and output variables are converted into linguistic or adjective terms, and the corresponding degree of one or more of several membership functions is determined.[23] Fuzzy Logic is used to control the process of pH (Non-linear process). Fuzzy refers to the fact that the logic involved can deal with concepts partially true.[22] In the pH process, the pH sensor is immersed in water.[22] In previous research the fuzzy system was used to model and control complex nonlinear systems for their excellent ability to approximate nonlinear systems.[6] Fuzzy PID controller tunes PID three parameters with a fuzzy controller. Note the oil temperature error e

and the error change rate PH as the input variable, and Kp (proportional gain correction), Ki (integral gain correction), Kd (gain correction derivative), which adjusts the parameter value of PID, as the output variable. Thus the overall fuzzy controller is two input systems and three outputs.[12] On the other hand, when applied to field-adjusted PIDs, which are the result of standard sites.[7] Fuzzy Logic Controler allows designers to design and build controllers by forming statements of IF-THEN in the form of statements. The Fuzzy Logic Controler structure contains four main sections as follows: Fuzzification, inference mechanisms, ground rules and defuzzification, in which the fuzzification section is used to convert real input to fuzzy input.[28] A standard fuzzy PID controller, which is formed using a PID fuzzy controller with an integrator and an addition unit at the output.[14] Many PID controllers based on nonlinear optimization are also proposed for various applications.[17] Proposed modified genetic algorithm for optimizing parameters of multi-objective PID controller and Testing it in revolving pendulum system.[29] To test the performance of fuzzy controllers such as PID, both simulations and experiments of various aqueous acid solutions showing buffer conditions comprising acetic acid and propionate neutralized in a single CSTR with sodium hydroxide having molar concentration [NaOH] = 0.2 Mol / L.[11] For that process with large delay, nonlinearity, etc.

1.2.2 Method 2

it's not easy for conventional PID to achieve the desired performance. The Fuzzy Controller adjustment does not rely on an accurate mathematical model and has a major advantage in solving uncertainty.[25] To build a digital control system model with a fuzzy PID controller in the SIMULINK modelling package, we will transfer from the Sources sub-category to the two-block model window. Constant and one Step block, generating the unit step function; Mathematical Operations - Sum comparison blocks and two Gain blocks.[15] Fuzzy Logic is used to control the process of pH (Non-linear process). The term fuzzy cannot be expressed as "true" or "false" but as "partially true".[13] The input of the fuzzy PID controller is the error e and the pH level change error, after the fuzzy, output, Kp, and Kd processing that make the PID controller adjust its own parameters according to the error and error rate different from the system.[26] [9]

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