

# **Water Level Control Prototype Using Fuzzy Logic Control Optimized by the Cuckoo Search Algorithm Method**

## *Prototipe Water Level Control Menggunakan Fuzzy Logic Control Yang Dioptimisasi Dengan Metode Cuckoo Search Algorithm*

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A boiler is a vessel used to produce water vapor which will be used as heating or propulsion. In the process industry, there are usually boilers that can produce steam to be used to transfer heat to a process. The steam produced by this boiler comes from water that is fed to the boiler and then boiled. After being raised at a certain temperature, the steam is ready to flow to the plant, such as a heater or turbine. In the process of converting water into steam, there are often problems so that the output is not what you want, such as the volume of water that is too large or below the setpoint. The volume of water that does not match the setpoint will cause many problems such as overpressure and overheat which causes the vapor pressure not to the desired specifications. In addition, failure in the control process can also result in system failure which can be fatal, such as damage to the vessel due to poorly controlled feed water which can even cause an explosion because the vessel is not strong enough to withstand the pressure generated [1].

The problems that arise at this time are the Fuzzy method in the Water Level Control System prototype to adjust the long time parameters and poor control accuracy, one of the efforts that is still very likely to be developed is; build an optimization method to solve the complexity of the optimization process, adjust the value of Fuzzy control parameters for a short time and have good control accuracy. The right method is the Cuckoo Search Algorithm (CSA).

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## **References**

1. R. S. Montolalu, F. Y. Suratman, & P. Pangaribuan,
2. "Rancang Bangun Sistem Kontrol Level Dan Temperatur
3. Boiler Dengan Metode Pid Dan Kontrol Dua Posisi ( Design And Implementation For Controlling Boiler Water
4. Level And Temperature Using Pid Method And On- Off
5. Control )," E-Proceeding Of Engineering, vol. 2, no. 2,
6. pp. 2262-2269, 2015.
7. W. Zulaikah & T. A, "Aplikasi Teknik Kendali Fuzzy
8. Pada Pengendalian Level Cairan," Repostory Universitas
9. Diponegoro, pp. 1-11, 2011.
10. E. Yazid, "Penerapan Kendali Cerdas Pada Sistem Tangki
11. Air Menggunakan Logika Fuzzy," Jurnal Fisisika Himpunan Fisika Indonesia, vol. 9, no. 2, pp. 11-23, 2009.
12. M. Dahria, "Kecerdasan Buatan ( Artificial Intelligence ),"
13. Jurnal Saintikom, vol. 5, no. 2, pp. 185-197, 2008.
14. M. R. Djajal, D. Ajiatmo, A. Imran, & I. Robandi, "Desain
15. Optimal Kontroler Pid Motor Dc Menggunakan Cuckoo
16. Search Algorithm," Sentia Polinema, 2014.
17. M. R. Djajal, D. Ajiatmo, & I. Robandi, "Frequency Control Pltmh Dengan Capacitive Energy Storage Menggunakan Cuckoo Search Algorithm," Repostory Universitas,

- 18.
19. Ardiansyah, "Rancang Bangun Sistem Pemberian Pakan
20. Ternak (Sapi) Dan Pengadukannya Secara Otomatis
21. Berbasis Mikrokontroler," Repostori Uin Alauddin, 2018.
22. N. P. Wong & D. Suwandi, "Penerapan Algoritma Cuckoo
23. Search Pada Travelling Salesman Problem," Seminar Nasional Sistem Informasi Indonesia, pp. 2-4, 2013.
24. Singgih, "Analisis Performa Water Tube Boiler Kapasitas 115 Ton / Jam Di Pt . Pertamina Refinery Unit Vi
25. Balongan-Indramayu," Jurnal Unnes, 2016.
26. I. K. Missa & E. Al, "Rancang Bangun Alat Pasang Surut Air Laut Berbasis Arduino Uno Dengan Menggunakan
27. Sensor Ultrasonik Hc-Sr04," Jurnal Fisika Sains, vol. 3,
28. no. 2, pp. 102-105, 2018.
29. I. Arifin, "Automatic Water Level Control Berbasis Mikrocontroller Dengan Sensor Ultrasonik," Jurnal
30. Unnes, 2015.
31. A. Megindo, E. Ariyanto, & Vokasi, "Sistem Kontrol
32. Suhu Air Menggunakan Pengendali Pid. Dan Volume Air
33. Pada Tanki Pemanas Air Berbasis Arduino Uno," Gema
34. Teknologi, vol. 18, no. 4, pp. 21-28, 2016.
35. M. Irwansyah & D. Istaridi, "Pompa Air Aquarium Menggunakan Solar Panel," Jurnal Polibatam, vol. 5, no. 1, pp.
36. -90, 2013.
37. A. Sofwan, "Penerapan Fuzzy Logic Pada Sistem Pengaturan Jumlah Air Berdasarkan Suhu Dan Kelembaban," Seminar Nasional Aplikasi Teknologi Informasi, pp.
38. -2005, 2005.
39. F. Hunaini, I. Robandi, & N. Sutantra, "Lateral And Yaw
40. Motion Control Of The Vehicle Using Fuzzy Logic And
41. Pid Being Optimized By Firefly Algorithm," Journal Of
42. Theoreted And Applied Information Technology, vol. 87,
43. no. 1, pp. 16-24, 2016.
44. R. Andiyani, "Penerapan Alogartima Cuckoo Search
45. Dalam Permasalahan Penjadwalan Flowshop," 2017.
46. M. Riduwan, F. Hunaini, & M. Mukhsim, "Sistem Kontrol
47. Governor Menggunakan Pid Yang Dioptimasi Dengan
48. Metode Cuckoo Search Algorithm (Csa) (Governor
49. Control System Using Pid Optimized With the Cuckoo
50. Search Algorithm (Csa)," JEEE-U (Journal of Electrical
51. and Electronic Engineering-UMSIDA), vol. 3, no. 1, pp.
52. -162, 2019. [Online]. Available: 10.21070/jeee-u.
53. v3i1.2090;https://dx.doi.org/10.21070/jeee-u.v3i1.2090