



















- [6] E. A. Chater, H. Housny, and H. El Fadil, "Adaptive proportional integral derivative deep feedforward network for quadrotor trajectory-tracking flight control," *International Journal of Electrical and Computer Engineering*, vol. 12, no. 4, 2022, doi: 10.11591/ijece.v12i4.pp3607-3619.
- [7] M. Lamatenggo, I. Wiranto, and W. Ridwan, "Perancangan Balancing Robot Beroda Dua Dengan Metode Pengendali PID Berbasis Arduino Nano," *Jambura Journal of Electrical and Electronics Engineering*, vol. 2, no. 2, 2020, doi: 10.37905/ijece.v2i2.6906.
- [8] S. J. Hammoodi, K. S. Flayyih, and A. R. Hamad, "Design and implementation speed control system of DC motor based on PID control and matlab simulink," *International Journal of Power Electronics and Drive Systems*, vol. 11, no. 1, 2020, doi: 10.11591/ijpeds.v11.i1.pp127-134.
- [9] I. P. Adinata, M. Pratama, I. N. Suweden, and I. B. A. Swamardika, "Sistem Kontrol Pergerakan Pada Robot Line Follower Berbasis Hybrid PID-Fuzzy Logic," *Prosiding Conference on Smart-Green Technology in Electrical and Information Systems*, no. November, 2013.
- [10] R. Dikairono, T. A. Sardjono, and L. Yulianto, "Sistem Navigasi Dan Penghindar Rintangan Pada Mobile Robot Menggunakan Gps Dan Pengukur Jarak Ultrasonik," *JAVA Journal of Electrical and Electronics Engineering*, vol. 11, no. 1, 2016.
- [11] J. M. Sole, R. P. Centelles, F. Freitag, and R. Meseguer, "Implementation of a LoRa Mesh Library," *IEEE Access*, vol. 10, 2022, doi: 10.1109/ACCESS.2022.3217215.
- [12] A. S. Milewski, Ł. Mierzejewski, and J. Tołstoj-Sienkiewicz, "Differential control of six-wheeled robot using a mobile application," in *Solid State Phenomena*, 2017. doi: 10.4028/www.scientific.net/SSP.260.45.
- [13] J. N. Fadila, "Improving UAV Radio Control System with 433 MHz Radio Wave Using Lo-Ra based on QCZEK Model Communication System," *MATICS*, vol. 14, no. 1, 2022, doi: 10.18860/mat.v14i1.16370.
- [14] H. Maghfiroh, M. Ahmad, A. Ramelan, and F. Adriyanto, "Fuzzy-PID in BLDC Motor Speed Control Using MATLAB/Simulink," *Journal of Robotics and Control (JRC)*, vol. 3, no. 1, 2022, doi: 10.18196/jrc.v3i1.10964.
- [15] A. Riansyah, S. Mulyono, and M. Roichani, "Applying fuzzy proportional integral derivative on internet of things for figs greenhouse," *IAES International Journal of Artificial Intelligence*, vol. 10, no. 3, pp. 536–544, Sep. 2021, doi: 10.11591/ijai.v10.i3.pp536-544.
- [16] A. M. Abed *et al.*, "Trajectory tracking of differential drive mobile robots using fractional-order proportional-integral-derivative controller design tuned by an enhanced fruit fly optimization," *Measurement and Control (United Kingdom)*, vol. 55, no. 3–4, 2022, doi: 10.1177/00202940221092134.
- [17] M. Fliess and C. Join, "An alternative to proportional-integral and proportional-integral-derivative regulators: Intelligent proportional-derivative regulators," *International Journal of Robust and Nonlinear Control*, vol. 32, no. 18, 2022, doi: 10.1002/rnc.5657.
- [18] O. A. Saraereh, A. Alsaraira, I. Khan, and P. Uthansakul, "Performance evaluation of UAV-enabled LoRa networks for disaster management applications," *Sensors (Switzerland)*, vol. 20, no. 8, 2020, doi: 10.3390/s20082396.
- [19] J. P. Shanmuga Sundaram, W. Du, and Z. Zhao, "A Survey on LoRa Networking: Research Problems, Current Solutions, and Open Issues," *IEEE Communications Surveys and Tutorials*, vol. 22, no. 1, 2020, doi: 10.1109/COMST.2019.2949598.
- [20] R. Liang, L. Zhao, and P. Wang, "Performance evaluations of lora wireless communication in building environments," *Sensors (Switzerland)*, vol. 20, no. 14, 2020, doi: 10.3390/s20143828.
- [21] C. Bouras, A. Gkamas, and S. A. K. Salgado, "Energy efficient mechanism for LoRa networks," *Internet of Things (Netherlands)*, vol. 13, 2021, doi: 10.1016/j.iot.2021.100360.
- [22] R. Islam, M. W. Rahman, R. Rubaiat, M. M. Hasan, M. M. Reza, and M. M. Rahman, "LoRa and server-based home automation using the internet of things (IoT)," *Journal of King Saud University - Computer and Information Sciences*, vol. 34, no. 6, 2022, doi: 10.1016/j.jksuci.2020.12.020.
- [23] A. J. Wixted, P. Kinnaird, H. Larijani, A. Tait, A. Ahmadinia, and N. Strachan, "Evaluation of LoRa and LoRaWAN for wireless sensor networks," in *Proceedings of IEEE Sensors*, 2017. doi: 10.1109/ICSENS.2016.7808712.
- [24] Q. Zhou, K. Zheng, L. Hou, J. Xing, and R. Xu, "Design and implementation of open LORA for IoT," *IEEE Access*, vol. 7, 2019, doi: 10.1109/ACCESS.2019.2930243.
- [25] A. Augustin, J. Yi, T. Clausen, and W. M. Townsley, "A study of Lora: Long range & low power networks for the internet of things," *Sensors (Switzerland)*, vol. 16, no. 9, 2016, doi: 10.3390/s16091466.
- [26] T. Antoine-Santoni, B. Poggi, D. Araujo, and C. Babatoude, "Factors Influencing LoRa Communication in IoT Deployment: Overview and Experience Analysis," 2022. doi: 10.5220/0011102600003194.
- [27] R. Anzum *et al.*, "A Multiwall Path-Loss Prediction Model Using 433 MHz LoRa-WAN Frequency to Characterize Foliage's Influence in a Malaysian Palm Oil Plantation Environment," *Sensors*, vol. 22, no. 14, 2022, doi: 10.3390/s22145397.
- [28] L. Moiroux-Arvis, C. Cariou, and J. P. Chanet, "Evaluation of LoRa technology in 433-MHz and 868-MHz for underground to aboveground data transmission," *Comput Electron Agric*, vol. 194, 2022, doi: 10.1016/j.compag.2022.106770.
- [29] Hudiono, M. Taufik, R. H. Y. Perdana, and A. E. Rakhmania, "Digital centralized water meter using 433 mhz lora," *Bulletin of Electrical Engineering and Informatics*, vol. 10, no. 4, 2021, doi: 10.11591/EEI.V10I4.2950.
- [30] M. O. Ojo, D. Adami, and S. Giordano, "Experimental evaluation of a Lora wildlife monitoring network in a forest vegetation area," *Future Internet*, vol. 13, no. 5, 2021, doi: 10.3390/fi13050115.