

DAFTAR PUSTAKA

- [1] D. Du, "Research on the application of 'last-mile' autonomous delivery vehicles in the context of epidemic prevention and control," in *Proceedings - 2021 International Symposium on Artificial Intelligence and its Application on Media, ISAIAM 2021*, Institute of Electrical and Electronics Engineers Inc., May 2021, pp. 74–77. doi: 10.1109/ISAIAM53259.2021.00022.
- [2] A. Shafiee, H. R. Moghaddam, and J. Lin, "Using Autonomous Modular Vehicle Technology as an Alternative for Last-Mile Delivery," in *2024 Forum for Innovative Sustainable Transportation Systems, FISTS 2024*, Institute of Electrical and Electronics Engineers Inc., Feb. 2024, pp. 1–6. doi: 10.1109/FISTS60717.2024.10485532.
- [3] M. Hossain, "Autonomous Delivery Robots: A Literature Review," *IEEE Engineering Management Review*, vol. 51, no. 4, pp. 77–89, Dec. 2023, doi: 10.1109/EMR.2023.3304848.
- [4] H. Hwang, H. Choi, and K. Nam, "Practical Synchronous Steering Angle Control of a Dual-Motor Driving Steer-by-Wire System," *IEEE Access*, vol. 7, pp. 133100–133110, Sep. 2019, doi: 10.1109/ACCESS.2019.2938803.
- [5] D. Mohanraj *et al.*, "A Review of BLDC Motor: State of Art, Advanced Control Techniques, and Applications," May 2022, *Institute of Electrical and Electronics Engineers Inc.* doi: 10.1109/ACCESS.2022.3175011.
- [6] W. Y. K. L. Feilang Li, "Quantitative Characteristic Comparison between Sensorless Six Step and Field Oriented Control Methods for Permanent Magnet Brushless DC Motors," *2019 IEEE Energy Conversion Congress and Exposition (ECCE)*, pp. 1881–1885, Sep. 2019, doi: 10.1109/ECCE.2019.8912478.
- [7] R. Lajić and P. Matić, "Digital Position Control System With a BLDC Motor Using Field Oriented Control," in *2023 22nd International Symposium INFOTEH-JAHORINA, INFOTEH 2023*, Institute of Electrical and Electronics Engineers Inc., 2023. doi: 10.1109/INFOTEH57020.2023.10094070.
- [8] R. Petrella and M. Tursini, "An embedded system for position and speed measurement adopting incremental encoders," *IEEE Trans. Ind. Appl.*, vol. 44, no. 5, pp. 1436–1444, 2008, doi: 10.1109/TIA.2008.2002167.
- [9] N. D. Irimia, F. L. Lazar, and M. Luchian, "Comparison Between Sinusoidal and Space Vector Modulation Techniques on the Resulting Electromagnetic Torque Ripple Produced by a Three-Phase BLDC Motor under Field-Oriented Control," in *2019 6th International Conference on Control, Decision and Information Technologies (CoDIT)*, Paris: IEEE, Apr. 2019, pp. 640–645. doi: 10.1109/CoDIT.2019.8820718.
- [10] R. C. Prayogo, A. Triwiyatno, and M. A. Riyadi, "Field Oriented Control Implementation on BLDC Motor Controller with PI and SVPWM using STM32F103C8T6," *J. Phys. Conf. Ser.*, vol. 2622, no. 1, 2023, doi: 10.1088/1742-6596/2622/1/012025.

- [11] Emanuel Efferu, "Hoverboard Firmware Hack FOC," *Github*, 2020, Accessed: Apr. 12, 2026. [Online]. Available: <https://github.com/EFeru/hoverboard-firmware-hack-FOC>
- [12] E. Alverhed, S. Hellgren, H. Isaksson, L. Olsson, H. Palmqvist, and J. Flodén, "Autonomous last-mile delivery robots: a literature review," *European Transport Research Review*, vol. 16, no. 1, Dec. 2024, doi: 10.1186/s12544-023-00629-7.
- [13] K. Kim, J. Lee, M. Kim, and K. Yi, "Adaptive sliding mode control of rack position tracking system for steer-by-wire vehicles," *IEEE Access*, vol. 8, pp. 163483–163550, 2020, doi: 10.1109/ACCESS.2020.3021038.
- [14] W. M. Choi, M. H. Lee, S. J. Park, and B. S. Lee, "The creation of toe-out when turning to minimize tire wear," *International Conference on Control, Automation and Systems*, Oct. 2008.
- [15] Y. H. Kang, D. C. Pang, and D. H. Zheng, "Optimal Dimensional Synthesis of Ackermann and Watt-I Six-Bar Steering Mechanisms for Two-Axle Four-Wheeled Vehicles," *Machines*, vol. 13, no. 7, Jul. 2025, doi: 10.3390/machines13070589.
- [16] R. Krishnan, "Permanent Magnet Synchronous and Brushless DC Motor Drives," in *CRC Press*, 1st ed., vol. 1, Boca Raton, FL: CRC Press, 2010.
- [17] L. R. Devi, S. Sreekumar, R. Bhakar, D. G., and S. Padmanaban, "Electric motor modeling, analysis, and design for E-mobility applications: A state of the art," *e-Prime - Advances in Electrical Engineering, Electronics and Energy*, vol. 12, Jun. 2025, doi: 10.1016/j.prime.2025.100985.
- [18] T. D. Ton, M. F. Hsieh, and P. H. Chen, "A novel robust sensorless technique for field-oriented control drive of permanent magnet synchronous motor," *IEEE Access*, vol. 9, pp. 100882–100894, 2021, doi: 10.1109/ACCESS.2021.3097120.
- [19] Y. Vazquez-Gutierrez, D. L. O'Sullivan, and R. C. Kavanagh, "Evaluation of three optical-encoder-based speed estimation methods for motion control," *The Journal of Engineering*, vol. 2019, no. 17, pp. 4069–4073, Jun. 2019, doi: 10.1049/joe.2018.8058.
- [20] A. A. Pop, "Incremental Encoder Speed Acquisition Using an STM32 Microcontroller and NI ELVIS," *Sensors*, vol. 22, no. 14, Jul. 2022, doi: 10.3390/s22145127.
- [21] Danaher, "Encoder Application Handbook," p. 16, 2003, Accessed: Jun. 12, 2026. [Online]. Available: https://www.joliettech.com/DynaparEncoderCatalog.pdf?utm_source
- [22] Y. Wang, X. Ma, M. Wang, and C. Cao, "PMSM Rotor Position Detection Based on Hybrid Optical Encoder and R-Signal Zero-Setting Scheme," *Journal of Control Science and Engineering*, vol. 2016, 2016, doi: 10.1155/2016/2712643.
- [23] L. Tian, Z. Wang, C. He, and X. Guo, "Current reconstruction compensation method using a single current sensor based on linear extended state observer for multi-IPMSM networked system," *J. Franklin Inst.*, vol. 363, no. 5, Mar. 2026, doi: 10.1016/j.jfranklin.2025.107983.

- [24] S. Il Kim, J. Y. Kim, and K. W. Lee, "Current Measurement Offset Error Compensation Scheme Considering Saturation of Current Controller in SPMSM Drives," *IEEE Access*, vol. 11, pp. 17233–17240, 2023, doi: 10.1109/ACCESS.2023.3245076.
- [25] K. Jankowska and M. Dybkowski, "A current sensor fault tolerant control strategy for pmsm drive systems based on cri markers," *Energies (Basel)*, vol. 14, no. 12, Jun. 2021, doi: 10.3390/en14123443.
- [26] I. Qureshi and V. Sharma, "Analysis of different control schemes of PMSM motor and also a comparison of FOPI and PI controller for sensorless MSVPWMM scheme," *e-Prime - Advances in Electrical Engineering, Electronics and Energy*, vol. 6, Dec. 2023, doi: 10.1016/j.prime.2023.100359.
- [27] S. Ju, D. Gross, and N. Hanenkamp, "Cutting force and vibration prediction of milling processes regarding the nonlinear behavior of cascade controlled feed drives," *Production Engineering*, vol. 16, no. 6, pp. 743–752, Dec. 2022, doi: 10.1007/s11740-022-01140-z.
- [28] I. M. Abdelaziz, Y. S. Mohamed, E. G. Shehata, and A. A. Z. Diab, "Comprehensive analysis of IPMSM drives with FOC under different operating modes," Apr. 01, 2025, *Springer Nature*. doi: 10.1007/s42452-024-06414-y.
- [29] S. Chai, L. Wang, and E. Rogers, "Model predictive control of a permanent magnet synchronous motor with experimental validation," *Control Eng. Pract.*, vol. 21, no. 11, pp. 1584–1593, Nov. 2013, doi: 10.1016/j.conengprac.2013.07.008.
- [30] A. M. Vural, "PSCAD modeling of a two-level space vector pulse width modulation algorithm for power electronics education," *Journal of Electrical Systems and Information Technology*, vol. 3, no. 2, pp. 333–347, Sep. 2016, doi: 10.1016/j.jesit.2016.01.005.
- [31] H. Liu, J. Li, X. Ji, and Y. Liu, "Design of a robust angle tracking controller for steering-by-wire systems with angular velocity observer and friction compensation," *Control Eng. Pract.*, vol. 163, Oct. 2025, doi: 10.1016/j.conengprac.2025.106402.
- [32] G. Luo, H. Li, B. Ma, and Y. Wang, "Event-triggered adaptive fuzzy control for automated vehicle steer-by-wire system with prescribed performance: Theoretical design and experiment implementation," *Expert Syst. Appl.*, vol. 195, Jun. 2022, doi: 10.1016/j.eswa.2021.116458.
- [33] STMicroelectronics, "STM32F103xC, STM32F103xD, STM32F103xE: High-density performance line Arm-based 32-bit MCU with 256 to 512 Kbytes Flash, USB, CAN, 11 timers, 3 ADCs, 13 communication interfaces," *STMicroelectronics*, p. 143, Jul. 2018, Accessed: Jun. 05, 2026. [Online]. Available: https://www.st.com/resource/en/datasheet/cd00191185.pdf?utm_source
- [34] C. Ye, Y. Wang, Y. Wang, and Y. Liu, "Steering-Angle Prediction and Controller Design Based on Improved YOLOv5 for Steering-by-Wire System," *Sensors*, vol. 24, no. 21, Nov. 2024, doi: 10.3390/s24217035.