

## DAFTAR PUSTAKA

- [1] International Labour Organization, “Construction: a hazardous work,” International Labour Office, Geneva, Report, 2015. [Online]. Available: [https://www.ilo.org/safework/areasofwork/hazardous-work/WCMS\\_356576/lang--en/index.htm](https://www.ilo.org/safework/areasofwork/hazardous-work/WCMS_356576/lang--en/index.htm)
- [2] LSP KATIGA PASS, “Kasus kecelakaan kerja di indonesia meningkat 2025: Apa penyebab utamanya?” May 2025, diakses: 20-12-2025.
- [3] Krismawan, “Tragedi maut di PT IPIP kolaka: Excavator terguling, pekerja tewas, aktivitas tambang tetap berjalan,” August 2025, diakses pada 26 Desember 2025. [Online]. Available: <https://www.indosultra.com/tragedi-maut-di-pt-ipip-kolaka-excavator-terguling-pekerja-tewas-aktivitas-tambang-tetap-berjalan>
- [4] S. Arango-Retamozo, M. Cotrina-Teatino, J. Marquina-Araujo, H. Portilla-Rodriguez, C. Torres-Rivera, and J. Vega González, “Estimating the economic impact of mining accidents: A case study from peru,” *International Journal of Safety and Security Engineering*, vol. 13, pp. 539–545, 07 2023.
- [5] DetikNews, “Kecelakaan kerja di proyek bendungan: Ekskavator terguling akibat beban berlebih,” October 2024, diakses pada 20 Februari 2025. [Online]. Available: <https://news.detik.com/>
- [6] K. Otomotif, “Analisis kegagalan traksi pada kendaraan berat di medan basah,” November 2023, diakses pada 20 Februari 2025. [Online]. Available: <https://otomotif.kompas.com/>
- [7] Kementerian Ketenagakerjaan RI, “Laporan tahunan keselamatan kerja sektor konstruksi dan alat berat,” January 2025, diakses pada 20 Februari 2025. [Online]. Available: <https://kemnaker.go.id/>
- [8] D. Liu, J. Kim, and Y. Ham, “Multi-user immersive environment for excavator teleoperation in construction,” *Automation in Construction*, vol. 156, 2023, cited by: 24. [Online]. Available: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85174444376&doi=10.1016%2fj.autcon.2023.105143&partnerID=40&md5=e938a2a18a3b5f69fb4ae4f0b24e69d5>
- [9] M. Seo, S. Gupta, and Y. Ham, “Exploratory study on time-delayed excavator teleoperation in virtual lunar construction simulation: Task performance and operator behavior,” *Automation in Construction*, vol. 168, p. 105871, 2024. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S0926580524006071>
- [10] S. B. Kamtam, Q. Lu, F. Bouali, O. C. L. Haas, and S. Birrell, “Network latency in teleoperation of connected and autonomous vehicles: A review of trends, challenges, and mitigation strategies,” vol. 24, no. 12, 2024. [Online]. Available: <https://www.mdpi.com/1424-8220/24/12/3957>
- [11] J. S. Lee, Y. Ham, H. Park, and J. Kim, “Challenges, tasks, and opportunities in teleoperation of excavator toward human-in-the-loop construction automation,” *Automation in Construction*, vol. 135, p. 104119, 2022. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S0926580521005707>

- [12] Q. Lu, Y. Zhu, and L. Zhang, "Excavation reinforcement learning using geometric representation," *IEEE Robotics and Automation Letters*, vol. 7, pp. 1–1, 04 2022.
- [13] J. Teizer, B. S. Allread, C. E. Fullerton, and J. Hinze, "Autonomous proactive real-time construction worker and equipment operator proximity safety alert system," *Automation in Construction*, vol. 19, no. 5, pp. 630–640, 2010, building Information Modeling and Collaborative Working Environments. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S0926580510000361>
- [14] M. Golparvar-Fard, A. Heydarian, and J. C. Niebles, "Vision-based action recognition of earthmoving equipment using spatio-temporal features and support vector machine classifiers," *Advanced Engineering Informatics*, vol. 27, no. 4, pp. 652–663, 2013. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S1474034613000761>
- [15] L. Li and X. Dong, "Excavator path planning based on reinforcement learning," *Journal of Intelligent & Fuzzy Systems*, vol. 0, no. 0, p. 18758967251358112, 0. [Online]. Available: <https://doi.org/10.1177/18758967251358112>
- [16] R. L. Johns, M. Wermelinger, R. Mascaro, D. Jud, F. Gramazio, M. Kohler, M. Chli, and M. Hutter, "Autonomous dry stone: On-site planning and assembly of stone walls with a robotic excavator," *Construction Robotics*, vol. 4, 12 2020.
- [17] A. Molaei, M. Heravi, and R. Ghabcheloo, *Learning to Capture Rocks using an Excavator: A Reinforcement Learning Approach with Guiding Reward Formulation*, 2025. [Online]. Available: <https://arxiv.org/abs/2510.04168>
- [18] D. Jud, P. Leemann, S. Lauria, M. Hutter, and R. Siegwart, "Planning and control for autonomous excavation," *IEEE Robotics and Automation Letters*, vol. 4, no. 4, pp. 4319–4326, Oct 2019.
- [19] Z. Liu, Y. Wang, and X. Li, "Trajectory tracking and stability control of hydraulic excavator based on pid and kalman filter," *Automation in Construction*, vol. 15, no. 3, pp. 112–120, 2018.
- [20] B. Egilmez, U. M. Park, and T. Huang, "Deep reinforcement learning for autonomous excavation," *IEEE Access*, vol. 8, pp. 192 986–192 997, 2020.
- [21] R. Hartley and A. Zisserman, *Multiple view geometry in computer vision*. Cambridge university press, 2003.
- [22] C. Ishmatuka, I. Soesanti *et al.*, "Trajectory control of hydraulic excavator using deep reinforcement learning based on proximal policy optimization," *International Journal of Advances in Intelligent Informatics*, vol. 9, no. 1, 2023.
- [23] P. Egli, D. Gehring, and M. Hutter, "A general approach for the automation of hydraulic excavator arms using reinforcement learning," *IEEE Robotics and Automation Letters*, vol. 7, no. 2, pp. 5679–5686, 2022.
- [24] W. Zhang, J. Wang, Y. Liu, and G. Gao, "Reinforcement learning-based intelligent energy management architecture for hybrid construction machinery," *Applied Energy*, vol. 275, p. 115401, 2020.

- [25] J. Chen, S. Yang, and Q. Wang, "Robust control of hydraulic excavator with unknown load estimation," *IEEE Access*, vol. 8, pp. 20 345–20 356, 2020.
- [26] N. Mu'afi, A. Ataka *et al.*, "Vision-based autonomous excavator navigation using deep reinforcement learning," in *EECSI*, 2025, in Press.
- [27] A. Indra, A. Ataka *et al.*, "Teleoperation and maneuvering control of robotic excavator using yolov8 and ppo," in *EECSI*, 2025, in Press.
- [28] I. Kurinov, G. Orzechowski, and A. Mikkola, "Automated excavation in a deformable terrain using deep reinforcement learning," *Automation in Construction*, vol. 112, p. 103105, 2020.
- [29] J. Benjamin, "Automated grading control for hydraulic excavators using deep reinforcement learning," *Proceedings of the International Symposium on Automation and Robotics in Construction (ISARC)*, 2018.
- [30] M. Kim and Y. Ham, "Human-inspired inverse reinforcement learning for autonomous excavation in unstructured environments," *Automation in Construction*, vol. 158, p. 105201, 2024, (Publikasi terkait 2025).
- [31] W. Luo *et al.*, "Multi-sensor fusion for autonomous driving: A survey," *IEEE Transactions on Intelligent Transportation Systems*, vol. 22, no. 10, 2021.
- [32] C. Cadena *et al.*, "Past, present, and future of simultaneous localization and mapping: Toward the robust-perception age," *IEEE Transactions on Robotics*, vol. 32, no. 6, pp. 1309–1332, 2016.
- [33] K. Karur *et al.*, "A survey of path planning algorithms for mobile robots," *Vehicular Communications*, vol. 32, p. 100371, 2021.
- [34] D. Fox, W. Burgard, and S. Thrun, "The dynamic window approach to collision avoidance," in *IEEE Robotics & Automation Magazine*, vol. 4, no. 1, 1997, pp. 23–33.
- [35] J. B. Rawlings, D. Q. Mayne, and M. Diehl, *Model Predictive Control: Theory, Computation, and Design*. Nob Hill Publishing, 2017.
- [36] J. Redmon, S. Divvala, R. Girshick, and A. Farhadi, "You only look once: Unified, real-time object detection," in *Proceedings of the IEEE conference on computer vision and pattern recognition*, 2016, pp. 779–788.
- [37] J. Kober, J. A. Bagnell, and J. Peters, "Reinforcement learning in robotics: A survey," *The International Journal of Robotics Research*, vol. 32, no. 11, pp. 1238–1274, 2013.
- [38] L. Everding and C. Lehnert, "Safety concepts for autonomous mobile robots in industrial environments," *Safety Science*, vol. 128, p. 104762, 2020.
- [39] R. Siegwart, I. R. Nourbakhsh, and D. Scaramuzza, *Introduction to autonomous mobile robots*. MIT press, 2011.
- [40] G. Dudek and M. Jenkin, *Computational principles of mobile robotics*. Cambridge university press, 2010.

- [41] A. Mandow, J. L. Martinez, J. Morales, J. L. Blanco, and A. Garcia-Cerezo, "Experimental kinematics for wheeled skid-steer mobile robots," *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 1222–1227, 2007.
- [42] K. Kozłowski and D. Pazderski, "Kinematic modeling of a skid-steering mobile robot," in *Proceedings of the international workshop on robot motion and control*. IEEE, 2004, pp. 453–458.
- [43] L. Caracciolo, A. De Luca, and S. Iannitti, "Trajectory tracking control of a four-wheel differentially driven mobile robot," *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, vol. 4, pp. 2632–2638, 1999.
- [44] P. Corke, *Robotics, vision and control: fundamental algorithms in MATLAB*. Springer, 2017.
- [45] A. Koivo, "Dynamic modeling and control of excavators," *IFAC Proceedings Volumes*, vol. 27, no. 14, pp. 613–618, 1994.
- [46] B. Siciliano and O. Khatib, *Springer handbook of robotics*. Springer, 2016.
- [47] S. Tafazoli, C. W. De Silva, and P. D. Lawrence, "Parameter estimation and friction modeling for a mini-excavator," *IEEE Transactions on Control Systems Technology*, vol. 7, no. 4, pp. 429–439, 1999.
- [48] M. W. Spong, S. Hutchinson, and M. Vidyasagar, *Robot modeling and control*. John Wiley & Sons, 2005.
- [49] Z.-Q. Zhao, P. Zheng, S.-t. Xu, and X. Wu, "Object detection with deep learning: A review," *IEEE transactions on neural networks and learning systems*, vol. 30, no. 11, pp. 3212–3232, 2019.
- [50] S. Amershi *et al.*, "Software engineering for machine learning: A case study," in *2019 IEEE/ACM 41st International Conference on Software Engineering (ICSE)*, 2019, pp. 291–300.
- [51] K. Arulkumaran, M. P. Deisenroth, M. Brundage, and A. A. Bharath, "Deep reinforcement learning: A brief survey," *IEEE Signal Processing Magazine*, vol. 34, no. 6, pp. 26–38, 2017.
- [52] J. Schulman, F. Wolski, P. Dhariwal, A. Radford, and O. Klimov, "Proximal policy optimization algorithms," *arXiv preprint arXiv:1707.06347*, 2017.
- [53] T. Haarnoja, A. Zhou, P. Abbeel, and S. Levine, "Soft actor-critic: Off-policy deep reinforcement learning with a stochastic actor," in *International conference on machine learning*. PMLR, 2018, pp. 1861–1870.
- [54] J. J. Craig, *Introduction to robotics: mechanics and control*, 3rd ed. Pearson Prentice Hall, 2005.
- [55] S.-Y. Lee and S. Poslad, "Sliding mode control of an excavator for trenching," *Mechatronics*, vol. 12, no. 9-10, pp. 1157–1166, 2002.

- [57] M. G. Bekker, *Introduction to terrain-vehicle systems*. University of Michigan Press, 1969.
- [58] K. Iagnemma and S. Dubowsky, *Mobile robots in rough terrain: estimation, motion planning, and control with application to planetary rovers*. Springer, 2004.
- [59] G. Ishigami, A. Miwa, K. Nagatani, and K. Yoshida, “Terramechanics-based model for steering maneuver of planetary exploration rovers on loose soil,” *Journal of Field Robotics*, vol. 24, no. 3, pp. 233–250, 2007.
- [60] H. Taghavifar and A. Mardani, “Off-road vehicle dynamics,” *Springer International Publishing*, 2013.
- [61] J. Fraden, *Handbook of modern sensors: physics, designs, and applications*, 5th ed. Springer, 2015.
- [62] J. Borenstein, H. R. Everett, and L. Feng, “Where am i? sensors and methods for mobile robot positioning,” University of Michigan, Technical Report, 1996.
- [63] S. Thrun, W. Burgard, and D. Fox, *Probabilistic robotics*. MIT press, 2005.
- [64] P. D. Groves, *Principles of GNSS, inertial, and multisensor integrated navigation systems*. Artech house, 2013.
- [65] D. Titterton and J. L. Weston, *Strapdown inertial navigation technology*. IET, 2004.
- [66] J. A. Farrell, *Aided navigation: GPS with high rate sensors*. McGraw-Hill, Inc., 2008.
- [67] R. Mahony, T. Hamel, and J.-M. Pflimlin, “Nonlinear complementary filters on the special orthogonal group,” *IEEE Transactions on Automatic Control*, vol. 53, no. 5, pp. 1203–1218, 2008.
- [68] S. M. Kay, *Fundamentals of statistical signal processing: estimation theory*. Prentice-Hall, Inc., 1993.
- [69] A. Papoulis and S. U. Pillai, *Probability, random variables, and stochastic processes*, 4th ed. Tata McGraw-Hill Education, 2002.
- [70] P. S. Maybeck, *Stochastic models, estimation, and control*. Academic press, 1979, vol. 1.