

DAFTAR PUSTAKA

- [1] Badan Pusat Statistik, *Statistik Transportasi Darat 2023*. Jakarta, Indonesia: BPS, 2023.
- [2] K. Wirdani and T. Darmi, “Studi kecepatan kendaraan pada ruas jalan perkotaan di Kota Padang,” *Jurnal Teknik Sipil dan Infrastruktur*, vol. 4, no. 2, pp. 98–103, 2015.
- [3] M. Rakhmadani, “Pengaruh kecepatan kendaraan terhadap keselamatan pengguna kendaraan bermotor pada simpang tak bersinyal,” in *Seminar Nasional Teknik Sipil Universitas Lambung Mangkurat*, 2017.
- [4] D. S. Kriswardhana, P. W. Suryandari, and M. B. Ismail, “Analisis hubungan antara kecepatan kendaraan dan laju kecelakaan pada jalan arteri primer di Kota Jember,” *Jurnal CIVEN-SE*, vol. 4, no. 1, pp. 12–19, 2020.
- [5] Heriyanto, S. P. Nugroho, and B. Yuwono, “Implementasi deteksi warna pada public monitoring system dengan Raspberry Pi,” in *Seminar Nasional Teknologi Komputer & Sains (SAINTEKS)*, ISBN: 978-602-52720-7-3, pp. 22–26, 2020.
- [6] W. Djurianto, E. Maulana, and C. Brilianto, “Aplikasi pendeteksi objek kendaraan menggunakan Intel Movidius Neural Compute Stick dengan algoritma MobileNet-YOLO,” *Jurnal EECCIS*, vol. 15, no. 3, pp. 92–97, 2021, doi: 10.21776/jeeccis.v15i3.1549.
- [7] A. A. Ashok and A. P. S. Ambili, “Arduino-based IoT system with infrared sensors for real-time vehicle speed detection,” *EPRA International Journal of Multidisciplinary Research*, vol. 10, no. 2, Feb. 2024. [Online]. Available: <https://eprajournals.com/IJMR/article/12395/abstract>
- [8] S. U. Khan, N. Alam, S. U. Jan, and I. S. Koo, “IoT-enabled vehicle speed monitoring system,” *Electronics*, vol. 11, no. 4, p. 614, 2024, doi: 10.3390/electronics11040614.
- [9] T. Sowmiya, P. Bhuvaneshwaran, T. Dhivaan, and R. Lokesh, “Enhancing road safety: Machine learning-driven vehicle speed monitoring and alerting in VANET environments – A review,” *Journal of Ubiquitous Computing and Communication Technologies*, vol. 6, no. 1, pp. 1–13, 2024, doi: 10.36548/jucct.2024.1.001.
- [10] “IoT-enabled real-time traffic monitoring and control management for intelligent transportation systems,” *IEEE Internet of Things Journal*, 2024, doi: 10.1109/JIOT.2024.3351908.
- [11] Pemerintah Republik Indonesia, *Peraturan Pemerintah Nomor 79 Tahun 2013 tentang Jaringan Lalu Lintas dan Angkutan Jalan*. Jakarta, Indonesia: Sekretariat Negara,

2013, pp. 1–51.

- [12] Kementerian Perhubungan Republik Indonesia, *Peraturan Menteri Perhubungan Nomor 111 Tahun 2015 tentang Tata Cara Penetapan Batas Kecepatan*. Jakarta, Indonesia: Kementerian Perhubungan RI, 2015.
- [13] C. W. Darmawan, S. R. U. A. Sompie, and F. D. Kambey, “Implementasi Internet of Things pada monitoring kecepatan kendaraan bermotor,” *Jurnal Teknik Elektro dan Komputer*, vol. 9, no. 2, pp. 91–100, 2020.
- [14] R. Pardede, H. Farisi, and I. Arwani, “Pengembangan sistem aplikasi monitoring sepeda motor berbasis IoT dengan modul GPS guna pemantauan dan keamanan kendaraan (studi kasus: Roganda Rental Motorbike),” *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer*, vol. 8, no. 6, 2024.
- [15] P. Sokibi and A. Widjaja, “Implementasi perangkat IoT (Internet of Things) sebagai sistem pemantau dan pengendali kendaraan,” *Bit (Fakultas Teknologi Informasi Universitas Budi Luhur)*, vol. 15, no. 1, 2018.
- [16] M. Attubel, D. Siswanto, and M. Mukhsim, “Sistem pemantauan dan pengingat waktu perawatan kendaraan berbasis Internet of Things,” *JASEE Journal of Application and Science on Electrical Engineering*, vol. 1, no. 1, pp. 1–6, 2020.
- [17] Nurlaila, S. Paembonan, and R. Suppa, “Rancang pendeteksi kecepatan kendaraan berbasis Arduino,” *Jurnal Informasi dan Teknologi Elektro Terapan*, vol. 12, no. 3, 2024, doi: 10.23960/jitet.v12i3.4771.
- [18] M. Jabbar, M. Shinoy, M. Kharbeche, K. Al-Khalifa, M. Krichen, and K. Barkaoui, “Urban traffic monitoring and modeling system: An IoT solution for enhancing road safety,” *arXiv preprint arXiv:2003.07672*, 2020, doi: 10.48550/arXiv.2003.07672.
- [19] M. Mokhtari, A. Hosseini, A. Habibi, A. Karshenas, and A. Amoomahdi, “Intelligent traffic control with smart speed bumps,” *arXiv preprint arXiv:2307.00433*, 2023, doi: 10.48550/arXiv.2307.00433.
- [20] J. Gandhi and R. Jhaveri, “Information systems design and intelligent applications,” in *Proc. 8th Int. Conf. Computer Science and Information Technology (CSIT)*, 2018.
- [21] K. Hammoudi, H. Benhabiles, M. Kasraoui, N. Ajam, and F. Dornaika, “Developing vision-based and cooperative vehicular embedded systems for enhancing road monitoring services,” *Procedia Computer Science*, vol. 73, pp. 242–249, 2015, doi: 10.1016/j.procs.2015.05.003.
- [22] H. R. Arkian, R. E. Atani, A. Pourkhalili, and S. Kamali, “A stable clustering scheme

- based on adaptive multiple metric in vehicular ad-hoc networks,” *Journal of Information Science and Engineering*, vol. 30, no. 2, pp. 433–451, 2014.
- [23] H. Xiao and Z. Lin, “A real-time IoT framework for traffic speed monitoring and incident detection,” *Journal of Information Technology & Engineering*, vol. 33, no. 2, pp. 201–217, 2021.
- [24] P. Jiang, D. Ergu, F. Liu, Y. Cai, and B. Ma, “A review of YOLO algorithm developments,” *Procedia Computer Science*, vol. 199, pp. 1066–1073, 2022, doi: 10.1016/j.procs.2022.01.135.
- [25] H. Deshpande, A. Singh, and H. Herunde, “Comparative analysis on YOLO object detection with OpenCV,” *Journal of Computer Applications*, vol. 9, no. 1, pp. 46–64, 2020.
- [26] B. A. B. Saputra, M. A. D. Septiawan, M. A. Nashrullah, A. Kusumah, and P. Rosyani, “Implementasi YOLO dan OpenCV untuk Identifikasi Usia Dibawah Umur,” *Jurnal AI dan SPK: Jurnal Artificial Inteligent dan Sistem Penunjang Keputusan*, vol. 1, no. 4, pp. 288–295, 2024.
- [27] T. Hope, Y. S. Resheff, and I. Lieder, *Learning TensorFlow*, O’Reilly Media, Inc., 1st ed., 2017.
- [28] A. S. Ismailov and Z. B. Jo‘rayev, “Study of Arduino microcontroller board,” *Science and Education: Scientific Journal*, vol. 3, no. 3, pp. 105–112, 2022.
- [29] D. Hercog, T. Lerher, M. Truntič, and O. Težak, “Design and implementation of ESP32-based IoT devices,” *Sensors*, vol. 23, no. 15, p. 6739, 2023, doi: 10.3390/s23156739.
- [30] E. Upton and G. Halfacree, *Raspberry Pi User Guide*. Chichester, West Sussex, UK: John Wiley & Sons Ltd., 2016.
- [31] R. Pranata, S. Samsugi, and S. A. F. Febriyansyah, “Pengembangan motor IoT untuk pemantauan kecepatan dan pemeliharaan melalui Telegram,” *Jurnal Informatika: Jurnal Pengembangan IT*, vol. 9, no. 3, pp. 315–321, 2024, doi: 10.30591/jpit.v9i3.6126.
- [32] A. Shabira, “Penerapan SCADA pada pengendali dan pemonitor kecepatan motor,” *Seminar Nasional Teknik Elektro*, vol. 7, pp. 69–72, 2021.
- [33] C. M. Jacob, N. George, A. Lal, R. J. George, M. Antony, and J. Joseph, “An IoT based smart monitoring system for vehicles,” in *Proc. 4th Int. Conf. Trends in Electronics and Informatics (ICOEI)*, 2020, pp. 396–401.

- [34] D. Siswanto and M. Mukhsim, "Sistem monitoring perawatan kendaraan berbasis Internet of Things (IoT)," *Ciastech 2019*, pp. 331–338, 2019.
- [35] M. S. Mulya, I. Yustiana, and I. L. Khrisma, "Rancang bangun sistem keamanan dan monitoring kendaraan berbasis IoT dan mobile apps," *Jurnal CoSciTech (Computer Science and Information Technology)*, vol. 3, no. 2, pp. 58–65, 2022, doi: 10.37859/coscitech.v3i2.3934.
- [36] T. Riyota, P. Boonpramuk, and S. Nuratch, "IoT-based embedded device development and real-time analysis for unexpected operations of motors," in *Proc. 6th Int. Conf. Measurement Instrumentation and Electronics (ICMIE)*, 2022, pp. 28–33.
- [37] C. Ulices, M. Irma, and J. Carlos, "Design of an electronic coupling to control speed of motor on a conveyor belt using IoT," in *Proc. Int. Conf. Mechatronics, Electronics and Automotive Engineering (ICMEAE)*, 2020, pp. 115–121.
- [38] M. A. Paun, J. M. Sallese, and M. Kayal, "Hall effect sensors design, integration, and behavior analysis," *Journal of Sensor and Actuator Networks*, vol. 2, no. 1, pp. 85–97, Mar. 2013, doi: 10.3390/jsan2010085.
- [39] D. P. Tarigan, P. S. Ramadhan, and S. Yakub, "Penerapan teorema Bayes untuk mendeteksi kerusakan mesin sepeda motor," *Jurnal Sistem Informasi Triguna Dharma (JURSI TGD)*, vol. 1, no. 2, pp. 73–80, 2022.
- [40] A. Fahrul Aji, M. Fathul Lathief, D. Anies Munawwaroh, and L. Gumilar, "Sistem keamanan biometrik sidik jari dan GPS tracking pada sepeda motor berbasis teknologi IoT," *Jurnal JURTIE*, vol. 4, no. 2, pp. 73–81, 2022, doi: 10.55542/jurtie.v4i2.256.
- [41] D. K. Hakim and S. A. Nugroho, "Implementasi Telegram Bot untuk monitoring Mikrotik router," *SAINTEKS*, vol. 16, no. 2, pp. 151–157, Oct. 2019, doi: 10.30595/ST.V16I2.7132.
- [42] C. Rus, R. Marcus, and O. Stoicuța, "Road traffic monitoring system with self-learning function using the Raspberry Pi platform," *MATEC Web of Conferences*, vol. 290, pp. 06009, 2019, doi: 10.1051/mateconf/201929006011.
- [43] I. P. E. Indrawan, L. P. R. Noviana, and A. A. K. Dewi, "Pengenalan otomatis pelat nomor kendaraan bermotor dalam citra digital menggunakan jaringan saraf tiruan backpropagation untuk identifikasi dan klasifikasi yang akurat dalam berbagai aplikasi, seperti manajemen parkir, pemantauan lalu lintas, dan sistem keamanan kendaraan," *Jurnal Manajemen dan Teknologi Informasi (JMTI)*, vol. 16, no. 1, pp. 84–90, 2025, doi: 10.59819.

- [44] M. Zuma, P. A. Owolawi, V. Malele, K. Odeyemi, G. Aiyetoro, and J. S. Ojo, "Intrusion detection system using Raspberry Pi and Telegram integration," Dept. Comput. Syst. Eng., Tshwane Univ. of Technology, Pretoria, South Africa, and Dept. Phys., Federal Univ. of Technology (FUTA), Akure, Nigeria.
- [45] N. Zarei, P. Moallem, and M. Shams, "Fast-Yolo-Rec: Incorporating YOLO-base detection and recurrent-base prediction networks for fast vehicle detection in consecutive images," *IEEE Access*, vol. 10, pp. 120592–120605, 2022, doi: 10.1109/ACCESS.2022.3221942.
- [46] S. Kumar, S. K. Singh, S. Varshney, S. Singh, P. Kumar, B.-G. Kim, and I.-H. Ra, "Fusion of Deep Sort and Yolov5 for effective vehicle detection and tracking scheme in real-time traffic management sustainable system," *Sustainability*, vol. 15, no. 24, p. 16869, 2023, doi: 10.3390/su152416869.
- [47] D. K. Dewangan and S. P. Sahu, "Deep learning-based speed bump detection model for intelligent vehicle system using Raspberry Pi," *IEEE Sensors Journal*, vol. 21, no. 3, pp. 3570–3578, Feb. 2021, doi: 10.1109/JSEN.2020.3027097.
- [48] C.-J. Lin, S.-Y. Jeng, and H.-W. Liao, "A real-time vehicle counting, speed estimation, and classification system based on virtual detection zone and YOLO," *Mathematical Problems in Engineering*, vol. 2021, Article ID 1577614, 10 pages, 2021, doi: 10.1155/2021/1577614.
- [49] Y. O. Adu-Gyamfi, E. Asante, O. Appiah, and S. Tobbin, "Real-time speed violation detection framework using computer vision and deep learning," *Transportation Research Part C: Emerging Technologies*, vol. 121, p. 102842, 2020, doi: 10.1016/j.trc.2020.102842.
- [50] Bochkovskiy, A., Wang, C. Y., & Liao, H. Y. M. (2020). YOLOv4: *Optimal speed and accuracy of object detection*. arXiv preprint arXiv:2004.10934. <https://arxiv.org/abs/2004.10934>
- [51] H. Li and C. Shen, "Reading car license plates using deep convolutional neural networks and LSTMs," *IEEE Intelligent Transportation Systems Magazine*, vol. 8, no. 4, pp. 28–42, 2016, doi: 10.48550/arXiv.1601.05610.
- [52] P. Jiang, D. Ergu, F. Liu, Y. Cai, and B. Ma, "A review of YOLO algorithm developments," *Procedia Computer Science*, vol. 199, pp. 1066–1073, 2022, doi: 10.1016/j.procs.2022.01.135.
- [53] *Penghitungan kecepatan: Sistem menghitung jarak perpindahan kendaraan*

berdasarkan perubahan koordinat posisi antar frame, CD Gabungan, p. 23, 2024.

- [54] R. Pranata, S. Samsugi, and S. A. F. Febriyansyah, “Pengembangan motor IoT untuk pemantauan kecepatan dan pemeliharaan melalui Telegram,” *Jurnal Informatika: Jurnal Pengembangan IT*, vol. 9, no. 3, pp. 315–321, 2024, doi: 10.30591/jpit.v9i3.6126.
- [55] E. Upton and G. Halfacree, *Raspberry Pi User Guide*, Chichester, U.K.: John Wiley & Sons, 2016.
- [56] SR 5.1: “Sistem dapat menyimpan data kecepatan kendaraan dan pelanggaran secara real-time ke Firebase”, CD Gabungan, p. 20, 2024.
- [57] C. Rus, R. Marcuş, and O. Stoicuţa, “Road traffic monitoring system with self-learning function using the Raspberry Pi platform,” *MATEC Web of Conferences*, vol. 290, p. 06009, 2019, doi: 10.1051/matecconf/201929006009.
- [58] I. P. E. Indrawan, L. P. R. Noviana, and A. A. K. Dewi, “Pengenalan otomatis pelat nomor kendaraan bermotor dalam citra digital menggunakan jaringan saraf tiruan backpropagation untuk identifikasi dan klasifikasi yang akurat dalam berbagai aplikasi, seperti manajemen parkir, pemantauan lalu lintas, dan sistem keamanan kendaraan,” *Jurnal Manajemen dan Teknologi Informasi (JMTI)*, vol. 16, no. 1, pp. 84–90, 2025, ISSN: 2721-7604 (Online), 2087-5312 (Print), doi: 10.59819.
- [59] D. K. Hakim and S. A. Nugroho, “Implementasi Telegram Bot untuk monitoring Mikrotik router,” *SAINTEKS*, vol. 16, no. 2, pp. 151–157, Oct. 2019, p-ISSN: 0852-1468, e-ISSN: 2686-0546, doi: 10.30595/st.v16i2.7132.
- [60] H. Xiao and Z. Lin, “A real-time IoT framework for traffic speed monitoring and incident detection,” *Journal of Information Technology & Engineering*, vol. 33, no. 2, pp. 201–217, 2021.
- [61] H. R. Arkian, R. E. Atani, A. Pourkhalili, and S. Kamali, “A stable clustering scheme based on adaptive multiple metric in vehicular ad-hoc networks,” *Journal of Information Science and Engineering*, vol. 30, no. 2, pp. 433–451, 2014.
- [62] N. H. Tsani, B. Dirgantoro, and A. L. Prasasti, “Implementasi deteksi kecepatan kendaraan menggunakan kamera webcam dengan metode frame difference,” *e-Proceeding of Engineering*, vol. 4, no. 2, pp. 2373–2381, 2017.