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DAFTAR PUSTAKA

[1] Kementerian Ketenagakerjaan RI, "Data kecelakaan kerja Indonesia tahun 2020–2022 berdasarkan BPJS Ketenagakerjaan," Jan. 12, 2023. Accessed: Mar. 09, 2026. [Online]. Available: https://x.com/KemnakerRI/status/1613464462929035264?s=20

[2] Kementerian Ketenagakerjaan RI, "Kecelakaan Kerja Tahun 2023," 2023, *Jakarta*. Accessed: Mar. 09, 2026. [Online]. Available: https://satudata.kemnaker.go.id/data/kumpulan-data/1728

[3] Kementerian Ketenagakerjaan RI, "Kasus Kecelakaan Kerja Tahun 2024," 2024, *Jakarta*. Accessed: Mar. 09, 2026. [Online]. Available: https://satudata.kemnaker.go.id/data/kumpulan-data/2447

[4] Pemerintah Republik Indonesia, "Undang-Undang Republik Indonesia Nomor 1 Tahun 1970 tentang Keselamatan Kerja," Jan. 12, 1970, *Jakarta*. Accessed: Mar. 10, 2026. [Online]. Available: https://peraturan.bpk.go.id/Details/47614/uu-no-1-tahun-1970

[5] Peraturan Kementeri Ketenagakerjaan, "Peraturan Menteri Ketenagakerjaan Nomor PER.08/MEN/VII/2010," Jul. 06, 2010, *Jakarta*. Accessed: Mar. 25, 2026. [Online]. Available: https://jdih.kemnaker.go.id/peraturan/detail/158/peraturan-menteri-nomor-8-tahun-2010

[6] R. O. Triutami, "Analisis Faktor-faktor Kecelakaan Kerja di Industri Manufaktur dengan Metode Principal Component Analysis (PCA) dan Analytical Hierarchy Process (AHP)," Universitas Islam Indonesia, Yogyakarta, 2023. Accessed: Mar. 30, 2026. [Online]. Available: dspace.uii.ac.id/123456789/48626

[7] P. Suartana, R. J. M. Mandagi, and D. Wilar, "Pengaruh Pengetahuan Keselamatan dan Kesehatan Kerja (K3) Terhadap Perilaku Pekerja dan

UNIVERSITAS
GADJAH MADA
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Kecelakaan Kerja Pada Proyek di DS LNG Kabupaten Banggai Propinsi Sulawesi Tengah," *REKONSTRUKSI TADULAKO: Civil Engineering Journal on Research and Development*, pp. 15–22, Mar. 2021, doi: 10.22487/renstra.v2i1.234.

[8] Almira Chiara Putri Nusantara, Andriyani Andriyani, and Triana Srisantyorini, "Kepatuhan Penggunaan Alat Pelindung Diri (APD) pada Pekerja Kontruksi: Kajian Literatur tentang Pengaruh Faktor Individu dan Pendekatan Keselamatan Kerja," *Jurnal Riset Ilmu Kesehatan Umum dan Farmasi (JRIKUF)*, vol. 3, no. 2, pp. 135–146, Apr. 2025, doi: 10.57213/jrikuf.v3i2.640.

[9] W. S. Intifada, "Analisis Risiko dan Strategi Peningkatan Keselamatan Kerja di Sektor Industri Manufaktur: Tinjauan Literatur," *Industrika: Jurnal Ilmiah Teknik Industri*, vol. 9, no. 1, pp. 240–253, Jan. 2025, doi: 10.37090/indstrk.v9i1.1901.

[10] S. Amri, L. Ouannes, A. Sahbani, and N. E. Ben Amara, "YOLO-Based Detector for Enhancing Workplace Safety: Real-Time PPE Detection and Monitoring," in *2024 IEEE/ACS 21st International Conference on Computer Systems and Applications (AICCSA)*, IEEE, Oct. 2024, pp. 1–8. doi: 10.1109/AICCSA63423.2024.10912638.

[11] J. Wang, S. Duan, J. Xu, S. Wang, and Q. Ling, "Synthesis of multiple video streams through multi-thread programming," in *2020 Chinese Control And Decision Conference (CCDC)*, IEEE, Aug. 2020, pp. 1152–1156. doi: 10.1109/CCDC49329.2020.9164266.

[12] Z. A. Aziz, D. Naseradeen Abdulqader, A. B. Sallow, and H. Khalid Omer, "Python Parallel Processing and Multiprocessing: A Rivew," *Academic Journal of Nawroz University*, vol. 10, no. 3, pp. 345–354, Aug. 2021, doi: 10.25007/ajnu.v10n3a1145.

[13] Keymetrics, "PM2 - Advanced Production Process Manager for Node.js." Accessed: May 05, 2026. [Online]. Available: https://pm2.keymetrics.io/

UNIVERSITAS
GADJAH MADA
Perancangan Sistem Pelaporan Pelanggaran Alat Pelindung Diri dengan Multi-Threading dan Multi-Processing Berbasis YOLOv12 dan Virtual Private Server
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

[14] E. Lemos, R. Oliveira, J. Rodrigues, and R. F. O. Neto, "Deep Learning Model Deployment in Multiple Cloud Providers: an Exploratory Study Using Low Computing Power Environments," Jan. 2026, [Online]. Available: http://arxiv.org/abs/2503.23988

[15] A. M. El-Kafrawy and E. H. Seddik, "Personal Protective Equipment (PPE) Monitoring for Construction Site Safety using YOLOv12," in *2025 International Conference on Machine Intelligence and Smart Innovation (ICMISI)*, IEEE, May 2025, pp. 456–459. doi: 10.1109/ICMISI65108.2025.11115450.

[16] Y. Ganesh and K. Natarajan, "Enhancing Occupational Safety Through Yolov12-Based Ppe and Hazard Detection," in *2026 5th International Conference on Sentiment Analysis and Deep Learning (ICSADL)*, IEEE, Feb. 2026, pp. 1–5. doi: 10.1109/ICSADL67539.2026.11452025.

[17] T.-M. Seo and D.-J. Kang, "PARA-CAM: Parallel Processing Architecture for Intelligent Real Time Multi IP Camera System With Deep Learning Models," *Int. J. Control Autom. Syst.*, vol. 23, no. 5, pp. 1563–1575, May 2025, doi: 10.1007/s12555-024-0899-8.

[18] F. Song and P. Li, "YOLOv5-MS: Real-Time Multi-Surveillance Pedestrian Target Detection Model for Smart Cities," *Biomimetics*, vol. 8, no. 6, p. 480, Oct. 2023, doi: 10.3390/biomimetics8060480.

[19] W. J. Hadiman and Y. S. Suharini, "Optimasi Kinerja Sistem Pengenalan Wajah Real-Time Berbasis CCTV Menggunakan MultiThreading pada Perangkat Tanpa GPU," *Prosiding Technopex 2025*, vol. 9, no. 1, pp. 1315–1320, 2025, Accessed: May 31, 2026. [Online]. Available: https://semnas.iti.ac.id/tpx/index.php/c/article/view/698

[20] A. Zholdybay and A. Aituov, "Python Concurrency for High-Load Multicore Processing," *Universum:Technical sciences*, vol. 134, no. 5, May 2025, doi: 10.32743/UniTech.2025.134.5.20073.

UNIVERSITAS
GADJAH MADA
Perancangan Sistem Pelaporan Pelanggaran Alat Pelindung Diri dengan Multi-Threading dan Multi-Processing Berbasis YOLOv12 dan Virtual Private Server
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

[21] S. H. Lee, "Real-time Edge Computing on Multi-processes and Multi-threading Architectures for Deep Learning Applications," *Microprocess. Microsyst.*, vol. 92, p. 104554, Jul. 2022, doi: 10.1016/j.micpro.2022.104554.

[22] T. Karimov, H. Imani, and A. Kazakov, "Quantization Robustness to Input Degradations for Object Detection," in *2025 Innovations in Intelligent Systems and Applications Conference (ASYU)*, IEEE, Sep. 2025, pp. 1–6. doi: 10.1109/ASYU67174.2025.11208310.

[23] H. Prasetya, R. R. Balo, T. Tumbal, A. M. Sambul, and M. Dwisnanto Putro, "Comparative Study of Lightweight YOLOv12 Models for Real-Time Underwater Object Detection," *Jurnal Telematika*, vol. 20, no. 2, pp. 127–137, Jan. 2026, doi: 10.61769/telematika.v20i2.799.

[24] Kementerian Ketenagakerjaan RI, "Alat Pelindung Diri (APD)," Jan. 25, 2023. Accessed: Jun. 01, 2026. [Online]. Available: https://x.com/KemnakerRI/status/1618126646925561861?s=20

[25] R. Goswami, "Comparison of State-of-the-Art Machine Learning Based Data Driven and Model Updating Methods Against Shallow and Deep Convolutional Neural Networks Methods of Structural Damage Detection," *International Research Journal of Engineering and Technology*, 2020, [Online]. Available: www.irjet.net

[26] Y. Gokcekuyu, F. Ekinci, M. S. Guzel, K. Acici, S. Aydin, and T. Asuroglu, "Artificial Intelligence in Biomaterials: A Comprehensive Review," *Applied Sciences*, vol. 14, no. 15, p. 6590, Jul. 2024, doi: 10.3390/app14156590.

[27] M. Q. Ibrahim, N. K. Hussein, D. Guinovart, and M. Qaraad, "Optimizing Convolutional Neural Networks: A Comprehensive Review of Hyperparameter Tuning Through Metaheuristic Algorithms," *Archives of Computational Methods in Engineering*, vol. 32, no. 8, pp. 5123–5160, Dec. 2025, doi: 10.1007/s11831-025-10292-x.

UNIVERSITAS
GADJAH MADA
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

[28] V. H. Phung and E. J. Rhee, "A High-Accuracy Model Average Ensemble of Convolutional Neural Networks for Classification of Cloud Image Patches on Small Datasets," *Applied Sciences*, vol. 9, no. 21, p. 4500, Oct. 2019, doi: 10.3390/app9214500.

[29] Reni Triyaningsih, Pradita Eko Prasetyo Utomo, and Benedika Ferdian Hutabarat, "Application of You Only Look Once (YOLO) Method for Sign Language Identification," *Jurnal Nasional Teknik Elektro dan Teknologi Informasi*, vol. 14, no. 4, pp. 254–262, Nov. 2025, doi: 10.22146/jnteti.v14i4.21931.

[30] K. M. Azhar, I. Santoso, and Y. A. A. Soetrisno, "Implementasi Deep Learning Menggunakan Metode Convolutional Neural Network dan Algoritma YOLO dalam Sistem Pendeteksi Uang Kertas Rupiah Bagi Penyandang Low Vision," *Transient: Jurnal Ilmiah Teknik Elektro*, vol. 10, no. 3, pp. 502–509, Sep. 2021, doi: 10.14710/transient.v10i3.502-509.

[31] Intara Pratama Harahap and Agus Muliantara, "Deteksi Objek pada Citra Menggunakan Model YOLO," *Jurnal Nasional Teknologi Informasi dan Aplikasnya*, vol. 2, no. 3, pp. 469–474, May 2024, doi: 10.24843/JNATIA.2024.v02.i03.p03.

[32] M. Yurdakul, H. Sazak, M. Kotan, and Ş. Taşdemir, "A Review of YOLO Family from YOLOv1 to YOLO26," Feb. 27, 2026. doi: 10.20944/preprints202602.1844.v1.

[33] N. Jegham, C. Y. Koh, M. Abdelatti, and A. Hendawi, "YOLO Evolution: A Comprehensive Benchmark and Architectural Review of YOLOv12, YOLO11, and Their Previous Versions," Mar. 2025, [Online]. Available: http://arxiv.org/abs/2411.00201

[34] Ultralytics, "YOLO12: Attention-Centric Object Detection." Accessed: Jul. 10, 2026. [Online]. Available: https://docs.ultralytics.com/models/yolo12#yolo12-attention-centric-object-detection

UNIVERSITAS
GADJAH MADA
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

[35] A. Lopes, F. Pereira dos Santos, D. de Oliveira, M. Schiezaro, and H. Pedrini, "Computer Vision Model Compression Techniques for Embedded Systems:A Survey," *Comput. Graph.*, vol. 123, p. 104015, Oct. 2024, doi: 10.1016/j.cag.2024.104015.

[36] A. Haniefardy, M. B. A. Fadhillah, and S. Rochimah, "Tinjauan Literatur Sistematis: Pengaruh Penggunaan Framework Khusus dalam Proses Pengembangan Web dan Pembuatan Web," *Matrix : Jurnal Manajemen Teknologi dan Informatika*, vol. 9, no. 2, pp. 68–73, Jul. 2019, doi: 10.31940/matrix.v9i2.1161.

[37] H. Rasikhah and A. R. Adriansyah, "Perancangan dan Implementasi Booking System Lapangan menggunakan Framework MVC berbasis Web," *Jurnal Informatika Terpadu*, vol. 8, no. 1, pp. 08–12, Mar. 2022, doi: 10.54914/jit.v8i1.384.

[38] Pallets Project, "Flask Documentation (3.1.x)." Accessed: Jun. 16, 2026. [Online]. Available: https://flask.palletsprojects.com/en/stable/

[39] Meta, "React: The Library for Web and Native User Interfaces." Accessed: Jun. 16, 2026. [Online]. Available: https://react.dev/

[40] OpenJS Foundation, "Express JS: Fast, unopinionated, minimalist web framework for Node.js." Accessed: Jun. 16, 2026. [Online]. Available: https://expressjs.com/en/

[41] Python Software Foundation, "Python 3 Documentation." Accessed: Jun. 16, 2026. [Online]. Available: https://docs.python.org/3/

[42] Ultralytics, "Ultralytics Documentation." Accessed: Jun. 16, 2026. [Online]. Available: https://docs.ultralytics.com/quickstart

[43] OpenCV Community, "OpenCV Documentation." Accessed: Jun. 16, 2026. [Online]. Available: https://opencv-opencv.mintlify.app/

UNIVERSITAS
GADJAH MADA
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

[44] NumPy Community, "NumPy Documentation." Accessed: Jun. 16, 2026. [Online]. Available: https://numpy.org/doc/

[45] Federico Di Gregorio, Daniele Varrazzo, and The Psycopg Team, "Psycopg Documentation." Accessed: Jun. 16, 2026. [Online]. Available: https://www.psycopg.org/docs/install.html

[46] NPM Team, "NPM Documentation." Accessed: Jun. 17, 2026. [Online]. Available: https://docs.npmjs.com/

[47] Ltd. Huawei Technologies Co., *Database Principles and Technologies – Based on Huawei GaussDB*. Singapore: Springer Nature Singapore, 2023. doi: 10.1007/978-981-19-3032-4.

[48] Pramod K. Nayar, *The New Media and Cybercultures Anthology*. Chichester, West Sussex, UK: Wiley-Blackwell, 2010.

[49] PostgreSQL Global Development Group, "PostgreSQL Documentation." Accessed: Jun. 16, 2026. [Online]. Available: https://www.postgresql.org/docs/

[50] Redis Inc., "Redis Documentation." Accessed: Jun. 16, 2026. [Online]. Available: https://redis.io/

[51] Quan Nguyen, *Mastering Concurrency in Python: Create faster programs using concurrency, asynchronous, multithreading, and parallel programming*. Birmingham, UK: Packt Publishing, 2018.

[52] J. Terven, D.-M. Cordova-Esparza, J.-A. Romero-González, A. Ramírez-Pedraza, and E. A. Chávez-Urbiola, "A Comprehensive Survey of Loss Functions and Metrics in Deep Learning," *Artif. Intell. Rev.*, vol. 58, no. 7, p. 195, Apr. 2025, doi: 10.1007/s10462-025-11198-7.

[53] G. Gallo, F. Di Rienzo, F. Garzelli, P. Ducange, and C. Vallati, "A Smart System for Personal Protective Equipment Detection in Industrial

UNIVERSITAS
GADJAH MADA
Perancangan Sistem Pelaporan Pelanggaran Alat Pelindung Diri dengan Multi-Threading dan Multi-Processing Berbasis YOLOv12 dan Virtual Private Server
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Environments Based on Deep Learning at the Edge," *IEEE Access*, vol. 10, pp. 110862–110878, 2022, doi: 10.1109/ACCESS.2022.3215148.

[54] D. Pratiwi and I. J. Matheus Edward, "Analysis Efficiency Network Performance of 4G LTE in Video Conference Applications," in *2022 16th International Conference on Telecommunication Systems, Services, and Applications (TSSA)*, IEEE, Oct. 2022, pp. 1–6. doi: 10.1109/TSSA56819.2022.10063921.

[55] European Telecommunications Standards Institute (ETSI), *Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; End-to-end Quality of Service in TIPHON systems; Part 2: Definition of speech Quality of Service (QoS) classes*, TS 101 329-2 V2.1.3. 2002.

[56] S. H. Sabila, I. W. Mustika, and S. Sulistyo, "Design and Implementation of Mobile Applications for Military Personnel Based on SIP (Session Initiation Protocol)," in *2022 IEEE 12th Annual Computing and Communication Workshop and Conference (CCWC)*, IEEE, Jan. 2022, pp. 0870–0875. doi: 10.1109/CCWC54503.2022.9720802.

[57] European Telecommunications Standards Institute (ETSI), *Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); General aspects of Quality of Service (QoS)*, TR 101 329 V2.1.1. 1999.

[58] dcarranza9, "Safety Goggles Project Complete Computer Vision Dataset." Accessed: Jun. 01, 2026. [Online]. Available: https://universe.roboflow.com/dcarranza9/safety-goggles-project-complete

[59] ppe9extra, "ppe9-ex-goggles Computer Vision Dataset." Accessed: Jun. 01, 2026. [Online]. Available: https://universe.roboflow.com/ppe9extra/ppe9-ex-goggles

UNIVERSITAS
GADJAH MADA
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

[60] OpenCV, “Gloves Detection Computer Vision Dataset.” Accessed: Jun. 01, 2026. [Online]. Available: https://universe.roboflow.com/opencv-7gjvb/gloves-detection-s9zga

[61] Roboflow Universe Projects, “Personal Protective Equipment - Combined Model Computer Vision Model.” Accessed: Jun. 01, 2026. [Online]. Available: https://universe.roboflow.com/roboflow-universe-projects/personal-protective-equipment-combined-model

[62] Mohamed Traore, “PPE Detection Computer Vision Model.” Accessed: Jun. 01, 2026. [Online]. Available: https://universe.roboflow.com/mohamed-traore-2ekkp/ppe-detection-l80fg

[63] shoe detection, “Shoes Computer Vision Model.” Accessed: Jun. 01, 2026. [Online]. Available: https://universe.roboflow.com/shoe-detection-u77cd/shoes-biuqw

[64] duc, “no-shoes-workers Computer Vision Dataset.” Accessed: Jun. 01, 2026. [Online]. Available: https://universe.roboflow.com/duc-vdcze/no-shoes-workers-wkpiv

[65] DigiTele Networks, “Shoes and Barefoot Computer Vision Model.” Accessed: Jun. 01, 2026. [Online]. Available: https://universe.roboflow.com/digitele-networks-qyanu/shoes-and-barefoot