

DAFTAR PUSTAKA

- [1] World Health Organization, “WHO global air quality guidelines Particulate matter (PM 2.5 and PM 10), ozone, nitrogen dioxide, sulfur dioxide, and carbon monoxide,” 2021.
- [2] Y. Saputra, H. S. Hasibuan, and M. Amin, “Integrated assesment of urban air pollution in South Tangerang, Indonesia: synergizing ground monitoring, Sentinel-5P retrievals, and HYSPLIT trajectory analysis,” pp. 1–20, Jun. 2025.
- [3] A. Hamapu, “BPBD Kepri: Kualitas Udara di Batam-Tanjungpinang Masuk Kategori Tidak Sehat.” Accessed: Nov. 24, 2025. [Online]. Available: <https://www.detik.com/sumut/berita/d-6970147/bpbd-kepri-kualitas-udara-di-batam-tanjungpinang-masuk-kategori-tidak-sehat>
- [4] IQAir, “Air quality in Tanjung Pinang.” Accessed: Nov. 24, 2025. [Online]. Available: <https://www.iqair.cn/cn-en/indonesia/riau-islands/tanjung-pinang>
- [5] E. González, J. Casanova-Chafer, A. Romero, X. Vilanova, J. Mitrovics, and E. Llobet, “Lora sensor network development for air quality monitoring or detecting gas leakage events,” *Sensors (Switzerland)*, vol. 20, no. 21, pp. 1–21, Oct. 2020, doi: 10.3390/s20216225.
- [6] W. A. Jabbar, T. Subramaniam, A. E. Ong, M. I. Shu’Ib, W. Wu, and M. A. de Oliveira, “LoRaWAN-Based IoT System Implementation for Long-Range Outdoor Air Quality Monitoring,” *Internet of Things (Netherlands)*, vol. 19, Aug. 2022, doi: 10.1016/j.iot.2022.100540.
- [7] C. Tagliaro, M. Komsic, A. Continella, K. Borgolte, and M. Lindorfer, “Large-Scale Security Analysis of Real-World Backend Deployments Speaking IoT-Focused Protocols,” in *ACM International Conference Proceeding Series*, Association for Computing Machinery, Sep. 2024, pp. 561–578. doi: 10.1145/3678890.3678899.
- [8] F. M. Shafira, S. Anindya, Z. A. Rosadi, D. R. Lingga, and J. Indrawan, “STRATEGI PERTAHANAN SIBER INDONESIA DALAM MENGHADAPI ANCAMAN,” vol. 6, Dec. 2025, doi: 10.1177/23477970211018436.
- [9] A. Bogdanov *et al.*, “PRESENT: An ultra-lightweight block cipher,” in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, Springer Verlag, 2007, pp. 450–466. doi: 10.1007/978-3-540-74735-2_31.

- [10] P. Panahi, C. Bayılmış, U. Çavuşoğlu, and Sezgin, "Performance Evaluation of Lightweight Encryption Algorithms for IoT-Based Applications," vol. 46, no. April 2021, pp. 4015–1037, Feb. 2021.
- [11] E. H. Yossy, A. Maulana, and R. Prastyantoro, "Air Pollution Monitoring System Based on IoT with Cloud," *PIKSEL : Penelitian Ilmu Komputer Sistem Embedded and Logic*, vol. 9, no. 2, pp. 119–134, Sep. 2021, doi: 10.33558/piksel.v9i2.3023.
- [12] L. A. Faturrahman, B. F. Tanjung, and Y. Saragih, "SISTEM MONITORING DAN DETEKSI DINI KUALITAS UDARA BERBASIS INTERNET OF THINGS," *Jurnal Informatika dan Teknik Elektro Terapan*, vol. 13, no. 3, Jul. 2025, doi: 10.23960/jitet.v13i3.6598.
- [13] A. Winarno and R. F. Sari, "A Novel Secure End-to-End IoT Communication Scheme Using Lightweight Cryptography Based on Block Cipher," *Applied Sciences (Switzerland)*, vol. 12, no. 17, Sep. 2022, doi: 10.3390/app12178817.
- [14] O. Pospisil, R. Fujdiak, K. Mikhaylov, H. Ruotsalainen, and J. Misurec, "Testbed for lorawan security: Design and validation through man-in-the-middle attacks study," *Applied Sciences (Switzerland)*, vol. 11, no. 16, Aug. 2021, doi: 10.3390/app11167642.
- [15] M. N. A. Ramadan, M. A. H. Ali, S. Y. Khoo, M. Alkhedher, and M. Alherbawi, "Real-time IoT-powered AI system for monitoring and forecasting of air pollution in industrial environment," *Ecotoxicol. Environ. Saf.*, vol. 283, Sep. 2024, doi: 10.1016/j.ecoenv.2024.116856.
- [16] J. Damodharan, E. R. Susai Michael, and N. Shaikh-Husin, "High Throughput PRESENT Cipher Hardware Architecture for the Medical IoT Applications," *Cryptography*, vol. 7, no. 1, Mar. 2023, doi: 10.3390/cryptography7010006.
- [17] H. Fereidouni, O. Fadeitseva, and M. Zalai, "IoT and Man-in-the-Middle Attacks," Aug. 2023, doi: 10.1002/spy2.70016.
- [18] P. Wadtkar, M. Zennaro, and P. Manzoni, "On Time Synchronization of LoRaWAN Based IoT Devices for Enhanced Event Correlation," in *ACM International Conference Proceeding Series*, Association for Computing Machinery, Sep. 2020, pp. 261–264. doi: 10.1145/3411170.3411264.
- [19] A. Choudhary, "Internet of Things: a comprehensive overview, architectures, applications, simulation tools, challenges and future directions," Dec. 01, 2024, *Springer Nature*. doi: 10.1007/s43926-024-00084-3.

- [20] M. A. Hassan and J. Li, "Demonstration of cyber security through Penetration testing on IP camera," Feb. 2023.
- [21] A. Caseiro, S. Schmitz, and E. von Schneidemesser, "Particle number size distribution evaluation of Plantower PMS5003 low-cost PM sensors - a field experiment," *Environmental Science: Atmospheres*, vol. 4, no. 10, pp. 1183–1194, Sep. 2024, doi: 10.1039/d4ea00086b.
- [22] G. Amirkhanova, S. Ismailov, A. Amirkhanov, S. Adilzhanova, M. Zhasuzakova, and S. Chen, "A Lightweight, End-to-End Encrypted Data Pipeline for IIoT: An AES-GCM Implementation for ESP32, MQTT, and Raspberry Pi," *Information*, vol. 17, no. 1, p. 33, Jan. 2026, doi: 10.3390/info17010033.
- [23] A. A. Laghari, H. Li, A. A. Khan, Y. Shoulin, S. Karim, and M. A. K. Khani, "Internet of Things (IoT) applications security trends and challenges," Dec. 01, 2024, *Springer Nature*. doi: 10.1007/s43926-024-00090-5.
- [24] P. de Moraes and A. F. da Conceição, "A Systematic Review of Security in the LoRaWAN Network Protocol," May 2021, [Online]. Available: <http://arxiv.org/abs/2105.00384>
- [25] Amrita, C. P. Ekwueme, I. H. Adam, and A. Dwivedi, "Lightweight Cryptography for Internet of Things: A Review," *EAI Endorsed Transactions on Internet of Things*, vol. 10, 2024, doi: 10.4108/eetiot.5565.
- [26] D. Indrajati and W. M. Ashari, "Evaluasi Efektivitas Algoritma Enkripsi Ringan terhadap Kinerja dan Keamanan Data pada Perangkat IoT," *Jurnal Informatika dan Komputasi Terapan*, vol. 9, no. 3, Jun. 2025.
- [27] A. Bogdanov *et al.*, "PRESENT: An Ultra-Lightweight Block Cipher," 2007.
- [28] M. Dworkin, "Recommendation for Block Cipher Modes of Operation: Methods for Format-Preserving Encryption," Gaithersburg, MD, Mar. 2016. doi: 10.6028/NIST.SP.800-38G.
- [29] H. Kwon, Y. B. Kim, S. C. Seo, and H. Seo, "High-speed implementation of PRESENT on AVR microcontroller," *Mathematics*, vol. 9, no. 4, pp. 1–16, Feb. 2021, doi: 10.3390/math9040374.
- [30] I. Radhakrishnan, S. Jadon, and P. B. Honnavalli, "Efficiency and Security Evaluation of Lightweight Cryptographic Algorithms for Resource-Constrained IoT Devices," *Sensors*, vol. 24, no. 12, Jun. 2024, doi: 10.3390/s24124008.

- [31] I. S. Ismail, N. A. A. Latiff, N. A. A. Ali, and N. M. A. Latiff, "Performance Evaluation Of Physical Layer Using Lora Technology For Indoor Environment," *INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH*, vol. 8, no. 09, Sep. 2019, [Online]. Available: www.ijstr.org
- [32] R. Liang, L. Zhao, and P. Wang, "Performance evaluations of lora wireless communication in building environments," *Sensors (Switzerland)*, vol. 20, no. 14, pp. 1–19, Jul. 2020, doi: 10.3390/s20143828.
- [33] F. M. Agugliaro *et al.*, "Academic Editors: Esther Salmerón-Manzano and A Survey of Efficient Lightweight Cryptography for Power-Constrained Microcontrollers," 2024, doi: 10.3390/technologies.

