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DAFTAR PUSTAKA

[1] H. jn, H. S. A. ., and D. anitha g.s, "Performance evaluation of single ended primary inductance converter for photo voltaic applications," 07 2014.

[2] T. M. Rumagit *et al.*, "Unjuk kerja panel surya 100 wp monocrystalline dalam menghasilkan listrik," *Jurnal Teknik Elektro dan Komputer*, 2023.

[3] Cara Ilmu, "Fungsi charge controller pada plts," 2020, accessed: Jul. 3, 2026. [Online]. Available: https://www.carailmu.com/2020/04/fungsi-charge-coontroller-pada-plts.html

[4] Voltaat, "Doit esp32 devkit v1 development board," 2026, accessed: Dec. 8, 2026. [Online]. Available: https://www.voltaat.com/products/doit-esp32-devkit-v1-development-board

[5] Alibaba, "Lcd1602a 16x2 character lcd display module," 2026, accessed: Jul. 3, 2026. [Online]. Available: https://www.alibaba.com/product-detail/LCD1602A-16x2-1602-Character-LCD-Display_1601627684709.html

[6] ——, "Lm2596 dc buck step down power module," 2026, accessed: Jul. 3, 2026. [Online]. Available: https://indonesian.alibaba.com/product-detail/LM2596-DC-Buck-Step-Down-Power-62054021130.html

[7] Nyereka Tech, "Ina219 i2c interface high side dc current sensor breakout module," 2026, accessed: Jul. 3, 2026. [Online]. Available: https://www.nyerekatech.com/shop/ina219-i2c-interface-high-side-dc-current-sensor-breakout-module/

[8] Voltaat, "Bh1750 light intensity illumination module," 2026, accessed: Jul. 3, 2026. [Online]. Available: https://www.voltaat.com/products/bh1750-light-intensity-illumination-module

[9] Pimoroni, "Ds18b20 programmable resolution 1-wire digital thermometer," 2026, accessed: Jul. 3, 2026. [Online]. Available: https://shop.pimoroni.com/products/ds18b20-programmable-resolution-1-wire-digital-thermometer?variant=32127344640083

[10] M. Abdel-Nasser and K. Mahmoud, "Accurate photovoltaic power forecasting models using deep lstm-rnn," *Neural Computing and Applications*, vol. 31, no. 7, pp. 2727–2740, 2019.

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[11] International Energy Agency, "World energy outlook 2023," International Energy Agency, Paris, France, Tech. Rep., 2023.

[12] International Renewable Energy Agency, "Renewable Power Generation Costs in 2022," IRENA, Abu Dhabi, United Arab Emirates, Tech. Rep., 2023.

[13] D. F. Silalahi, A. B. Utama, B. Arianto *et al.*, "Indonesia's vast solar energy potential," *Energies*, vol. 14, no. 17, p. 5424, 2021.

[14] M. Rumbayan, A. Abudureyimu, and K. Nagasaka, "Mapping of solar energy potential in indonesia using artificial neural network and geographical information system," *Renewable and Sustainable Energy Reviews*, vol. 16, no. 3, pp. 1437–1449, 2012.

[15] Ministry of Energy and Mineral Resources, "Rencana usaha penyediaan tenaga listrik (ruptl) pt pln 2021–2030," Kementerian Energi dan Sumber Daya Mineral, Jakarta, Indonesia, Tech. Rep., 2021.

[16] J. E. Siswanto and E. Rahayu, "Analisa intensitas cahaya matahari terhadap daya keluar dan efisiensi pada panel surya," *Jurnal Inovator*, vol. 7, no. 2, pp. 72–77, 2024.

[17] S. Yuliananda, G. Sarya, and R. R. Hastijanti, "Pengaruh perubahan intensitas matahari terhadap daya keluaran panel surya," in *Seminar Nasional XII Rekayasa Teknologi Industri dan Informasi*, 2015, pp. 193–202.

[18] X. Zhao *et al.*, "Prediction of solar irradiance and photovoltaic solar energy production using machine learning models," *Energy Reports*, vol. 7, pp. 6237–6249, 2021.

[19] I. Santiago, J. L. Esquivel-Martin, D. Trillo-Montero, R. J. Real-Calvo, and V. Pallarés-López, "Classification of daily irradiance profiles and the behaviour of photovoltaic plant elements: The effects of cloud enhancement," *Renewable Energy*, vol. 164, pp. 938–950, 2021.

[20] N. Thipwangmek, T. Tanitteerapan, A. Udomsuk *et al.*, "Enhancing short-term solar photovoltaic power forecasting in tropical climate using hybrid deep learning models," *IEEE Access*, vol. 11, pp. 130 380–130 393, 2023.

[21] L. O. Aghenta and M. T. Iqbal, "Design and implementation of a low-cost, open source iot-based scada system using esp32 with oled, thingsboard and mqtt protocol," *AIMS Electronics and Electrical Engineering*, vol. 4, no. 1, pp. 57–86, 2020.

[22] S. Hochreiter and J. Schmidhuber, "Long short-term memory," *Neural Computation*, vol. 9, no. 8, pp. 1735–1780, 1997.

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[23] C. H. Liu, C. S. Gu, M. T. Yang *et al.*, "A simplified lstm neural networks for one day-ahead solar power forecasting," *IEEE Access*, vol. 9, pp. 17 125–17 139, 2021.

[24] Z. Ullah, S. M. Shahid, J. Park, B. Min, and S. Kwon, "Lstm-based online learning for real-time solar power forecasting," *IEEE Access*, 2025.

[25] N. Sutarna, C. Tjahyadi, P. Oktivasari, M. Dwiyaniti, and Tohazen, "Hyperparameter tuning impact on deep learning bi-lstm for photovoltaic power forecasting," *Journal of Robotics and Control*, vol. 5, no. 3, pp. 677–693, 2024.

[26] H. Yue, M. M. Ali, Y. Lin, and H. Liu, "Ultra-short-term forecasting of large distributed solar pv fleets using sparse smart inverter data," *IEEE Transactions on Sustainable Energy*, vol. 15, no. 3, pp. 1968–1980, 2024.

[27] M. V. Nugroho, F. Mardiansah, T. O. Pratama, Z. A. Fikriyadi, D. V. Dianti, and A. Prastawa, "A comparative study of the effect of weather conditions on solar irradiance forecasting using various methods in yogyakarta, indonesia," *Journal of Physics: Conference Series*, vol. 2828, p. 012028, 2024.

[28] M. V. Nugroho, A. Prastawa, F. Mardiansah, A. Rezavidi, A. Fudholi, and S. Palaloi, "A stacked lstm model for day-ahead solar irradiance forecasting under tropical seasons in java-bali," *International Journal of Power Electronics and Drive Systems*, vol. 15, no. 3, pp. 1878–1891, 2024.

[29] M. Sabri and M. E. Hassouni, "Photovoltaic power forecasting with a long short-term memory autoencoder networks," *Soft Computing*, 2023.

[30] M. Rezza *et al.*, "Prediksi radiasi surya menggunakan metode long short-term memory," *Jurnal Teknologi dan Sistem Energi*, 2024.

[31] F. Jafari *et al.*, "Predicting photovoltaic power output using lstm: A comparative study using both historical and climate data," *Renewable Energy*, 2025.

[32] R. Sianipar, "Dasar perencanaan pembangkit listrik tenaga surya," *Jetri : Jurnal Ilmiah Teknik Elektro*, 2017.

[33] S. Mohammed Sulthan and D. Devaraj, "Simulation and analysis of stand-alone photovoltaic system with boost converter using matlab/simulink," *Proceedings of the IEEE International Conference on Current Trends in Engineering and Technology (ICCPCT)*, Mar. 2014.

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[34] E. Faizal, Y. Winoko, M. Mustapa, and M. Kozin, "Solar charger controller efficiency analysis of type pulse width modulation (pwm) and maximum power point tracking (mppt)," *Asian Journal Science and Engineering*, vol. 1, no. 2, pp. 90–98, 2023.

[35] W. Kuczynski and K. Chliszcz, "Energy and exergy analysis of photovoltaic panels in northern poland," *Renewable and Sustainable Energy Reviews*, vol. 174, p. 113138, 2023. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S136403212201019X

[36] Commission Internationale de l'Eclairage, "CIE S 017/E:2020 ILV – International Lighting Vocabulary," Commission Internationale de l'Eclairage (CIE), Vienna, Austria, Tech. Rep., 2020. [Online]. Available: https://cie.co.at/publications/ilv-international-lighting-vocabulary-2nd-edition-0

[37] S. M. Sulthan and D. Devaraj, "Simulation and analysis of stand-alone photovoltaic system with boost converter using matlab/simulink," in *2014 International Conference on Circuit, Power and Computing Technologies (ICCPCT)*, 2014, pp. 1–6.

[38] A. Mellit, A. Massi Pavan, E. Ogliari, S. Leva, and V. Lughi, "Advanced methods for photovoltaic output power forecasting: A review," *Applied Sciences*, vol. 10, no. 2, p. 487, 2020.

[39] N. Mohan, T. M. Undeland, and W. P. Robbins, *Power Electronics: Converters, Applications and Design*, 3rd ed. John Wiley & Sons, 2003.

[40] EPEVER, *PWM Solar Charge Controller User Manual*, EPEVER Technology, 2022, technical Manual.

[41] Espressif Systems, *ESP32 Series Datasheet*, Espressif Systems, 2023, version 5.0, Accessed: 2026-05-15. [Online]. Available: https://www.espressif.com/sites/default/files/documentation/esp32_datasheet_en.pdf

[42] NXP Semiconductors, "Pcf8574 remote 8-bit i/o expander for i2c-bus," https://www.nxp.com/docs/en/data-sheet/PCF8574_PCF8574A.pdf, 2022, datasheet.

[43] Texas Instruments, *LM2596 SIMPLE SWITCHER Power Converter*, Texas Instruments, 2023, datasheet. [Online]. Available: https://www.ti.com/lit/ds/symlink/lm2596.pdf

[44] ——, *INA219 Zero-Drift, Bidirectional Current/Power Monitor With I2C Interface*, Texas Instruments, 2021, datasheet. [Online]. Available: https://www.ti.com/lit/ds/symlink/ina219.pdf

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

[45] ROHM Semiconductor, *BH1750FVI Digital Light Sensor IC*, ROHM Semiconductor, 2011, datasheet. [Online]. Available: https://www.mouser.com/datasheet/2/348/bh1750fvi-e-186247.pdf

[46] Maxim Integrated, *DS18B20 Programmable Resolution 1-Wire Digital Thermometer*, Maxim Integrated, 2019, datasheet. [Online]. Available: https://datasheets.maximintegrated.com/en/ds/DS18B20.pdf

[47] D. A. R. Ridho, Rusda, and M. A. Putra, "Analisis pengaruh sudut kemiringan panel surya terhadap penerimaan iradiasi matahari dan daya keluaran yang dihasilkan," *PoliGrid*, vol. 4, no. 1, pp. 25–31, Juni 2023, submitted: 03/10/2023; Revised: 14/10/2023; Accepted: 09/11/2023; Online first: 12/11/2023.

[48] M. Ordenes, D. Marinoski, P. Braun, and R. Rüther, "The impact of building-integrated photovoltaics on the energy demand of multi-family dwellings in brazil," *Energy and Buildings*, vol. 39, no. 6, pp. 629–642, jun 2007.

[49] A. Al-Fuqaha, M. Guizani, M. Mohammadi, M. Aledhari, and M. Ayyash, "Internet of things: A survey on enabling technologies, protocols, and applications," *IEEE Communications Surveys & Tutorials*, vol. 17, no. 4, pp. 2347–2376, 2015.

[50] I. Goodfellow, Y. Bengio, A. Courville, and Y. Bengio, *Deep learning*. MIT press Cambridge, 2016, vol. 1, no. 2.

[51] Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta, 2017.

[52] Z. Pelawi, Armansyah, and J. Husna, "Pengaruh intensitas cahaya matahari terhadap tegangan panel surya," *Jurnal Elektro Teknologi (JET)*, vol. 10, no. 1, 2025. [Online]. Available: https://jurnal.uisu.ac.id/index.php/jet/article/view/12212/8177

[53] A. Sahrin *et al.*, "Electrical power prediction of polycrystalline solar panels based on lstm model with environmental influence," *International Journal of Renewable Energy Research*, 2025.

[54] W. Li *et al.*, "Predicting ultra-short-term wind power combinations under extreme weather conditions," *Energy Reports*, 2025.

[55] Z. Hou *et al.*, "Photovoltaic power forecasting based on variational mode decomposition and long short-term memory neural network," *Energy*, 2025.

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

[56] E. F. Aritonang *et al.*, "Prediksi akurat output daya jangka pendek plts menggunakan algoritma long short-term memory (lstm) jaringan saraf tiruan berbasis data cuaca real-time," *Jurnal Energi Terbarukan Indonesia*, 2026.

[57] M. Z. A. Suyuti *et al.*, "Prediksi potensi energi surya dan angin menggunakan model long short-term memory (lstm) berbasis data meteorologi," *Jurnal Rekayasa Energi*, 2026.

[58] T. Esram and P. Chapman, "Comparison of photovoltaic array maximum power point tracking techniques," *Energy Conversion, IEEE Transactions on*, vol. 22, pp. 439 – 449, 07 2007.

[59] H. Wang, Z. Lei, X. Zhang, B. Zhou, and J. Peng, "A review of deep learning for renewable energy forecasting," *Energy Conversion and Management*, vol. 198, p. 111799, 2019.

[60] M. G. Villalva, J. R. Gazoli, and E. R. Filho, "Comprehensive approach to modeling and simulation of photovoltaic arrays," *IEEE Transactions on Power Electronics*, vol. 24, no. 5, pp. 1198–1208, may 2009.