

- [1] R. Kuswandi. (2015) Longsor yang tewaskan 4 orang sudah terdeteksi sejak maret. [Online]. Available: <https://regional.kompas.com/read/2015/05/06/18331791/Longsor.yang.Tewaskan.4.Orang.Sudah.Terdeteksi.Sejak.March>
- [2] Shafwandi. (2025) Peranan bahan organik dalam tanah. [Online]. Available: <https://pustaka-pertanian.blogspot.com/2011/12/peranan-bahan-organik-dalam-tanah.html>
- [3] K. Kasjuaji. (2025) Ciri ciri tanah lempung. [Online]. Available: <https://ilmugeografi.com/ilmu-bumi/tanah/ciri-ciri-tanah-lempung>
- [4] Amazon. (2025) Sbc nodemcu esp32 development board esp32 module. [Online]. Available: <https://www.amazon.com.be/-/en/SBC-NodeMCU-ESP32-Development-Board-ESP32-Module/dp/B07BDMLYL9>
- [5] Ardutech. (2025) Mengenal esp32 development kit untuk iot (internet of things). [Online]. Available: <https://www.ardutech.com/mengenal-esp32-development-kit-untuk-iot-internet-of-things/>
- [6] Anything Weather. (2025) Gs3 soil moisture, temperature & electrical conductivity sensor. [Online]. Available: <https://store.anythingweather.com/g3-soil-moisture-temperature-electrical-conductivity-sensor>
- [7] Litmus. (2025) Mqtt. [Online]. Available: <https://litmus.io/de/integrations/mqtt>
- [8] Mega. (2025) Pengertian xampp. [Online]. Available: <https://bikin.website/blog/pengertian-xampp/>
- [9] Baraka UMA. (2025) Cara menggunakan xampp untuk membuat website lokal. [Online]. Available: <https://baraka.uma.ac.id/cara-menggunakan-xampp-untuk-membuat-website-lokal/>
- [10] Ebhoot Electronics. (2025) Buzzer 12v 12mm pcb mountable. [Online]. Available: <https://ebhoot.in/shop-2/electronics-components/buzzer-microphone/buzzer-12v-12mmcb-mountable/?v=644d99afb936>
- [11] VSeeds. (2025) Lm2596 step down module 1.25v-30v. [Online]. Available: <https://www.vseeds.lk/products/lm2596-step-down-module-1-25v-30v>
- [12] S. Miah. (2025) Telegram logo, telegram social media icon (png image). [Online]. Available: <https://www.vecteezy.com/png/42148630-telegram-logo-telegram-social-media-icon>
- [13] Badan Nasional Penanggulangan Bencana (BNPB). (2025) Data dan informasi bencana indonesia 2015–2025. [Online]. Available: <https://bnpb.go.id/>
- [14] Pusat Vulkanologi dan Mitigasi Bencana Geologi (PVMBG). (2024) Peta rawan tanah longsor indonesia. [Online]. Available: <https://vsi.esdm.go.id/>
- [15] Badan Nasional Penanggulangan Bencana (BNPB). (2025) Laporan bencana alam tahun 2025. [Online]. Available: <https://bnpb.go.id/berita/laporan-bencana-2023>

- [16] Kementerian Pekerjaan Umum dan Perumahan Rakyat (PUPR). (2025) Dampak ekonomi pasca bencana tanah longsor. [Online]. Available: <https://pu.go.id/>
- [17] T. F. Fathani *et al.*, “Development of landslide early warning system in indonesia,” *International Journal of Disaster Risk Reduction*, vol. 45, pp. 1–12, 2020. [Online]. Available: <https://doi.org/10.1016/j.ijdr.2020.101512>
- [18] Badan Riset dan Inovasi Nasional (BRIN). (2023) Inovasi teknologi peringatan dini bencana alam. [Online]. Available: <https://brin.go.id/>
- [19] E. Yuliza, H. Habil, M. M. Munir, M. Irsyam, M. Abdullah, and Khairurrijal, “Study of soil moisture sensor for landslide early warning system: Experiment in laboratory scale,” *Journal of Physics: Conference Series*, vol. 739, p. 012034, 2016. [Online]. Available: <https://iopscience.iop.org/article/10.1088/1742-6596/739/1/012034>
- [20] A. Setyawan, J. E. Suseno, R. D. Winesthi, and S. A. Otaviana, “Peringatan dini tanah longsor berdasarkan kelembaban tanah secara jarak jauh menggunakan sensor fc-28 dan node mcu,” *Jurnal Ilmu Lingkungan*, vol. 18, no. 2, pp. 242–246, 2020. [Online]. Available: <https://ejournal.undip.ac.id/index.php/ilmulingkungan/article/view/28500>
- [21] I. S. Wibowo, P. W. Ciptadi, and R. H. Hardyanto, “Sistem peringatan dini bencana longsor menggunakan sensor accelerometer dan sensor soil moisture berbasis android,” in *Seminar Nasional Dinamika Informatika*. Universitas PGRI Yogyakarta, 2021, pp. 164–169.
- [22] Kalisa, A. Nurdin, and M. Fadhli, “Perancangan alat peringatan dini longsor dengan sensor ultrasonik dan sensor kelembaban tanah berbasis internet of things,” in *Seminar Nasional Inovasi dan Aplikasi Teknologi di Industri*. Institut Teknologi Nasional Malang, 2019, pp. 188–192.
- [23] M. Sharma and S. Laskar, “Soil moisture sensor-based landslide monitoring: A laboratory-based approach for guwahati city,” *International Journal of Environmental Engineering and Development*, vol. 2, pp. 27–34, 2024. [Online]. Available: <https://www.researchgate.net/publication/378202620>
- [24] E. D. Atmajati, E. Yuliza, H. Habil, I. A. Sadisun, M. M. Munir, and Khairurrijal, “A simple landslide model at a laboratory scale,” in *AIP Conference Proceedings*, vol. 1857, 2017, p. 060002. [Online]. Available: <http://aip.scitation.org/doi/abs/10.1063/1.4987085>
- [25] R. Syahputra, “Perancangan sistem peringatan dini tanah longsor di kota manado menggunakan modul nodemcu berbasis internet of things,” *Jurnal Teknologi Sistem Informasi dan Sistem Komputer TGD*, vol. 8, no. 2, pp. 253–261, 2025. [Online]. Available: <https://www.researchgate.net/publication/396594846>
- [26] A. Andang *et al.*, “Pengembangan purwarupa sistem peringatan dini longsor berbasis internet of things (iot),” *JITEL (Jurnal Ilmiah Telekomunikasi, Elektronika, dan Listrik Tenaga)*, vol. 5, no. 1, pp. 1–10, 2025. [Online]. Available: <https://doi.org/10.35313/jitel.v5.i1.2025.1-10>
- [27] F. D. Wahyuni and Wildian, “Prototipe sistem peringatan dini tanah longsor translasi berbasis potensiometer geser dan sensor kelembaban tanah dengan keluaran

- [28] D. A. Hilmy, S. Aminah, and A. S. Sunarya, “Perancangan sistem peringatan dini tanah longsor berbasis perubahan resistivitas tanah dengan menggunakan arduinomega 2560 dan wemos esp8266 d1–mini,” in *Proceedings of STEMAN 2016*, 2016, pp. A–66–A–72. [Online]. Available: <https://www.researchgate.net/publication/324330491>
- [29] R. Ameliah, Musrawati, and N. P. Husain, “Perancangan alat pendeteksi kelembaban tanah berbasis iot (internet of things) menggunakan nodemcu dan blynk,” *JIKTIF: Jurnal Ilmu Komputer dan Teknologi Informasi*, vol. 2, no. 1, pp. 156–164, 2025. [Online]. Available: <https://jiktif.ft-uim.ac.id>
- [30] B. Artono and R. G. Putra, “Internet of things untuk deteksi longsor di desa banaran kecamatan pulung kabupaten ponorogo,” *Jurnal Poli-Teknologi*, vol. 18, no. 2, pp. 191–196, 2019. [Online]. Available: <https://doi.org/10.3772/jyc.v18.0.149>
- [31] E. Mardhatillah and W. Wildian, “Rancang bangun sistem peringatan dini tanah longsor berbasis mikrokontroler atmega328 menggunakan metode penginderaan berat,” *Jurnal Fisika Unand*, vol. 6, no. 2, pp. 162–168, 2017. [Online]. Available: <https://www.researchgate.net/publication/337491448>
- [32] R. M. Utama, I. Sucahyo, and M. Yantidewi, “Rancang bangun alat deteksi tanah longsor berbasis iot dengan nodemcu esp8266 dan mpu6050,” *Jiif (Jurnal Ilmu dan Inovasi Fisika)*, vol. 6, no. 2, pp. 137–146, 2022. [Online]. Available: <https://jurnal.unpad.ac.id/jiif>
- [33] I. Priyadi, F. Hadi, Y. S. Pranata, and M. R. Razali, “Rancangan dan implementasi sistem deteksi longsor berbasis sms dan progressive web apps,” *ELKOMIKA: Jurnal Teknik Energi Elektrik, Teknik Telekomunikasi, & Teknik Elektronika*, vol. 10, no. 1, pp. 243–258, 2022. [Online]. Available: <http://dx.doi.org/10.26760/elkomika.v10i1.243>
- [34] Kementerian ESDM RI. (2025) Faktor-faktor penyebab tanah longsor. [Online]. Available: <https://www.esdm.go.id/en/media-center/news-archives/faktor-faktor-penyebab-tanah-longsor>
- [35] BPBD Kabupaten Bogor. (2025) Penyebab longsor yang patut diwaspadai. [Online]. Available: <https://bpbd.bogorkab.go.id/berita/Seputar-OPD/penyebab-longsor-yang-patut-diwaspadai>
- [36] E. M. Rahayu and A. Syarifuddin, “Edukasi pendekatan vegetatif dalam upaya pencegahan longsor di desa sukumulyo kecamatan pujon kabupaten malang,” *Inovasi Jurnal Pengabdian Masyarakat*, vol. 2, no. 3, pp. 465–472, 2024. [Online]. Available: <https://doi.org/10.54082/ijpm.623>
- [37] BPBD Provinsi Jawa Tengah. (2025) Pengertian longsor, faktor penyebab dan cara mencegahnya. [Online]. Available: <https://bpbd.jatengprov.go.id/main/pengertian-longsor-faktor-penyebab-dan-cara-mencegahnya/>

- [38] DPMG Banda Aceh. (2025) Mengenal tanah longsor. [Online]. Available: <https://dpmg.bandaacehkota.go.id/2012/05/25/mengenal-tanah-longsor/>
- [39] BPBD Kabupaten Sidoarjo. (2025) Tanah longsor. [Online]. Available: <https://sigap.sidoarjo.go.id/website/detilInfo/1/6>
- [40] K. A. Mutiarasari. (2025) Faktor penyebab tanah longsor, penjelasan dan jenis-jenis longsor. [Online]. Available: <https://news.detik.com/berita/d-6223169/faktor-penyebab-tanah-longsor-penjelasan-dan-jenis-jenis-longsor>
- [41] V. K. M. Putri. (2022) Tanah andosol: Pengertian dan ciri-cirinya. [Online]. Available: <https://www.kompas.com/skola/read/2022/07/01/073000069/tanah-andosol--pengertian-dan-ciri-cirinya>
- [42] C. Asdak, “Hubungan klasifikasi longsor klasifikasi,” *Jurnal Ilmu Tanah dan Lingkungan*, vol. 10, no. 1, pp. 1–10, 2010. [Online]. Available: <https://media.neliti.com/media/publications/61412-ID-hubungan-klasifikasi-longsor-klasifikasi.pdf>
- [43] USDA, *The Soil Survey Manual*, 2022. [Online]. Available: <https://www.nrcs.usda.gov/sites/default/files/2022-09/The-Soil-Survey-Manual.pdf>
- [44] Nakatama. (2025) Sifat plastisitas tanah dan manfaatnya bagi manusia. [Online]. Available: <https://nakatama.co.id/sifat-plastisitas-tanah-dan-manfaatnya-bagi-manusia/>
- [45] A. O. Rosetta. (2025) Tanah lempung: Pengertian, karakteristik, proses dan persebaran di indonesia. [Online]. Available: <https://mediaindonesia.com/humaniora/723648/tanah-lempung-pengertian-karakteristik-proses-dan-persebaran-di-indonesia>
- [46] Espressif. (2025) Esp32 get started. [Online]. Available: <https://docs.espressif.com/projects/esp-idf/en/stable/esp32/get-started/index.html>
- [47] —, *ESP32 Datasheet*, 2022. [Online]. Available: [https://www.espressif.com/sites/default/files/documentation/esp32\\_datasheet\\_en.pdf](https://www.espressif.com/sites/default/files/documentation/esp32_datasheet_en.pdf)
- [48] METER Group, *GS3 Integrator Guide*, 2022. [Online]. Available: <https://publications.metergroup.com/Integrator%20Guide/18256%20GS3%20Integrator%20Guide.pdf>
- [49] D. H. Agustina and Elfrida, “Pengaruh perubahan kadar air terhadap kekuatan geser tanah lempung,” *Jurnal Sigma Teknika*, vol. 2, no. 1, pp. 115–122, 2019. [Online]. Available: <https://www.journal.unrika.ac.id/index.php/sigmateknika/article/view/1935>
- [50] H. B. Yang, X. D. Yu, H. M. Fu, H. T. Li, J. L. Zhao, and W. Xu, “Variation of soil temperature and its relationship with the environment in nagqu, tibet,” *Journal of Global Change Data & Discovery*, vol. 4, no. 2, pp. 144–154, 2020. [Online]. Available: <https://www.geodoi.ac.cn/WebEn/doi.aspx?Id=1255>
- [51] Climate4Life. (2025) Konsep fisis suhu tanah sebagai bagian pengamatan klimatologi. [Online]. Available: <https://www.climate4life.info/2025/03/konsep-fisis-suhu-tanah-sebagai-bagian-pengamatan-klimatologi.html>

- [52] BMKG Staklim Sumsel. (2025) Termometer tanah gundul. [Online]. Available: <https://staklim-sumsel.bmkg.go.id/termometer-tanah-gundul/>
- [53] V. A. Suoth and H. I. R. Moseya, “Rancang bangun alat pengukur suhu tanah secara multi lateral berbasis mikrokontroler untuk pertumbuhan benih tanaman,” *Jurnal MIPA UNSRAT Online*, vol. 6, no. 2, pp. 97–100, 2017. [Online]. Available: <http://ejournal.unsrat.ac.id/index.php/jmuo/article/view/17962>
- [54] M. Loche and G. Scaringi, “Assessing the influence of temperature on slope stability in a temperate climate: A nationwide spatial probability analysis in italy,” *Environmental Modelling and Software*, vol. 183, p. 106217, 2025. [Online]. Available: <https://doi.org/10.1016/j.envsoft.2024.106217>
- [55] Campbell Scientific, *GS3 Brochure*, 2022. [Online]. Available: [https://s.campbellsci.com/documents/ca/product-brochures/g33\\_br.pdf](https://s.campbellsci.com/documents/ca/product-brochures/g33_br.pdf)
- [56] C.-H. Weng, Y.-J. Tsai, C.-L. Shieh, and T. Egusa, “Study on correlation of electrical conductivity and potential large-scale landslide in taiwan,” in *Symposium Proceedings of the INTERPRAEVENT 2018 in the Pacific Rim*, 2018, pp. 110–115. [Online]. Available: [https://archive.interpraevent.at/palm-cms/upload\\_files/Publikationen/Tagungsbeitraege/2018\\_1\\_110.pdf](https://archive.interpraevent.at/palm-cms/upload_files/Publikationen/Tagungsbeitraege/2018_1_110.pdf)
- [57] EnviroDIY. (2025) Arduino sdi-12 documentation. [Online]. Available: <https://envirodiy.github.io/Arduino-SDI-12/index.html>
- [58] SDI-12 Support Group, *SDI-12 Specification Version 1.4*, 2023. [Online]. Available: [https://www.sdi-12.org/current\\_specification/SDI-12%20Specification%201.4%20February%2020%202023.pdf](https://www.sdi-12.org/current_specification/SDI-12%20Specification%201.4%20February%2020%202023.pdf)
- [59] HiveMQ Team. (2025) The history of mqtt part 1: The origin. [Online]. Available: <https://www.hivemq.com/blog/the-history-of-mqtt-part-1-the-origin/>
- [60] OASIS, *MQTT Version 3.1.1*, 2014. [Online]. Available: <https://docs.oasis-open.org/mqtt/mqtt/v3.1.1/csprd02/mqtt-v3.1.1-csprd02.pdf>
- [61] HiveMQ Team. (2025) Mqtt essentials part 2: Publish/subscribe. [Online]. Available: <https://www.hivemq.com/blog/mqtt-essentials-part2-publish-subscribe/>
- [62] EMQ Team. (2025) The easiest guide to getting started with mqtt. [Online]. Available: <https://www.emqx.com/en/blog/the-easiest-guide-to-getting-started-with-mqtt>
- [63] Eclipse Paho. (2025) Mqtt client qos. [Online]. Available: <https://eclipse.dev/paho/files/mqttdoc/MQTTClient/html/qos.html>
- [64] HiveMQ Team. (2025) Mqtt essentials part 5: Mqtt topics best practices. [Online]. Available: <https://www.hivemq.com/blog/mqtt-essentials-part-5-mqtt-topics-best-practices/>
- [65] ——. (2025) Mqtt security fundamentals: Authentication with username and password. [Online]. Available: <https://www.hivemq.com/blog/mqtt-security-fundamentals-authentication-username-password/>

- [66] TwoBitHistory. (2017) The rise and rise of json. [Online]. Available: <https://twobithistory.org/2017/09/21/the-rise-and-rise-of-json.html>
- [67] F. Irfan. (2025) What is json? [Online]. Available: <https://www.hostinger.com/tutorials/what-is-json>
- [68] W3Schools. (2025) Json introduction. [Online]. Available: [https://www.w3schools.com/js/js\\_json\\_intro.asp](https://www.w3schools.com/js/js_json_intro.asp)
- [69] GeeksforGeeks. (2025) Javascript json. [Online]. Available: <https://www.geeksforgeeks.org/javascript/json/>
- [70] Kodezi. (2025) Rest api vs json: Key differences for developers in 2025. [Online]. Available: <https://blog.kodezi.com/rest-api-vs-json-key-differences-for-developers-in-2025/>
- [71] A. Farid. (2025) Xampp adalah: Pengertian, sejarah, fungsi, hingga cara menggunakannya. [Online]. Available: <https://www.exabytes.co.id/blog/apa-itu-xampp-adalah/>
- [72] Eranyacloud. (2025) Xampp adalah: Pengertian, fungsi, serta cara menggunakannya. [Online]. Available: <https://eranyacloud.com/id/blog/xampp-adalah-pengertian-fungsi-serta-cara-menggunakannya/>
- [73] D. Kristanto. (2025) Xampp adalah: Pengertian, cara kerja & komponen. [Online]. Available: <https://blog.ionnetwork.co.id/xampp-adalah-pengertian-cara-kerja-komponen/>
- [74] M. R. Adani. (2025) Apa itu xampp? pengertian, fungsi, & cara menggunakan. [Online]. Available: <https://www.sekawanmedia.co.id/blog/apa-itu-xampp/>
- [75] Jagoanhosting. (2025) Xampp adalah: Pengertian, fungsi, cara install, dan cara menggunakan. [Online]. Available: <https://www.jagoanhosting.com/blog/xampp-adalah/>
- [76] E. A. Prastyo. (2022) Pengertian dan penjelasan tentang arduino uno. [Online]. Available: <https://www.edukasielektronika.com/2022/10/pengertian-dan-penjelasan-tentang.html>
- [77] ——. (2025) Fungsi dan cara kerja buzzer dalam proyek elektronika. [Online]. Available: <https://www.arduino.biz.id/2025/04/fungsi-dan-cara-kerja-buzzer-dalam-proyek-elektronika.html>
- [78] A. Razor. (2020) Buzzer arduino : Pengertian, cara kerja, dan contoh program. [Online]. Available: <https://www.aldyrazor.com/2020/05/buzzer-arduino.html>
- [79] Soldered. (2025) Hum: Lm2596 buck converter. [Online]. Available: <https://soldered.com/learn/hum-lm2596-buck-converter/>
- [80] WatElectronics. (2025) Lm2596 ic: Pin configuration, specifications, circuit diagram and its applications. [Online]. Available: <https://www.watelectronics.com/lm2596-ic/>
- [81] A. Faudin. (2025) Penjelasan tentang sistem dc buck converter. [Online]. Available: <https://www.nyebarilmu.com/penjelasan-tentang-sistem-dc-buck-converter/>



[82] Robotronic in Circuits. (2025) How to use dc to dc buck converter (lm2596). [Online]. Available: <https://www.instructables.com/How-to-Use-DC-to-DC-Buck-Converter-LM2596/>

[83] A. Widiawati. (2025) 10 kelebihan telegram dibandingkan whatsapp & aplikasi chat lain. [Online]. Available: <https://www.idntimes.com/tech/trend/kelebihan-telegram-dibandingkan-whatsapp-go25q3-00-v8jyb-skrw4z>

[84] M. Adieb. (2025) Apa itu aplikasi telegram? yuk, kenali lebih dalam! [Online]. Available: <https://glints.com/id/lowongan/aplikasi-telegram/>