

## DAFTAR PUSTAKA

- [1] Y. Pusparisa, “BNPB: Ada 1.441 Bencana Alam yang Melanda Indonesia Hingga Juni 2021 | Databoks,” Jun. 19, 2021. <https://databoks.katadata.co.id/datapublish/2021/06/19/bnpb-20-gempa-bumi-mengguncang-indonesia-hingga-18-juni-2021> (accessed Sep. 29, 2021).
- [2] A. M. Hatta, Y. Semenova, Q. Wu, and G. Farrell, “Strain sensor based on a pair of single-mode-multimode-single-mode fiber structures in a ratiometric power measurement scheme,” *Appl Opt*, vol. 49, no. 3, pp. 536–541, 2010, doi: 10.1364/AO.49.000536.
- [3] K. Higuchi, K. Fujisawa, K. Asai, A. Pasuto, and G. Marcato, “Application of New Landslide Monitoring Technique using Optical Fiber Sensor at Takisaka Landslide,” 2007.
- [4] D. Bayuwati, T. Budi Waluyo, P. Puranto, H. Adinanta, and I. Mulyanto, “Uji Kinerja Ekstensometer Serat Optik di Laboratorium dan di Lereng Buatan,” *Jurnal Otomasi Kontrol dan Instrumentasi*, vol. 9, no. 2, p. 131, 2017, doi: 10.5614/joki.2017.9.2.6.
- [5] A. R. N and A. Srirahayu, “Analisis Model Lekukan Pada Serat Optik Multimode Sebagai Sensor Pergeseran,” vol. 3, pp. 80–85, 2017.
- [6] H. S. Herlin, Harmadi, Febrieliyanti, and Muldarisnur, “Applications of fiber optic sensor for monitoring and early warning of soil shift on iot-based system,” *International Journal on Informatics Visualization*, vol. 4, no. 3, pp. 117–122, 2020, doi: 10.30630/joiv.3.1.219.
- [7] A. N. Costrada, S. Deswilan, B. M. Kemal, M. Marzuki, and H. Harmadi, “Characterization of Multiple-bend Optical Fiber Extensometer Design for Landslide Sensor,” *Jurnal Ilmu Fisika | Universitas Andalas*, vol. 13, no. 1, pp. 1–7, 2020, doi: 10.25077/jif.13.1.1-7.2021.
- [8] B. DIY, “BPBD Daerah Istimewa Yogyakarta,” Dec. 06, 2018. <http://bpbd.jogjaprov.go.id/berita/mitigasi-bencana-tanah-longsor-1> (accessed Oct. 09, 2021).

- [9] D. E. Jawa Tengah, “Waspada Tanah Longsor – Dinas ESDM Provinsi Jawa Tengah,” Jan. 25, 2019. <https://esdm.jatengprov.go.id/waspada-tanah-longsor/> (accessed Oct. 09, 2021).
- [10] C. Novita, “Apa itu Tanah Longsor: Pengertian, Jenis-jenis, & Proses Terjadinya,” Sep. 23, 2021. <https://tirto.id/apa-itu-tanah-longsor-pengertian-jenis-jenis-proses-terjadinya-gaF3> (accessed Oct. 09, 2021).
- [11] D. E. Sumber daya, “Pengenalan Gerakan Tanah,” *Esdm*, 2005, [Online]. Available:  
[https://www.esdm.go.id/assets/media/content/Pengenalan\\_Gerakan\\_Tanah.pdf](https://www.esdm.go.id/assets/media/content/Pengenalan_Gerakan_Tanah.pdf)
- [12] R. E. N. Iswan Umaterate, M. Zen Saifuddin, Hidayat Saman, “Sistem Penyambungan dan Pengukuran Kabel Fiber Optik Menggunakan Optical Time Domain Reflectometer ( OTDR ) pada PT . Telkom Kandatel Ternate,” *Jurnal Teknik Elektro Fakultas Teknik Universitas Khairun Ternate*, vol. 3, no. 1, pp. 1–10, 2016, [Online]. Available:  
<https://ejournal.unkhair.ac.id/index.php/protk/article/view/39/118>
- [13] A. H. Rambe, “Teknologi Serat Optik Perancangan Antena Mikrostrip Patch Segi Empat Dual Band (1,8 GHz dan 2,4 GHz) View project Rancang bangun antenna microstrip View project,” 2006. [Online]. Available:  
<https://www.researchgate.net/publication/42362874>
- [14] R. Risyan, “Pengertian Fiber Optik Adalah : Jenis, Cara Kerja, Kelebihan, Dan Kekurangan - Monitor Teknologi,” May 12, 2020. <https://www.monitorteknologi.com/pengertian-fiber-optik/> (accessed Nov. 29, 2021).
- [15] Hariyadi, “Sistem Komunikasi Fiber Optik Dan Pemanfaatannya Pada PT.Semen Padang Hariyadi,” *Vol. I No.1 Januari 2018*, vol. I, no. 1, pp. 43–51, 2018.
- [16] W. P. Tresna, D. Hanto, and B. Widiyatmoko, “Rancangan Sensor Pergeseran Tanah Berbasis Serat Optik untuk Deteksi Longsor: Studi Awal (Measurement of Curvature Optical Fiber Loss As A Displacement Sensors In Landslide Detector),” *Widyariset*, vol. 13, no. 3, pp. 117–121, 2010.

- [17] A. Solichin, “Konsep Fisika pada Teknologi Fiber Optik,” May 29, 2020. <https://netsolution.co.id/konsep-fisika-pada-fiber-optik/> (accessed Nov. 29, 2021).
- [18] S. Arisya, Waluyo, and H. Darmono, “Analisis Rugi-Rugi Macrobending Pada Core Serat Optik Berstruktur Singlemode-Multimode-Singlemode,” *Jurnal JARTEL*, vol. 9, no. 2, pp. 11–16, 2019.
- [19] R. Khamimatul Ula, D. Hanto, P. Penelitian Fisika LIPI, and T. Selatan, *SEMINAR NASIONAL JURUSAN FISIKA FMIPA UM 2016 Sensor Beban Berbasis Optik dengan Micro bending Fiber Optik Tipe MMSI FG050LGA*. [Online]. Available: [http://www.thorlabs.com/newgrouppage9.cfm?objectgroup\\_id=683](http://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=683)
- [20] I. Ristika, R. Barani, S. N. Sari, J. Teknik, E. Fakultas, and T. Universitas, “Pengaruh rugi-rugi macrobending terhadap kinerja plastic optical fiber jenis step index multimode,” *Jurnal Teknik Elektro Fakultas Teknik Universitas Brawijaya*, no. Ld, pp. 1–6, 2013.
- [21] M. W. Buwana, S. H. Pramono, and S. N. Sari, “Analisis Pengaruh Macrobending Losses terhadap Performansi Sistem Time Division Multiplexing dengan Media Transmisi Plastic Optical Fiber,” *Jurnal Mahasiswa TEUB*, vol. 2, no. 5, 2014, Accessed: Nov. 14, 2021. [Online]. Available: <http://elektro.studentjournal.ub.ac.id/index.php/teub/article/view/298>
- [22] A. Nugraha, I. A. Hambali, and E. Suhartono, “PERANCANGAN DAN Analisis Purwarupa untuk Sistem Pemantauan Fiber Optik dengan Power Meter Optik Berbasis ESP8266 Design and Analysis Prototype for Fiber Optic Monitoring System with Optical Power Meter Based on ESP8266.” [Online]. Available: [www.hackaday.io/project/21599-optical-power-meter-with-sfp-and-](http://www.hackaday.io/project/21599-optical-power-meter-with-sfp-and-)
- [23] SFF Committee, “INF-8074i Specification for SFP (Small Formfactor Pluggable) Transceiver,” 2001. [Online]. Available: <http://www.snia.org/sff/specificationsorftp://ftp.seagate.com/sff>
- [24] Contributor to Wikimedia Projects, “Small form-factor pluggable transceiver - Wikipedia,” *Wikimedia Foundation, Inc.*, Apr. 25, 2022.

- [https://en.wikipedia.org/wiki/Small\\_form-factor\\_pluggable\\_transceiver#cite\\_note-sfpmsa-2](https://en.wikipedia.org/wiki/Small_form-factor_pluggable_transceiver#cite_note-sfpmsa-2) (accessed May 11, 2022).
- [25] T. Lindsay and I. Dal Allan, “SFF-8079 Specification for SFP Rate and Application Selection,” 2005.
- [26] F. Corporation, “AN-2030: Digital Diagnostic Monitoring Interface for Optical Transceivers F i n i s a r Digital Diagnostic Monitoring Interface for SFP and SFP+ Optical Transceivers,” 2014.
- [27] C. Loapheang and S. Sitjongsataporn, “Design of Small Form-factor Pluggable Reader using Arduino Board,” in *Proceedings of the 2020 International Conference on Power, Energy and Innovations, ICPEI 2020*, Oct. 2020, pp. 209–212. doi: 10.1109/ICPEI49860.2020.9431389.
- [28] Bobsis, “Mengenal Mikrokontroler | BINUS UNIVERSITY BANDUNG - Kampus Teknologi Kreatif,” Nov. 12, 2019. <https://binus.ac.id/bandung/2019/11/mengenal-mikrokontroler/> (accessed Oct. 13, 2021).
- [29] D. Kho, “Pengertian Mikrokontroler (Microcontroller) dan Strukturnya,” Apr. 01, 2020. <https://teknikelektronika.com/pengertian-mikrokontroler-microcontroller-struktur-mikrokontroler/> (accessed Dec. 01, 2021).
- [30] Efendi, “Apa itu Mikrokontroler? Mengenal Pengertian Mikrokontroler,” Jan. 17, 2021. <https://www.nesabamedia.com/apa-itu-mikrokontroler/> (accessed Oct. 13, 2021).
- [31] A. Faudin, “Project membuat Data Logger RTC DS3231,” May 30, 2018. <https://www.nyebarilmu.com/project-membuat-data-logger-rtc-ds3231/> (accessed Nov. 19, 2021).
- [32] R. Angriawan and N. Anugraha, “Sistem Pelacak Lokasi Sapi dengan Sistem Komunikasi LoRa SISTEM PELACAK LOKASI SAPI DENGAN SISTEM KOMUNIKASI LORA,” 2019.
- [33] T. M. Workgroup, “A technical overview of LoRa ® and LoRaWAN™ What is it?,” no. November, 2015, [Online]. Available: <https://loralliance.org/resource-hub/what-lorawantm>
- [34] A. A. Nurhadi, D. Darlis, and M. A. Murti, “Implementasi Modul Komunikasi LoRa RFM95W Pada Sistem Pemantauan Listrik 3 Fasa

- Berbasis IoT,” *Ultima Computing : Jurnal Sistem Komputer*, vol. 13, no. 1, p. 17, 2021.
- [35] E. D. Widiyanto, A. A. Faizal, D. Eridani, R. D. O. Augustinus, and M. S. Pakpahan, “Simple LoRa Protocol: Protokol Komunikasi LoRa Untuk Sistem Pemantauan Multisensor,” *TELKA - Telekomunikasi, Elektronika, Komputasi dan Kontrol*, vol. 5, no. 2, pp. 83–92, Nov. 2019, doi: 10.15575/telka.v5n2.83-92.
- [36] Imelda, “Teknologi LoRa dan Protokol LoRaWan,” May 01, 2019. <https://www.kmtech.id/post/teknologi-lora-dan-protokol-lorawan> (accessed Dec. 04, 2021).
- [37] R. Wulandari, “Analisis QoS (Quality of Service) pada Jaringan Internet (Studi Kasus : UPT LOKA Uji Teknik Penambangan Jampang Kulon-LIPI),” 2016.
- [38] H. Andre, B. A. Sugara, B. Baharuddin, R. Fernandez, and R. W. Pratama, “Analisis Komunikasi Data Jaringan Nirkabel Berdaya Rendah Menggunakan Teknologi Long Range (LoRa) di Daerah Hijau Universitas Andalas,” *Jurnal Ecotipe (Electronic, Control, Telecommunication, Information, and Power Engineering)*, vol. 9, no. 1, pp. 1–7, Oct. 2021, doi: 10.33019/jurnalecotipe.v9i1.2480.
- [39] ETSI, “Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); General aspects of Quality of Service (QoS),” 1999. [Online]. Available: <http://www.etsi.org>
- [40] Hasanul Fahmi, “Analisis QoS (*Quality of Service*) Pengukuran *Delay*, *Jitter*, *Packet Lost* dan *Throughput* untuk mendapatkan Kualitas Kerja Radio Streaming yang Baik Analysis QoS (*Quality of Service*) Measurement of *Delay*, *Jitter*, *Packet Lost* and *Throughput* to get Good Quality of Radio Streaming Work,” 2018.
- [41] Arduino.cc, “Nano | Arduino Documentation | Arduino Documentation,” Sep. 15, 2021. <https://docs.arduino.cc/hardware/nano> (accessed Jun. 14, 2022).
- [42] Microchip Technology Inc., “ATmega48A-PA-88A-PA-168A-PA-328-P-DS-DS40002061A,” pp. 1–662, 2018.

- [43] SIA Mikrotikls, “MikroTik Routers and Wireless - Products: S-31DLC20D.” <https://mikrotik.com/product/S-31DLC20D-181#fndtn-specifications> (accessed Jun. 14, 2022).
- [44] SIA Mikrotikls, “SFP Transceivers,” pp. 1–2.
- [45] S. Fiber, P. Cables, and S. Compliance, “Standard Fiber Patch Cables,” pp. 1–7, 2003.
- [46] F. Wijaya, “APF : 4 Steps - Instructables,” Jan. 04, 2021. <https://www.instructables.com/APF/> (accessed Dec. 04, 2021).
- [47] Maxim Integrated, “DS3231 RTC General Description,” *Data Sheet*, p. 20, 2015.
- [48] sparkfun, “SparkFun OpenLog - DEV-13712 - SparkFun Electronics,” May 06, 2016. <https://www.sparkfun.com/products/13712> (accessed Dec. 01, 2021).
- [49] SD Card Association, “Part1\_Physical\_Layer\_Simplified\_Specification\_Ver8.00,” pp. 1–305, 2020.
- [50] MENKOMINFO, “Persyaratan Teknis Alat dan / atau Perangkat Telekomunikasi *Low Power Wide Area*,” *rancangan peraturan menteri komunikasi dan informatika republik indonesia*, pp. 1–31, 2018.
- [51] Hope Microelectronics, “RFM95W/96W/98W v2.0,” *Datasheets*, pp. 1–123, 2018.
- [52] C&T RF Antennas Inc., “CTRF-ANTENNA-AP-0915-10109-SMA,” 2021. [Online]. Available: <http://www.ctrfantennas.com/>
- [53] Oakkar, “Optical Power Meter (with SFP and DDM protocol) | Hackaday.io,” Apr. 30, 2017. <https://hackaday.io/project/21599-optical-power-meter-with-sfp-and-ddm-protocol> (accessed Aug. 29, 2022).
- [54] G. Keiser, “Optical Fiber Communications-Fourth Edition,” 2011.
- [55] A. Ramadhani, A. Rusdinar, and A. Z. Fuadi, “Data Komunikasi secara Real Time menggunakan Long Range (LoRa) Berbasis Internet of Things untuk Pembuatan *Weather Station Real Time Communication Data using Long Range (LoRa) Based Internet of Things for Weather Station.*”

- [56] S. S. M. M. R. Asma Yanziah, “Analisis Jarak Jangkauan LoRa dengan Parameter RSSI dan Packet Loss pada Area Urban,” *TEKNOLOGI TECHNOSCIENTIA*, vol. 13, pp. 1–9, 2020.
- [57] F. Muhammad, A. Bhawiyuga, and D. P. Kartikasari, “Analisis Kinerja Protokol LoRaWAN untuk Transmisi Data pada Skenario Urban Area,” 2019. [Online]. Available: <http://j-ptiik.ub.ac.id>