

DAFTAR PUSTAKA

- [1] Kemenkes, R. I. "Laporan nasional riset kesehatan dasar 2018." *Kementarian Kesehatan RI* 1.1 (2019).
- [2] Hansraj, Kenneth K. "Assessment of stresses in the cervical spine caused by posture and position of the head." *Surg Technol Int* 25.25 (2014): 277-9.
- [3] Mahmoud, Nesreen Fawzy, et al. "The relationship between forward head posture and neck pain: a systematic review and meta-analysis." *Current reviews in musculoskeletal medicine* 12.4 (2019): 562-577.
- [4] Hartvigsen, Jan, et al. "What low back pain is and why we need to pay attention." *The Lancet* 391.10137 (2018): 2356-2367.
- [5] Kado, Deborah M., et al. "Hyperkyphosis predicts mortality independent of vertebral osteoporosis in older women." *Annals of internal medicine* 150.10 (2009): 681-687.
- [6] N. Akkarakittichoke and P. Janwantanakul, "Seat pressure distribution characteristics during 1 hour sitting in office workers with and without chronic low back pain," *Safety and Health at Work*, vol. 8, no. 2, pp. 212–219, (2017)
- [7] T. Kamegaya, "Effects of wheelchair sitting posture on gluteal pressure," *Journal of Physical Therapy Science*, vol. 36, no. 2, pp. 145–151, 2024.
- [8] U. J. Park and S. H. Jang, "The influence of backrest inclination on buttock pressure," *Annals of Rehabilitation Medicine*, vol. 35, no. 6, pp. 897–906, 2011
- [9] M. Vergara and Á. Page, "Relationship between comfort and back posture and mobility in sitting-posture," *Applied Ergonomics*, vol. 33, no. 1, pp. 1–8, 2002.

- [10] Fatharani, Lukman Faishal, et al. "Prevalence and Characteristics of Forward Head Posture among University Students." *Journal of Public Health and Pharmacy* 5.1 (2025): 96-104.
- [11] Triangto, Kevin, Siti Chandra Widjanantie, and Nury Nurdwinuringtyas. "Biomechanical impacts of forward head posture on the respiratory function." *Indonesian Journal of Physical Medicine and Rehabilitation* 8.02 (2019): 50-64.
- [12] Mashhadi, Syed Fawad, et al. "Adverse Effects of Prolonged Sitting Behaviour on the General Health and Posture of Medical Students." *Pakistan Armed Forces Medical Journal* 72 (2022): 869-873.
- [13] Szczygieł, Elżbieta, et al. "Is the forward head posture a health problem affecting children and adolescents?." *Journal of Kinesiology and Exercise Sciences* 32.98 (2022): 37-44.
- [14] Adams, M. A., & Dolan, P. (1995). Recent advances in lumbar spinal mechanics. *Spine*, 20(15), 1705–1713.
- [15] O'Sullivan, K., et al. (2012). The effect of fatigue on normal sitting posture. *Spine*, 37(14), E888–E895.
- [16] Wilke, H. J., et al. (1999). New in vivo measurements of pressures in the intervertebral disc. *Spine*, 24(8), 755–762.
- [17] Beach, T. A., et al. (2012). Effects of prolonged sitting on lumbar posture. *Journal of Electromyography and Kinesiology*, 22(1), 1–8.
- [18] De Luca, C. J. (1997). Surface electromyography: A comprehensive guide. *Myoelectric Signal Processing*.
- [19] Farina, D., et al. (2004). The extraction of neural information from the surface EMG. *Critical Reviews in Biomedical Engineering*, 32(3-4), 219–356.

[20] Arendt-Nielsen, L., et al. (1996). Muscle fatigue and EMG changes during sustained contractions. *Journal of Electromyography and Kinesiology*, 6(4), 223–230.

[21] Arendt-Nielsen, L., et al. (1996). Muscle fatigue and EMG changes during sustained contractions. *Journal of Electromyography and Kinesiology*, 6(4), 223–230.

[22] Borg, G. (1998). Borg's Perceived Exertion and Pain Scales. *Human Kinetics*.

[23] Hermens, H. J., et al. (2000). European recommendations for surface electromyography. *Roessingh Research and Development*, 21, 13–54.

[24] Claus, A. P., et al. (2008). Sitting postures and trunk muscle activity. *Manual Therapy*, 13(4), 320–328.

[25] R.Nuraulia, "Penatalaksanaan Fisioterapi Pada Gangguan Fungsional Lumbal Akibat Low Back Pain Non Specific di RSUD DR.La Palaloi Maros", Karya Tulis Ilmiah, Makassar: Politeknik Kesehatan Makassar.2023

[26] ISO 9241-5:1998. Ergonomics of human-system interaction – Workstation layout and postural requirements. International Organization for Standardization.

[27] S. McGill, *Low Back Disorders: Evidence-Based Prevention and Rehabilitation*. Champaign, IL, USA: Human Kinetics, 2002.

[28] D.-E. Lee, S.-M. Seo, H.-S. Woo, and S.-Y. Won, "Analysis of body imbalance in various writing sitting postures using sitting pressure measurement," *J. Phys. Ther. Sci.*, vol. 30, no. 2, pp. 343–346, Feb. 2018, doi: 10.1589/jpts.30.343.

[29] W. Li *et al.*, "Effects of seat cushion contour and sitting posture on surface pressure distribution," *Int. J. Occup. Med. Environ. Health*, 2020.

- [30] M. Stephens and C. A. Bartley, "Understanding the association between pressure ulcers and sitting in adults," *Journal of Tissue Viability*, vol. 27, no. 2, pp. 59–73, 2018.
- [31] Interlink Electronics, *FSR 400 Series Datasheet*. https://cdn-shop.adafruit.com/datasheets/FSR400Series_PD.pdf
- [32] Tekscan Inc., *FlexiForce A201 Datasheet*. <https://www.tekscan.com/products-solutions/force-sensors/a201>
- [33] Y.-C. Tsai et al., "An Automated Sitting Posture Recognition System Utilizing Pressure Sensors," *Sensors*, vol. 23, no. 12, 2023.
- [34] J. Nielsen, *Usability Engineering*, Morgan Kaufmann, 1993.
- [35] H. Van der Kooij et al., "Bioumpa balik for postural control," *Journal of NeuroEngineering and Rehabilitation*, 2015.
- [36] Microchip Technology Inc., *ATmega328P Datasheet*. <https://ww1.microchip.com/downloads/en/DeviceDoc/ATmega328P-Data-Sheet-Complete-DS-7810.pdf>
- [37] Raspberry Pi Ltd., *RP2040 Datasheet*. <https://datasheets.raspberrypi.com/rp2040/rp2040-datasheet.pdf>
- [38] A. Jain and S. Jain, "Posture Guard – A Human Sitting Posture Detection And Alarming System," *2025 International Conference on Electronics, AI and Computing (EAIC)*, Jalandhar, India, 2025, pp. 1-6, doi: 10.1109/EAIC66483.2025.11101526.
- [39] J. Patil, S. Joshi, R. Mulla and K. Yadav, "Intelligent Posture Detection System for Improved Ergonomics," *2025 International Conference on Intelligent Control, Computing and Communications (IC3)*, Mathura, India, 2025, pp. 892-896, doi: 10.1109/IC363308.2025.10957530

[40] M. V. Putri and D. S. Yusiani, “Dampak intervensi ergonomi terhadap kesehatan pekerja kantoran: Tinjauan sistematis dengan fokus pada intervensi berbasis teknologi dan integrasi kesejahteraan mental,” *Jurnal Liga Ilmu Serantau (JLSI)*, vol. 2, no. 2, pp. 103–114, 2025, doi: 10.36352/jlis.v2i2.1244.

[41] G. B. J. Andersson, “Epidemiological features of chronic low-back pain,” *The Lancet*, vol. 354, no. 9178, pp. 581–585, 1999.

[42] World Health Organization, *Musculoskeletal Conditions*. Geneva, Switzerland: WHO, 2019. [Online]. Available: <https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions>

[43] United Nations Environment Programme, *E-waste Management*. Nairobi, Kenya: UNEP, 2018. [Online]. Available: <https://www.unep.org/resources/report/e-waste-management>

[44] European Commission, *Circular Economy Action Plan*. Brussels, Belgium: European Union, 2020. [Online]. Available: https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en

[45] A. C. O’Sullivan, P. B. Dankaerts, and K. M. Burnett, “Effect of different sitting postures on spinal–pelvic curvature and trunk muscle activation,” *Spine*, vol. 31, no. 19, pp. E707–E712, 2006.

[46] Occupational Safety and Health Administration, *Computer Workstations eTool*. Washington, DC, USA: OSHA, 2022. [Online]. Available: <https://www.osha.gov/etools/computer-workstations>

[47] S. Lee, J. Park, and S. Kim, “Computer vision-based posture monitoring system for detecting forward head posture,” *Sensors*, vol. 19, no. 21, pp. 1–15, 2019.

[48] A. Boschmann, M. Plamondon, and D. Farina, “Combining EMG and inertial sensors to assess muscle fatigue and posture,” *Journal of Electromyography and Kinesiology*, vol. 24, no. 2, pp. 229–237, 2014.

- [49] M. M. Makhsous, J. Lin, C. Bankard, J. Hendrix, and L. Hepler, "Seat pressure distribution in sitting: Posture and discomfort analysis," *Clinical Biomechanics*, vol. 24, no. 7, pp. 557–563, 2009.
- [50] J. H. Lee, J. S. Kim, and K. S. Park, "Seat pressure distribution analysis for posture classification," *Sensors*, vol. 18, no. 5, pp. 1–15, 2018.
- [51] S. Madgwick, A. Harrison, and R. Vaidyanathan, "Estimation of IMU and MARG orientation using a gradient descent algorithm," *IEEE International Conference on Rehabilitation Robotics*, pp. 1–7, 2011.
- [52] K. K. Singla and S. Vejar, "Association between forward head posture and craniovertebral angle," *Journal of Physical Therapy Science*, vol. 29, no. 3, pp. 468–471, 2017.
- [53] G. de Haan and V. Jeanne, "Robust pulse rate from chrominance-based rPPG," *IEEE Transactions on Biomedical Engineering*, vol. 60, no. 10, pp. 2878–2886, 2013.
- [54] R. Wang, S. Guo, and D. Zhang, "Non-contact physiological monitoring using camera-based systems," *Biomedical Signal Processing and Control*, vol. 57, pp. 1–12, 2020.
- [55] V. Bazarevsky *et al.*, "BlazePose: On-device Real-time Body Pose tracking," *arXiv preprint arXiv:2006.10204*, 2020.
- [56] Verma, Shivani, et al. "Prevalence of forward head posture among 12–16-year-old school going students—A cross-sectional study." *Applied Medical Research* 4.2 (2018): 18-21.
- [57] D. G. Lema, F. M. Goya, J. A. F. de Oliveira, and J. F. L. de Oliveira, "Comparative analysis of object detection models on edge computing devices," *Integration*, vol. 95, p. 102127, 2024. [Online]. Available: <https://doi.org/10.1016/j.vlsi.2023.102127>

[58] N. Surantha, "Key Considerations for Real-Time Object Recognition on Edge Computing Devices," *Applied Sciences*, vol. 15, no. 13, p. 7533, Jul. 2025. [MDPI](#)

[59] Raspberry Pi Foundation, "*Raspberry Pi Camera Module 3 Product Brief*," Raspberry Pi Ltd., Cambridge, UK, 2023. [Online]. Available: <https://www.raspberrypi.com/products/camera-module-3/>

[60] AAEON Technology Inc., "*EP-DCOV2735-F36 USB 1080P HD Camera Module Specification Sheet*," AAEON Industrial Camera Series, Taipei, Taiwan, 2024. [Online]. Available: <https://www.aaeon.com/en/p/usb-camera-ep-dcov2735-f36>

[61] Logitech International S.A., "*Logitech C270 HD Webcam Product Specifications*," Logitech Support, Lausanne, Switzerland, 2024. [Online]. Available: <https://support.logi.com/hc/en-us/articles/360023278374>

[62] S. Li et al., "A Comprehensive Survey on Object Detection Using Deep Learning," *Revue d'Intelligence Artificielle*, vol. 37, no. 2, pp. 407–414, 2023.

[63] Redmon, Joseph, et al. "You only look once: Unified, real-time object detection." *Proceedings of the IEEE conference on computer vision and pattern recognition*. 2016.

[64] Bazarevsky, Valentin, and Ivan Grishchenko. "On-device, real-time body pose tracking with mediapipe blazepose." *Google AI Blog* (2020).

[65] D. K. Alqahtani, A. Cheema, and A. N. Toosi, "Benchmarking deep learning models for object detection on edge computing devices," arXiv preprint arXiv:2409.16808, Sept. 2024.

[66] NVIDIA Developer, *Jetson Orin Nano Developer Kit – Hardware Specifications*,

- [67] Raspberry Pi Ltd., “Raspberry Pi 5 – Product Brief,” Jan. 2025. Available: <https://datasheets.raspberrypi.com/rpi5/raspberry-pi-5-product-brief.pdf>
- [68] Raspberry Pi Ltd., “*Raspberry Pi AI HAT+ – Product Brief*,” Oct. 2024. Available: <https://datasheets.raspberrypi.com/ai-hat-plus/raspberry-pi-ai-hat-plus-product-brief.pdf>
- [69] Tokopedia, “KY-012 Active Buzzer,” akses: 27 Nov 2025. <https://www.tokopedia.com/freelab-jakarta/ky-012-buzzer-aktif>
- [70] Tokopedia, “Raspberry Pi 3 ABS Case Box,” akses: 27 Nov 2025. <https://www.tokopedia.com/rajacell/raspberry-pi-3-abs-case-box>
- [71] W. Li, X. Yu, Y. Wang, et al., “Effects of seat cushion characteristics on sitting pressure distribution,” *International Journal of Occupational Medicine and Environmental Health*, 2019.
- [72] R. Merletti and P. Parker, *Electromyography: Physiology, Engineering, and Applications*. Hoboken, NJ: Wiley-IEEE Press, 2004. [Online]. Available: <https://doi.org/10.1002/0471678384>
- [73] D. Farina and R. Merletti, “Comparison of algorithms for estimation of EMG variables during voluntary isometric contractions,” *Journal of Electromyography and Kinesiology*, vol. 10, no. 5, pp. 337–349, 2000. [Online]. Available: [https://doi.org/10.1016/S1050-6411\(00\)00025-9](https://doi.org/10.1016/S1050-6411(00)00025-9)
- [74] R. B. Parikh, “EMG Signal Frequency Range and Filtering Techniques,” *IEEE Engineering in Medicine*, 2019. [Online]. Available: <https://ieeexplore.ieee.org/document/8932268>
- [75] R. Sinderby et al., “Accurate detection of respiratory muscle fatigue using RMS and MF,” *Respiratory Physiology*, vol. 102, no. 1, pp. 161–170, 1995. [Online]. Available: [https://doi.org/10.1016/0034-5687\(95\)00076-3](https://doi.org/10.1016/0034-5687(95)00076-3)

- [76] A. Phinyomark, P. Phukpattaranont, and C. Limsakul, "Feature extraction for EMG pattern recognition," *Applied Soft Computing*, vol. 12, 2012. [Online]. Available: <https://doi.org/10.1016/j.asoc.2012.02.021>
- [77] Advancer Technologies, "MyoWare Muscle Sensor Product Datasheet," 2020. [Online]. Available: <https://www.advancertechnologies.com/p/myoware.html>
- [78] OYMotion Technologies, "EMG Sensor V3 Datasheet," 2021. [Online]. Available: <https://docs.oymotion.com/en/latest/hardware/emg-sensor.html>
- [79] STMicroelectronics, "LSM6DS3 – iNEMO inertial module," Datasheet, 2020. [Online]. Available: <https://www.st.com/en/mems-and-sensors/lsm6ds3.html>
- [80] Bosch Sensortec, "BMI160 Low Power IMU," Datasheet, 2019. [Online]. Available: <https://www.bosch-sensortec.com/products/motion-sensors/imus/bmi160/>
- [81] S. Madgwick, "An efficient orientation filter for inertial/magnetic sensor arrays," Report x-io Technologies, 2010. [Online]. Available: http://x-io.co.uk/res/doc/madgwick_internal_report.pdf
- [82] R. Mahony, T. Hamel, and J. Pflimlin, "Nonlinear complementary filters on SO(3)," *IEEE Transactions on Automatic Control*, vol. 53, no. 5, pp. 1203–1218, 2008. [Online]. Available: <https://doi.org/10.1109/TAC.2008.924932>
- [83] M. Kok, J. D. Hol, and T. Schön, "Using inertial sensors for position and orientation estimation," *Foundations & Trends in Signal Processing*, vol. 11, no. 1–2, 2017. [Online]. Available: <https://doi.org/10.1561/20000000094>
- [84] Precision Microdrives, "310-113 – Coin Vibration Motor Datasheet," 2021. [Online]. Available: <https://www.precisionmicrodrives.com/product/310-113-vibration-motor-coin-10mm/>

- [85] Murata Manufacturing, “PKLCS1212E4001-R1 – Piezoelectric Sounder,” Datasheet, 2020. [Online]. Available: <https://www.murata.com/en-us/products/productdetail?partno=PKLCS1212E4001-R1>
- [86] J. Kim, “Evaluation of haptic umpan balik strength for wearable applications,” in IEEE Haptics Symposium, 2018. [Online]. Available: <https://doi.org/10.1109/HAPTICS.2018.8357157>
- [87] Texas Instruments, “DRV2605L Haptic Driver,” TI Datasheet, 2020. [Online]. Available: <https://www.ti.com/product/DRV2605L>
- [88] SparkFun Electronics, “Vibration Motor Module,” Hookup Guide, 2022. [Online]. Available: <https://learn.sparkfun.com/tutorials/vibration-motor-hookup-guide>
- [89] Espressif Systems, “ESP32 Technical Reference Manual,” 2022. [Online]. Available: <https://www.espressif.com/en/support/documents/technical-documents>
- [90] J. H. Lee and Y. S. Kim, “Performance Analysis of Bluetooth Low Energy,” IEEE Communications Surveys, 2016. [Online]. Available: <https://doi.org/10.1109/COMST.2016.2556419>
- [91] Solomon Systech Limited, “SSD1306: 128 × 64 Dot Matrix OLED/PLED Segment/Common Driver with Controller,” Datasheet, 2023. [Online]. Available: <https://cdn-shop.adafruit.com/datasheets/SSD1306.pdf>
- [92] InfluxData, “InfluxDB Time-Series Database Architecture Overview,” 2022. [Online]. Available: <https://www.influxdata.com/products/influxdb-overview/>
- [93] J. H. Lee and Y. S. Kim, “Performance Analysis of Bluetooth Low Energy,” IEEE Communications Surveys, 2016. [Online]. Available: <https://doi.org/10.1109/COMST.2016.2556419>

- [94] A. Pathak, "Wi-Fi latency characterization for IoT devices," IEEE Internet of Things Journal, 2021. [Online]. Available: <https://doi.org/10.1109/JIOT.2021.3096723>
- [95] Google Firebase, "Firebase Realtime Database Documentation," 2023. [Online]. Available: <https://firebase.google.com/docs/database>
- [96] Google LLC, *Android Developers: Kotlin for Android*, Mountain View, CA, USA, 2023. [Online]. Available: <https://developer.android.com/kotlin>. Akses: Jan. 2026.
- [97] Meta Platforms, Inc., *React Native Documentation*, Menlo Park, CA, USA, 2023. [Online]. Available: <https://reactnative.dev/docs/getting-started>. Akses: Jan. 2026.
- [98] Google LLC, *Flutter Documentation*, Mountain View, CA, USA, 2023. [Online]. Available: <https://docs.flutter.dev>. Akses: Jan. 2026.
- [99] L. M. Straker and S. Parry, "Sedentary work and musculoskeletal discomfort: a review of the literature," *Ergonomics*, vol. 55, no. 10, pp. 1256–1272, 2012.
- [100] Stanford Environmental Health & Safety, "Microbreaks," Stanford University. [Online]. Available: https://ehs.stanford.edu/subtopic/microbreaks?utm_source=chatgpt.com
- [101] P. Van Geffen et al., "Decoupled pelvis rotation in sitting: A passive motion technique that regulates buttock load," *Journal of Biomechanics*, vol. 42, no. 9, pp. 1288–1294, 2009.
- [102] J. Reenalda et al., "Analysis of healthy sitting behavior: Interface pressure distribution and subcutaneous tissue oxygenation," *Journal of Rehabilitation Research & Development*, vol. 46, no. 5, pp. 577–586, 2009.

[103] Advancer Technologies, “MyoWare v2 Advanced Guide,” 2022. [Online]. Available: https://myoware.com/wp-content/uploads/2022/03/MyoWare_v2_AdvancedGuide-Updated.pdf

[104] J. Jie, K. Liu, H. Zheng, B. Wang, and R. Dai, “High dimensional feature data reduction of multichannel sEMG for gesture recognition based on double phases PSO,” *Complex & Intelligent Systems*, vol. 7, pp. 1877–1893, 2021, doi: 10.1007/s40747-020-00232-6.

[105] InvenSense, “MPU-9250 Product Specification,” Document No. PS-MPU-9250A-01, Rev. 1.0, 2014. [Online]. Available: <https://invensense.tdk.com/wp-content/uploads/2015/02/MPU-9250-Datasheet.pdf>

[106] S. O. H. Madgwick, “An efficient orientation filter for inertial and inertial/magnetic sensor arrays,” x-io Technologies, 2010. [Online]. Available: <https://x-io.co.uk/downloads/madgwick-phd-thesis.pdf>

[107] SENIAM, “Recommendations for sensor locations in trunk or (lower) back muscles: Erector Spinae,” European Recommendations for Surface ElectroMyoGraphy. [Online]. Available: <https://seniam.org/erectorspinaeiliocostalis.html>

[108] A. Vijayvargiya, B. Singh, R. Kumar, and J. M. R. S. Tavares, “Human lower limb activity recognition techniques, databases, challenges and its applications using sEMG signal: an overview,” *Biomedical Engineering Letters*, vol. 12, no. 4, pp. 343–358, 2022, doi: 10.1007/s13534-022-00236-w.

[109] Nucleisys, “Biquad Cascade IIR Filters Using Direct Form I Structure,” NMSIS DSP Documentation, 2026. [Online]. Available:

https://doc.nucleisys.com/nmsis/dsp/api/groupfilters/api_biquadcascadedfl.html

[110] Kementerian Energi dan Sumber Daya Mineral Republik Indonesia, “Peraturan Menteri ESDM No. 7 Tahun 2021 tentang Standardisasi di Bidang Ketenagalistrikan dan Pembubuhan Tanda Standar Nasional Indonesia dan/atau Tanda Keselamatan,” 2021.

