



## DAFTAR PUSTAKA

- [1] S. G. Kandlikar, I. Perez-Raya, P. A. Raghupathi, J.-L. Gonzalez-Hernandez, D. Dabydeen, L. Medeiros, and P. Phatak, “Infrared imaging technology for breast cancer detection – current status, protocols and new directions,” *International Journal of Heat and Mass Transfer*, vol. 108, pp. 2303–2320, May 2017. [Online]. Available: <https://doi.org/10.1016/j.ijheatmasstransfer.2017.01.086>
- [2] A. M. Campbell, “Measurements and analysis of the microwave dielectric properties of tissues,” Ph.D. dissertation, University of Oxford, Jan 1990. [Online]. Available: <https://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.309869>
- [3] A. Devices, “Adg1406/adg1407 multiplexers data sheet.” [Online]. Available: [https://www.analog.com/media/en/technical-documentation/data-sheets/ADG1406\\_1407.pdf](https://www.analog.com/media/en/technical-documentation/data-sheets/ADG1406_1407.pdf)
- [4] F. Pennati, A. Angelucci, L. Morelli, S. Bardini, E. Barzanti, F. Cavallini, A. Conelli, G. Di Federico, C. Paganelli, and A. Aliverti, “Electrical impedance tomography: From the traditional design to the novel frontier of wearables,” *Sensors*, vol. 23, no. 3, p. 1182, Jan 2023. [Online]. Available: <https://doi.org/10.3390/s23031182>
- [5] *Breast Cancer*. Exon Publications eBooks, Aug 2022. [Online]. Available: <https://www.ncbi.nlm.nih.gov/books/NBK583818/>
- [6] I. E. Khuda, “A comprehensive review on design and development of human breast phantoms for ultra-wide band breast cancer imaging systems,” *Engineering Journal*, vol. 21, no. 3, pp. 183–206, Jun 2017. [Online]. Available: <https://doi.org/10.4186/ej.2017.21.3.183>
- [7] A. Adler and D. Holder, *Electrical Impedance Tomography*. CRC Press eBooks, Nov 2021. [Online]. Available: <https://doi.org/10.1201/9780429399886>
- [8] “Nucleo-f446re | mbed.” [Online]. Available: <https://os.mbed.com/platforms/ST-Nucleo-F446RE/>
- [9] M. R. Baidillah, A.-A. S. Iman, Y. Sun, and M. Takei, “Electrical impedance spectro-tomography based on dielectric relaxation model,” *IEEE Sensors Journal*, vol. 17, no. 24, pp. 8251–8262, Dec 2017. [Online]. Available: <https://doi.org/10.1109/jsen.2017.2710146>
- [10] B. M. Graham, “Enhancements in electrical impedance tomography (eit) image reconstruction for three-dimensional lung imaging,” Ph.D. dissertation, University of Ottawa, Jan. 2007. [Online]. Available: <https://ruor.uottawa.ca/bitstream/10393/29436/1/NR32402.PDF>
- [11] B. Liu, B. Yang, C. Xu, J. Xia, M. Dai, Z. Ji, F. You, X. Dong, X. Shi, and F. Fu, “pyeit: A python-based framework for electrical impedance tomography,” *SoftwareX*, vol. 7, pp. 304–308, Jan. 2018. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S2352711018301407>



- [12] Stanford University, “K-means clustering.” [Online]. Available: <https://stanford.edu/~criegel/cs221/handouts/kmeans.html>
- [13] World Health Organization, “Breast cancer,” Mar 2024. [Online]. Available: <https://www.who.int/news-room/fact-sheets/detail/breast-cancer>
- [14] American Cancer Society, “Survival rates for breast cancer,” 2024. [Online]. Available: <https://www.cancer.org/cancer/types/breast-cancer/understanding-a-breast-cancer-diagnosis/breast-cancer-survival-rates.html>
- [15] O. L. Silva, R. G. Lima, T. C. Martins, F. S. De Moura, R. S. Tavares, and M. S. G. Tsuzuki, “Influence of current injection pattern and electric potential measurement strategies in electrical impedance tomography,” *Control Engineering Practice*, vol. 58, pp. 276–286, Jan 2017. [Online]. Available: <https://doi.org/10.1016/j.conengprac.2016.03.003>
- [16] B. H. Brown and A. D. Seagar, “The sheffield data collection system,” *Clinical Physics and Physiological Measurement*, vol. 8, no. 4A, pp. 91–97, Nov 1987. [Online]. Available: <https://doi.org/10.1088/0143-0815/8/4a/012>
- [17] V. Cherepenin, A. Karpov, A. Korjenevsky, V. Kornienko, A. Mazaletskaya, D. Mazourov, and D. Meister, “A 3d electrical impedance tomography (eit) system for breast cancer detection,” *Physiological Measurement*, vol. 22, no. 1, pp. 9–18, Feb 2001. [Online]. Available: <https://doi.org/10.1088/0967-3334/22/1/302>
- [18] A. Ganesan and V. Durgamahanthi, “Non-invasive breast cancer detection using electrical impedance tomography: Design, analysis and comparison of reconstruction algorithms,” *Traitemen Du Signal*, vol. 40, no. 6, pp. 2809–2817, Dec 2023. [Online]. Available: <https://doi.org/10.18280/ts.400641>
- [19] R. P. Henderson and J. G. Webster, “An impedance camera for spatially specific measurements of the thorax,” *IEEE Transactions on Biomedical Engineering*, vol. BME-25, no. 3, pp. 250–254, May 1978. [Online]. Available: <https://doi.org/10.1109/tbme.1978.326329>
- [20] A. Benabid, L. Balme, J. Persat, M. Belleville, J. Chirossel, M. Buyle-Bodin, J. De Rougemont, and C. Poupot, “Electrical impedance brain scanner: principles and preliminary results of simulation,” *PubMed*, vol. 8, no. 1–2, pp. 59–68, Jan 1978. [Online]. Available: <https://pubmed.ncbi.nlm.nih.gov/741464>
- [21] C. Barber, B. Brown, and I. Freeston, “Imaging spatial distributions of resistivity using applied potential tomography,” *Electronics Letters*, vol. 19, no. 22, p. 933, Jan 1983. [Online]. Available: <https://doi.org/10.1049/el:19830637>
- [22] D. C. Barber, B. H. Brown, and I. L. Freeston, *Imaging Spatial Distributions of Resistivity Using Applied Potential Tomography — APT*, Jan 1984, pp. 446–462. [Online]. Available: [https://doi.org/10.1007/978-94-009-6045-9\\_26](https://doi.org/10.1007/978-94-009-6045-9_26)
- [23] D. Murphy and P. Rolfe, “Aspects of instrumentation design for impedance imaging,” *Clinical Physics and Physiological Measurement*, vol. 9, no. 4A, pp. 5–14, Nov 1988. [Online]. Available: <https://doi.org/10.1088/0143-0815/9/4a/002>



- [24] A. V. Noordegraaf, P. W. A. Kunst, A. Janse, R. A. Smulders, R. M. Heethaar, P. E. Postmus, T. J. C. Faes, and P. M. J. M. De Vries, "Validity and reproducibility of electrical impedance tomography for measurement of calf blood flow in healthy subjects," *Medical & Biological Engineering & Computing*, vol. 35, no. 2, pp. 107–112, Mar 1997. [Online]. Available: <https://doi.org/10.1007/bf02534139>
- [25] B. M. Eyuboglu, A. F. Oner, U. Baysal, C. Biber, A. I. Keyf, U. Yilmaz, and Y. Erdogan, "Application of electrical impedance tomography in diagnosis of emphysema - a clinical study," *Physiological Measurement*, vol. 16, no. 3A, pp. A191–A211, Aug 1995. [Online]. Available: <https://doi.org/10.1088/0967-3334/16/3a/018>
- [26] N. J. Avis and D. C. Barber, "Image reconstruction using non-adjacent drive configurations (electric impedance tomography)," *Physiological Measurement*, vol. 15, no. 2A, pp. A153–A160, May 1994. [Online]. Available: <https://doi.org/10.1088/0967-3334/15/2a/020>
- [27] F. Dickin and M. Wang, "Electrical resistance tomography for process applications," *Measurement Science and Technology*, vol. 7, no. 3, pp. 247–260, Mar 1996. [Online]. Available: <https://doi.org/10.1088/0957-0233/7/3/005>
- [28] D. G. Gisser, D. Isaacson, and J. C. Newell, "Current topics in impedance imaging," *Clinical Physics and Physiological Measurement*, vol. 8, no. 4A, pp. 39–46, Nov 1987. [Online]. Available: <https://doi.org/10.1088/0143-0815/8/4a/005>
- [29] H. C. N. Jongschaap, R. Wytch, J. M. S. Hutchison, and V. Kulkarni, "Electrical impedance tomography: a review of current literature," *European Journal of Radiology*, vol. 18, no. 3, pp. 165–174, Aug 1994. [Online]. Available: [https://doi.org/10.1016/0720-048x\(94\)90329-8](https://doi.org/10.1016/0720-048x(94)90329-8)
- [30] "What is cancer?" Oct 2021. [Online]. Available: <https://www.cancer.gov/about-cancer/understanding/what-is-cancer>
- [31] W. T. Joines, Y. Zhang, C. Li, and R. L. Jirtle, "The measured electrical properties of normal and malignant human tissues from 50 to 900 mhz," *Medical Physics*, vol. 21, no. 4, pp. 547–550, Apr 1994. [Online]. Available: <https://doi.org/10.1118/1.597312>
- [32] S. Khalil, M. Mohktar, and F. Ibrahim, "The theory and fundamentals of bioimpedance analysis in clinical status monitoring and diagnosis of diseases," *Sensors*, vol. 14, no. 6, pp. 10 895–10 928, Jun 2014. [Online]. Available: <https://doi.org/10.3390/s140610895>
- [33] M. Abraham, S. Feruglio, A. Hamraoui, H. Talleb, V. Vivier, and K. Ngo, "The dielectric properties of biological tissues: I. literature survey," *Physics in Medicine and Biology*, vol. 41, no. 11, pp. 2231–2249, Nov 1996. [Online]. Available: <https://iopscience.iop.org/article/10.1088/0031-9155/41/11/001>
- [34] B. Packham, H. Koo, A. Romsauerova, S. Ahn, A. McEwan, S. C. Jun, and D. S. Holder, "Comparison of frequency difference reconstruction algorithms for the detection of acute stroke using eit in a realistic head-shaped tank," *Physiological*



*Measurement*, vol. 33, no. 5, pp. 767–786, Apr 2012. [Online]. Available: <https://doi.org/10.1088/0967-3334/33/5/767>

- [35] STMicroelectronics, “Um1724 user manual stm32 nucleo-64 boards (mb1136).” [Online]. Available: [https://www.st.com/resource/en/user\\_manual/dm00105823-stm32-nucleo-64-boards-mb1136-stmicroelectronics.pdf](https://www.st.com/resource/en/user_manual/dm00105823-stm32-nucleo-64-boards-mb1136-stmicroelectronics.pdf)
- [36] D. Chattopadhyay, *Electronics (Fundamentals and Applications)*. New Age International, Jan 2006.
- [37] A. K. Maini, *Digital Electronics: Principles, Devices and Applications*. John Wiley & Sons, Sep 2007.
- [38] “IEC 60601-1-11:2015 - Medical electrical equipment - Part 1-11: General requirements for basic safety and essential performance - Collateral Standard: Requirements for medical electrical equipment and medical electrical systems used in the home healthcare environment,” 2015. [Online]. Available: <https://www.iso.org/standard/65529.html>
- [39] N. Jin, H. Saybasili, and X. Bi, *Spatial, Temporal Resolution and Signal-to-Noise Ratio*. Springer, Jan. 2015, pp. 41–62. [Online]. Available: [https://link.springer.com/chapter/10.1007/978-3-319-22141-0\\_4](https://link.springer.com/chapter/10.1007/978-3-319-22141-0_4)
- [40] J. Riera, P. J. Riu, P. Casan, and J. R. Masclans, “Tomografía de impedancia eléctrica en la lesión pulmonar aguda,” *Medicina Intensiva*, vol. 35, no. 8, pp. 509–517, Nov. 2011. [Online]. Available: <https://pubmed.ncbi.nlm.nih.gov/21680060/>
- [41] A. Nissinen, V. P. Kolehmainen, and J. P. Kaipio, “Compensation of modelling errors due to unknown domain boundary in electrical impedance tomography,” *IEEE Transactions on Medical Imaging*, vol. 30, no. 2, pp. 231–242, Feb. 2011. [Online]. Available: <https://pubmed.ncbi.nlm.nih.gov/20840893/>
- [42] A. Adler, R. Guardo, and Y. Berthiaume, “Impedance imaging of lung ventilation: Do we need to account for chest expansion?” *IEEE Transactions on Biomedical Engineering*, vol. 43, no. 4, pp. 414–420, Apr. 1996. [Online]. Available: <https://pubmed.ncbi.nlm.nih.gov/8626190/>
- [43] M. Takhti and K. Odame, “Structured design methodology to achieve a high snr electrical impedance tomography,” *IEEE Transactions on Biomedical Circuits and Systems*, vol. 13, no. 2, pp. 364–375, Apr. 2019. [Online]. Available: <https://pubmed.ncbi.nlm.nih.gov/30668480/>
- [44] N. K. Soni, K. D. Paulsen, H. Dehghani, and A. Hartov, “Finite element implementation of maxwell’s equations for image reconstruction in electrical impedance tomography,” *IEEE Transactions on Medical Imaging*, vol. 25, no. 1, pp. 55–61, Jan. 2006. [Online]. Available: <https://pubmed.ncbi.nlm.nih.gov/16398414/>
- [45] M. Cheney and D. Isaacson, “Issues in electrical impedance imaging,” *IEEE Computational Science and Engineering*, vol. 2, no. 4, pp. 53–62, 1995.
- [46] S. Russo, S. Nefti-Meziani, N. Carbonaro, and A. Tognetti, “A quantitative evaluation of drive pattern selection for optimizing eit-based stretchable



sensors," *Sensors*, vol. 17, no. 9, p. 1999, Aug. 2017. [Online]. Available: <https://www.mdpi.com/1424-8220/17/9/1999>

- [47] Y. Hirose, J. Sagawa, Y. Sibamoto, and Y. Kukita, "Coping with electrode polarization for development of dc-driven electrical impedance tomography," *Flow Measurement and Instrumentation*, vol. 81, p. 102006, Oct. 2021. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S0955598621001138>
- [48] D. K. Anderson, I. L. Freeston, and R. C. Tozer, "Analytic solution of the forward problem for induced current electrical impedance tomography systems," *IEE Proceedings - Science, Measurement and Technology*, vol. 142, no. 6, pp. 425–432, Nov. 1995. [Online]. Available: <https://doi.org/10.1049/ip-smt:19952133>
- [49] P. C. Hansen, *Rank-Deficient and Discrete Ill-Posed Problems*. Society for Industrial and Applied Mathematics (SIAM), Jan. 1998. [Online]. Available: <https://doi.org/10.1137/1.9780898719697>
- [50] R. Supardi and I. Kanedi, "Implementasi metode algoritma k-means clustering pada toko eidelweis," *Jurnal Teknologi Informasi*, vol. 4, no. 2, pp. 270–277, Dec. 2020. [Online]. Available: <https://doi.org/10.36294/jurti.v4i2.1444>
- [51] R. Koprowski, *Image pre-processing*, January 2016, pp. 19–43. [Online]. Available: [https://doi.org/10.1007/978-3-319-29546-6\\_2](https://doi.org/10.1007/978-3-319-29546-6_2)
- [52] R. P. R. Paper, R. C. S. Chandel, and G. Gupta, "Image filtering algorithms and techniques: A review," 2013. [Online]. Available: <https://api.semanticscholar.org/CorpusID:212459099>
- [53] OpenCV, "Image filtering." [Online]. Available: [https://docs.opencv.org/4.x/d4/d86/group\\_\\_imgproc\\_\\_filter.html#gae8bdcd9154ed5ca3cbc1766d960f45c1](https://docs.opencv.org/4.x/d4/d86/group__imgproc__filter.html#gae8bdcd9154ed5ca3cbc1766d960f45c1)
- [54] A. Kour, V. K. Yadav, V. Maheshwari, and D. Prashar, "A review on image processing," *International Journal of Electronics Communication and Computer Engineering (IJECCE)*, January 2013. [Online]. Available: <https://ijecce.com/index.php/issues?view=publication&task=show&id=383>
- [55] OpenCV, "Histogram equalization." [Online]. Available: [https://docs.opencv.org/4.x/d4/d1b/tutorial\\_histogram\\_equalization.html](https://docs.opencv.org/4.x/d4/d1b/tutorial_histogram_equalization.html)
- [56] J. Canny, "A computational approach to edge detection," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. PAMI-8, no. 6, pp. 679–698, 1986.
- [57] OpenCV, "Canny edge detection." [Online]. Available: [https://docs.opencv.org/4.x/da/d22/tutorial\\_py\\_canny.html?ref=blog.roboflow.com](https://docs.opencv.org/4.x/da/d22/tutorial_py_canny.html?ref=blog.roboflow.com)
- [58] ——, "Contours: Getting started." [Online]. Available: [https://docs.opencv.org/3.4/d4/d73/tutorial\\_py\\_contours\\_begin.html](https://docs.opencv.org/3.4/d4/d73/tutorial_py_contours_begin.html)
- [59] H. Golnabi, M. Matloob, M. Bahar, and M. Sharifian, "Investigation of electrical conductivity of different water liquids and electrolyte solutions," 2009. [Online]. Available: <https://api.semanticscholar.org/CorpusID:96563657>



- [60] F. Marra, M. Zell, J. Lyng, D. Morgan, and D. Cronin, “Analysis of heat transfer during ohmic processing of a solid food,” *Journal of Food Engineering*, vol. 91, no. 1, pp. 56–63, Mar 2009. [Online]. Available: <https://www.sciencedirect.com/science/article/abs/pii/S0260877408003919>
- [61] Matplotlib, “Choosing colormaps in matplotlib — matplotlib 3.9.2 documentation.” [Online]. Available: <https://matplotlib.org/stable/users/explain/colors/colormaps.html>