**Bibliography on the Ethical, Legal, and Social Implications of** **Emerging Portable and Accessible Neuroimaging Technologies**

*Last updated: November 1, 2023*

**Introduction**

This bibliography contains resources related to the ethical, legal, and social implications (ELSI) of emerging portable and accessible neuroimaging technologies, as well as selected relevant publications from the scientific and medical literatures. The bibliography is focused specifically on the ELSI of portable and accessible neuroimaging, and does not include citations to broader literatures on ELSI of traditional fixed neuroimaging (e.g. the extensive literature on ELSI of incidental findings in MRI). The bibliography also does not include citations to literature on emerging neurotechnologies beyond brain imaging (e.g. neurostimulation). For more general resources on neuroethics, readers might view the resources page of NIH BRAIN Neuroethics and the resources page of the Global Neuroethics Summit. The bibliography contains selected scientific publications related to emerging portable neuroimaging technologies, but is not exhaustive and generally excludes publications that are more technical in nature.

The bibliography is a product of an NIH RF1 grant: *Highly Portable and Cloud-Enabled Neuroimaging Research: Confronting Ethics Challenges in Field Research with New Populations* (NIH Grant #RF1MH123698). A web-based version of the Bibliography, as well as more information about the grant, is available online. The grant is based at the University of Minnesota’s Consortium on Law and Values in Health, Environment & the Life Sciences.

The Bibliography is organized by topical area, with entries listed alphabetically within each category by last name of the first author. You can scroll down or click on each topical heading below to jump to a particular section:

* Law and Ethics
* [Selected Guidelines](#Guidelines)
* [Neuroimaging in Low-Resource Contexts](#LowResource)
* [Portable Magnetic Resonance I](#PortableMRI)maging (MRI)
* [Portable Magnetoencephalography (MEG](#PortableMEG))
* [Portable Positron Emission Tomography (PET](#PortablePET))
* [Portable Functional Near-Infrared Spectroscopy (fNIRS](#PortablefNIRS))
* [Portable Electroencephalography (EEG](#PortableEEG))

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**Law and Ethics**

*Although there are established literatures on the ethics of traditional fixed neuroimaging, the literature specific to the ethical, legal, and social implications of highly portable and accessible neuroimaging is only beginning to emerge.*

Bannier, E., Barker, G., Borghesani, V., Broeckx, N., Clement, P., Emblem, K. E., Ghosh, S., Glerean, E., Gorgolewski, K. J., Havu, M., Halchenko, Y. O., Herholz, P., Hespel, A., Heunis, S., Hu, Y., Hu, C.-P., Huijser, D., de la Iglesia Vayá, M., Jancalek, R., … Zhu, H. (2021). The Open Brain Consent: Informing Research Participants and Obtaining Consent to Share Brain Imaging Data. *Human Brain Mapping*, *42*(7), 1945–1951. https://doi.org/10.1002/hbm.25351

Beauvais, M. J. S., Knoppers, B. M. & Illes, J. (2021). A Marathon, Not a Sprint – Neuroimaging, Open Science and Ethics. *NeuroImage*, *236*, 118041. https://doi.org/10.1016/j.neuroimage.2021.118041 PMID: 33848622

Bianchi, D. W., Cooper, J. A., Gordon, J. A., Heemskerk, J., Hodes, R., Koob, G. F., Koroshetz, W. J., Shurtleff, D., Sieving, P. A., Volkow, N. D., Churchill, J. D. & Ramos, K. M. (2018). Neuroethics for the National Institutes of Health BRAIN Initiative. *Journal of Neuroscience*, *38*(50), 10583–10585. https://doi.org/10.1523/JNEUROSCI.2091-18.2018 PMID: 30541766

Clark, D. B., Fisher, C. B., Bookheimer, S., Brown, S. A., Evans, J. H., Hopfer, C., Hudziak, J., Montoya, I., Murray, M., Pfefferbaum, A. & Yurgelun-Todd, D. (2017). Biomedical Ethics and Clinical Oversight in Multisite Observational Neuroimaging Studies with Children and Adolescents: The ABCD Experience. *Developmental Cognitive Neuroscience*, *32*, 143–154. https://doi.org/10.1016/j.dcn.2017.06.005 PMID: 28716389

Greely, H. T., Grady, C., Ramos, K. M., Chiong, W., Eberwine, J., Farahany, N. A., Johnson, L. S. M., Hyman, B. T., Hyman, S. E., Rommelfanger, K. S. & Serrano, E. E. (2018). Neuroethics Guiding Principles for the NIH BRAIN Initiative. *Journal of Neuroscience*, *38*(50), 10586–10588. https://doi.org/10.1523/JNEUROSCI.2077-18.2018 PMID: 30541767

Gaudry, K. S., Ayaz, H., Bedows, A., Celnik, P., Eagleman, D., Grover, P., Illes, J., Rao, R. P. N., Robinson, J. T., Thyagarajan, K. & The Working Group on Brain-Interfacing Devices in 2040 (2021). Projections and the Potential Societal Impact of the Future of Neurotechnologies. *Frontiers in Neuroscience*, *15*, 658930. https://doi.org/10.3389/fnins.2021.658930 PMCID: PMC8634831

Goldfarb, M. G. & Brown, D. R. (2022). Diversifying Participation: The Rarity of Reporting Racial Demographics in Neuroimaging Research. *NeuroImage*, *254*, 119122. https://doi.org/10.1016/j.neuroimage.2022.119122 PMID: 35339685

Greely, H. T., Ramos, K. M. & Grady, C. (2016). Neuroethics in the Age of Brain Projects. *Neuron*, *92*(3), 637–641. https://doi.org/10.1016/j.neuron.2016.10.048 PMID: 27810008

Janssen, T. W. P., Grammer, J. K., Bleichner, M. G., Bulgarelli, C., Davidesco, I., Dikker, S., Jasińska, K. K., Siugzdaite, R., Vassena, E., Vatakis, A., Zion-Golumbic, E. & van Atteveldt, N. (2021). Opportunities and Limitations of Mobile Neuroimaging Technologies in Educational Neuroscience. *Mind, Brain and Education*, *15*(4), 354–370. https://doi.org/10.1111/mbe.12302 PMID: 35875415

Jones, D. T. & Kerber, K. A. (2022). Artificial Intelligence and the Practice of Neurology in 2035: The Neurology Future Forecasting Series. *Neurology*, *98*(6), 238–245. https://doi.org/10.1212/WNL.0000000000013200 PMID: 35131918

Jwa, A. S. & Poldrack, R. A. (2022). The Spectrum of Data Sharing Policies in Neuroimaging Data Repositories. *Human Brain Mapping*, 1–15. https://doi.org/10.1002/hbm.25803 PMID: 35142409

Krainak, D.M., Zeng, R., Li, N. et al. US regulatory considerations for low field magnetic resonance imaging systems. Magn Reson Mater Phy (2023). https://doi.org/10.1007/s10334-023-01083-1

Li, Y., Thompson, W. K., Reuter, C., Nillo, R., Jernigan, T., Dale, A., Sugrue, L. P. & ABCD Consortium. (2021). Rates of Incidental Findings in Brain Magnetic Resonance Imaging in Children. *JAMA Neurology*, *78*(5), 578–587. https://doi.org/10.1001/jamaneurol.2021.0306 PMID: 33749724

Palk, A., Illes, J., Thompson, P. M. & Stein, D. J. (2020). Ethical Issues in Global Neuroimaging Genetics Collaborations. *NeuroImage*, *221*, 117208. https://doi.org/10.1016/j.neuroimage.2020.117208 PMID: 32736000

Presidential Commission for the Study of Bioethical Issues (2015, March). *Gray Matters: Topics at the Intersection of Neuroscience, Ethics, and Society (Vol. 2)*. https://bioethicsarchive.georgetown.edu/pcsbi/sites/default/files/GrayMatter\_V2\_508.pdf

Ramos, K. M., Grady, C., Greely, H. T., Chiong, W., Eberwine, J., Farahany, N. A., Johnson, L. S. M., Hyman, B. T., Hyman, S. E., Rommelfanger, K. S., Serrano, E. E., Churchill, J. D., Gordon, J. A. & Koroshetz, W. J. (2019). The NIH BRAIN Initiative: Integrating Neuroethics and Neuroscience. *Neuron*, *101*(3), 394–398. https://doi.org/10.1016/j.neuron.2019.01.024 PMID: 30731065

Ramos, K. M., Rommelfanger, K. S., Greely, H. T. & Koroshetz, W. J. (2018). Neuroethics and the NIH BRAIN Initiative. *Journal of Responsible Innovation*, *5*(1), 122–130. https://doi.org/10.1080/23299460.2017.1319035 PMID: 30854409

Robinson, J. T., Rommelfanger, K. S., Anikeeva, P. O., Etienne, A., French, J., Gelinas, J., Grover, P. & Picard, R. (2022). Building a Culture of Responsible Neurotech: Neuroethics as Socio-Technical Challenges. *Neuron, S0896-6273*(22), 2057–2062. https://doi.org/10.1016/j.neuron.2022.05.005 PMID: 35671759

Rommelfanger, K. S., Jeong, S.-J., Ema, A., Fukushi, T., Kasai, K., Ramos, K. M., Salles, A. & Singh, I. (2018). Neuroethics Questions to Guide Ethical Research in the International Brain Initiatives. *Neuron*, *100*(1), 19–36. https://doi.org/10.1016/j.neuron.2018.09.021 PMID: 30308169

Shen, F. X., Wolf, S. M., Bhavnani, S., Deoni, S., Elison, J. T., Fair, D., Garwood, M., Gee, M. S., Geethanath, S., Kay, K., Lim, K. O., Lockwood Estrin, G., Luciana, M., Peloquin, D., Rommelfanger, K., Schiess, N., Siddiqui, K., Torres, E. & Vaughan, J. T. (2021). Emerging Ethical Issues Raised by Highly Portable MRI Research in Remote and Resource-Limited International Settings. *NeuroImage*, *238*, 118210. https://doi.org/10.1016/j.neuroimage.2021.118210 PMCID: PMC8382487

Shen, F., Wolf, S., Garwood, M., Han, D., Illes, J., Kimberly, W., Klein, E., Rommelfanger, K., Rosen, M., Sheth, K., Torres, E., Tuite, P. & Vaughan, J. (2022). Challenges in Deploying Low-Field and Ultra-Low Field MRI in Research, Clinical Care, Population Screening, and Direct-to-Consumer Use (P15-7.001). *Neurology*, *98*(18 Supplement), 586. https://n.neurology.org/content/98/18\_Supplement/586

Shen, F. X., Wolf, S. M., Gonzalez, R. G. & Garwood, M. (2020). Ethical Issues Posed by Field Research Using Highly Portable and Cloud-Enabled Neuroimaging. *Neuron*, *105*(5), 771–775. https://doi.org/10.1016/j.neuron.2020.01.041 PMID: 32135089

**Selected Guidelines**

*As neuroimaging research moves out of the lab and into the field, neuroimaging researchers will be confronted with novel ethical and technical challenges. The selected guidelines below provide high-level guidance for addressing those challenges.*

American College of Radiology Committee on MR Safety (2020). *ACR Manual on MR Safety*. https://www.acr.org/-/media/ACR/Files/Radiology-Safety/MR-Safety/Manual-on-MR-Safety.pdf

Council for International Organizations of Medical Sciences (2016). *International Ethical Guidelines for Health-Related Research Involving Humans*. https://cioms.ch/wp-content/uploads/2017/01/WEB-CIOMS-EthicalGuidelines.pdf

National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1979, April 18). *The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research*. https://www.hhs.gov/ohrp/sites/default/files/the-belmont-report-508c\_FINAL.pdf

Nuffield Council on Bioethics (2013). *Novel Neurotechnologies: Intervening in the Brain*. https://www.nuffieldbioethics.org/wp-content/uploads/2013/06/Novel\_neurotechnologies\_report\_PDF\_web\_0.pdf

Participants in the 2006 Georgetown University Workshop on the Ancillary-Care Obligations of Medical Researchers Working in Developing Countries (2008). The Ancillary-Care Obligations of Medical Researchers Working in Developing Countries. *PLOS Med 5*(5), e90. https://doi.org/10.1371/journal.pmed.0050090 PMID: 18494553

Presidential Commission for the Study of Bioethical Issues (2010, December). *New Directions: The Ethics of Synthetic Biology and Emerging Technologies*. https://bioethicsarchive.georgetown.edu/pcsbi/sites/default/files/PCSBI-Synthetic-Biology-Report-12.16.10\_0.pdf

TRUST Equitable Research Partnerships (2018). *Global Code of Conduct for Research in Resource-Poor Settings*. https://www.globalcodeofconduct.org/wp-content/uploads/2018/05/Global-Code-of-Conduct-Brochure.pdf

World Health Organization (2011). *Standards and Operational Guidance for Ethics Review of Health-Related Research with Human Participants*. Retrieved September 12, 2021, from https://www.who.int/publications/i/item/9789241502948

World Medical Association (2013, October). *Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects*. https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/

Yeung, A. W. K., Singh, P. & Eickhoff, S. B. (2021). The Dissemination of Brain Imaging Guidelines and Recommendations. *IBRO Neuroscience Reports*, *12*, 20–24. https://doi.org/10.1016/j.ibneur.2021.11.003 PMID: 34918005

Yoo, S. H., Choi, K., Nam, S., Yoon, E. K., Sohn, J. W., Oh, B. M., Shim, J., & Choi, M. Y. (2023). Development of Korea Neuroethics Guidelines. Journal of Korean medical science, 38(25), e193. <https://doi.org/10.3346/jkms.2023.38.e193> PMID: 37365727

**Neuroimaging Research in Low-Resource Contexts**

*The increased portability and lower costs of new MRI technologies will allow researchers and clinicians to utilize MRI in low-resource contexts that previously did not have access to MRI. The citations below include articles in which MRI is being used in a wide range of research in low-resource contexts.*

Altaf, A., Baqai, M. W., Urooj, F., Alam, M. S., Aziz, H. F., Mubarak, F., Knopp, E. A., Siddiqui, K. M., & Enam, S. A. (2023). Utilization of an ultra-low-field, portable magnetic resonance imaging for Brain Tumor Assessment in lower middle-income countries. Surgical Neurology International, 14, 260. <https://doi.org/10.25259/sni_123_2023> PMID: 37560587

DesRoche, C. N., Johnson, A. P., Hore, E. B., Innes, E., Silver, I., Tampieri, D., Kwan, B. Y. M., Ortiz Jimenez, J., Boyd, J. G., & Islam, O. (2023). Feasibility and Cost Analysis of Portable MRI Implementation in a Remote Setting in Canada. The Canadian journal of neurological sciences. Le journal canadien des sciences neurologiques, 1–27. Advance online publication. <https://doi.org/10.1017/cjn.2023.250> PMID: 37434471

DeStigter, K., Pool, K. L., Leslie, A., Hussain, S., Tan, B. S., Donoso-Bach, L. & Andronikou, S. (2021). Optimizing Integrated Imaging Service Delivery by Tier in Low-Resource Health Systems. *Insights into Imaging*, *12*(1), 1–11. https://doi.org/10.1186/s13244-021-01073-8 PMCID: PMC8444174

Fuhrimann, S., Winkler, M. S., Staudacher, P., Weiss, F. T., Stamm, C., Eggen, R. I., Lindh, C. H., Menezes-Filho, J. A., Baker, J. M., Ramírez-Muñoz, F., Gutiérrez-Vargas, R. & Mora, A. M. (2019). Exposure to Pesticides and Health Effects on Farm Owners and Workers From Conventional and Organic Agricultural Farms in Costa Rica: Protocol for a Cross-Sectional Study. *JMIR Research Protocols*, *8*(1), e10914. https://doi.org/10.2196/10914 PMCID: PMC6367668

Harding, L., McFarlane, J., Honey, C. R., McDonald, P. J., & Illes, J. (2023). Mapping the Landscape of Equitable Access to Advanced Neurotechnologies in Canada. The Canadian journal of neurological sciences. Le journal canadien des sciences neurologiques, 50(s1), s17–s25. https://doi.org/10.1017/cjn.2023.18

Katus, L., Hayes, N. J., Mason, L., Blasi, A., McCann, S., Darboe, M. K., de Haan, M., Moore, S. E., Lloyd-Fox, S. & Elwell, C. E. (2019). Implementing Neuroimaging and Eye Tracking Methods to Assess Neurocognitive Development of Young Infants in Low- and Middle-Income Countries. *Gates Open Research*, *3*, 1113. https://doi.org/10.12688/gatesopenres.12951.2 PMCID: PMC6719506

Mateen, F. J. (2019). Multiple Sclerosis in Resource-Limited Settings: Research Opportunities in an Unequal World. *Neurology*, *93*(4), 176–180. https://doi.org/10.1212/WNL.0000000000007837 PMID: 31332086

Murali, S., Ding, H., Adedeji, F., Qin, C., Obungoloch, J., Asllani, I., Anazodo, U., Ntusi, N. A. B., Mammen, R., Niendorf, T., & Adeleke, S. (2023). Bringing MRI to low- and middle-income countries: Directions, challenges and potential solutions. NMR in biomedicine, e4992. Advance online publication. https://doi.org/10.1002/nbm.4992

Palzes, V. A., Sagiv, S. K., Baker, J. M., Rojas-Valverde, D., Gutiérrez-Vargas, R., Winkler, M. S., Fuhrimann, S., Staudacher, P., Menezes-Filho, J. A., Reiss, A. L., Eskenazi, B. & Mora, A. M. (2019). Manganese Exposure and Working Memory-Related Brain Activity in Smallholder Farmworkers in Costa Rica: Results from a Pilot Study. *Environmental Research*, *173*, 539–548. https://doi.org/10.1016/j.envres.2019.04.006 PMCID: PMC6581040

**Portable MRI**

*Multiple research teams are actively developing more portable and more accessible magnetic resonance imaging (MRI) technologies. These technologies include low-field MRI, ultra-low field MRI, and more portable high-field MRI. The citations below are selected publications describing these technological advances.*

Abbas, A., Hilal, K., Rasool, A. A., Zahidi, U., Shamim, M. S., & Abbas, Q. (2023). Low-field magnetic resonance imaging in a boy with intracranial bolt after severe traumatic brain injury: illustrative case, Journal of Neurosurgery: Case Lessons, 6(1), CASE23225. <https://doi.org/10.3171/CASE23225> PMID: 37392768

Aggarwal, P. P. K., Jimeno, M. M., & Geethanath, S. (2023). Repeatability of image quality in very low field MRI. arXiv preprint arXiv:2304.07267.

Altaf, A., Baqai, M. W. S., Urooj, F., Alam, M. S., Aziz, H. F., Mubarak, F., Knopp, E., Siddiqui, K., & Enam, S. A. (2023). Intraoperative use of ultra-low-field, portable magnetic resonance imaging - first report. Surgical neurology international, 14, 212. <https://doi.org/10.25259/SNI_124_2023> PMID: 37404510

Arnold, T. C., Tu, D., Okar, S. V., Nair, G., By, S., Kawatra, K. D., Robert-Fitzgerald, T. E., Desiderio, L. M., Schindler, M. K., Shinohara, R. T., Reich, D. S. & Stein, J. M. (2022). Sensitivity of Portable Low-Field Magnetic Resonance Imaging for Multiple Sclerosis Lesions. *NeuroImage: Clinical*, *35*, 103101. https://doi.org/10.1016/j.nicl.2022.103101 PMID: 35792417

Anoardo, E., & Rodriguez, G. G. (2022). New challenges and opportunities for low-field MRI. *Journal of Magnetic Resonance Open*, 100086. https://doi.org/10.1016/j.jmro.2022.100086

Ayde, R., Senft, T., Salameh, N. & Sarracanie, M. (2022). Deep Learning for Fast Low-Field MRI Acquisitions. *Scientific Reports*, *12*(1), 11394. https://doi.org/10.1038/s41598-022-14039-7 PMID: 35794175

Basser, P. (2022). Detection of Stroke by Portable, Low-Field MRI: A Milestone in Medical Imaging. *Science Advances*, *8*(16), eabp9307. https://doi.org/10.1126/sciadv.abp9307 PMID: 35442726

Beekman, R., Crawford, A., Mazurek, M. H., Prabhat, A. M., Chavva, I. R., Parasuram, N., Kim, N., Kim, J. A., Petersen, N., de Havenon, A., Khosla, A., Honiden, S., Elliott Miller, P., Wira, C., Daley, J., Payabvash, S., Greer, D. M., Gilmore, E. J., Taylor Kimberly, W. & Sheth, K. N. (2022). Bedside Monitoring of Hypoxic Ischemic Brain Injury Using Low-Field, Portable Brain Magnetic Resonance Imaging After Cardiac Arrest. *Resuscitation, S0300-9572*(22), 150­–4. https://doi.org/10.1016/j.resuscitation.2022.05.002

Bossert, S., Unadkat, P., Sheth, K. N., Sze, G., & Schulder, M. (2023). A novel portable, mobile MRI: Comparison with an established low-field intraoperative MRI system. Asian Journal of Neurosurgery. https://doi.org/10.1055/s-0043-1760857

Chaban, Y. V., Vosshenrich, J., McKee, H., Gunasekaran, S., Brown, M. J., Atalay, M. K., Heye, T., Markl, M., Woolen, S. A., Simonetti, O. P., & Hanneman, K. (2023). Environmental sustainability and MRI: Challenges, opportunities, and a call for action. Journal of Magnetic Resonance Imaging. https://doi.org/10.1002/jmri.28994

Chetcuti, K., Chilingulo, C., Goyal, M. S., Vidal, L., O’Brien, N. F., Postels, D. G., Seydel, K. B. & Taylor, T. E. (2022). Implementation of a Low-Field Portable MRI Scanner in a Resource-Constrained Environment: Our Experience in Malawi. *American Journal of Neuroradiology, 43*(5), 670–674. https://doi.org/10.3174/ajnr.A7494 PMID: 35450856

Cho, S.-M., Wilcox, C., Keller, S., Acton, M., Rando, H., Etchill, E., Bush, E. L., Sair, H. I., Pitts, J., Kim, B. S., Whitman, G. & Giuliano, K. (2022). *Assessing the SAfety and FEasibility of Bedside Portable Low-Field Brain Magnetic Resonance Imaging in Patients on ECMO (SAFE-MRI ECMO study) – Study Protocol and First Case Series Experience* [Manuscript Submitted for Publication]. Johns Hopkins University School of Medicine. https://doi.org/10.21203/rs.3.rs-1409569/v1

Cooley, C. Z., McDaniel, P. C., Stockmann, J. P., Srinivas, S. A., Cauley, S. F., Śliwiak, M., Sappo, C. R., Vaughn, C. F., Guerin, B., Rosen, M. S., Lev, M. H. & Wald, L. L. (2021). A Portable Scanner for Magnetic Resonance Imaging of the Brain. *Nature Biomedical Engineering*, *5*(3), 229–239. https://doi.org/10.1038/s41551-020-00641-5

Cooley, C. Z., Stockmann, J. P., Witzel, T., LaPierre, C., Mareyam, A., Jia, F., Zaitsev, M., Wenhui, Y., Zheng, W., Stang, P., Scott, G., Adalsteinsson, E., White, J. K. & Wald, L. L. (2020). Design and Implementation of a Low-Cost, Tabletop MRI Scanner for Education and Research Prototyping. *Journal of Magnetic Resonance*, *310*, 106625. https://doi.org/10.1016/j.jmr.2019.106625

de Havenon, A., Parasuram, N. R., Crawford, A. L., Mazurek, M. H., Chavva, I. R., Yadlapalli, V., Iglesias, J. E., Rosen, M. S., Falcone, G. J., Payabvash, S., Sze, G., Sharma, R., Schiff, S. J., Safdar, B., Wira, C., Kimberly, W. T., & Sheth, K. N. (2023). Identification of White Matter Hyperintensities in Routine Emergency Department Visits Using Portable Bedside Magnetic Resonance Imaging. Journal of the American Heart Association, e029242. Advance online publication. https://doi.org/10.1161/JAHA.122.029242

de Leeuw den Bouter, M. L., Ippolito, G., O’Reilly, T. P. A., Remis, R. F., van Gijzen, M. B. & Webb, A. G. (2022). Deep Learning-Based Single Image Super-Resolution for Low-Field MR Brain Images. *Scientific Reports*, *12*(1), 6362. https://doi.org/10.1038/s41598-022-10298-6 PMID: 35430586

Deoni, S. C. L., Bruchhage, M. M. K., Beauchemin, J., Volpe, A., D’Sa, V., Huentelman, M. & Williams, S. C. R. (2021). Accessible Pediatric Neuroimaging Using a Low Field Strength MRI Scanner. *NeuroImage*, *238*, 118273. https://doi.org/10.1016/j.neuroimage.2021.118273 PMID: 34146712

Deoni, S. C. L., Medeiros, P., Deoni, A. T., Burton, P., Beauchemin, J., D’Sa, V., Boskamp, E., By, S., McNulty, C., Mileski, W., Welch, B. E. & Huentelman, M. (2022). Development of a Mobile Low-Field MRI Scanner. *Scientific Reports*, *12*(1), 5690. https://doi.org/10.1038/s41598-022-09760-2 PMID: 35383255

Ezeala-Adikaibe, B. A., Oti, B., Ohaegbulam, S. C., Okwuonodulu, O. & Ndubuisi, C. (2022). 0.35 Tesla Magnetic Resonance Imaging Findings in a Cohort of 399 Seizure Patients. Experience From a Single Centre in Nigeria. *Annals of Clinical and Biomedical Research*, *3*(1), 188. https://doi.org/10.4081/acbr.2022.188

Frija, G., Blažić, I., Frush, D. P., Hierath, M., Kawooya, M., Donoso-Bach, L. & Brkljačić, B. (2021). How to Improve Access to Medical Imaging in Low- and Middle-Income Countries? *EClinicalMedicine*, *38*. https://doi.org/10.1016/j.eclinm.2021.101034 PMCID: PMC8318869

Geethanath, S. & Vaughan, J. T. (2019). Accessible Magnetic Resonance Imaging: A Review. *Journal of Magnetic Resonance Imaging*, *49*(7), e65–e77. https://doi.org/10.1002/jmri.26638

Gilk, T., Kanal, E. (2023) MRI safety considerations associated with low-field MRI: mostly good news. *Magn Reson* *Mater Phy.* https://doi.org/10.1007/s10334-023-01079-x

Guallart-Naval, T., Algarín, J. M., Pellicer-Guridi, R., Galve, F., Vives-Gilabert, Y., Bosch, R., Pallás, E., González, J. M., Rigla, J. P., Martínez, P., Lloris, F. J., Borreguero, J., Marcos-Perucho, A., Negnevitsky, V., Martí-Bonmatí, L., Ríos, A., Benlloch, J. M. & Alonso, J. (2022). Portable Magnetic Resonance Imaging of Patients Indoors, Outdoors and at Home. *ArXiv:2203.03455 [Physics]*. http://arxiv.org/abs/2203.03455

Guallart-Naval, T., O’Reilly, T., Algarín, J. M., Pellicer-Guridi, R., Vives-Gilabert, Y., Craven-Brightman, L., Negnevitsky, V., Menküc, B., Galve, F., Stockmann, J. P., Webb, A. & Alonso, J. (2022). Benchmarking the Performance of a Low-Cost Magnetic Resonance Control System at Multiple Sites in the Open MaRCoS Community. *ArXiv:2203.11314 [Physics]*. http://arxiv.org/abs/2203.11314

Harper, J. R., Cherukuri, V., O’Reilly, T., Yu, M., Mbabazi-Kabachelor, E., Mulando, R., Sheth, K. N., Webb, A. G., Warf, B. C., Kulkarni, A. V., Monga, V. & Schiff, S. J. (2021). Assessing the Utility of Low Resolution Brain Imaging: Treatment of Infant Hydrocephalus. *NeuroImage Clinical*, *32*, 102896. <https://doi.org/10.1016/j.nicl.2021.102896> PMID: 34911199

Hennig, J. An evolution of low-field strength MRI. *Magn Reson Mater* *Phy* *33* 335–346 (2023). https://doi.org/10.1007/s10334-023-01104-z

Hovis, G., Langdorf, M., Dang, E. & Chow, D. (2021). MRI at the Bedside: A Case Report Comparing Fixed and Portable Magnetic Resonance Imaging for Suspected Stroke. *Cureus*, *13*(8). https://doi.org/10.7759/cureus.16904

Huang, S., Ren, Z. H., Obruchkov, S., Gong, Ji., Dykstra, R. & Yu, W. (2019). Portable Low-Cost MRI System Based on Permanent Magnets/Magnet Arrays. *Investigative Magnetic Resonance Imaging*, *23*(3), 179–201. https://doi.org/10.13104/imri.2019.23.3.179

Iglesias, J. E., Schleicher, R., Laguna, S., Billot, B., Schaefer, P., McKaig, B., Goldstein, J. N., Sheth, K. N., Rosen, M. S. & Kimberly, W. T. (2022). Accurate Super-Resolution Low-Field Brain MRI. *ArXiv:2202.03564 [Cs, Eess]*. http://arxiv.org/abs/2202.03564

Islam, O., Lin, A. W., & Bharatha, A. (2023). Potential application of ultra-low field portable MRI in the ICU to improve CT and MRI access in Canadian hospitals: a multi-center retrospective analysis. Frontiers in neurology, 14, 1220091. <https://doi.org/10.3389/fneur.2023.1220091> PMID: 37808492

J.M. Algar, T. Guallart-Naval, E. Gastalda-Orqu, R. Bosch, F.J. Lloris, E. Pall, J.P. Rigla, P. Martinez, J. Borreguero, R. Alamar, L. Mart-Bonmat, J.M. Benlloch, F. Galve and J. Alonso. (2023). “Portable MRI for major sporting events -- a case study on the MotoGP World Championship” *arXiv:2303.09264v2 [physics.med-ph]. https*://arxiv.org/pdf/2303.09264.pdf

Kawatra, K. D., Okar, S. V., By, S., Mina, Y., Fletcher, A., Azodi, S., Reich, D. S., Nair, G. & Cortese, I. C. M. (2022). Utility and Feasibility of Portable Ultra-Low Field MRI in Patients with Progressive Multifocal Leukoencephalopathy. *Neurology, 98*(18 Supplement). https://n.neurology.org/content/98/18\_Supplement/3385

Kimberly, W. T., Sorby-Adams, A. J., Webb, A. G., Wu, E. X., Beekman, R., Bowry, R., Schiff, S. J., de Havenon, A., Shen, F. X., Sze, G., Schaefer, P., Iglesias, J. E., Rosen, M. S., & Sheth, K. N. (2023). Brain imaging with portable low-field MRI. Nature reviews bioengineering, 1(9), 617–630. https://doi.org/10.1038/s44222-023-00086-wLiu, Y., Leong, A.T., Zhao, Y., Xiao, L., Mak, H.K., Tsang, A.C.O., Lau, G.K., Leung, G.K. & Wu, E.X. (2021). A Low-Cost and Shielding-Free Ultra-Low-Field Brain MRI Scanner. *Nature Communications*, *12*(1), 1–14. https://doi.org/10.1038/s41467-021-27317-1 PMID: 34907181

Marques, J. P., van Kemenade, W., Gazzo, S., Grodzki, D., Knopp, E. A. & Stainsby, J. (2021). ESMRMB Annual Meeting Roundtable Discussion: “When Less is More: The View of MRI Vendors on Low-Field MRI.” *Magnetic Resonance Materials in Physics, Biology and Medicine*. https://doi.org/10.1007/s10334-021-00938-9 PMCID: PMC8278376

Mazurek, M. H., Cahn, B. A., Yuen, M. M., Prabhat, A. M., Chavva, I. R., Shah, J. T., Crawford, A. L., Welch, E. B., Rothberg, J., Sacolick, L., Poole, M., Wira, C., Matouk, C. C., Ward, A., Timario, N., Leasure, A., Beekman, R., Peng, T. J., Witsch, J., … Sheth, K. N. (2021). Portable, Bedside, Low-Field Magnetic Resonance Imaging for Evaluation of Intracerebral Hemorrhage. *Nature Communications*, *12*, 5119. https://doi.org/10.1038/s41467-021-25441-6 PMID: 34433813

Mazurek, M. H., Parasuram, N. R., Peng, T. J., Beekman, R., Yadlapalli, V., Sorby-Adams, A. J., Lalwani, D., Zabinska, J., Gilmore, E. J., Petersen, N. H., Falcone, G. J., Sujijantarat, N., Matouk, C., Payabvash, S., Sze, G., Schiff, S. J., Iglesias, J. E., Rosen, M. S., de Havenon, A., Kimberly, W. T., … Sheth, K. N. (2023). Detection of Intracerebral Hemorrhage Using Low-Field, Portable Magnetic Resonance Imaging in Patients With Stroke. Stroke, 10.1161/STROKEAHA.123.043146. Advance online publication. <https://doi.org/10.1161/STROKEAHA.123.043146> PMID: 37795593

McDaniel, P. C., Cooley, C. Z., Stockmann, J. P. & Wald, L. L. (2019). The MR Cap: A single-Sided MRI System Designed for Potential Point-of-Care Limited Field-of-View Brain Imaging. *Magnetic Resonance in Medicine*, *82*(5), 1946–1960. https://doi.org/10.1002/mrm.27861 PMCID: PMC6660420

Miyasaka, T., Kajiwara, M., Kawasaki, A., Okamoto, Y. & Terada, Y. (2022). Development of a Car-Mounted Mobile MR Imaging System for Diagnosis of Sports-related Wrist Injury. *Magnetic Resonance in Medical Sciences*. https://doi.org/10.2463/mrms.tn.2021-0158 PMID: 35473757

Mullen, M., Kobayashi, N. & Garwood, M. (2019). Two-Dimensional Frequency-Swept Pulse with Resilience to Both B1 and B0 Inhomogeneity. *Journal of Magnetic Resonance*, *299*, 93–100. https://doi.org/10.1016/j.jmr.2018.12.017 PMCID: PMC6369020

Norris, D. G. & Webb, A. (2021). This House Proposes that Low Field and High Field MRI are by Destiny Worst Enemies, and Can Never Be the Best of Friends! *Magnetic Resonance Materials in Physics, Biology and Medicine*. https://doi.org/10.1007/s10334-021-00940-1

Obungoloch, J. & Ahishakiye, E. (2021). *Approaches for Image Reconstruction in Low-Field Magnetic Resonance Imaging*. Research Square. https://doi.org/10.21203/rs.3.rs-1127552/v1

Parasuram, N. R., Crawford, A. L., Mazurek, M. H., Chavva, I. R., Beekman, R., Gilmore, E. J., ... & Sheth, K. N. (2023). Future of Neurology & Technology: Neuroimaging Made Accessible Using Low-Field, Portable MRI. *Neurology*. https://doi.org/10.1212/WNL.0000000000207074" https://doi.org/10.1212/WNL.0000000000207074 PMCID: 36720639

Peng, Y., Li, M., Grandinetti, J., Wang, G. & Jia, X. (2022). Top-Level Design and Simulated Performance of the First Portable CT-MR Scanner. *ArXiv:2203.15989 [Physics]*. http://arxiv.org/abs/2203.15989

Prabhat, A. M., Crawford, A. L., Mazurek, M. H., Yuen, M. M., Chavva, I. R., Ward, A., Hofmann, W. V., Timario, N., Qualls, S. R., Helland, J., Wira, C., Sze, G., Rosen, M. S., Kimberly, W. T. & Sheth, K. N. (2021). Methodology for Low-Field, Portable Magnetic Resonance Neuroimaging at the Bedside. *Frontiers in Neurology*, *12*, 760321. https://doi.org/10.3389/fneur.2021.760321 PMID: 34956049

Roberts, D. R., McGeorge, T., Abrams, D., Hewitt, R., LeBlanc, D., Dennis, W., Rosenberg, M., Kasab, S. A., Holmstedt, C., Spampinato, M. V., Torres-Rosado, S., Ancrum, R., Haschker, M., & Harvey, J. (2023). Mobile point-of-care MRI demonstration of a normal volunteer in a telemedicine-equipped ambulance. *Journal of stroke and cerebrovascular diseases,* 32(10), 107301. Advance online publication. https://doi.org/10.1016/j.jstrokecerebrovasdis.2023.107301

Sabir, H., Kipfmueller, F., Bagci, S., Dresbach, T., Grass, T., Nitsch-Felsecker, P., Pantazis, C., Schmitt, J., Schroeder, L., & Mueller, A. (2023). Feasibility of bedside portable MRI in neonates and children during ECLS. *Critical care (London, England), 27(1), 134*. <https://doi.org/10.1186/s13054-023-04416-7>

Salameh, N., Lurie, D.J., Ipek, Ö. et al. Exploring the foothills: benefits below 1 Tesla?. *Magn Reson Mater Phy* (2023). https://doi.org/10.1007/s10334-023-01106-x

Sarracanie, M., LaPierre, C. D., Salameh, N., Waddington, D. E. J., Witzel, T. & Rosen, M. S. (2015). Low-Cost High-Performance MRI. *Scientific Reports*, *5*(1), 15177. https://doi.org/10.1038/srep15177 PMCID: PMC4606787

Sarracanie, M. & Salameh, N. (2020). Low-Field MRI: How Low Can We Go? A Fresh View on an Old Debate. *Frontiers in Physics*, *8*, 172. https://www.frontiersin.org/article/10.3389/fphy.2020.00172

Sheth, K. N., Yuen, M. M., Mazurek, M. H., Cahn, B. A., Prabhat, A. M., Salehi, S., Shah, J. T., By, S., Welch, E. B., Sofka, M., Sacolick, L. I., Kim, J. A., Payabvash, S., Falcone, G. J., Gilmore, E. J., Hwang, D. Y., Matouk, C., Gordon-Kundu, B., Rn, A. W., … Kundu, P. (2022). Bedside Detection of Intracranial Midline Shift Using Portable Magnetic Resonance Imaging. *Scientific Reports*, *12*(1), 67. https://doi.org/10.1038/s41598-021-03892-7 PMID: 34996970

Shoghli, A., Chow, D., Kuoy, E., & Yaghmai, V. (2023). Current role of portable MRI in diagnosis of acute neurological conditions. Frontiers in Neurology, 14. https://doi.org/10.3389/fneur.2023.1255858

Sien, M. E., Robinson, A. L., Hu, H. H., Nitkin, C. R., Hall, A. S., Files, M. G., Artz, N. S., Pitts, J. T. & Chan, S. S. (2022). Feasibility of and Experience Using a Portable MRI Scanner in the Neonatal Intensive Care Unit. *Archives of Disease in Childhood - Fetal and Neonatal Edition*, F1–F6. https://doi.org/10.1136/archdischild-2022-324200 PMID: 35788031

Torres, E., Froelich, T., Wang, P., DelaBarre, L., Mullen, M., Adriany, G., Pizetta, D. C., Martins, M. J., Vidoto, E. L. G., Tannús, A. & Garwood, M. (2021). B1-Gradient–Based MRI Using Frequency-Modulated Rabi-Encoded Echoes. *Magnetic Resonance in Medicine*, mrm.29002, 1–12. https://doi.org/10.1002/mrm.29002

Tyszka, J. M. (2021). Compact Brain MRI. *Nature Biomedical Engineering*, *5*(3), 201–202. https://doi.org/10.1038/s41551-021-00702-3 PMID: 33727710

Wald, L. L., McDaniel, P. C., Witzel, T., Stockmann, J. P. & Cooley, C. Z. (2020). Low-Cost and Portable MRI. *Journal of Magnetic Resonance Imaging*, *52*(3), 686–696. https://doi.org/10.1002/jmri.26942

Weinreb, J. C. (2021). Low-Cost Low-Field MRI Has Arrived: What Does It Mean for Radiology? *Journal of the American College of Radiology*. Advance online publication. https://doi.org/10.1016/j.jacr.2021.09.025

Yuen, M. M., Prabhat, A. M., Mazurek, M. H., Chavva, I. R., Crawford, A., Cahn, B. A., Beekman, R., Kim, J. A., Gobeske, K. T., Petersen, N. H., Falcone, G. J., Gilmore, E. J., Hwang, D. Y., Jasne, A. S., Amin, H., Sharma, R., Matouk, C., Ward, A., Schindler, J., … Sheth, K. N. (2022). Portable, Low-Field Magnetic Resonance Imaging Enables Highly Accessible and Dynamic Bedside Evaluation of Ischemic Stroke. *Science Advances*, *8*(16), eabm3952. https://doi.org/10.1126/sciadv.abm3952 PMID: 35442729

**Portable MEG**

*Magnetoencephalography (MEG) measures the magnetic waves created by the brain’s neural activity. Traditional MEG requires a large device, a big liquid helium cooling unit, and a motionless participant. But researchers are now developing portable MEG technology that relaxes those constraints. The citations below are selected publications describing new, portable MEG.*

Boto, E., Hill, R. M., Rea, M., Holmes, N., Seedat, Z. A., Leggett, J., Shah, V., Osborne, J., Bowtell, R. & Brookes, M. J. (2021). Measuring Functional Connectivity with Wearable MEG. *NeuroImage*, *230*, 117815. https://doi.org/10.1016/j.neuroimage.2021.117815 PMCID: PMC8216250

Boto, E., Holmes, N., Leggett, J., Roberts, G., Shah, V., Meyer, S. S., Muñoz, L. D., Mullinger, K. J., Tierney, T. M., Bestmann, S., Barnes, G. R., Bowtell, R. & Brookes, M. J. (2018). Moving Magnetoencephalography Towards Real-World Applications with a Wearable System. *Nature*, *555*(7698), 657–661. https://doi.org/10.1038/nature26147 PMCID: PMC6063354

Boto, E., Seedat, Z. A., Holmes, N., Leggett, J., Hill, R. M., Roberts, G., Shah, V., Fromhold, T. M., Mullinger, K. J., Tierney, T. M., Barnes, G. R., Bowtell, R. & Brookes, M. J. (2019). Wearable Neuroimaging: Combining and Contrasting Magnetoencephalography and Electroencephalography. *NeuroImage*, *201*, 116099. https://doi.org/10.1016/j.neuroimage.2019.116099 PMCID: PMC8235152

Hill, R. M., Boto, E., Holmes, N., Hartley, C., Seedat, Z. A., Leggett, J., Roberts, G., Shah, V., Tierney, T. M., Woolrich, M. W., Stagg, C. J., Barnes, G. R., Bowtell, R., Slater, R. & Brookes, M. J. (2019). A Tool for Functional Brain Imaging with Lifespan Compliance. *Nature Communications*, *10*(1), 4785. https://doi.org/10.1038/s41467-019-12486-x PMCID: PMC6831615

Hill, R. M., Boto, E., Rea, M., Holmes, N., Leggett, J., Coles, L. A., Papastavrou, M., Everton, S. K., Hunt, B. A. E., Sims, D., Osborne, J., Shah, V., Bowtell, R. & Brookes, M. J. (2020). Multi-Channel Whole-Head OPM-MEG: Helmet Design and a Comparison with a Conventional System. *NeuroImage*, *219*, 116995. https://doi.org/10.1016/j.neuroimage.2020.116995 PMCID: PMC8274815

Hill, R. M., Devasagayam, J., Holmes, N., Boto, E., Shah, V., Osborne, J., Safar, K., Worcester, F., Mariani, C., Dawson, E., Woolger, D., Bowtell, R., Taylor, M. J. & Brookes, M. J. (2022). Using OPM-MEG in Contrasting Magnetic Environments. *NeuroImage*, *253*, 119084. https://doi.org/10.1016/j.neuroimage.2022.119084 PMID: 35278706

Holmes, N., Tierney, T. M., Leggett, J., Boto, E., Mellor, S., Roberts, G., Hill, R. M., Shah, V., Barnes, G. R., Brookes, M. J. & Bowtell, R. (2019). Balanced, Bi-Planar Magnetic Field and Field Gradient Coils for Field Compensation in Wearable Magnetoencephalography. *Scientific Reports*, *9*(1), 14196. https://doi.org/10.1038/s41598-019-50697-w PMCID: PMC6775070

Paek, A. Y., Kilicarslan, A., Korenko, B., Gerginov, V., Knappe, S. & Contreras-Vidal, J. L. (2020). Towards a Portable Magnetoencephalography Based Brain Computer Interface with Optically-Pumped Magnetometers. *2020 42nd Annual International Conference of the IEEE Engineering in Medicine Biology Society (EMBC)*, 3420–3423. https://doi.org/10.1109/EMBC44109.2020.9176159

Rea, M., Holmes, N., Hill, R. M., Boto, E., Leggett, J., Edwards, L. J., Woolger, D., Dawson, E., Shah, V., Osborne, J., Bowtell, R. & Brookes, M. J. (2021). Precision Magnetic Field Modelling and Control for Wearable Magnetoencephalography. *NeuroImage*, *241*, 118401. https://doi.org/10.1016/j.neuroimage.2021.118401

Tierney, T. M., Holmes, N., Meyer, S. S., Boto, E., Roberts, G., Leggett, J., Buck, S., Duque-Muñoz, L., Litvak, V., Bestmann, S., Baldeweg, T., Bowtell, R., Brookes, M. J. & Barnes, G. R. (2018). Cognitive Neuroscience Using Wearable Magnetometer Arrays: Non-Invasive Assessment of Language Function. *NeuroImage*, *181*, 513–520. https://doi.org/10.1016/j.neuroimage.2018.07.035 PMCID: PMC6150946

Tierney, T. M., Mellor, S., O’Neill, G. C., Holmes, N., Boto, E., Roberts, G., Hill, R. M., Leggett, J., Bowtell, R., Brookes, M. J. & Barnes, G. R. (2020). Pragmatic Spatial Sampling for Wearable MEG Arrays. *Scientific Reports*, *10*(1), 21609. https://doi.org/10.1038/s41598-020-77589-8 PMCID: PMC7729945

**Portable PET**

*Positron emission tomography (PET) is a method of indirectly measuring brain function by injecting a radioactive tracer into the bloodstream and then tracking how brain cells consume glucose. Traditional PET technology has required a large machine, with patients flat on their back. But new research is exploring the possibility of more portable and wearable PET technology. The citations below are selected publications describing these advances.*

Allison, J., Antkowiak, P., Bellam, N., Castro, F., Chen, L., Correia, P., Encarnação, P., Veloso, J., Mięsak, P., Morichi, M., Ren, Z., Simpura, S., Suhonen, E., Venturini, Y. & Watts, S. (n.d.). Wearable Positron Emission Tomography. *ATTRACT*. https://phase1.attract-eu.com/wp-content/uploads/2019/05/WPET.pdf

Bauer, C. E., Brefczynski-Lewis, J., Marano, G., Mandich, M.-B., Stolin, A., Martone, P., Lewis, J. W., Jaliparthi, G., Raylman, R. R. & Majewski, S. (2016). Concept of an Upright Wearable Positron Emission Tomography Imager in Humans. *Brain and Behavior*, *6*(9), e00530. https://doi.org/10.1002/brb3.530 PMCID: PMC5036439

Flatz, W., Hinzmann, D., Kampmann, P., Poehlmann, L., Reidler, P., Schlichtiger, J., Kanz, K. G., Ricke, J., Bazarian, J., & Bogner-Flatz, V. (2023). Mobile Computed Tomography at Munich Oktoberfest. The New England journal of medicine, 389(11), 1051–1052. <https://doi.org/10.1056/NEJMc2306490> PMID: 37703560

Hwang, S., Song, Y. & Kim, J. (2021). Evaluation of AI-Assisted Telemedicine Service Using a Mobile Pet Application. *Applied Sciences*, *11*(6), 2707. https://doi.org/10.3390/app11062707

Kinahan, P., Majewski, S., Elston, B., Harrison, R., Qi, J., Manjeshwar, R., Dolinsky, S., Stolin, A. & Brefczynski-Lewis, J. (2015). Design Considerations for AMPET: The Ambulatory Micro-Dose, Wearable PET Brain Imager. *Journal of Nuclear Medicine*, *56*(supplement 3), 1540–1540.

Noble, R. M. (2019). Ambulatory Microdose PET: A Wearable PET Scanner for Neurologic Imaging. *Journal of Nuclear Medicine Technology*, *47*(4), 336–340. https://doi.org/10.2967/jnmt.119.228718 PMID: 31182665

Suzuki, M., Fushimi, Y., Okada, T., Hinoda, T., Nakamoto, R., Arakawa, Y., Sawamoto, N., Togashi, K. & Nakamoto, Y. (2021). Quantitative and Qualitative Evaluation of Sequential PET/MRI Using a Newly Developed Mobile PET System for Brain Imaging. *Japanese Journal of Radiology*, *39*(7), 669–680. https://doi.org/10.1007/s11604-021-01105-9

Tao, W., Weng, F., Chen, G., Lv, L., Zhao, Z., Xie, S., Zan, Y., Xu, J., Huang, Q. & Peng, Q. (2020). Design Study of Fully Wearable High-Performance Brain PETs for Neuroimaging in Free Movement. *Physics in Medicine & Biology*, *65*(13), 135006. https://doi.org/10.1088/1361-6560/ab8c90

van der Linden, D., Zamansky, A., Hadar, I., Craggs, B. & Rashid, A. (2019). Buddy’s Wearable Is Not Your Buddy: Privacy Implications of Pet Wearables. *IEEE Security Privacy*, *17*(3), 28–39. https://doi.org/10.1109/MSEC.2018.2888783

Yamamoto, S., Honda, M., Oohashi, T., Shimizu, K. & Senda, M. (2011). Development of a Brain PET System, PET-Hat: A Wearable PET System for Brain Research. *IEEE Transactions on Nuclear Science*, *58*(3), 668–673. https://doi.org/10.1109/TNS.2011.2105502

**Portable fNIRS**

*Functional near-infrared spectroscopy (fNIRS) utilizes sensers on the human scalp and optimal imaging to indirectly measure brain function by detecting changes in cerebral blood flow. fNIRS has always been more portable than fixed MRI, MEG, and PET, but new advances are allowing for even more portability at lower costs. The citations below present selected research utilizing portable fNIRS.*

Agrò, D., Canicattì, R., Pinto, M., Morsellino, G., Tomasino, A., Adamo, G., Curcio, L., Parisi, A., Stivala, S., Galioto, N., Busacca, A. & Giaconia, C. (2016). Design and Implementation of a Portable fNIRS Embedded System. In A. De Gloria (Ed.), *Applications in Electronics Pervading Industry, Environment and Society 2014* (pp. 43–50). Springer International Publishing. https://doi.org/10.1007/978-3-319-20227-3\_6

Arakawa, T., Hibi, R. & Fujishiro, T. (2019). Psychophysical Assessment of a Driver’s Mental State in Autonomous Vehicles. *Transportation Research Part A: Policy and Practice*, *124*, 587–610. https://doi.org/10.1016/j.tra.2018.05.003

Baker, J. M., Rojas, -Valverde Daniel, Guti, érrez R., Winkler, M., Fuhrimann, S., Eskenazi, B., Reiss, A. L. & Mora, A. M. (n.d.). Portable Functional Neuroimaging as an Environmental Epidemiology Tool: A How-To Guide for the Use of fNIRS in Field Studies. *Environmental Health Perspectives*, *125*(9), 094502. https://doi.org/10.1289/EHP2049 PMCID: PMC5915206

Barreto, C. & Soltanlou, M. (2022). Functional Near-Infrared Spectroscopy as a Tool to Assess Brain Activity in Educational Settings: An Introduction for Educational Researchers. *South African Journal of Childhood Education*, *12*(1), 10. https://doi.org/10.4102/sajce.v12i1.1138

Bergen-Cico, D., Hirshfield, L. & Costa, M. (2018). Measuring the Neural Correlates of Mindfulness with Functional Near-Infrared Spectroscopy. In D. Grimes, Q. Wang & H. Lin (Eds.), *Empirical Studies of Contemplative Practices* (pp. 117–145). Nova Science Publishers.

Blasi, A., Lloyd-Fox, S., Katus, L. & Elwell, C. E. (2019). FNIRS for Tracking Brain Development in the Context of Global Health Projects. *Photonics*, *6*(3), 89. https://doi.org/10.3390/photonics6030089 PMCID: PMC7745110

Burgess, P. W., Crum, J., Pinti, P., Aichelburg, C., Oliver, D., Lind, F., Power, S., Swingler, E., Hakim, U., Merla, A., Gilbert, S., Tachtsidis, I. & Hamilton, A. (2022). Prefrontal Cortical Activation Associated with Prospective Memory While Walking Around A Real-World Street Environment. *NeuroImage,* 258, 119392. https://doi.org/10.1016/j.neuroimage.2022.119392 PMID: 35714887

Fishell, A. K., Arbeláez, A. M., Valdés, C. P., Burns-Yocum, T. M., Sherafati, A., Richter, E. J., Torres, M., Eggebrecht, A. T., Smyser, C. D. & Culver, J. P. (2020). Portable, Field-Based Neuroimaging Using High-Density Diffuse Optical Tomography. *NeuroImage*, *215*, 116541. https://doi.org/10.1016/j.neuroimage.2020.116541

Friesen, C. L., Lawrence, M., Ingram, T. G. J., Smith, M. M., Hamilton, E. A., Holland, C. W., Neyedli, H. F. & Boe, S. G. (2022). Portable Wireless and Fibreless fNIRS Headband Compares Favorably to a Stationary Headcap-Based System. *PLOS ONE*, *17*(7), e0269654. https://doi.org/10.1371/journal.pone.0269654 PMID: 35834524

Herold, F., Wiegel, P., Scholkmann, F. & Müller, N. G. (2018). Applications of Functional Near-Infrared Spectroscopy (fNIRS) Neuroimaging in Exercise–Cognition Science: A Systematic, Methodology-Focused Review. *Journal of Clinical Medicine*, *7*(12), 466. https://doi.org/10.3390/jcm7120466 PMCID: PMC6306799

Huve, G., Takahashi, K. & Hashimoto, M. (2017). Brain Activity Recognition with a Wearable fNIRS Using Neural Networks. *2017 IEEE International Conference on Mechatronics and Automation*, 1573–1578. https://doi.org/10.1109/ICMA.2017.8016051

Ishida, M., Ushioda, S., Nagasawa, Y., Komuroa, Y., Tang, Z., Hu, L., Tamura, T. & Sakatani, K. (2020). Development of an IoT-Based Monitoring System for Healthcare: A Preliminary Study. In P.-D. Ryu, J. C. LaManna, D. K. Harrison & S.-S. Lee (Eds.), *Oxygen Transport to Tissue XLI* (pp. 291–297). Springer International Publishing. https://doi.org/10.1007/978-3-030-34461-0\_37

Jasińska, K. K. & Guei, S. (2018). Neuroimaging Field Methods Using Functional Near Infrared Spectroscopy (NIRS) Neuroimaging to Study Global Child Development: Rural Sub-Saharan Africa. *Journal of Visualized Experiments: JoVE*, *132*, e57165. https://doi.org/10.3791/57165 PMID: 29443053

Kassab, A., Hinnoutondji Toffa, D., Robert, M., Lesage, F., Peng, K. & Khoa Nguyen, D. (2021). Hemodynamic Changes Associated with Common EEG Patterns in Critically Ill Patients: Pilot Results from Continuous EEG-fNIRS Study. *NeuroImage : Clinical*, *32*, 102880. https://doi.org/10.1016/j.nicl.2021.102880 PMID: 34773798

Kopton, I. M. & Kenning, P. (2014). Near-Infrared Spectroscopy (NIRS) as a New Tool for Neuroeconomic Research. *Frontiers in Human Neuroscience*, *8*, 549. https://doi.org/10.3389/fnhum.2014.00549 PMCID: PMC4124877

Krampe, C., Gier, N. R. & Kenning, P. (2018). The Application of Mobile fNIRS in Marketing Research—Detecting the “First-Choice-Brand” Effect. *Frontiers in Human Neuroscience*, *12*, 433. https://doi.org/10.3389/fnhum.2018.00433 PMCID: PMC6222120

Kwasa, J., Peterson, H. M., Karrobi, K., Jones, L., Parker, T., Nickerson, N., & Wood, S. (2023). Demographic reporting and phenotypic exclusion in fNIRS. Frontiers in neuroscience, 17, 1086208. https://doi.org/10.3389/fnins.2023.1086208

Li, C., Su, M., Xu, J., Jin, H. & Sun, L. (2020). A Between-Subject fNIRS-BCI Study on Detecting Self-Regulated Intention During Walking. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, *28*(2), 531–540. https://doi.org/10.1109/TNSRE.2020.2965628 PMID: 31940543

Lühmann, A. von, Lühmann, A. von, Zimmermann, B. B., Ortega-Martinez, A., Perkins, N., Yücel, M. A., Yücel, M. A., Boas, D. A. & Boas, D. A. (2020, April 20–23). *Towards Neuroscience in the Everyday World: Progress in Wearable fNIRS Instrumentation and Applications* [Paper presentation]. Biophotonics Congress: Biomedical Optics 2020, Washington D.C., United States.https://doi.org/10.1364/BRAIN.2020.BM3C.2

Martini, M. & Arias, N. (2021). Near-Infrared Light Spectroscopy and Stimulation in Cognitive Neuroscience: The Need for an Integrative View? *Journal of Integrative Neuroscience*, *20*(4), 1105–1109. https://doi.org/10.31083/j.jin2004111 PMID: 34997733

Meyerding, S. G. & Risius, A. (2018). Reading Minds: Mobile Functional Near-Infrared Spectroscopy as a New Neuroimaging Method for Economic and Marketing Research—A Feasibility Study. *Journal of Neuroscience, Psychology, and Economics*, *11*(4), 197.

Pinti, P., Aichelburg, C., Gilbert, S., Hamilton, A., Hirsch, J., Burgess, P. & Tachtsidis, I. (2018). A Review on the Use of Wearable Functional Near-Infrared Spectroscopy in Naturalistic Environments. *Japanese Psychological Research*, *60*(4), 347–373. https://doi.org/10.1111/jpr.12206 PMCID: PMC6329605

Pinti, P., Aichelburg, C., Lind, F., Power, S., Swingler, E., Merla, A., Hamilton, A., Gilbert, S., Burgess, P. & Tachtsidis, I. (2015). Using Fiberless, Wearable fNIRS to Monitor Brain Activity in Real-world Cognitive Tasks. *Journal of Visualized Experiments*, *106*, 53336. https://doi.org/10.3791/53336 PMCID: PMC4692764

Piper, S. K., Krueger, A., Koch, S. P., Mehnert, J., Habermehl, C., Steinbrink, J., Obrig, H. & Schmitz, C. H. (2014). A Wearable Multi-Channel fNIRS System for Brain Imaging in Freely Moving Subjects. *NeuroImage*, *85*, 64–71. https://doi.org/10.1016/j.neuroimage.2013.06.062 PMCID: PMC3859838

Quaresima, V. & Ferrari, M. (2019). Functional Near-Infrared Spectroscopy (fNIRS) for Assessing Cerebral Cortex Function During Human Behavior in Natural/Social Situations: A Concise Review. *Organizational Research Methods*, *22*(1), 46–68. https://doi.org/10.1177/1094428116658959

Sagiv, S. K., Bruno, J. L., Baker, J. M., Palzes, V., Kogut, K., Rauch, S., Gunier, R., Mora, A. M., Reiss, A. L. & Eskenazi, B. (2019). Prenatal Exposure to Organophosphate Pesticides and Functional Neuroimaging in Adolescents Living in Proximity to Pesticide Application. *Proceedings of the National Academy of Sciences*, *116*(37), 18347–18356. https://doi.org/10.1073/pnas.1903940116 PMID: 31451641

Saikia, M. J., Besio, W. G. & Mankodiya, K. (2019). WearLight: Toward a Wearable, Configurable Functional NIR Spectroscopy System for Noninvasive Neuroimaging. *IEEE Transactions on Biomedical Circuits and Systems*, *13*(1), 91–102. https://doi.org/10.1109/TBCAS.2018.2876089

Saikia, M. J. & Mankodiya, K. (2018). A Wireless fNIRS Patch with Short-Channel Regression to Improve Detection of Hemodynamic Response of Brain. *2018 International Conference on Electrical, Electronics, Communication, Computer, and Optimization Techniques*, 90–96. https://doi.org/10.1109/ICEECCOT43722.2018.9001342

Schober, P. & Schwarte, L. A. (2020). Thinking Out of the (Big) Box: A Wearable Near-Infrared Spectroscopy Monitor for the Helicopter Emergency Medical Service. *Air Medical Journal*, *39*(2), 120–123. https://doi.org/10.1016/j.amj.2019.10.002 PMID: 32197689

Si, J., Zhao, R., Zhang, Y., Zuo, N., Zhang, X. & Jiang, T. (2015). A Portable fNIRS System with Eight Channels. *Optical Techniques in Neurosurgery, Neurophotonics, and Optogenetics II*, *9305*, 93051B. https://doi.org/10.1117/12.2080947

Stuart, S., Belluscio, V., Quinn, J. F. & Mancini, M. (2019). Pre-frontal Cortical Activity During Walking and Turning Is Reliable and Differentiates Across Young, Older Adults and People With Parkinson’s Disease. *Frontiers in Neurology*, *10*, 536. https://doi.org/10.3389/fneur.2019.00536 PMCID: PMC6540937

Tan, S. H. J., Wong, J. N., & Teo, W.-P. (2023). Is neuroimaging ready for the classroom? A systematic review of hyperscanning studies in learning. NeuroImage, 281, 120367. https://doi.org/10.1016/j.neuroimage.2023.120367

Tang, L., Si, J., Sun, L., Mao, G. & Yu, S. (2022). Assessment of the Mental Workload of Trainee Pilots of Remotely Operated Aircraft Using Functional Near-Infrared Spectroscopy. *BMC Neurology, 22*(1), 160. https://doi.org/10.1186/s12883-022-02683-5 PMID: 35490209

Tsow, F., Kumar, A., Hosseini, S. H. & Bowden, A. (2021). A Low-Cost, Wearable, Do-it-Yourself Functional Near-Infrared Spectroscopy (DIY-fNIRS) Headband. *HardwareX*, *10*, e00204. https://doi.org/10.1016/j.ohx.2021.e00204

von Lühmann, A., Herff, C., Heger, D. & Schultz, T. (2015). Toward a Wireless Open Source Instrument: Functional Near-infrared Spectroscopy in Mobile Neuroergonomics and BCI Applications. *Frontiers in Human Neuroscience*, *9*, 617. <https://doi.org/10.3389/fnhum.2015.00617> PMCID: PMC6540937

Wang, J., Gao, X., Xiang, Z., Sun, F., & Yang, Y. (2023). Evaluation of consciousness rehabilitation via neuroimaging methods. Frontiers in human neuroscience, 17, 1233499. <https://doi.org/10.3389/fnhum.2023.1233499> PMID: 37780959

Wang, Q., Zhu, G.-P., Yi, L., Cui, X.-X., Wang, H., Wei, R.-Y. & Hu, B.-L. (2020). A Review of Functional Near-Infrared Spectroscopy Studies of Motor and Cognitive Function in Preterm Infants. *Neuroscience Bulletin*, *36*(3), 321–329. https://doi.org/10.1007/s12264-019-00441-1 PMCID: PMC7056771

Wheelock, M. D., Culver, J. P. & Eggebrecht, A. T. (2019). High-Density Diffuse Optical Tomography for Imaging Human Brain Function. *Review of Scientific Instruments*, *90*(5), 051101. https://doi.org/10.1063/1.5086809 PMCID: PMC6533110

Wyser, D. G., Lambercy, O., Scholkmann, F., Wolf, M. & Gassert, R. (2017). Wearable and Modular Functional Near-Infrared Spectroscopy Instrument with Multidistance Measurements at Four Wavelengths. *Neurophotonics*, *4*(4), 041413. https://doi.org/10.1117/1.NPh.4.4.041413 PMCID: PMC5562388

Yaqub, M. A., Woo, S.-W. & Hong, K.-S. (2020). Compact, Portable, High-Density Functional Near-Infrared Spectroscopy System for Brain Imaging. *IEEE Access*, *8*, 128224–128238. https://doi.org/10.1109/ACCESS.2020.3008748

**Portable EEG**

*Electroencephalography (EEG) was invented in the 1920s and uses electrodes on the scalp to measure the brain’s electrical activity. Relative to the other technologies included in this bibliography, EEG is the most affordable and most portable. EEG is used in a variety of consumer-grade technologies, in technologies designed to monitor and enhance athletes’ performance, and in many field-based research projects. The citations below present a selection of this portable EEG research, but it should be noted that in the interests of space, much additional portable EEG research is not included here.*

Abdulghani, A. M., Casson, A. J. & Rodriguez-Villegas, E. (2009). Quantifying the Feasibility of Compressive Sensing in Portable Electroencephalography Systems. In D. D. Schmorrow, I. V. Estabrooke & M. Grootjen (Eds.), Foundations of Augmented Cognition*. Neuroergonomics and Operational Neuroscience* (pp. 319–328). Springer. https://doi.org/10.1007/978-3-642-02812-0\_38

Aspinall, P., Mavros, P., Coyne, R. & Roe, J. (2015). The Urban Brain: Analysing Outdoor

Physical Activity with Mobile EEG. *British Journal of Sports Medicine*, *49*(4), 272–276. https://doi.org/10.1136/bjsports-2012-091877 PMID: 23467965

Bhavnani, S., Parameshwaran, D., Sharma, K. K., Mukherjee, D., Divan, G., Patel, V. & Thiagarajan, T. C. (2022). The Acceptability, Feasibility, and Utility of Portable Electroencephalography to Study Resting-State Neurophysiology in Rural Communities. *Frontiers in Human Neuroscience*, *16*, 802764. https://doi.org/10.3389/fnhum.2022.802764 PMID: 35386581

Casson, A. J. (2019). Wearable EEG and Beyond. *Biomedical Engineering Letters*, *9*(1), 53–71.

https://doi.org/10.1007/s13534-018-00093-6 PMID: 30956880

Casson, A. J. & Rodriguez-Villegas, E. (2009). Toward Online Data Reduction for Portable Electroencephalography Systems in Epilepsy. *IEEE Transactions on Biomedical Engineering*, *56*(12), 2816–2825. https://doi.org/10.1109/TBME.2009.2027607 PMID: 19643698

Casson, A. J., Yates, D. C., Smith, S. J. M., Duncan, J. S. & Rodriguez-Villegas, E. (2010). Wearable Electroencephalography. *IEEE Engineering in Medicine and Biology Magazine*, *29*(3), 44–56. https://doi.org/10.1109/MEMB.2010.936545 PMID: 20659857

Chen, X., Li, C., Liu, A., McKeown, M. J., Qian, R. & Wang, Z. J. (2021). Toward Open-World Electroencephalogram Decoding Via Deep Learning: A Comprehensive Survey. *ArXiv:2112.06654v2*. http://arxiv.org/abs/2112.06654

Craik, A., González-España, J. J., Alamir, A., Edquilang, D., Wong, S., Sánchez Rodríguez, L., Feng, J., Francisco, G. E., & Contreras-Vidal, J. L. (2023). Design and Validation of a Low-Cost Mobile EEG-Based Brain-Computer Interface. Sensors (Basel, Switzerland), 23(13), 5930. <https://doi.org/10.3390/s23135930> PMID: 37447780

Dan, J., Vandendriessche, B., Paesschen, W. V., Weckhuysen, D. & Bertrand, A. (2020). Computationally-Efficient Algorithm for Real-Time Absence Seizure Detection in Wearable Electroencephalography. *International Journal of Neural Systems*, *30*(11), 2050035. https://doi.org/10.1142/S0129065720500355 PMID: 32808854

Debener, S., Emkes, R., De Vos, M. & Bleichner, M. (2015). Unobtrusive Ambulatory EEG Using a Smartphone and Flexible Printed Electrodes Around the Ear. *Scientific Reports*, *5*(1), 16743. https://doi.org/10.1038/srep16743 PMCID: PMC4648079

Debener, S., Minow, F., Emkes, R., Gandras, K. & Vos, M. de. (2012). How About Taking a Low-Cost, Small, and Wireless EEG for a Walk? *Psychophysiology*, *49*(11), 1617–1621. https://doi.org/10.1111/j.1469-8986.2012.01471.x PMID: 23013047

Gottlibe, M., Rosen, O., Weller, B., Mahagney, A., Omar, N., Khuri, A., Srugo, I. & Genizi, J. (2020). Stroke Identification Using a Portable EEG Device – A Pilot Study. *Neurophysiologie Clinique*, *50*(1), 21–25. https://doi.org/10.1016/j.neucli.2019.12.004 PMID: 32014371

He, C., Chen, Y. Y., Phang, C. R., Stevenson, C., Chen, I. P., Jung, T. P., & Ko, L. W. (2023). Diversity and Suitability of the State-of-the-Art Wearable and Wireless EEG Systems Review. IEEE journal of biomedical and health informatics, PP, 10.1109/JBHI.2023.3239053. Advance online publication. <https://doi.org/10.1109/JBHI.2023.3239053>

Huang, S.-C. L., Chiang, N. C., Kuo, N.-F. & Chen, Y.-J. (2019). An Exploratory Approach for Using EEG to Examine Person-Environment Interaction. *Landscape Research*, *44*(6), 702–715. https://doi.org/10.1080/01426397.2018.1548586

Jebelli, H., Khalili, M. M. & Lee, S. (2019). Mobile EEG-Based Workers’ Stress Recognition by Applying Deep Neural Network. In I. Mutis & T. Hartmann (Eds.), *Advances in Informatics and Computing in Civil and Construction Engineering* (pp. 173–180). Springer International Publishing. https://doi.org/10.1007/978-3-030-00220-6\_21

Jiang, Z. & Zhao, W. (2020). Optimal Selection of Customized Features for Implementing Seizure Detection in Wearable Electroencephalography Sensor. *IEEE Sensors Journal*, *20*(21), 12941–12949. https://doi.org/10.1109/JSEN.2020.3003733

Jillian T. Teo, Stuart J. Johnstone, Susan J. Thomas, Use of portable devices to measure brain and heart activity during relaxation and comparative conditions: Electroencephalogram, heart rate variability, and correlations with self-report psychological measures, International Journal of Psychophysiology, 2023, ISSN 0167-8760, https://doi.org/10.1016/j.ijpsycho.2023.04.002.

Kosch, T., Funk, M., Schmidt, A. & Chuang, L. L. (2018). Identifying Cognitive Assistance with Mobile Electroencephalography: A Case Study with In-Situ Projections for Manual Assembly. *Proceedings of the ACM on Human-Computer Interaction*, *2*(EICS), 11:1–11:20. https://doi.org/10.1145/3229093

Ladouce, S., Donaldson, D. I., Dudchenko, P. A. & Ietswaart, M. (2019). Mobile EEG Identifies the Re-Allocation of Attention During Real-World Activity. *Scientific Reports*, *9*(1), 15851. https://doi.org/10.1038/s41598-019-51996-y PMCID: PMC6825178

Lareau, E., Lesage, F., Pouliot, P., Lan, J. L., Sawan, M. & Nguyen, D. (2011). Multichannel Wearable System Dedicated for Simultaneous Electroencephalography/Near-Infrared Spectroscopy Real-Time Data Acquisitions. *Journal of Biomedical Optics*, *16*(9), 096014. https://doi.org/10.1117/1.3625575

Lau-Zhu, A., Lau, M. P. H. & McLoughlin, G. (2019). Mobile EEG in Research on Neurodevelopmental Disorders: Opportunities and Challenges. *Developmental Cognitive Neuroscience*, *36*, 100635. https://doi.org/10.1016/j.dcn.2019.100635 PMCID: PMC6534774

Lazarou, I., Oikonomou, V. P., Mpaltadoros, L., Grammatikopoulou, M., Alepopoulos, V., Stavropoulos, T. G., Bezerianos, A., Nikolopoulos, S., Kompatsiaris, I., Tsolaki, M., & RADAR-AD Consortium (2023). Eliciting brain waves of people with cognitive impairment during meditation exercises using portable electroencephalography in a smart-home environment: a pilot study. Frontiers in aging neuroscience, 15, 1167410. <https://doi.org/10.3389/fnagi.2023.1167410> PMID: 37388185

Li, H., Wang, D., Chen, J., Luo, X., Li, J. & Xing, X. (2019). Pre-Service Fatigue Screening for Construction Workers Through Wearable EEG-Based Signal Spectral Analysis. *Automation in Construction*, *106*, 102851. https://doi.org/10.1016/j.autcon.2019.102851

Lin, W., Chen, Q., Jiang, M., Tao, J., Liu, Z., Zhang, X., Wu, L., Xu, S., Kang, Y. & Zeng, Q. (2020). Sitting or Walking? Analyzing the Neural Emotional Indicators of Urban Green Space Behavior with Mobile EEG. *Journal of Urban Health*, *97*(2), 191–203. https://doi.org/10.1007/s11524-019-00407-8 PMCID: PMC7101459

Madison Milne-Ives, Jonas Dunn-Henriksen, Lykke Blaabjerg, Brendan Mclean, Rohit Shankar, Edward Meinert, At home EEG monitoring technologies for people with epilepsy and intellectual disabilities: A scoping review, Seizure, 2023, ISSN 1059-1311, <https://doi.org/10.1016/j.seizure.2023.05.007.>

Martins, I. P., Westerfield, M., Lopes, M., Maruta, C. & Gil-da-Costa, R. (2020). Brain State Monitoring for the Future Prediction of Migraine Attacks. *Cephalalgia*, *40*(3), 255–265. https://doi.org/10.1177/0333102419877660 PMID: 31530007

Mehdi, M., Hennig, L., Diemer, F., Dode, A., Pryss, R., Schlee, W., Reichert, M. & Hauck, F. J. (2021). Towards Mobile-Based Preprocessing Pipeline for Electroencephalography (EEG) Analyses: The Case of Tinnitus. In J. Ye, M. J. O’Grady, G. Civitarese & K. Yordanova (Eds.), *Wireless Mobile Communication and Healthcare* (pp. 67–86). Springer International Publishing. https://doi.org/10.1007/978-3-030-70569-5\_5

Mulkey, M. A., Gantt, L. T., Hardin, S. R., Munro, C. L., Everhart, D. E., Kim, S., Schoeman, A. M., Roberson, D. W., McAuliffe, M. & Olson, D. M. (2022). Rapid Handheld Continuous Electroencephalogram (EEG) Has the Potential to Detect Delirium in Older Adults. *Dimensions of Critical Care Nursing: DCCN*, *41*(1), 29–35. https://doi.org/10.1097/DCC.0000000000000502 PMID: 34817959

Mustile, M., Kourtis, D., Ladouce, S., Learmonth, G., Edwards, M. G., Donaldson, D. I. & Ietswaart, M. (2021). Mobile EEG Reveals Functionally Dissociable Dynamic Processes Supporting Real-World Ambulatory Obstacle Avoidance: Evidence for Early Proactive Control. *European Journal of Neuroscience*, 1–14. https://doi.org/10.1111/ejn.15120

Nagar, P. & Sethia, D. (2019). Brain Mapping Based Stress Identification Using Portable EEG Based Device. *2019 11th International Conference on Communication Systems Networks*, 601–606. https://doi.org/10.1109/COMSNETS.2019.8711009

Neale, C., Aspinall, P., Roe, J., Tilley, S., Mavros, P., Cinderby, S., Coyne, R., Thin, N. & Thompson, C. W. (2020). The Impact of Walking in Different Urban Environments on Brain Activity in Older People. *Cities & Health*, *4*(1), 94–106. https://doi.org/10.1080/23748834.2019.1619893

Nielsen, J. M., Rades, D. & Kjaer, T. W. (2021). Wearable Electroencephalography for Ultra-Long-Term Seizure Monitoring: A Systematic Review and Future Prospects. *Expert Review of Medical Devices*, *18*(sup1), 57–67. https://doi.org/10.1080/17434440.2021.2012152 PMID: 34836477

Nordin, A. D., Hairston, W. D. & Ferris, D. P. (2018). Dual-Electrode Motion Artifact Cancellation for Mobile Electroencephalography. *Journal of Neural Engineering*, *15*(5), 056024. https://doi.org/10.1088/1741-2552/aad7d7

Park, J. L. & Donaldson, D. I. (2019). Detecting the Neural Correlates of Episodic Memory with Mobile EEG: Recollecting Objects in the Real World. *NeuroImage*, *193*, 1–9. https://doi.org/10.1016/j.neuroimage.2019.03.013

Qiu, J. M., Casey, M. A. & Diamond, S. G. (2019). Assessing Feedback Response with a Wearable Electroencephalography System. *Frontiers in Human Neuroscience*, *13*, 258. https://doi.org/10.3389/fnhum.2019.00258 PMCID: PMC6669939

Radüntz, T. & Meffert, B. (2019). User Experience of 7 Mobile Electroencephalography Devices: Comparative Study. *JMIR MHealth and UHealth*, *7*(9), e14474. https://doi.org/10.2196/14474 PMCID: PMC6751099

Reiser, J. E., Wascher, E. & Arnau, S. (2019). Recording Mobile EEG in an Outdoor Environment Reveals Cognitive-Motor Interference Dependent on Movement Complexity. *Scientific Reports*, *9*(1), 13086. https://doi.org/10.1038/s41598-019-49503-4 PMCID: PMC6739372

Ries, A. J., Touryan, J., Vettel, J., McDowell, K. & Hairston, W. D. (2014). A Comparison of Electroencephalography Signals Acquired from Conventional and Mobile Systems. *Journal of Neuroscience and Neuroengineering*, *3*(1), 10–20. https://doi.org/10.1166/jnsne.2014.1092

Sokolov, E., Bachir, D. H. A., Sakadi, F., Williams, J., Vogel, A. C., Schaekermann, M., Tassiou, N., Bah, A. K., Khatri, V., Hotan, G. C., Ayub, N., Leung, E., Fantaneanu, T. A., Patel, A., Vyas, M., Milligan, T., Villamar, M. F., Hoch, D., Purves, S., … Mateen, F. J. (2020). Tablet-Based Electroencephalography Diagnostics for Patients with Epilepsy in the West African Republic of Guinea. *European Journal of Neurology*, *27*(8), 1570–1577. https://doi.org/10.1111/ene.14291

Stangl, M., Maoz, S.L. & Suthana, N. Mobile cognition: imaging the human brain in the ‘real world’. Nat Rev Neurosci 24, 347–362 (2023). https://doi.org/10.1038/s41583-023-00692-y

Stopczynski, A., Stahlhut, C., Petersen, M. K., Larsen, J. E., Jensen, C. F., Ivanova, M. G., Andersen, T. S. & Hansen, L. K. (2014). Smartphones as Pocketable Labs: Visions for Mobile Brain Imaging and Neurofeedback. *International Journal of Psychophysiology*, *91*(1), 54–66. https://doi.org/10.1016/j.ijpsycho.2013.08.007

Tan, S. H. J., Wong, J. N., & Teo, W.-P. (2023). Is neuroimaging ready for the classroom? A systematic review of hyperscanning studies in learning. NeuroImage, 281, 120367. https://doi.org/10.1016/j.neuroimage.2023.120367

Titgemeyer, Y., Surges, R., Altenmüller, D.-M., Fauser, S., Kunze, A., Lanz, M., Malter, M. P., Nass, R. D., Podewils, F. von, Remi, J., Spiczak, S. von, Strzelczyk, A., Ramos, R. M., Kutafina, E. & Jonas, S. M. (2020). Can Commercially Available Wearable EEG Devices be Used for Diagnostic Purposes? An Explorative Pilot Study. *Epilepsy & Behavior*, *103*. https://doi.org/10.1016/j.yebeh.2019.106507 PMID: 31645318

Vacas, S., McInrue, E., Gropper, M. A., Maze, M., Zak, R., Lim, E. & Leung, J. M. (2016). The Feasibility and Utility of Continuous Sleep Monitoring in Critically Ill Patients Using a Portable Electroencephalography Monitor. *Anesthesia and Analgesia*, *123*(1), 206–212. https://doi.org/10.1213/ANE.0000000000001330 PMCID: PMC5493322

Varga, L. (2018). Overview of EEG Research in Early Childhood Education: An International Perspective. *Training and Practice*, *16*(3), 37–44. https://doi.org/10.17165/TP.2018.3.4

von Lühmann, A., Wabnitz, H., Sander, T. & Müller, K.-R. (2016, October 13). *Miniaturized CW NIRS for Integration and Hybridization with Mobile EEG / ECG / EMG and Accelerometer* [Paper presentation]. The Society for functional Near Infrared Spectroscopy Biennial Meeting 2016, Paris, France. https://www.researchgate.net/publication/311183763\_Miniaturized\_CW\_NIRS\_for\_integration\_and\_hybridization\_with\_mobile\_EEG\_ECG\_EMG\_and\_Accelerometer

von Lühmann, A., Wabnitz, H., Sander, T. & Müller, K.-R. (2017). M3BA: A Mobile, Modular, Multimodal Biosignal Acquisition Architecture for Miniaturized EEG-NIRS-Based Hybrid BCI and Monitoring. *IEEE Transactions on Biomedical Engineering*, *64*(6), 1199–1210. https://doi.org/10.1109/TBME.2016.2594127

Wang, D., Chen, J., Zhao, D., Dai, F., Zheng, C. & Wu, X. (2017). Monitoring Workers’ Attention and Vigilance in Construction Activities Through a Wireless and Wearable Electroencephalography System. *Automation in Construction*, *82*, 122–137. https://doi.org/10.1016/j.autcon.2017.02.001

Ward, J., Pinti, P., Amft, O. & Van Laerhoven, K. (2019). Wearables and the Brain. *IEEE Pervasive Computing*, *18*, 94–100. https://doi.org/10.1109/MPRV.2019.2898536

Wilkinson, C. M., Burrell, J. I., Kuziek, J. W. P., Thirunavukkarasu, S., Buck, B. H. & Mathewson, K. E. (2020). Predicting Stroke Severity with a 3-min Recording from the Muse Portable EEG System for Rapid Diagnosis of Stroke. *Scientific Reports*, *10*(1), 18465. https://doi.org/10.1038/s41598-020-75379-w PMCID: PMC7595199

Williams, N. S., McArthur, G. M. & Badcock, N. A. (2020). 10 Years of EPOC: A Scoping Review of Emotiv’s Portable EEG Device. *BioRxiv*. Advance online publication. https://doi.org/10.1101/2020.07.14.202085

Yokota, Y., Tanaka, S., Miyamoto, A. & Naruse, Y. (2017). Estimation of Human Workload from the Auditory Steady-State Response Recorded via a Wearable Electroencephalography System during Walking. *Frontiers in Human Neuroscience*, *11*, 314. https://doi.org/10.3389/fnhum.2017.00314 PMCID: PMC5468449

Zhang, Q., Wang, P., Liu, Y., Peng, B., Zhou, Y., Zhou, Z., Tong, B., Qiu, B., Zheng, Y. & Dai, Y. (2018). A Real-Time Wireless Wearable Electroencephalography System Based on Support Vector Machine for Encephalopathy Daily Monitoring. *International Journal of Distributed Sensor Networks*, *14*(5), 1–9. https://doi.org/10.1177/1550147718779562

Zink, R., Hunyadi, B., Huffel, S. V. & Vos, M. D. (2016). Mobile EEG on the Bike: Disentangling Attentional and Physical Contributions to Auditory Attention Tasks. *Journal of Neural Engineering*, *13*(4), 046017. https://doi.org/10.1088/1741-2560/13/4/046017