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Open-Source Low-Cost Wearable Physical Activity Tracker

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The WHO Global Burden of Disease study identified physical inactivity as one of the most important risk factors affecting global health in recent years. Physical activity and good sleep reduce occurrences of cardiac [1], bone and joint diseases [2], and are linked to occurrences of diabetes [3] and Alzheimer's [4]. Devices used for tracking physical activity in clinical settings are too expensive for ubiquitous and long-term use, while low-cost consumer devices fail to replicate the performance of their clinical counterparts. Furthermore, commercially available devices lack transparency in data processing, and hence, reliability.

We have developed a low-cost physical activity tracking platform, consisting of a wearable device based on a 3-axis accelerometer, and a mobile app. The wearable device can be wirelessly configured with validated algorithms, each optimized for a particular type of physical activity and sensor placement. The device features an exchangeable battery, offering up to 6 months of standalone operation. Device hardware and algorithms are open-sourced to offer maximal transparency; this allows configuring the device with customized, user-specific algorithms, enabling novel research and citizen-science applications, as well as monitoring chronic conditions linked to physical inactivity in low-resource settings.

- [1] S. Yusuf, S. Hawken, S. Ôunpuu, T. Dans, A. Avezum, F. Lanas, M. McQueen, A. Budaj, P. Pais, J. Varigos, and L. Lisheng, "Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries in a case-control study based on the INTERHEART study," *Lancet*, vol. 364, pp. 937–952, 2004.
- [2] D. E. R. Warburton, C. W. Nicol, and S. S. D. Bredin, "Health benefits of physical activity: the evidence.," *Can. Med. Assoc. J.*, vol. 174, no. 6, pp. 801–809, 2006.
- [3] S. W. H. Lee, K. Y. Ng, W. K. Chin, "The impact of sleep amount and sleep quality on glycemic control in type 2 diabetes: A systematic review and meta-analysis", *Sleep Med Rev.*, 2016.
- [4] A. P. Spira, A. A. Gamaldo, Y. An, et al. "Self-reported Sleep and β -Amyloid Deposition in Community-Dwelling Older Adults" *JAMA Neurol.*, 2013.