

Wearable Sensors for Disease Monitoring

The **Embedded Systems Advanced Research and Prototyping Lab (ESARP)** and the **Printed Bioelectronics and Sensor Lab (BioSens)**, work on ultra low-power wearable sensor technologies for health monitoring. This team is led by Professor of Electrical and Computer Engineering, Bashir Morshed.

-Research Interests and Current Work-

Dr. Morshed's group has developed battery-less wireless sensors based technology called **Wireless Resistive Analog Passive Sensors**, or WRAP sensors, that can sense bioelectric and physiological signals. WRAP sensors are low cost, capable of high sampling rate, and do not require a battery. The sensors are prototyped with an inkjet printed technique to produce BandAid-like disposable sensors on paper.

The group recently demonstrated its fully passive wireless sensors on thin flexible inexpensive substrates, and the sensors are currently being tested to determine their capability to enable individuals to self-monitor health in home settings. Their goal is to produce an integrated, networked sensor system that produces reliable and actionable data to support individual level health monitoring, secure sharing of events of interest data with medical practitioners, and anonymous data sharing with spatio-temporal overlay for community health monitoring. This work is supported by the National Science Foundation.

-Recent Publications and Patents-

B. I. Morshed, B. Harmon, M. S. Zaman, M. J. Rahman, S. Afroz, and M. Rahman, "Inkjet Printed Fully-passive Body-worn Wireless Sensors for Smart and Connected Community (SCC)", *J. Low Power Electron. Appl.*, vol. 7, no. 4, article 26, pp. 1-21, Nov. 2017.

S. Consul-Pacareu, R. Mahajan, and M. J. AbuSaude, and B. I. Morshed, "NeuroMonitor: A Low-power, Wireless, Wearable EEG Device with DRL-less AFE", *The IET Circuits, Devices, & Systems Journal*, Mar. 2017.

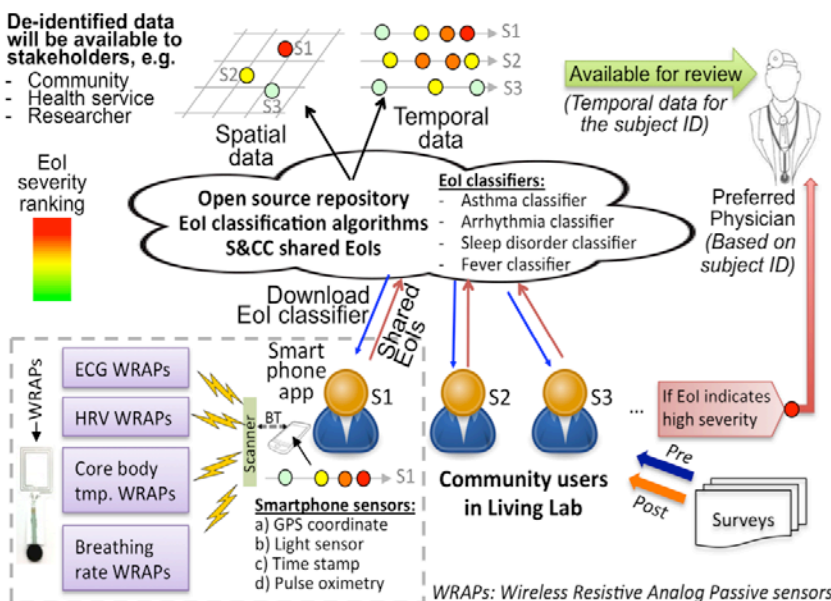
B. Noorozi and B. I. Morshed, "PSC Optimization of 13.56-MHz Resistive Wireless Analog Passive Sensors", *IEEE Trans. Microwave Theory and Techniques*, Feb. 2017.

S. Khatun, R. Mahajan, and B. I. Morshed, "Comparative Study of Wavelet Based Unsupervised Ocular Artifact Removal Techniques for Single Channel EEG Data", *Journal of Translational Engineering in Health and Medicine (JTEHM)*, vol. 4, no. 1, pp. 1-8, Dec. 2016.

B. I. Morshed, "Multilayer Additive Printed Circuit", USPTO Patent Application, Nov. 9, 2016. (USPTO Provisional Patent Application, No. 62/252,706, filed on Nov. 9, 2015.)

B. I. Morshed and R. Mahajan, "Fully Reconfigurable Modular Body-Worn Sensors", USPTO Patent Application US 2016/0128596 A1, 12 May 2016. (International Patent Application, PCT/US15/60293, filed Nov 12, 2015. Provisional patent application, No. 62/078,822, filed on 12 Nov. 2014.)

B. I. Morshed, and S. Consul-Pacareu. "Wireless Analog Passive Sensors". USPTO Patent Application, US 2015/029763 A1, 15 Oct. 2015 (Patent application filed 14 Apr. 2015, Application # 14/686,275. Provisional app. no. 61/979,223, filed on 14 Apr. 2014.)



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