Md Abu Saleh Tajin

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Professional Summary

6+ years of antenna and radio frequency (RF) design experience, complemented by 1+ years of analog and mixed-signal integrated circuit (IC) design experience. Team player with extensive collaborative and mentoring experience. Seeking challenging product development roles in the broad antennas, RF, and wireless systems domain.

Experience

Cornell University *Ithaca, NY*

Postdoctoral Researcher *Aug 2023 - Present*

- RF, analog and mixed-signal chip design for biomedical and wireless applications

Drexel University *Philadelphia, PA*

Research and Teaching Assistant *Sept 2017 - July 2023*

- Reconfigurable antenna design for biomedical and 5G mmWave applications

Bangla Phone Limited *Dhaka, Bangladesh*

Junior System Engineer *Oct 2015 - May 2017*

- Optical fiber network design and implementation

Education

Drexel University *Philadelphia, PA*

PhD/MS in Electrical Engineering, *July 2023/Sept 2021*

Bangladesh University of Engineering & Technology *Dhaka, Bangladesh*

BS in Electrical and Electronic Engineering *Sept 2015*

Skills

- **Design**: HFSS, CST, Cadence, Calibre DRC/LVS, ADS, Wireless InSite, Altium, Eagle
- **Test & Hardware**: Network analyzer, spectrum analyzer, anechoic chamber, reverberation chamber, EMscan, oscilloscope, FPGA, PCB milling, software defined radio (SDR), radio frequency identification (RFID), scanning electron microscope (SEM)
- **Language**: Matlab, C/C++, Verilog/VHDL
- **Semiconductor technology nodes**: 22nm, 45nm SOI, 180nm

Projects

- Designed a passive/battery-free RFID respiration sensor antenna (902-928 MHz) using conductive fabrics. It works at a maximum distance of **5.8 meters**, a **10x improvement** over its predecessor (0.6 meters). The new antenna sensor is an important part of artificial intelligence-based respiratory anomaly detection research.
- Developed a wearable Bluetooth low energy (BLE) sensor antenna (2.4 GHz) with a custom PCB for **COVID monitoring**. The integrated sensor can monitor **respiration rate/pattern, temperature, SpO2** as well as track contact with other users.
- Developed a smart diaper sensor (**4.4 meters** read range) and a smart IV sensor **4.6 meters** read range), both having the **longest read ranges** in the literature.
- Developed a new method for mapping incident power and relative phase distribution in reconfigurable intelligent surfaces (RIS) using energy harvesting circuits. The circuits are **low cost, compact, and simplified state-selection**.
- Commercial RFID interrogators are directional antenna units with limited flexibility (90° coverage). I developed a reconfigurable RFID interrogator antenna array that offers total horizontal coverage (360°), resulting in a **4x improvement in the coverage area**.
- Developed a novel method for extracting RF sheet resistance from unconventional conductive surfaces, since the sheet resistance formula only works for conductors with uniform geometry. It **reduces prototyping time and material waste by more than 50%**.
- Developed a wireless radio channel emulation testbed for evaluating the performance of wireless antenna sensors. It offers a **reliable, cost-effective, and scalable alternative to physical experiments** for evaluating sensor performance. It can also quickly generate a large amount of data, which is critical for training machine learning models.
- Taped out a single-photon avalanche diode (SPAD) sensor array in TSMC 180nm process for recording neural activity. The proposed technology will replace traditional optical sensors, potentially leading to **10x improvement in photon detection efficiency**.
- Mentored a senior design team in the development of a conformal millimeter wave antenna (28 GHz) array for 5G applications, resulting in a paper at the top IEEE conference on antennas and propagation, leading to multiple team members **securing placements at top companies like Lockheed Martin, Northrop Grumman, SRC, and Jacobs**.

Selected Publications

- **Tajin, M. A. S.** *et al.* Incident power and phase mapping in reconfigurable intelligent surfaces using energy harvesting. *IEEE Transactions on Antennas and Propagation, 2023*
- **Tajin, M. A. S.** *et al.* K. R. Passive UHF RFID-based knitted wearable compression sensor. *IEEE Internet of Things Journal, 2021*
- **Tajin, M. A. S.** *et al.* On the effect of sweat on sheet resistance of knitted conductive yarns in wearable antenna design. *IEEE Antennas and Wireless Propagation Letters, 2020*