

MORTEZA TAVAKOLI TABA

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Education

University of Michigan

Ann Arbor, MI

Ph.D., Electrical Engineering and Computer Science (Electronics and RF Circuits), GPA: 4/4 09/01/2018 – 08/18/2023

- **Thesis title:** Next Generation Sub-THz Circuits and Systems on Silicon
- **Advisor:** Prof. Ehsan Afshari

University of Michigan

Ann Arbor, MI

M.S., Electrical Engineering and Computer Science (Electronics and RF Circuits), GPA: 4/4 09/01/2018 – 04/30/2021

- **Advisor:** Prof. Ehsan Afshari

Sharif University of Technology

Tehran, Iran

B.Sc. in Electrical Engineering (Electronics), GPA: 3.9/4 09/01/2013 – 06/30/2018

- **Advisor:** Prof. Mehrdad Sharifbakhtiar

Research Interest

- RF, mm-wave, and terahertz integrated circuit design
- Sub-THz/THz Communication systems and circuits for next generation 6G
- Machine learning-based circuit design
- Mm-wave and THz sensing imaging systems
- Cryogenic circuits for quantum computing and biology (cancer detection)
- Mm-wave/Sub-THz phased array systems for communications and sensing

Scholarships & Awards

- Selected as **Featured Article** in the Applied Physics Reviews Journal (impact factor: 12.75) for the paper “Terahertz electronics: Application of wave propagation and non-linear processes.” (2020)
- Ranked **2nd/100** in Ph.D. Qualifying Examination in Electrical Engineering department (ECE) at the University of Michigan. (2019)
- University of Michigan Rackham Merit **Fellowship**. (2018)
- Ranked **17th/100000** in ECE major in M.Sc. nationwide university entrance exam. (2018)
- Ranked **31st/222507** in B.Sc. nationwide university entrance exam. (2013)

Professional Experience

Mm-wave Design Engineer

08/06/2023 – Present

Apple Sunnyvale, CA

- Design and implementation of mm-wave circuits for cellular and sensing.

Internship

05/15/2022 – 08/31/2022

Apple San Jose, CA

- Design and implementation of mm-wave circuits for 5G applications.

Graduate Research and Teaching Assistant

09/01/2018 – 08/18/2023

University of Michigan Ann Arbor, MI

- Implementation of a 100, 200, and 363 GHz FMCW radar for imaging and detection of hidden objects behind the wall.
- Computer-aided circuit block design using machine learning techniques.
- 40, 80, and 160 GHz frequency-locked sources operating at cryogenic temperature for magnetic resonance force spectroscopy (MRFM), collaboration with the University of Cornell, Department of Chemistry (received NIH grant).
- Energy efficient wireless communication circuit and system design with data rates exceeding 20 Gb/s.
- Implementation of a 4-by-4 FMCW array at 220 GHz for electrical beam steering.
- Worked on the theory and design of a low phase-noise power amplifier funded by Texas Instrument (TI).
- Design of millimeter-wave circuit blocks for phased arrays and beam steering applications funded by AirVine Scientific Inc.

- 4Gb/s Optical 8-channel transceiver for LiDAR applications funded by Avicena Tech.

Research and Teaching Assistant

09/01/2016 – 06/30/2018

Sharif University of Technology

Tehran, Iran

- Smart antenna-tracking system for 5G applications.
- Extraction of information from ECG signals for the detection of different kinds of heart diseases.
- A high-efficiency class F power amplifier design for WiFi applications.
- An 8-phase clock generator at 2 GHz for n-path filters.

Teacher and Editor

09/01/2013 – 06/30/2018

Sharif University of Technology and Salam Yousef Abad high school

Tehran, Iran

- High school teacher (math, physics, and chemistry) at Salam Yousef Abad High School.
- Editor of high school workbooks in Gaj Institute.
- Editor of analog/digital circuit books by Mehrdad Sharifbakhtiar and Mahmoud Tabandeh.

Publications

1. Naghavi, SM Hossein, **Morteza Tavakoli Taba**, Ruonan Han, Mohammed A. Aseeri, Andreia Cathelin, and Ehsan Afshari. "Filling the gap with sand: When CMOS reaches THz." *IEEE Solid-State Circuits Magazine* 11, no. 3, 2019.
2. Aghasi, H., S. M. H. Naghavi, **M. Tavakoli Taba**, M. A. Aseeri, A. Cathelin, and E. Afshari. "Terahertz electronics: Application of wave propagation and nonlinear processes." *Applied Physics Reviews*, Vol. 7, no. 2, 2020.
3. **M. T. Taba** et al., "Progress Towards Fully On-Chip Frequency-Stabilization for Sub-Terahertz Sources." in *IEEE 20th Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems (SiRF)*, pp. 30-34, Jan 2020.
4. S. M. H. Naghavi, **M. T. Taba**, B. Yektakhah, M. Aseeri, A. Cathelin, and Ehsan Afshari. "Broadband Sub-THz Chirp Linearization Using Particle Swarm Optimization for Precision Metrology Applications." in *IEEE 21st International Microwave Symposium (IMS)*, pp. 752-755, June 2021.
5. **M. T. Taba***, S. M. H. Naghavi*, M. Aseeri, and Ehsan Afshari. "A 100 GHz Fully Integrated FMCW Imaging Radar in 110 nm CMOS with Fundamental Oscillation Above $f_{max}/2$ for Drywall Inspection." in *IEEE 22nd International Microwave Symposium (IMS)*, pp. 549-552, June 2022 (*Equal contribution).
6. **M. T. Taba** et al., "A Review on the State-of-the-Art THz FMCW Radars Implemented on Silicon (Invited)." in *IEEE 48th European Solid-State Circuits Conference (ESSCIRC)*, pp. 533-537, Sep 2022.
7. L. Chen, **M. T. Taba**, A. Cathelin, and Ehsan Afshari. "A Low-Power 20Gb/s 196GHz BPSK Wireless Transmitter Achieving Energy Efficiency FoM of 0.15pJ/bit/cm." in *IEEE Custom Integrated Circuits Conference (CICC)*, pp. 1-2, April 2023.
8. L. Chen*, **M. T. Taba***, Zain Khalifa, Andreia Cathelin, and Ehsan Afshari. "A Fast Back-to-Lock DPLL-Based 192–210-GHz Chirp Generator With 5.9-dBm Peak Output Power for Sub-THz Imaging and Sensing" in *IEEE Journal of Solid-State Circuits (JSSC)*, 2023 (*Equal contribution).
9. **M. T. Taba** et al., "A Compact CMOS 363 GHz Autodyne FMCW Radar with 57 GHz Bandwidth for Dental Imaging." in *IEEE Custom Integrated Circuits Conference (CICC)*, pp. 1-2, April, 2023.
10. S. M. H. Naghavi*, **M. T. Taba***, M. Aseeri, and Ehsan Afshari. "A 100 GHz Fully Integrated FMCW Imaging Radar in 110 nm CMOS with Fundamental Oscillation Above $f_{max}/2$ for Drywall Inspection." in *IEEE Transaction on Microwave Theory and Techniques (TMTT)*, 2023 (*Equal contribution).
11. **M. T. Taba** et al., "A 53-62 GHz Two-channel Differential 6-bit Active Phase Shifter in 55-nm SiGe Technology" in *IEEE 49th European Solid-State Circuits Conference (ESSCIRC)*, pp. 445-448, Sep 2023.
12. M. Fayazi, **M. T. Taba**, Ehsan Afshari, and Ronald Dreslinski. "AnGeL: Fully-Automated Analog Circuit Generator Using a Neural Network Assisted Semi-Supervised Learning Approach" in *IEEE Transaction on Circuit and Systems I (TCAS-I)*, 2023.

13. M. Fayazi, **M. T. Taba**, A. Tabatabavakili, Ehsan Afshari, and Ronald Dreslinski. “FuNTOM: Functional Modeling of RF Circuits Using a Neural Network Assisted Two-Port Analysis Method” to appear in *IEEE International Conference on Computer-Aided Design (ICCAD)*, 2023.
14. S. M. H. Naghavi, **M. T. Taba**, A. Tabatabavakili, A. Mostajeran, A. Cathelin and Ehsan Afshari. “Sub-THz Ruler: Spectral Bistability in a 235GHz Self-Injection-Locked Oscillator for Agile and Unambiguous Ranging” to appear in *IEEE International Solid-State Circuits Conference (ISSCC)*, 2024.
15. **M. T. Taba** et al., “A 363 GHz CMOS Autodyne FMCW Radar For Dental Imaging.” submitted to *IEEE Transaction on Microwave Theory and Techniques (TMTT)*.
16. S. M. H. Naghavi, Z. Khalifa, H. Alotaibi, F. Khoeini, **M. T. Taba**, et al., “A super-resolution sub-terahertz autodyne frequency-modulated radar using self-injection locking”, submitted to *Nature electronics*.

Patents

1. M. T. Taba and Xiang Guan, ”Wideband Compact Low-Loss Switched-Type Phase Shifter”, Apple.Inc (accepted).
2. M. Fayazi, M. T. Taba, and E. Afshari, and R. Dreslinski, ”AnGeL: Fully-Automated Analog Circuit Generator Using a Neural Network Assisted Semi-supervised Learning Approach”, University of Michigan (pending).

Presentations & Talks

Compact CMOS 363 GHz Autodyne FMCW Radar with 57 GHz Bandwidth for Dental Imaging **April 2023**
IEEE Custom Integrated Circuits Conference (CICC)

A Review on the State-of-the-Art THz FMCW Radars Implemented on Silicon (Invited) **September 2022**
IEEE 48th European Solid-State Circuits Conference (ESSCIRC), Virtual

A 100 GHz Fully Integrated FMCW Imaging Radar in 110 nm CMOS with Fundamental Oscillation Above $f_{max}/2$ for Drywall Inspection **June 2022**
IEEE 22nd International Microwave Symposium (IMS)

Professional Service

- Paper review for *IEEE Transactions on Microwave Theory and Techniques (TMTT)* August 2023
- Paper review for *IEEE Transactions on Circuits and Systems I (TCAS-I)* May 2023

Teaching Assistant

University of Michigan

- Fall 2019, 2020, 2021: EECS 215, Monolithic Amplifier Circuits
- Winter 2021: EECS 215, Introduction to Electronic Circuits
- Winter 2019: EECS 522, Analog Integrated Circuits

Sharif University of Technology

- Winter 2018: CMOS II (graduate course), Analog Electronics
- Fall 2017: CMOS I (graduate course), Principle of Electronics, Energy Conversion (electric machines 1)
- Winter 2017: Analog Electronics, Energy Conversion (electric machines 1), Pulse techniques, Analog Circuits
- Fall 2016: Principles of Electrical Engineering, Analog Electronics, Energy Conversion (electric machines 1)
- Winter 2016: Energy Conversion (electric machines 1)
- Fall 2015: Energy Conversion (electric machines 1)

Skills

Programming: C, C++, MATLAB, Verilog

Software: Cadence, HFSS, ADS, Altium, Pspice, Hspice, LTspice, Code Vision, LaTeX