

Kaustav Aras Gopinathan

EDUCATION

Harvard Medical School **Boston, MA**

Harvard/MIT MD-PhD Candidate, Expected graduation 2024

Harvard-MIT Division of Health Sciences and Technology (HST)
Medical Scientist Training Program Fellow

Harvard Graduate School of Arts and Sciences **Boston, MA**

PhD Candidate, Expected graduation 2022

Harvard Biophysics Graduate Program
Thesis Advisor: Prof. Mehmet Toner, PhD

Massachusetts Institute of Technology **Cambridge, MA**

Bachelor of Science, June 2016

S.B., Electrical Engineering and Electrical Sciences, minor in Biomedical Engineering
GPA: 5.0/5.0

HONORS AND AWARDS

- **Medical Scientist Training Program (MSTP), 2016.**
- **Barry Goldwater Scholar, 2015.** Established by the US congress and designed to foster outstanding students to pursue careers in the fields of mathematics, the natural sciences, and engineering.
- **MIT EECS – Outstanding Research Project Award, 2015.** Awarded for research on the electrical properties of blood and anemia diagnosis using dielectric spectroscopy.
- **Texas Instruments Research and Innovation Scholar, 2014.** Awarded for undergraduate research work.

RESEARCH EXPERIENCE

Massachusetts General Hospital, Center for Engineering in Medicine **Charlestown, MA**

Graduate Student

October 2017 – Present

- Graduate student in the laboratory of Prof. Mehmet Toner, developing single-cell manipulation and analytics.

Rotation Student

June 2017 – October 2017

- Rotation student in the laboratory of Prof. Mehmet Toner, focusing on microfluidic diagnostic technologies.
- Worked on characterizing a microfluidic device to separate bacteria from blood biopsies for sepsis diagnosis.
- Developed an analysis pipeline to study the cell products of the device, producing better separation and purification.

Massachusetts Institute of Technology, Department of Biological Engineering **Cambridge, MA**

Rotation Student

January 2017 – May 2017

- Rotation student in the laboratory of Prof. Roger Kamm, focusing on the mechanobiology of vascular networks.
- Developed and built a microfluidic platform to culture vascular tissue under pulsatile stresses *in-vitro*, quantify stress-strain relationships of the cultured cells, and analyze the network integrity under different mechanical forces.

Rotation Student

July 2016 – August 2016

- Rotation student in the laboratory of Prof. Jongyoon Han, focusing on the isolation and analysis of white blood cells.
- Studied eosinophils separated from sputum samples using a spiral inertial microfluidic device to study the inflammatory response in asthmatic patients.

Massachusetts Institute of Technology, Research Laboratory of Electronics (RLE) **Cambridge, MA**

Research Assistant – Independent Research

June 2013 – July 2016

- Conducted independent research with Prof. Collin Stultz and Prof. George Verghese to develop a medical device utilizing dielectric spectroscopy to determine the Hematocrit and RBC Count of a given blood sample.
- Motivated by desire to develop a portable, low-cost, and fast diagnostic device for anemia in resource-poor areas.

- Planned out research approach from developing theoretical electrical models to running wet-lab biological experiments. Key tasks included:
 - Developing an electromagnetic model to calculate the clinical RBC Indices from high-frequency impedance measurements of the blood sample (dielectric spectroscopy).
 - Experimentally testing the model on human blood.
- Received the 2015 Outstanding Research Project Award from the MIT EECS department as part of the SuperUROP program.
- Received the 2015 Barry Goldwater Scholarship in part for this research project.

Research Assistant

October 2012 – May 2013

- Research assistant in the laboratory of Prof. Thomas Heldt, focusing on leveraging multi-modal ICU signals to better predict and diagnose diseases in hospitals.
- Developed signal processing models and algorithms to detect and characterize neonatal apneic episodes using autonomic tone and the morphology of anteceding ECG and SpO₂ signals.
- Algorithms were tested on several hundred real cases for robustness and accuracy.

Massachusetts Institute of Technology, Microsystems Technology Laboratory (MTL)

Cambridge, MA

Research Assistant

July 2011 – August 2011

- Research assistant in the laboratory of Dean Anantha Chandrakasan, focusing on developing low-cost, low-power biomedical electronics.
- Worked on the signal processing for a low-power ambulatory ECG monitoring system, detecting morphological abnormalities and arrhythmias using a light-weight feature-detection algorithm.

TEACHING EXPERIENCE

Massachusetts Institute of Technology, Health, Sciences and Technology (HST)

Cambridge, MA

Undergraduate Teaching Assistant

Spring 2015 and Spring 2016 Semesters

- One of three teaching assistants for Quantitative Systems Physiology (6.022/6.522), a graduate-level and undergraduate-level physiology class taught by Prof. Roger Mark and Prof. Thomas Heldt for 30 students.
- Responsible for teaching office hours and recitations, conducting review sessions before exams, preparing surgical labs for the class, as well as grading problem sets and exams.

PUBLICATIONS AND PRESENTATIONS

Gopinathan, Kaustav A., Eduardo A. Maury, and Dylan V. Neel. "Resonance-Based Physiological Monitoring," PCT International Application No. PCT/US2018/021203 filed 03/06/2018.

Gopinathan, Kaustav A., George C. Verghese, and Collin M. Stultz. "Estimating Hematocrit and RBC Count from the Impedance of Blood," (2015) Poster presented MIT Department of Electrical Engineering SuperUROP session.

Gopinathan, Kaustav A., "The Effects of Vitamins D, E, and Zinc on Lung Development," (2013) Seminar at Indira Gandhi Institute of Child Health, Bangalore.

Invited speaker to MIT's SuperUROP Conference (2015), to give talk on the importance of long-term undergraduate research and the role of the SuperUROP program in fostering student innovation.

Invited student speaker for MIT EECS Visiting Committee (2015). The committee is a group of leaders in academia and industry, acting as an advisory board for the MIT Corporation and the EECS Department Strategic Plan.