

**BIOGRAPHICAL SKETCH**

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NAME: Steven S. Saliterman

eRA COMMONS USERNAME (credential, e.g., agency login): SSALITERMAN

POSITION TITLE: Adjunct Professor of Biomedical Engineering

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Minnesota, Minneapolis, MN	BA	1973	Physiology
NASA Johnson Space Center, Houston, TX	Internship	1974	Aerospace Medicine
NASA Ames Research Center, Mountain View, CA	Fellowship	1976	Biomedical Engineering
Mayo Medical School, Rochester, MN	MD	1977	Medicine
Mayo Clinic, Rochester, MN	Residency	1981	Internal Medicine
University of Minnesota, Minneapolis, MN		2020	CITI Good Clinical Practices & Human Research Protection
University of Minnesota, Minneapolis, MN		2020	HIPPA Training

“My Bibliography”, NCBI: <https://www.ncbi.nlm.nih.gov/myncbi/1TKeUflxorz5r/bibliography/public/>

**A. Personal Statement**

I am an Adjunct Professor of Biomedical Engineering at the University of Minnesota. I have engaged in both research and teaching and am a recipient of a Venture Well Faculty Grant. My areas of expertise include biomedical engineering, aerospace and internal medicine, cardiopulmonary physiology, bioMEMS, organ-on-a-chip, nanofabrication, nanosensors, actuators and nanorobotics. I have additional interest in optical engineering and astrophysics, the latter provides the requisite mathematical foundation for application of electromagnetism, photonics and high-energy systems to medical applications.

My recent teaching has included medical device prototyping, including machining, rapid prototyping, electronics, CAD, programming, and microcontrollers. I have also led student teams in medical device ideation, design and fabrication in partnership with physicians, nursing and others in healthcare. As detailed below, these student projects have not only benefited the students but have had impactful contributions to science. These teams have tended to be interdepartmental, sometimes requiring students' years to complete a project, and have resulted in both publication in high-ranking journals and patents. My most enduring teaching has been biomedical micro- and nanotechnology to graduate and upper senior students.

**B. Positions, Scientific Appointments, and Honors****Positions and Scientific Appointments**

2023 - Present      Session Co-Chair & Moderator (2025), *Medical Education Training*

2020 *Contributing Papers*, Design of Medical Devices Conference, Minneapolis, MN  
 Session Co-Chair & Moderator, *COVID-19 Response*, Design of Medical Devices Conference, Minneapolis, MN

2020, Present Member, Institute for Engineering in Medicine, University of Minnesota, Minneapolis, MN

2020 – 2023 Industry Advisory Board, Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN

2019 – 2023 Undergraduate Education Working Group, Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN

2019 Strategic Planning Undergraduate Education, Biomedical Engineering, University of Minnesota, Minneapolis, MN

2017 – Present Scientific community representative, Artemis Program Lunar Surface Science Workshops

2017 – 2019 Anderson Student Innovation Labs Executive Committee, College of Science & Engineering, University of Minnesota, Minneapolis, MN

2012 - Present Adjunct Professor, Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN

2008 - 2012 Adjunct Associate Professor, Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN

2005 - 2008 Adjunct Assistant Professor, Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN

2004 – 2005 Methodist Hospital Executive Committee, St. Louis Park, MN

2003 – Present Senior Member, SPIE - International Society for Optics and Photonics

2003 – Present Mayo Plummer Society, Rochester, MN

2002 - 2005 Lecturer, Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN

2002 – 2005 Chief & Vice-Chief of Medicine, Methodist Hospital, St. Louis Park, MN

1997 - 2002 Clinical Assistant Professor, University of Minnesota, Minneapolis, MN

1994 – 2000 Fairview Hospital Internal Medicine Committee, Edina, MN

1992 – 2014 Medical Staff, Fairview Hospital, Edina, MN

1992 – 1995 Methodist Hospital Research & Development Committee, St. Louis Park, MN

1990 – 1991 Board of Directors, Medical Services Corp., Minnesota State Medical Society

1988 – 2014 CLIA, Laboratory Director, Technical Consultant, and Clinical Consultant

1987 – 1992 Board of Directors, Medical Bureau Inc., Hennepin County Medical Society, Minneapolis, MN

1987 – 1991 Socio-Economic Committee, Hennepin County Medical Society, Minneapolis, MN

1985 – Present Fellow, American College of Physicians (ACP)

1985 Strategic Planning Committee, Hennepin County Medical Society, Minneapolis, MN

1984 – 1987 President, Mayo Medical School Alumni Society, Rochester, MN

1984 Session Chair, SIGGRAPH '84, Role of Computer Graphics and Imaging in Biomedicine, Minneapolis, MN

1983 American Board of Internal Medicine

1981 – 2014 Senior Aviation Medical Examiner, FAA

1981 – 2014 Medical Staff, Methodist Hospital, St. Louis Park, MN

1978 – 1989 Board of Directors, Mayo Medical School Alumni Society, Rochester, MN

1977 - 1980 Instructor, Advanced Cardiac Life Support, Mayo Clinic, Rochester, MN

1977 – Present Medical License, State of Minnesota

1977 Instructor Rating, Advanced Cardiac Life Support, Mayo Clinic, Rochester, MN

1977 National Board of Medical Examiners

1977 – Present Member, Mayo Alumni Association

1970 – 1972 Twin City Regional Science Fair Committee, Minneapolis, MN

1970 – 1972 Minnesota State Board of Education Advisory Committee: “Computers in the Classroom”,  
*(Youngest person ever appointed to a Minnesota State Board of Education committee)*

## Honors

2025 Elected to Senior Member of SPIE - International Society for Optics and Photonics

2024 Feature story, *No funding, no lab, no problem for dogged University of Minnesota student inventors* StarTribune, Minneapolis, MN

2020	Feature story, <i>A Gown for U</i> , CBS, WCCO TV Minnovators
2020	Feature story, StarTribune, <i>A Gown for U: University of Minnesota students saved local hospitals from running out of PPE</i> , Minneapolis, MN
2018	Venture Well Faculty Grant recipient.
2006	Feature story, <i>SPIE Professional</i>
1993	Interview, <i>Healthcare</i> , NBC News
1992	Feature story, <i>Critical Care Patient Simulator</i> , NASA Spinoff,
1992	Feature story, <i>Critical Care Patient Simulator</i> , CBS, WCCO TV Nightly News,
1969	Minnesota Professional Engineers Society Achievement Award
1969	United States Army Achievement Award
1969	Feature story, <i>Computer</i> , ABC KSTP TV Nightly News
1969	Feature story, <i>Computer</i> , Minneapolis Tribune
1969	Awarded attendance at the <i>National Youth Science Camp</i> , Barto, WV, by the <i>Minneapolis – St. Paul Science Fair</i>

### C. Contributions to Science

1. At the peak of the COVID-19 pandemic, I received an emergency request to develop personal protective gowns on behalf of M Health Fairview Hospitals & Clinics. They faced a dire shortage of PPI with replacement supplies no longer being available from vendors. M Health Fairview was turned away by leading medical device manufacturers in our community, as well as the University of Minnesota Earl Bakken Medical Devices Center. Closure of Minnesota's second largest medical center was imminent. Along with 17 of my students, we accepted the challenge. Within two weeks our team assessed the problem, designed a low-cost, easily manufactured FDA approved gown; motivated the hospital to perform due diligence and funding; specified and procured raw materials; and set into production 10,000 gowns per day. The designs were telegraphed across the country and globe, and a crisis averted. The team received numerous recognitions, including internal praise, and newspaper, radio and TV stories. The effort was presented at the Design of Medical Devices annual conference and subsequently published by ASME in 2021. The IP (intellectual property) was made open access.
  - a. Liu, J, J. Kerber & S. Saliterman, *Emergency design and production of level 1 hospital gowns during the COVID-19 pandemic*, proceedings of the 2021 Design of Medical Devices Conference, ASME, 2021. DOI 10.1115/DMD2021-1019
  
2. I joined the Department of Biomedical Engineering at the University of Minnesota in 2002. I was asked to teach physiology initially, then upper senior and graduate students in micro- and nanotechnology, and its application to bioMEMS – an emerging field of biomedical devices for analytical studies. These included clinical laboratory medicine, genetic testing, drug testing and more. This technology had promise for very low cost, mass-screening with high throughput and accuracy. The course draws students from many different departments. Refinement of the curriculum led to my publishing the first college textbook in the field (over 2,800 copies sold), published by SPIE - International Society for Optics and Photonics. The course has attracted 50 students each year (over a thousand students total), and has expanded from simple lab-on-a-chip to advanced topics in nanosensors and actuators, organ & body-on-a-chip systems, and micro- & nanorobotics. These are on the cutting edge of biology and medicine, incorporating biochemistry, chemical engineering, cell and molecular biology, materials science, physics and optical engineering. The course has had an international following of instructors, students and industry; with over a thousand visitors to my university course website annually (Google Analytics). Beginning in 2017, I created two new courses, one in medical device prototyping and the other a medical device practicum experience for undergraduate students.
  - a. Saliterman S. *Fundamentals of BioMEMS and Medical Microdevices* SPIE Press, Bellingham, WA (2006). [spie.org/Publications/Book/631781](http://spie.org/Publications/Book/631781)
  - b. Saliterman S. *Education, bioMEMS and the medical microdevice revolution*. Expert Review of Medical Devices 2(5):515-519. September 2005. DOI 10.1586/17434440.2.5.515

3. My first venture into optical engineering was as a physiology major at the University of Minnesota, where I undertook study of power development in the muscles of a jumping frog. My goal was to study the effects of environmental changes – including weightlessness – on muscle performance. Over a two-year period, I designed and built my own research equipment. I wrote to Bausch and Lomb in Rochester, NY outlining my proposal to use laser light to study the flight characteristics of the jumping frog. They kindly flew me to their headquarters in Rochester, NY to present my proposal, and granted my request for a special helium neon laser. Using a system of mirrors, miniature treadmill (to return the frog to the starting point after jumping), and a long/tall/narrow environmentally controlled enclosure, the task was accomplished.

I continued to expand my knowledge and abilities in biomedical engineering in a subsequent internship at the NASA Johnson Space Center in Houston, TX and Fellowship at the NASA Ames Research Center in Mountain View CA (while in medical school).

The engineering skills I acquired from these experiences would serve as a cornerstone for the remainder of my career, particularly in optical engineering. In 2018, my students and I addressed the vasospasm and related symptoms of patients with Raynaud's phenomenon. This disorder affects the hands primarily and can lead to ulceration and loss of fingers. An alternative to pharmacologic therapy was needed. We looked at an earlier study out of Johns Hopkins University on vasospasm in mice, and concluded that low levels of blue light, at specific frequencies and energy fluxes, could interact with the cellular signaling mechanism and lead to vasodilation in humans. To study this further an experimental study apparatus was required. The resulting six-year development effort led to publication of our original research, a patent, and approval of a clinical study (the latter awaiting funding).

- a. B. Levac, J. Kerber, E. Wagner, J. A. Molitor and S. S. Saliterman, *An Experimental Phototherapy Device for Studying the Effects of Blue Light on Patients with Raynaud's Phenomenon*, *Annals of Biomedical Engineering* 2024 Vol. 52 Issue 6 Pages 1732-1743. DOI 10.1007/s10439-024-03487-z
  - b. Steven S. Saliterman, Jennifer Chmura, Brett Levac, Jerry Molitor, James Kerber, Kushal Sehgal, *Light-based treatment devices and methods*. Patent number: 11,865,357, Date: January 9, 2024.
  - c. Steven S. Saliterman, Jennifer Chmura, Brett Levac, Jerry Molitor, James Kerber, Kushal Sehgal, *Light-based treatment devices and methods*. Publication: 20210128940, Date: May 6, 2021.
4. After leaving Mayo Graduate School of Medicine, I developed a simulator that could be used to train residents and others in performing heart catheterization. It would become the first manikin simulator ever interfaced to a computer for medical training. It was obtained by 17 institutions and used at an annual workshop at Johns Hopkins Hospital for several years. Optical quadrature encoders (designed and built from scratch) were at the center of detecting a catheter's position, suitable for determining site-specific heart chamber and pulmonary artery wedge pressure readings, and simulated x-ray imaging. The accompanying software I wrote, written in Pascal, ran over 25,000 lines, included an electronic medical record (a first!) and ability to simulate the effects of medical intervention in real-time on a simulated cardiac monitor. The project was published in the Mayo Clinic Proceedings and NASA *Spinoff* and received a patent.
    - a. Saliterman S., *A computerized simulator for critical care training: new technology for medical education*. Mayo Clinic Proceedings. 65:968-978. July 1990. [mayoclinicproceedings.org/article/S0025-6196\(12\)65158-1/fulltext](http://mayoclinicproceedings.org/article/S0025-6196(12)65158-1/fulltext)
    - b. Saliterman S., *Hemodynamic monitoring trainer*. Patent: 4,642,055, Date: February 10, 1987.