Randal C Schulhauser

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Professional Summary

An accomplished MedTech professional combining clinical (BA in Physiology), technical (BSC in Electrical Engineering), and business (Certificate in Executive Business Commerce) with over 40 years of experience. Industry recognized as one of the Founding-Fathers of active implantable monitoring in the cardiac space, he continues to apply the knowledge gained into implantable neuro monitoring. Having lectured for many years on the topic of medtech entrepreneurism, creativity/innovation/intellectual property, and strategy development - I'm seeking a "*professor-of-practice*" appointment and opportunity to complete and publish reference book on "*active implantable monitoring*".

With 40+ years of experience working in the MedTech Industry (~40 years at Medtronic) and 25+ years residing in Arizona, Randal has unique skills and perspectives that will prove valuable to any medical technology commercial or academic organization. My job description for the past 10 years at Medtronic has been succinctly stated as; "*Figure out how medicine will be practiced 5 to 10 years from now and help Medtronic make decisions today to be relevant 5 to 10 years from now*".

To execute this job description, an assortment of skills has been honed over the years including:

- Real-world experience bringing commercial medtech products to market from idea, through technical feasibility to product development, producing clinical and economic evidence to commercial launch. Examples include the Medtronic Reveal™/LINQ™ implantable cardiac monitor product portfolio https://www.tctmd.com/news/medtronic-announces-canadian-launch-miniature-cardiac-monitor-reveal-linqtm-icm , Medtronic's PCD™ early generation implantable defibrillators, Medtronic's PREMIER™ first generation emerging market pacemaker, wireless NIM, biochemical multi-sensors, and many others.
- Developing strategic business plans and making recommendations on organic, inorganic, or hybrid investment(s) to implement the strategy.
    - Organic investment plans include cost modeling to deliver specific opportunities to the local and/or global market. Most recent examples: Vital NIM, Implantable Neuromonitoring.
    - Inorganic investment plans including strategic investments and/or acquisition. Most recent example: Sophono, Endotronix, Avertto.
    - Hybrid investment plans. Internal with 3rd party partnerships (trisensor). Intentional spinouts partnered with Fogarty Institute (Ryme Medical www.rymemedical.com , Boomerang Medical www.boomerangmedical.com)
- These plans were developed using a 3-step methodology I frequently had responsibility facilitating; i) futuring (what will be the future drivers over the time horizon of the strategic plan?), ii) strategy distillation (stratifying elements starting with hi-impact, hi-probability and triage appropriately), iii) wargaming (stress-test the strategy given the competitive environment to include scenario planning).
- Competitive landscapes
- IP landscapes

  - 70 patents have been issued to Randal C Schulhauser
  - 6 trade secrets
  - Additional 30+ patent applications filed at USPTO
  - 975 citations as of 10Nov2026
- As a physiologist, an electrical engineer, and a businessperson, I can interface competently with the 3 macro elements that make the MedTech Industry unlike any other – it's a comingling of 3 essential strands of DNA – i) clinical/HC delivery component, ii) technology component, iii) business component.
- Accredited Investor per 3rd party verification having met minimum income per IRS tax filings the past 2 years, net assets exceeding $5M, and a business development company www.SchulhauserAssociatesLLC.com all satisfying requirements. Investments typically part of a syndicated offering involving diligence activity by my LLC.
- Connection to premier MedTech innovation ecosystems around the world.
  - 850 PBC, Phoenix Biosciences Core via work with MDM2 www.850pbc.com and www.mdm2.org
  - Bay Area California via work with Fogarty Institute www.fogartyinnovation.org
  - Orange County California via lecturing in BioENGINE and MENG program and incubator at UC Irvine https://innovation.uci.edu/the-cove/
  - Minnesota Medical Alley via lecturing on MedTech Entrepreneurism at Minnesota State University www.medicalalley.org
  - Galway Ireland Healthcare Innovation Hub https://hih.ie/
  - Israel Med-X Incubator https://medxelerator.com/
  - Singapore EDB Medical Device initiative https://www.edb.gov.sg/en/our-industries/medical-technology.html
  - Shanghai/Suzhou Bio Bay BioTech Megahub https://www.biobay.com.cn/
- Frequent judge at start-up competitions
  - MedTech Innovator $1M annual prize competition www.medtechinnovator.org
  - RESI competition at annual JP Morgan Healthcare conference www.resiconference.com
  - University of California Healthcare Pitch competition https://merage.uci.edu/research-faculty/centers/innovation-entrepreneurship/new-venture-competiton.html
- AZ WearTech Center advisory board https://www.azweartech.org/people/randal-schulhauser
- AZBio board of directors (retired) and White Hat Investors Conference https://www.azbio.org/
- Arizona Medtech Hub (MDM2) steering committee member www.mdm2.org and https://www.eda.gov/funding/programs/regional-technology-and-innovation-hubs/2023/Medical-Device-Manufacturing-Multiplier-Strategy-Development-Consortium
- Arizona NSF Engines HAPPI advisor https://new.nsf.gov/funding/opportunities/nsf-regional-innovation-engines-nsf-engines-0
- Advisory board member for ASU John Shufeldt School of Medicine and Medical Engineering https://medicine.asu.edu/
- NIH Brain Initiative grant proposal for implantable neuro monitoring (INM) https://braininitiative.nih.gov/funding/funding-opportunities
- NIDDK grant proposal for Trisensor (continuous monitoring of glucose + potassium + creatinine to manage AKI and/or ADHF patients) https://www.niddk.nih.gov/research-funding/current-opportunities
- Frequent lecturer at ASU-Mayo MedTech Accelerator (aka Health Care Accelerator) annual program https://www.medtechaccel.com/ and https://www.healthcareaccel.com/ (Charlie Lewis ASU, Steve Lester MD Mayo contacts), Grand Canyon University biomedical engineering capstone program https://www.gcu.edu/degree-programs/bachelor-science-biomedical-engineering (Prof Jeff LaBelle

contact), UC Irvine BioENGINE program https://engineering.uci.edu/dept/bme (Prof John Wainwright, Prof Michele Khine contacts)

- Featured speaker and/or moderator at medical and industry conferences such as;
  - "*Shaping the Future of Advancing Electronics & Medical Technologies*" (https://www.semi.org/en/event/2025-technology-workshops-shaping-future-electronics#overview), Phoenix AZ, April 22-24, 2025
  - MedTech Innovator Roadshow (https://medtechinnovator.org/apply/), UCLA campus Los Angeles CA, March 4-6, 2025
  - White Hat Investor Conference (https://www.azbio.org/whitehat2024), Phoenix AZ, September 20, 2024
  - Vitatron Pacing World Series (https://vitatrontraining.com/events/), Marrakesh Morocco, June 5-10, 2023.
- Global Assignments include;
  - Maastricht Netherlands in 1987 (PCD implantable defibrillator tech transfer to Medtronic Kerkrade BV)
  - Arnhem Netherlands in 1990 (Vitatron operations transfer to new facility)
  - Birmingham England/Tolochenaz Switzerland in 1998 (launch Medtronic Reveal^{TM} ICM in Europe)
  - India in 2013 and 2014 (AIM business strategy)
  - China dates 2015 and 2016 (AIM business strategy)
  - Singapore dates 2017 (AIM business strategy)
- Major grants such as;
  - Government of Canada IRAP ($250K for commercial syncope monitor design partnered with Creation Technologies in Vancouver BC)
  - Government of Canada IRAP ($1.5M for Premier pacemaker development and automated manufacturing partnered with Prof Gary Bone at McMaster University, Hamilton ON)
  - Medtronic QUEST ($250K for implantable syncope monitor)
  - Medtronic QUEST ($250K for stroke detection via EEG)
  - Medtronic QUEST ($250K implantable neuro monitoring for stroke and seizure detection)
  - Arizona WearTech Center ($350K for trisensor integration feasibility)
  - NSF I-Corps ($70K for LevoSens market feasibility)
  - Currently have ABRC, NIH Brain Initiative/Blueprint MedTech, NHLBI Catalyst, ARPA-H and NIDDK grant proposals under review.
- Volunteering includes "Path to Wellness" project, Cardiorenal Society of America, Twinepidemic, Inc: Nonprofit serving ethnic communities all over the world, Ladakh Heart Foundation Cardiorenal Screening project, Leh, Ladakh, 2014, AIM (Asian Impact at Medtronic – employee resource group for "all things Asia").
- Mentoring examples helping transition technical careers into customer facing roles as well as guiding start-up entrepreneurs into successful enterprises;
  - Gary Stefanov manufacturing engineer to field clinical engineer to sales rep.
  - Michael Kane design engineer to field clinical engineer
  - Alan Waziri MD CEO of ICE Neurosystems – MTI non-dilutive funding award 2024 www.iceneurosystems.com
  - Chetan Patel Medtronic engineer to co-founder of Basata.ai in 2024 www.basata.ai

Professional Experience

CEO and CoFounder
Schulhauser Associates LLC, Phoenix, Arizona
June 2024 – Present

- **Medtronic Neurosciences/Active Contract 1**: Reporting to the Neurosciences CMO, Ash Sharan MD; create, align, and execute a funding strategy to bring implantable neuro monitoring (INM) to market ranging from 100% MDT funded to 0% MDT funded and every possibility in between. Includes execution of human feasibility studies to derisk the opportunity. Also help CMO deliver MDT's brain computer interface (BCI) strategy to internal stakeholders for funding.
- **Medtronic Acute Care & Monitoring (ACM)/Active Contract 2**: Reporting to the ACM VP of Business Development & Innovation, Rakesh Sethi; create, align, and execute a funding strategy to bring continuous basic metabolic panel to market. Includes execution of human feasibility studies to derisk the opportunity.
- **UC Irvine Lecturer/Active Contract 3**: Reporting to Prof John Wainwright, deliver 2 lectures per semester supporting BME 295P: Functional Medical Device Development - How to bring devices to market successfully. Also guest lecturer in BioENGINE and MENG programs.
- **Basata.ai Advisory Board Member/Active Contract 4**: Reporting to CEO Kaled Alhanafi; provide general board advice to nascent start up and connections to physician specialty practices that receive high numbers of referrals. https://www.basata.ai/
- **Aventyn Board Member/Active Contract 5:** Reporting to CEO & Founder Navin Govind; provide general board advice and execution guidance for their AHA grant funded CHAPPARONE study. http://www.aventyn.com/
- **LevoSens Board Member/Active Contract 6:** Reporting to CTO & CoFounder David Probst; provide general board advice and risk reduction strategy/execution per I-Corps funding to have start up investment ready in CY2026. https://levosens.com/
- **Intelimensa/TINS Strategy Board Member/Active Contract 7:** Reporting to CEO & President Raul Cristian Mureșan, PhD; provide strategy board advice and US + ROW adoption roadmap for their wearable BCI system for ALS and other neuromuscular compromised patients. https://intelimensa.com/
- **AlphaSights Contract Consultant:** Miscellaneous MedTech project consulting as requested by AlphaSights' clients. https://www.alphasights.com/
- **Accredited Investor:** Participation in select syndicated MedTech investments and diligence primarily through Jet Stream Venture Fund www.jvf.vc , www.StartEngine.com and www.MedTechInnovator.org
- **Advisory Board Member** for ASU John Shufeldt School of Medicine and Medical Engineering https://medicine.asu.edu/ and https://medicine.asu.edu/people/community-advisory-board

Director of Business Development & Innovation
Medtronic plc, Minneapolis MN
May/2022 – July/2024

- **Responsibilities**: Remote position based out of Medtronic Tempe Campus but reporting to cardiovascular group and corporate. Continuation of my basic job description for the past 10 years at Medtronic; "*Figure out how medicine will be practiced 5 to 10 years from now and help Medtronic make decisions today to be relevant 5 to 10 years from now*". Emphasis on applying enabling technologies on new indications. Advise on organic, inorganic, or hybrid funding strategies.
- **Accomplishments**: Intentional spinouts partnered with Fogarty Institute (Ryme Medical www.rymemedical.com , Boomerang Medical www.boomerangmedical.com). Continuation of iCREATE internal seed fund management (source of funding to translate internal Medtronic ideas into working prototype and animal feasibility study). Led annual cross-business shark tank competition to facilitate idea jump into business strategic plan opportunity. Facilitated futuring/strategy development/wargaming sessions for multiple business units. Recognized as a "prolific inventor" upon issuance of my 50th USPTO patent.

Senior Manager of Research, Technology & Business Development
Medtronic CRM, Minneapolis MN
May/2019 – May/2022

- **Responsibilities**: Remote position based out of Medtronic Tempe Campus but reporting to Cardiac Rhythm Management (CRM) business unit management team in Minneapolis MN. Continuation of my basic job description for the past 10 years at Medtronic; "*Figure out how medicine will be practiced 5 to 10 years from now and help Medtronic make decisions today to be relevant 5 to 10 years from now*". Emphasis on white space identification, business model development, and applying enabling cardiac technologies on new indications.
- **Accomplishments**: Established iCREATE internal seed fund management (source of funding to translate internal Medtronic ideas into working prototype and animal feasibility study). Established annual cardiac focused cross-business shark tank competition to facilitate idea jump into business strategic plan opportunity. Facilitated futuring/strategy development/wargaming sessions for multiple business units.

Senior Manager of Technology & Business Development
Medtronic Tempe Campus, Tempe AZ
Feb/2009 – May/2019

- **Responsibilities**: Reporting to the Tempe Campus General Manager, expand the application of existing electrical platforms to create new value propositions across the enterprise. Emphasis on applying electronic technologies in business units that have none. Also created a competitive intelligence organization with complete teardown capabilities to build comprehensive technology, supply chain, and cost structure maps.
- **Accomplishments**: Business plan owner for dispositioning Tempe Campus' boutique wafer fab into a waferscale packaging foundry. Current products produced leveraging this novel technology include LINQ II™ implantable cardiac monitors and Unity™ continuous glucose monitoring sensors (CGMS).

Senior Manager of Product Development
Medtronic Tempe Campus, Tempe AZ
Aug/2002 – Feb/2009

- **Responsibilities**: Dual reporting role to Tempe Campus VP of R&D and CRM VP of R&D in Minneapolis, leading multi-disciplined teams to deliver next-generation products to market on time, on budget, and with superior quality, reliability, and manufacturing metrics.
- **Accomplishments**: Led multi-disciplined team delivering the first 100% Medtronic content implantable cardiac monitors branded Reveal™ DX/XT. This was the world's first ICM capable of detecting AF and determining AF burden. Other products brought to market include Bravo™ pH monitor for gastric reflux disease monitoring, Vitatron™ nEw3 value brand pacemakers, plus various research devices not intended for market release.

Manager of Manufacturing, Engineering & Development
Medtronic of Canada, Mississauga ON, Canada
May/1990 – Aug/2002

- **Responsibilities**: Lead a multidisciplined engineering team for all products in development and manufactured at the Medtronic of Canada facility.
- **Accomplishments**: Partner with 3rd partner design house to co-develop and manufacture the world's first commercially available implantable cardiac monitor (ICM) system, Reveal™ and Reveal Plus™. Leverage 3rd party funding (primarily Government of Canada IRAP grants) for development and manufacturing of Medtronic's PREMIER™ first generation emerging market pacemaker.

Product Engineer
Medtronic of Canada, Mississauga ON, Canada
May/1985 – May/1990

- **Responsibilities**: Provide engineering support for all products in development and manufactured at the Medtronic of Canada facility.
- **Accomplishments**: Established partnership with renowned physician researchers at University Hospital, London Ontario; George Klein MD and Andrew Krahn MD for the development of Medtronic's first-generation implantable defibrillator, PCD™, and research platform Syncope Monitor™ for monitoring and diagnosis of unexplained syncope.

Product Engineer
BioTechnics Audiology Specialists, Burlington ON, Canada
May/1981 – May/1985

- **Responsibilities**: As the 3rd employee at a biomedical start up, responsibilities ranged from designing a sound room amplifier system driven by a handheld audiology screener to answering the phones to taking the garbage out at night. Combined full and part time work at BioTechnics while completing my engineering degree.
- **Accomplishments**: Patented sound room amplifier system became BioTechnics number one selling product and allowed company to grow from 3 employees to 30 employees during the 4 years I worked at BioTechnics.

Council of Advisors
BioAccel/BioInspire, Phoenix AZ
Apr/2012 – Apr/2022 (retired)

- **Responsibilities**: Advise a novel 501(c)(3) early-stage investment fund and virtual incubator accelerating the development of new bioscience companies and biomedical products by providing entrepreneurs with the training, mentoring, and support they need to succeed in one of the most heavily regulated and strategically important industries – biomedical technology.
- **Accomplishments**: Help adjudicate multiple investment requests into the vital few. BioAccel has helped launch 17 Arizona start-up companies with non-dilutive and follow-on dilutive funding. Completed my 10-year Medtronic approved community service appointment in 2022.

Board of Directors
Arizona Bioindustry Association (AZBio), Phoenix AZ
Jan/2009 – Jan/2019 (retired)

- **Responsibilities**: Represent Medtronic Tempe Campus interests at the state and national bioindustry association board of directors' meetings and selected events.
- **Accomplishments**: Helped founding of the White Hat Life Science Investor Conference in 2014 that is shared annually by the 4-corner states (AZ, UT, CO, NM). White Hat held its 10th annual conference in 2024.

Education

Bachelor of Science – Electrical Engineering
Queen's University, Kingston, ON, Canada
May/1985 Graduation

Bachelor of Arts - Physiology
Queen's University, Kingston, ON, Canada
May/1981 Graduation

Certificate of Completion – Executive Business Commerce
Medtronic/Wharton School of Business, Minneapolis MN
Aug/2000 Completion

Certifications and Licenses

Professional Engineer License (Biomedical Engineer)
Professional Engineers of Ontario (PEO) – Granted May1987

Accredited Investor
3rd party verification by Fidelity Investments – Granted September 2025

Professional Affiliations

Institute of Electrical and Electronics Engineers (IEEE)
Member, 1985 – Present

Professional Engineers of Ontario (PEO)
Member, 1987 – 2002

Heart Rhythm Society (HRS)
Member, 1989 – Present

International Society for Cardiovascular Translational Research (ISCTR)
Member, 2002 – Present

Arizona BioIndustry Association (AZBio.org)
Member, 2002 - Present

American Heart Association/American Stroke Association (AHA/ASA)
Member, 2005 – Present

Cardio-Renal-Metabolic Society (CRMS)
Member, 2006 – Present

MedTech Strategist
Member, 2019 – Present

Medical Device Manufacturing Multiplier (MDM2.org)
Member, 2026 – Present

Awards and Honors

Medtronic Star of Excellence
Awarded for significant business excellence at Medtronic during the calendar year. Syncope Monitor research device first implant with George Klein MD and Andrew Krahn MD, 1993.

Medtronic Technical Contributor of the Year (TCOY)
Awarded for most significant technical achievement at Medtronic during the calendar year. Premier pacemaker automated manufacturing, 1999.

Medtronic Prolific Inventor Bronze Award
Awarded to prolific inventors having achieved their 25th patent granted by USPTO. Awarded in 2021.

Medtronic Prolific Inventor Silver Award
Awarded to prolific inventors having achieved their 50th patent granted by USPTO. Awarded in 2024.

Grants and Other 3rd Party Funding

Medtronic QUEST funding
Awarded to most significant unmet medical need proposal during the calendar year.

- Medtronic QUEST ($250K for implantable syncope monitor). Device feasibility funding as precursor to Syncope Monitor research device first implant partnered with George Klein MD and Andrew Krahn MD, 1993. Reference "Krahn AD, Klein GJ, Norris C, Yee R. "*The etiology of syncope in patients with negative tilt table and electrophysiological testing*". Circulation 1995; 92:1819-24 https://www.ahajournals.org/doi/10.1161/01.cir.92.7.1819 and https://www.cmaj.ca/content/cmaj/161/11/1424.full.pdf
- Medtronic QUEST ($250K for stroke detection via EEG). EEG biomarker signal acquisition study and stroke detection algorithm development partnered with Steven C Cramer MD, 2020. Reference Steven C Cramer et al "*Electroencephalography Might Improve Diagnosis of Acute Stroke and Large Vessel Occlusion*", AHA/ASA Stroke 2020 https://www.ahajournals.org/doi/10.1161/STROKEAHA.120.030150
- Medtronic QUEST ($250K implantable neuro monitoring for stroke and seizure detection). Device feasibility funding as precursor to Implantable Neuro Monitoring (INM) FIH feasibility study with Jonathon Parker MD https://www.dbnlab.org/research

Canadian NRC IRAP funding
Awarded by Canada's National Research Council, the Industrial Research Assistance Program supports wealth creation through innovation.

- Government of Canada IRAP ($250K for commercial syncope monitor design partnered with Creation Technologies in Vancouver BC).
- Government of Canada IRAP ($1.5M for Premier pacemaker development and automated manufacturing partnered with Prof Gary M Bone at McMaster University, Hamilton ON)

AZ WearTech funding
Arizona WearTech Center ($350K for trisensor integration feasibility).

NIH Brain Initiative
Under review – R01 and R61 proposal for implantable neuro monitoring feasibility leveraging EEG biomarker as the 6th vital sign. Partnered with Jonathon Parker MD at Mayo Clinic Arizona.

ABRC
LoI under review – AZ Investigator Grant proposal ($250K per year for 3 years) for trisensor feasibility for AKI and ADHF continuous monitoring. Partnered with Leslie Thomas MD at Mayo Clinic Arizona and Marylaura Thomas PhD at ASU Department of Chemical Engineering.

NIDDK
LoI under review – R01 proposal for trisensor feasibility for CKM continuous monitoring. Partnership with clinical expert under review.

Blueprint MedTech
LoI under review – proposal for ViveNeuro INM under review.

NSF I-Corps
Awarded to LevoSens ($70K award in 2025) for market feasibility of novel levodopa sensor partnered with Prof David Probst at University of North Carolina.

Intellectual Property (70 patents, 975 citations)

01. US5431695-A
Pacemaker. Randal C Schulhauser et al granted 11Jul1995.

02. US5851221-A
Attachment apparatus and method for an implantable medical device. Randal C Schulhauser et al granted 22Dec1998.

03. US6869404-B2
Apparatus and method for chronically monitoring heart sounds for deriving estimated blood pressure. Randal C Schulhauser et al granted 22Mar2005.

04. US8165662-B2
Methods and systems for observing sensor parameters. Randal C Schulhauser et al granted 17Apr2012.

05. US8543190-B2
Inductive coil device on flexible substrate. Randal C Schulhauser et al granted 24Sep2013.

06. US8979808-B2
Electronic injector. Randal C Schulhauser et al granted 17Mar2015.

07. US8979799-B2
Electronic injector. Randal C Schulhauser et al granted 17Mar2015.

08. US9265884-B2
On-body injector and method of use. Randal C Schulhauser et al granted 23Feb2016.

09. US9539386-B2
On-body injector and method of use. Randal C Schulhauser et al granted 10Jan2017.

10. US9545477-B2
On-body injector and method of use. Randal C Schulhauser et al granted 17Jan2017.

11. US9545215-B2
Apparatus and method for detecting cardiac events. Randal C Schulhauser et al granted 17Jan2017.

12. US9839783-B2
Magnetic field detectors, implantable medical devices, and related methods that utilize a suspended proof mass and magnetically sensitive material. Randal C Schulhauser et al granted 12Dec2017.

13. US9913693-B2
Error correction techniques in surgical navigation. Randal C Schulhauser et al granted 13Mar2018.

14. US9918669-B2
Wireless nerve integrity monitoring systems and devices. Randal C Schulhauser et al granted 20Mar2018.

15. US10111643-B2
Cardiac monitor system and method for home and telemedicine application. Randal C Schulhauser et al granted 30Oct2018.

16. US10123731-B2
Wireless sensors for nerve integrity monitoring systems. Randal C Schulhauser et al granted 13Nov2018.

17. US10188861-B2
Bioabsorbable or partially-bioabsorbable bone growth stimulator system and method for manufacturing a bioabsorbable or partially-bioabsorbable bone-regeneration stimulator system. Randal C Schulhauser et al granted 29Jan2019.

18. US10339273-B2
Systems and methods for pre-operative procedure determination and outcome predicting. Randal C Schulhauser et al granted 02Jul2019.

19. US10368808-B2
System and methods of determining etiology of undiagnosed symptomatic events. Randal C Schulhauser et al granted 06Aug2019.

20. US10368793-B2
Wireless nerve integrity monitoring systems and devices. Randal C Schulhauser et al granted 06Aug2019.

21. US10398369-B2
Wireless stimulation probe device for wireless nerve integrity monitoring systems. Randal C Schulhauser et al granted 03Sep2019.

22. US10445466-B2
Systems and methods for post-operative outcome monitoring. Randal C Schulhauser et al granted 15Oct2019.

23. US10665337-B2
Systems and methods for pre-operative procedure determination and outcome predicting. Randal C Schulhauser et al granted 26May2020.

24. US10852268-B2
Electrochemical sensor including multiple work electrodes and common reference electrode. Randal C Schulhauser et al granted 01Dec2020.

25. US10874300-B2
Waferscale physiological characteristic sensor package with integrated wireless transmitter. Randal C Schulhauser et al granted 29Dec2020.

26. US11145415-B2
Systems and methods for post-operative outcome monitoring. Randal C Schulhauser et al granted 12Oct2021.

27. US11167127-B2
System and method for therapy. Randal C Schulhauser et al granted 09Nov2021.

28. US11167140-B2
System and method for therapy. Randal C Schulhauser et al granted 09Nov2021.

29. US11200981-B2
Systems and methods for pre-operative procedure determination and outcome predicting. Randal C Schulhauser et al granted 14Dec2021.

30. US11273305-B2
Medical lead for treating obstructive sleep apnea (OSA) with electrical stimulation. Randal C Schulhauser et al granted 15Mar2022.

31. US11464977-B2
Obstructive and central sleep apnea combination therapy control. Randal C Schulhauser et al granted 11Oct2022.

32. US11490811-B2
Waferscale physiological characteristic sensor package with integrated wireless transmitter. Randal C Schulhauser et al granted 08Nov2022.

33. US11583219-B2
Wireless stimulation probe device for wireless nerve integrity monitoring systems. Randal C Schulhauser et al granted 21Feb2023.

34. US11623089-B2
Levodopa sensor for tight tuning of dosage. Randal C Schulhauser et al granted 28Feb2023.

35. US11623089-B2
Obstructive and central sleep apnea combination therapy control. Randal C Schulhauser et al granted 11Apr2023.

36. US11623102-B2
System and method for therapy. Randal C Schulhauser et al granted 11Apr2023.

37. US11623102-B2
Wearable defibrillation apparatus configured to apply a machine learning algorithm. Randal C Schulhauser et al granted 11Apr2023.

38. US11638549-B2
Wireless nerve integrity monitoring systems and devices. Randal C Schulhauser et al granted 02May2023.

39. US11654283-B2
Obstructive sleep apnea patient programmer for implantable devices. Randal C Schulhauser et al granted 23May2023.

40. US11666370-B2
Apparatus and method for targeted temporary bronchial nerve modulation by cryo-ablation for prevention and treatment of acute respiratory distress syndromes. Randal C Schulhauser et al granted 06Jun2023.

41. US11666270-B2
Personalized and contextualized treatment of sleep apnea and obesity comorbidity. Randal C Schulhauser et al granted 06Jun2023.

42. US11666755-B2
System and method for therapy. Randal C Schulhauser et al granted 06Jun2023.

43. US11696719-B2
Wireless sensors for nerve integrity monitoring systems. Randal C Schulhauser et al granted 11Jul2023.

44. US11744492-B2
Electrochemical sensor including multiple work electrodes and common reference electrode. Randal C Schulhauser et al granted 05Sep2023.

45. US11749409-B2
Systems and methods for post-operative outcome monitoring. Randal C Schulhauser et al granted 05Sep2023.

46. US11801005-B2
Wireless sensors for nerve integrity monitoring systems. Randal C Schulhauser et al granted 31Oct2023.

47. US11865341-B2
Obstructive and central sleep apnea combination therapy control. Randal C Schulhauser et al granted 09Jan2024.

48. US11890463-B2
Medical lead for treating obstructive sleep apnea (OSA) with electrical stimulation. Randal C Schulhauser et al granted 06Feb2024.

49. US11942217-B2
Systems and methods for pre-operative procedure determination and outcome predicting. Randal C Schulhauser et al granted 26Mar2024.

50. US12138050-B2
Electrochemical sensor including multiple work electrodes and common reference electrode. Randal C Schulhauser et al granted 12Nov2024.

51. US12201436-B2
Wireless nerve integrity monitoring systems and devices. Randal C Schulhauser et al granted 21Jan2025.

52. US12232842-B2
Waferscale physiological characteristic sensor package with integrated wireless transmitter. Randal C Schulhauser et al granted 25Feb2025.

53. US12232842-B2
Waferscale physiological characteristic sensor package with integrated wireless transmitter. Randal C Schulhauser et al granted 25Feb2025.

54. US12239423-B2
Detection of patient conditions using signals sensed on or near the head. Randal C Schulhauser et al granted 04Mar2025.

55. US12263020-B2
Systems and methods for detecting strokes. Randal C Schulhauser et al granted 01Apr2025.

56. US12272458-B2
Systems and methods for pre-operative procedure determination and outcome predicting. Randal C Schulhauser et al granted 08Apr2025.

57. US12285264-B2
Determining composite signals from at least three electrodes. Randal C Schulhauser et al granted 29Apr2025.

58. US12364397-B2
Systems and methods for detecting strokes. Randal C Schulhauser et al granted 22Jul2025.

59. US12415075-B2
Integrated sleep apnea and at least one of cardiac monitoring and cardiac therapy. Randal C Schulhauser et al granted 16Sep2025.

60. US12426811-B2
Detection of changes in patient health based on glucose data. Randal C Schulhauser et al granted 30Sep2025.

61. US12471996-B2
Extended intelligence for pulmonary procedures. Randal C. Schulhauser et al granted 18Nov2025.

62. US12471996-B2
Bilateral vagus nerve stimulation. Randal C. Schulhauser et al granted 30Dec2025.

63. US12558167-B2
Extended intelligence for cardiac implantable electronic device (CIED) placement procedures. Randal C. Schulhauser et al granted 24Feb2026.

64. US125582344-B2
Wireless stimulation probe device for wireless nerve integrity monitoring systems. Randal C. Schulhauser et al granted 24Mar2026.

65. US125588967-B2
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66. US12661019-B2
System for reproductive monitoring. Randal C. Schulhauser et al granted 23Jun2026.

67. US12697037-B2
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Levodopa sensor for tight tuning of dosage. Randal C. Schulhauser et al granted 25Aug2026.

69. US12714338-B2
Wireless sensors for nerve integrity monitoring systems. Randal C. Schulhauser et al granted 13Oct2026.

70. US12788481-B2
Interatrial multi-cuspid valvular shunt. Randal C. Schulhauser et al granted 10Nov2026.

Publications and Presentations

"CHAPERONE-CKM: An Explainable Clinician-Supervised Artificial Intelligence Framework Integrating Digital Biomarkers for Cardiovascular–Kidney–Metabolic Population Health."
Manuscript by Kris Vijay MD et al accepted by Circulation: Population Health and Outcomes on 03Aug2026 with publication date tbd. Conclusions: In a synthetic validation environment, the CHAPERONE-CKM framework demonstrated implementation readiness, transparent decision pathways, and compatibility with multidisciplinary CKM population health management. These findings are an early translational milestone, not clinical validation, and support external validation, prospective implementation studies, and Learning Health System integration to assess effects on care delivery, equity, and value-based outcomes.

ASU-Mayo Clinic IMPACT Program (based on Stanford Biodesign methodology).
Lecture delivered on 21May2026, “"Stakeholder Mapping & Value Hypothesis – A Medtronic/Schulhauser Associates LLC Perspective” by Randal C Schulhauser.

UC Irvine MENG Program (Biomedical Engineering concentration – includes UCI Medical School and MBA students).
Lecture delivered on 09Apr2026, “Medtech Entrepreneurism – Developing & Market Launching Novel Active Implantable Devices – A Medtronic/Schulhauser Associates LLC Perspective” by Randal C Schulhauser. Also advising on restarting the pre-pandemic “BioENGINE Program” where students are tasked with launching a medtech start-up and pitching their start-up for funding at the end of the semester.

Mayo Clinic – Arizona State University Health Care Accelerator (HCA).
Lecture delivered on 24Mar2026, “What’s Your Start-Up Exit Strategy? – by Randal C Schulhauser (Schulhauser Associates LLC / ex-Medtronic) and Carl Rickenbaugh (First Keel LLC / ex-Abbott & ex-Bard).

CHAPERONE: Cardiovascular Kidney and Metabolic (CKM) Health Assessment and Patient Empowerment in chronic Disease using a Health Coach iNtervention ModEl: A Randomized Clinical Trial Design by Kris Vijay MD et al; presented at AHA Scientific Sessions 2025 in New Orleans Louisiana.
The interconnectedness between Cardiovascular Kidney and Metabolic (CKM) diseases has been increasing in its importance, morbidity, mortality, and economic burden. There is sparse data on the impact of AI/ML based intervention to improve outcomes. The primary objective is to assess the safety and efficacy of the CHAPERONE CKM AI/ML-based intervention versus standard of care in reducing CKM progression, through a two-phase randomized study.
○ Phase I: Validation of Chatbot and Copilot performance by patients and clinicians
○ Phase IIa & IIb: Feasibility (n=30) and randomized trials (n=300) 1:1 CHAPERONE vs SOC
https://www.ahajournals.org/doi/abs/10.1161/circ.152.suppl_3.4372725

BCI Re-Imagined – Response to Dec2024 Nature Comment Article by Tim Dennison et al; “An application-based taxonomy for brain-computer interfaces (BCI)”.
Considering the Nature comment article on “an application-based taxonomy for brain-computer interfaces (BCI)”, are there other categories that should be considered beyond “communication & movements BCIs” and/or “therapeutic BCIs”? Panelists and moderator hypothesized that “implantable neuro monitoring (INM)”

for brain disease state detection, monitoring, and patient management merits a 3rd category. Reply by Randal C Schulhauser et al submitted to Tim Dennison 18Jun2025. https://www.nature.com/articles/s41551-024-01326-z

Implantable Neuro Monitor (INM) 5-Minute Video and Pitch Deck
3rd party investment presentation delivered to internal and external stakeholders by Randal C Schulhauser on 30Sep2025. https://www.dropbox.com/scl/fi/o9i7fi9tvglmehad8j0jk/CVG-INM-Funding-UC202601806EN-1080p-121625.mp4?rlkey=7avor8bez5dgsokkkn8f6u1sq&dl=0

SEMI-MDM2 2025 Technology Workshop Program – Panel Discussion: The New Frontier of Long-Term Brain Monitoring: Brain Computer Interface (BCI) Re-Imagined.
Panel Moderator Randal C Schulhauser on 24Apr2025 with Panelists Jonathon Parker (Neurosurgeon, Director of Device-Based Neuroelectronics Lab, Mayo Clinic Arizona), Allen Waziri (Neurosurgeon, Co-Founder iCE Neurosystems, iCE Neurosystems), Paul Gerrish (VP, Technology and Medtronic Fellow, Medtronic), Ash Sharan (Neurosurgeon Thomas Jefferson University Medical Center and Medtronic Neurosciences CMO). https://www.semi.org/en/event/2025-technology-workshops-shaping-future-electronics#agenda

XLR8 PBC Program (S25 cohort company CEOs).
Lecture delivered on 16Apr2025, "Talent, Leadership, and the MedTech Triangle – A Medtronic/Schulhauser Associates LLC Perspective" by Randal C Schulhauser.

UC Irvine MENG Program (Biomedical Engineering concentration – includes UCI Medical School students).
Lecture delivered on 10Apr2025, "Medtech Entrepreneurism – Bringing Novel Active Implantable Devices to Market – A Medtronic/Schulhauser Associates LLC Perspective" by Randal C Schulhauser.

ASU-Mayo MedTech Accelerator (MTI).
Lecture delivered on 25Mar2025, "What's Your Exit Plan? – A Medtronic/Schulhauser Associates LLC Perspective" by Randal C Schulhauser.

UC Irvine BME 295P: Functional Medical Device Development - How to bring devices to market successfully.
Lecture delivered on 04Mar2025, "MedTech Entrepreneurism – Bringing Novel Implantable Cardiac Devices to Market" by Randal C Schulhauser.

Trisensor 2-Minute Video and Pitch Deck
3rd party investment presentation delivered to internal and external stakeholders by Randal C Schulhauser on 11Jan2025.
https://www.dropbox.com/scl/fi/6igmcv4zdayi89id11c2w/Medtronic_Music_2_Final.mp4?rlkey=8grbshbzvnqsbrqdgcid75chs&st=he8kamgq&dl=0

Medtronic University: Futuring, Strategy Development, and Wargaming – 3 steps to an impactful strategy.
Lecture and certification course developed and delivered by Randal C Schulhauser et al upon request. Frequently integrated into core business unit strategic plans.

Medtronic University: Opportunity Scorecards and Risk Management.
Lecture and certification course developed and delivered by Randal C Schulhauser et al upon request. Course develops a framework for evaluating multiple opportunities to triage priorities with respect to business model and risk score. Frequently integrated into business unit BD&S and/or RT&D organizations to provide rationale for functional priorities and determining "what's next" targets.

Medtronic University: Creativity, Innovation, and Intellectual Property.
Lecture and certification course developed and delivered by Randal C Schulhauser et al upon request. Frequently integrated into core R&D programs intellectual property portfolio development.

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Electrochemical sensor including multiple work electrodes and common reference electrode. Randal C Schulhauser et al published by USPTO 14May2026.

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Bilateral vagus nerve stimulation. Randal C Schulhauser et al published by USPTO 30Apr2026.

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Stroke detection system. Randal C Schulhauser et al published by USPTO 12Dec2025.

20250366762-A1
Detection of physiologic signals of a patient using selective amplification. Randal C Schulhauser et al published by USPTO 04Dec2025.

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Stackable multi-electrode sensor array providing modularity in making multianalyte sensing devices. Randal C Schulhauser et al published by USPTO 18Sep2025.

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Systems and methods for chronic obstructive pulmonary disease targeted lung denervation. Randal C Schulhauser et al published by USPTO 30Jan2025.

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Books

Handbook of Leads for Pacing, Defibrillation & Cardiac Resynchronization
Erick Cuvillier MSc
First published in 2009

- Chapter contributions by Randal C Schulhauser.
- https://www.amazon.com/Handbook-Pacing-Defibrillation-Cadiac-Resynchronization/dp/1596085851/ref=sr_1_1?dib=eyJ2IjoiMSJ9.Q9AS9eIA6wGyvH0nt5eNWQ.ADzBW7T3ctcY39wdmprF1OEM6xRaIrfw-ZQExmvN7Jw&dib_tag=se&qid=1741629632&refinements=p_27%3AMsc+Erick+Cuvillier&s=books&sr=1-1

Volunteer Experience

"Path to Wellness" project
Cardiorenal Society of America, Twinepidemic, Inc: Nonprofit serving ethnic communities all over the world, Phoenix AZ, 2016, 2017,2018,2019.

Ladakh Heart Foundation Cardiorenal Screening project
Twinepidemic, Inc: Nonprofit serving ethnic communities all over the world, Leh, Ladakh, 2014.

AIM (Asian Impact at Medtronic)
Employee resource group for "all things Asia". Multiple assignments to India, China, and Singapore - leveraging contacts in North America to help boots on the ground in Asian countries.

MDM2 (Medical Device Multiplier) project
Volunteer consortium leveraging EDA grant to have Phoenix AZ designated a MedTech Hub.

Arizona BioIndustry Association (AZBio)
Volunteer board member – retired.

American Diabetes Association (ADA)
Arizona chapter board member – retired.

Mentoring Experience

Mentoring examples helping transition technical careers into customer facing roles as well as guiding start-up entrepreneurs into successful enterprises;

- Gary Stefanov manufacturing engineer to field clinical engineer to sales rep.
- Michael Kane design engineer to field clinical engineer.
- Enmartz Anderson manufacturing engineer to field clinical engineer.
- Alan Waziri MD CEO of ICE Neurosystems – MTI non-dilutive funding award 2024 www.iceneurosystems.com
- Chetan Patel Medtronic engineer to co-founder of Basata.ai in 2024 www.basata.ai

- David Probst development engineer to return to school to obtain PhD to Professor at UNC to co-founder of LevoSens in 2024 www.LevoSens.com
- Scott McMahan sales rep to business development & strategy role for nascent Medtronic epilepsy business.
- Daniel Hahn – business development & strategy role to return to medical school to obtain CMO role.
- Sarah Soaf manufacturing engineer – currently coaching efforts to obtain neurosciences research role or return to medical school.

References

Available upon request.
