Lane Desborough

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Lane Desborough is the founder and CEO of Nudge BG, an engineering consulting services and algorithm development company focused on modeling, simulation, and control of physiological systems such as Automated Insulin Delivery (AID) for people living with insulin-requiring diabetes.

Education

- Queen's University, 1992 - MScEng - Chemical Engineering Process Control
  Thesis "Performance Assessment Measures for Univariate Control"
- University of Waterloo, 1990 - Bachelor of Applied Science - Chemical Engineering

Experience

CEO, Nudge BG
Jan 2020-Present, Thousand Oaks, CA
Drug and Medical Device Consulting

Ongoing work:

- Nov 2023 -Present: Torramics - Early-stage insulin pump component. Technical / engineering / product requirement support.
- Oct 2023 -Present: Physiologic Devices - Mid-stage insulin pump (intraperitoneal). Closed loop algorithm and system engineering support.
- Feb 2023 -Present: Perceptive Medical - Mid-stage anesthesia (hypotension feedback control). Closed loop algorithm and simulation support.

Previous work:

- Oct 2023 - Feb 2024: DEKA / Sequel – Paper and poster co-authoring for insulin pump.
- Aug 2022 – Feb 2024: Zense – Algorithm and data science support for glucose sensors.
- Jan 2021 – Dec 2023: Luna Diabetes – Closed-loop algorithm and data analysis support for insulin pump.
- Apr 2022 – Nov 2023: Modular Medical – Technical product requirement support for insulin pump.
- Jul 2021 – Mar 2023: MannKind – Simulation support for inhalable insulin.
- Jun 2020 – Jul 2021: Tandem Diabetes Care – automated insulin delivery.
- Jun 2020 – Aug 2023: Roche Diabetes Care – system engineering for insulin pump.
- May 2020 – Mar 2023: Vapotherm – system engineering and closed loop algorithm developent
- Apr 2020 – Nov 2020: Tidepool - Risk management and safety engineering
- Apr 2020 – Apr 2021: SecureCell – Simulation and closed loop algorithm development

AiTA Bio, Inc.
Oct 2019 - Dec 2019, Thousand Oaks, CA (remote)

Engineer - Data science and engineering related to insulin delivery.

Bigfoot Biomedical, Inc.
Dec 2014 - Oct 2019, Milpitas, CA

Chief Engineer - Drove principles, practices, methods, tools, and processes across Bigfoot Engineering to deliver quality, repeatable, efficient engineering resulting in safe, secure, usable, reliable, and supportable systems. Delivered modeling, statistical analysis, and control engineering.

Co-Founder - Contributed insights to inform business strategy, product management and design, clinical research, leadership, risk management, knowledge management, and corporate governance.

Medical Device Development: Hybrid Closed Loop AID System
- Computer Modeling and Simulation
- Control Algorithm Development
- Interoperability Safety Engineering
- Regulatory Strategy

Medtronic Diabetes
Apr 2010 – Dec 2014, Northridge, CA

Chief Engineer, Insulin Delivery - Introduced new concepts to advance diabetes management. Developed these concepts and guided others in their adoption. Built technology assessments to enable the business to identify trends, new opportunities, and emerging competitive threats or disruptions. Matured internal capability to identify improvements to therapy designs, inform clinical study strategy, and expedite therapy approval. Represented Medtronic with external stakeholders, used interactions to learn from stakeholders. Incorporated feedback and learning from these interactions into solution creation framework. Found avenues of collaboration for common solution needs. Mentored technical staff to advance their skills in bringing more effective therapies to market through learning new engineering and critical thinking skills.

Product Strategist - Led innovation and development thought processes in which disruptive or game-changing insights were identified, evaluated, incubated, and commercialized. Provided unique insights that were utilized for growth platforms in key areas related to continuous glucose monitoring, insulin delivery, connected care, decision support, and closed loop technologies. Interfaced with cross-functional leaders and customers to understand needs and evaluate potential solutions. Developed business, market, clinical, and technical evaluations of innovative concept solutions.

Medical Device Development: Predictive Low Glucose Management Algorithm for Medtronic AID Systems
- Computer Modeling and Simulation
- Control Algorithm Development

GE Energy Services
Apr 2008 - Apr 2010, Atlanta, GA (remote)

Engineering, Monitoring and Diagnostic Center Product Manager, System Engineering Distributed Intelligence Architect - Product management, system requirements, software

architecting, and interoperability for a global remote monitoring and diagnostic system for combined cycle gas turbine power plants.

Honeywell Process Solutions
1995 – Apr 2008

Director of Strategy and other roles

- Computer modeling, simulation, and control projects
- Remote monitoring and diagnostics (Loop Scout, Alarm Scout)
- Interoperability standards and business strategy

Select Invited Presentations

2023 FDA OHT7 Diabetes Branch "iCGM Considerations"
2023 AFDO/RAPS Healthcare Products Collaborative AI Expert Network "Algorithms: apex predators of the software eating the world"
2023 "Accelerating Diabetes Technology Innovation Through Simulation"
2023 FDA Reagan Udall Foundation – Good Simulation Practices working group
2023 NIH FDA JDRF 5th Artificial Pancreas Workshop – "Automation Interoperability"
2023 Mathworks – "Derisking and Accelerating Physiological Closed Loop Control Using Model Based Design"
2023 FDA – OSEL "Software Intensive System Regulation Across Industries"
2021 IFAC – "Machine Learning"
2021 CSEC – Keynote "Lessons from 3 decades of global automation experience across 5 industries"
2020 RV2020 – Keynote "The Physical Side of Cyber-Physical Systems"
2019 Health Canada – "Expert Panel on AID and AI"
2018 DData18 – "How Machine Learning Fuels Diabetes Industry Solution"
2016 Mathworks – "Developing an Artificial Pancreas Using Model-Based Design"
2016 Nightscout Foundation, "Nightscout Origins & Bigfoot Biomedical"
2016 NIH FDA JDRF 4th Artificial Pancreas Workshop – "Automation Interoperability"
2013 DData – "Nightscout", Stanford University, November 2013
2013 AAMI – "Device Design Considerations – How can we ensure that technology is "home ready?", AAMI/FDA Summit on Healthcare Technology in Nonclinical Settings, October 9-10, 2013.
2012 AAMI – "Interoperability insights from other domains", AAMI/FDA Summit on Interoperability, October, 2012.
2012 Conference Board of Canada, Vancouver "Patient Remote Monitoring and Self Management"
2011 AAMI – "Taming the Alarm Problem: To boldly go where others have gone before", AAMI/FDA Summit on Clinical Alarms, October, 2011.

Patents: https://patents.google.com/?inventor=%22lane+desborough%22

Select Publications: https://scholar.google.com/citations?user=lMkvfl8AAAAJ&hl=en
Citations 3179, h-index 23, i10-index 41

- Desborough, L., Jaffe, K., Hanna (Sylvan), J., Ulloa, J. and Kaiserman, K., 2023. Transforming Evidence Generation for Drug Label Changes: A Case Study. Annals of Biomedical Engineering, 51(1), pp.137-149.

- Desborough, L., Kaiserman, K.B., Hanna (Sylvan), J., Jaffe, K. and Ulloa, J., 2022. 1496-PUB: Augmenting Clinical Trial Data with In-Silico Evidence to Evaluate Initial Conversion Dose Changes for Technosphere Insulin (TI). Diabetes, 71 (Supplement_1).
- Tarniceriu, A., Desborough, L., Ziemba, C., Schar, B. and Mathys, R., 2021, June. Developing a Novel Intravenous Automated Insulin Delivery System. An In-silico Study Characterizing the Glucose Measurement Effect on the System's Performance. In Diabetes Technology & Therapeutics (Vol. 23, pp. A13-A13). 140 Huguenot Street, 3rd Fl, New Rochelle, NY 10801 USA: Mary Ann Liebert, Inc.
- Lal, R., Quinlan, A., Desborough, L. and Nykaza, E., 2021, June. Optimizing formulas for basal, carb ratio and sensitivity factor for predictive controllers: lessons learned from Loop. In Diabetes Technology & Therapeutics (Vol. 23, pp. A16-A17). 140 Huguenot Street, 3rd fl, New Rochelle, NY 10801 USA: Mary Ann Liebert, Inc.
- Desborough, L, Naylor, R, Block, J, Buckingham, B, Pinsker, J, Wadwa, P, Forlenza, G, O'Brien, R, Lum, J, and B. Mazlish, "Leveraging Modeling and Simulation in the Development of the Bigfoot Biomedical Automated Insulin Delivery System", Poster, DTM 2017, Bethesda, MD.
- Palerm, C. C., L. Lintereur, S. Monirabbasi, and L. Desborough. 2014 "Virtual Trial Predicts Clinical Trial Outcomes-Accelerating Development and Reducing Risk Through Model-Based Design." In Diabetes Technology & Therapeutics (Vol. 16, pp. A43-A44). 140 Huguenot Street, 3rd Fl, New Rochelle, NY 10801 USA: Mary Ann Liebert, Inc.
- Picton, P.E., Yeung, M., Hamming, N., Desborough, L., Dassau, E. and Cafazzo, J.A., 2013. Advancement of the artificial pancreas through the development of interoperability standards. Journal of Diabetes Science and Technology, 7(4), pp.1066-1070.
- Trenchard, A., Desborough, L. and Miller, R., 2002. Managing control systems as assets: maximizing economic return through process-centric control loop management.
- Desborough, L. and Miller, R., 2002, January. Increasing customer value of industrial control performance monitoring-Honeywell's experience. In AIChE symposium series (No. 326, pp. 169-189). New York; American Institute of Chemical Engineers; 1998.
- Miller, R. and Desborough, L., 2000. Web-enabled control loop assessment. Chemical engineering (New York, NY), 107(5), pp.76-79.
- Harris, T.J., Seppala, C.T. and Desborough, L.D., 1999. A review of performance monitoring and assessment techniques for univariate and multivariate control systems. Journal of process control, 9(1), pp.1-17.
- Desborough, L. and Harris, T., 1993. Performance assessment measures for univariate feedforward/feedback control. The Canadian Journal of Chemical Engineering, 71(4), pp.605-616.
- Desborough, L. and Harris, T., 1992. Performance assessment measures for univariate feedback control. The Canadian Journal of Chemical Engineering, 70(6), pp.1186-1197.

Relevant Skills and Experience

- Automation Human Factors
- Big Data / Cloud Computing / Data Mining / Analytics
- Computational Modeling and Simulation

- Control Engineering
- Decision Support
- Diabetes
- Modeling and Statistics
- Product Development
- Remote Monitoring and Diagnostics
- Standards / Interoperability
- System Engineering / System Architecting