Bruce Wiggin PhD

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Portfolio available at www.brucewiggin.com

Key Strengths
- Proven experience designing and managing the development of medical devices, including surgical robotic systems
- Nature published author, developed first portable exoskeleton to make human locomotion more efficient
- Experienced leader with strong interpersonal, communication, vendor management, and teamwork skills
- Broad technical knowledge base that can be utilized across many diverse fields

Work Experience
- Senior Product Development Engineer – Asensus Surgical, Raleigh, NC 2014-present
  - ➢ Managed development of surgical robotic systems, surgical simulators, augmented reality tools, remote surgical systems, and surgical optimization projects.
  - ➢ R&D lead for developing system components and subsystems for laparoscopic surgical robots
  - ➢ Developed an 3D-HD, articulating endoscope
  - ➢ Developed customer and product requirements and developed and managed V&V test plans and procedures for FDA and CE submissions
- Associate Professor– NC State/UNC Chapel Hill Dept. of Biomedical Engineering 2021-Present
- Lead Senior Design Instructor – NC State/UNC Chapel Hill 2019 – 2021
  - ➢ Developed and taught Senior Design course, teaching medical device development for NCSU/UNC department of Biomedical Engineering
- Adjunct Professor and Course Developer – North Central University 2015-2018
  - ➢ Taught Masters and PhD level courses in R&D management, management of technology, and quality management
  - ➢ Developed Masters and PhD level online courses in engineering and patent law
- Graduate Research Assistant - North Carolina State University (2009-2014)
  - ➢ Full funding and stipend for graduate research designing human exoskeletons.
- Design Engineer - Thayer Coggin Inc. High Point, NC (2006- present)
  - ➢ Designed contemporary furniture and help with product development
- Medical Device Design Engineer - Martin Innovations, Raleigh, NC (2008-2011)
  - ➢ Designed automated and robotic exam tables and patient mobility devices (patient lifts, patient movers, MRI compatible stretchers)
- Mechanical Design Engineer - MPD^2 , Raleigh, NC 2009-2011
  - ➢ Designed portable solar power systems and farms
- Contract Design Engineer 2009-2011
  - ➢ Designed metal working equipment, and re-engineered linear actuators

Education
PhD - University of North Carolina/ North Carolina State University (2009-2014)
  - ➢ PhD - Biomedical Engineering
    - Dissertation: Characterizing optimal performance of a passive elastic ankle exoskeleton during human locomotion
    - COE Fellowship Recipient
    - Examination Fields: Biomechanics, Mechatronics, Design Engineering, Controls, Dynamics, Robotics, Musculoskeletal Physiology, Rehabilitation
    - **BS** - North Carolina State University (2005-2009) Graduated Magna Cum Laude
  - ➢ BS - Biomedical Engineering
    - Bioinstrumentation Concentration

Awards
- Nature published author for research in developing human exoskeletons
- Exoskeleton designs exhibited in the London Museum of Science, Popular Mechanics, BBC, CNN, Science, and Discovery Chanel
- President's Award from the American Society of Biomechanics 2012
- Da Vinci Award 2011 for Environmental Adaptation/Daily Living Chair-A-Table
- Chancellor's Innovation Fund (2012) Development of a passive elastic exoskeleton $75,000

Design Engineering
- Developed first portable exoskeleton to make human locomotion more efficient and lower metabolic cost of walking
  - ➢ Designed space frame carbon fiber composites, mechanical gearing, and mechatronic controls based on biofeedback
- Developed 3D articulating endoscopes from concept to manufacturing
  - ➢ Managed third party developers and vendors
  - ➢ Designed parts for manufacturing and set up manufacturing line and assembly protocols
- Designed robotic exam tables and patient mobility devices
- Designed and developed portable solar farm equipment
- 6 Non Provisional Patents for Medical Devices, 10+ Provisional Patents
- Developed over 15 medical devices manufactured and sold internationally

Coding / CAD
- **CAD** Solidworks
- **Coding** Matlab, Vicon, Labview Programs written to analyze: 3D motion capture, inverse dynamics, human kinetics and kinematics, EMG, human metabolics, genetic algorithms, engineering simulations, FEAs, microcontroller and electronics programming

Assigned Patents
- US20200315740A1 Identification and assignment of instruments in a surgical system using camera recognition
- US 8561226 B1 MRI or imaging transfer table
- US 20130296741 A1 Vibrotactile biofeedback AFO
- US 20130046218 A1 Exoskeleton using controlled storage and release
- US 20120291197 A1 Patient Lift Device
- US 8464371 B1 Patient lifting device
- PCT/US14/61668 Electromechanical, unidirectional, rotary clutch systems and methods

Publications and Presentations
- Reducing the energy cost of human walking using an unpowered exoskeleton, Wiggin MB, Collins SH, Sawicki GS (2015 Nature)
- Dynamic Walking 2013 Spring stiffness affects energy cost during walking with a clutched ankle- foot orthosis
- Dynamic Walking 2012 Passive Dynamic Ankle Exoskeleton Reduces Metabolic Cost of Walking
- An exoskeleton using controlled energy storage and release to aid ankle propulsion. IEEE Int Conf Rehabil Robot Wiggin, MB., Collins, S.H., Sawicki, G.S. (2011)
- Regional SICB 2011 A Bio-Inspired, Passive-Elastic, Ankle Exoskeleton
- ICORR 2011 An exoskeleton using controlled energy storage and release to aid ankle propulsion.
- Dynamic Walking 2011 A Passive Elastic Exoskeleton Using Controlled Energy Storage and Release to Reduce the Metabolic Cost of Walking
- ASB 2010 A Passive-Elastic Ankle Exoskeleton Using Controlled Energy Storage and Release