

1. NAME: Lawrence D. Noble Jr.

2. EDUCATION

DOCTORATE IN APPLIED BIOMEDICAL ENGINEERING

Dissertation: *Development of a Muscle Force Optimization Algorithm to Improve Center of Pressure During Simulated Walking*, Cleveland State University, May 2011.

MASTERS OF SCIENCE IN CHEMICAL ENGINEERING

All elective courses in biomedical engineering, Cleveland State University, May 2006.

BACHELORS OF SCIENCE IN CHEMICAL ENGINEERING

Cleveland State University, May 1984.

3. ACADEMIC EXPERIENCE

University of Akron

ASSOCIATE CHAIR OF UNDERGRADUATE PROGRAM (October 2017 to Present)

Responsible for undergraduate program focusing mainly in curriculum revisions, EBET Accreditation, student advising and student recruitment.

PROFESSOR OF ENGINEERING PRACTICE (May 2019 to Present)

ASSOCIATE PROFESSOR OF ENGINEERING PRACTICE (May 2016 to May 2019)

Appointed full-time, permanent position in the Department of Biomedical Engineering. Taught the following courses: Sophomore Seminar, Biomedical Signal and Image Processing, BME Tools: Matlab, Program Management for Medical Devices (Graduate-level), Experimental Methods in Biomechanics, and Modeling and Simulation of Biomedical Systems.

VISITING DESIGN INSTRUCTOR (September 2015 – May 2016)

Full-time, temporary faculty position in the Department of Biomedical Engineering. Responsible for development of curriculum, including textbook selection, for three courses: Instructed graduate students for the Program Management for Medical Devices class, Instructing undergraduate students for two sessions of Biomedical Modeling and Simulation, Physiological Control System (Spring 2016).

4. NON-ACADEMIC EXPERIENCE

Florida Baptist Children's Homes (July 2014 to September 2015)

Full-time house parent for residential foster home for school-age children. Provided all the necessary physical, emotional, social, educational and spiritual needs for the children. Responsible for daily meal preparation (including shopping), chores administration, transportation to medical/dental appointments, therapy sessions, church and extracurricular activities. Assisted with daily school assignments, scheduling of tutors, mentors and social workers. Advocated for improvements to their individual education plans (IEPs).

Parker Hannifin Corporation (October 2010 to December 2013)

TECHNICAL PROJECT MANAGER, SPECIAL ASSIGNMENTS

Managed highly visible development program for a novel therapeutic apheresis system by coordinating three Parker Hannifin operating divisions involved in the design and development of prototypes and training units. Provided the primary interface to the inventor/clinician and ensured that the development met the clinical and regulatory demands.

TECHNICAL PROJECT MANAGER, LIFE SCIENCES

Responsible for the management of 3rd party collaboration with the Cleveland Clinic. Performed a technical evaluation of lower extremity exoskeleton technologies and compared these technologies for possible licensing and manufacturing. Developed an acquisition strategy for prosthetic device manufacturing companies to focused on accelerating the manufacturing and commercialization of an exoskeleton.

Lerner Research Institute, Cleveland Clinic Foundation (May 2005 to October 2010)

SENIOR PRINCIPAL RESEARCH ENGINEER

Responsible for the development of medical devices including proposal preparation, conceptual design, preliminary design, final design, prototype fabrication and testing. Devices developed include tricuspid valve occluder, breast biopsy needle, left ventricle assist device, convection enhanced drug delivery catheter, suture clip and implantable aortic wall displacement sensor. Work closely with Cleveland Clinic physicians and commercialization officers at Cleveland Clinic Innovations.

Responsible for fundamental research of tibial and calcaneal bone strain during simulated walking using cadaver lower legs with a robotic musculoskeletal simulator. Studied activation of extrinsic muscles of the foot to determine impact on center of pressure during walking through modeling and cadaver testing using the musculoskeletal simulator.

Developed a multi-tendon actuator assembly to simulate muscle forces during simulated walking with cadaver legs. Used this device in conjunction with the robotic musculoskeletal simulator used to simulated ground forces.

Northrop Grumman, Brook Park Ohio (November 1999 to September 2004)

PROJECT ENGINEER/PROJECT MANAGER

Responsible for developing the Environmental Control System for the Space Station Fluids and Combustion Facility (FCF). Successfully integrated these systems with the flight racks and performed all certification testing, analysis and inspections required for NASA Glenn Research Center (GRC) validation/verification.

Responsible for developing a comprehensive verification program for the FCF facilities. In this role identified verification methods and plans of parts, sub-assemblies, assemblies and systems and monitored reviewed/approved all verification results. Comprehensive verification was performed on science requirements, engineering requirements and NASA payload requirements.

Responsible for the oversight of the assembly and integration of the FCF Combustion Science (CS) and Fluid Physics (FP) racks in the Building 333 Highbay at NASA GRC. Responsible for developing and maintaining the cleanroom environment within the Highbay.

Developed the ground processing sequence that was followed at NASA Kennedy Space Center after delivery of the FCF CS and FP racks that was required before integration into the space shuttle cargo bay.

ABB Automation (Bailey Controls Company), Wickliffe Ohio (October 1995 to November 1999)

PROJECT MANAGER

Responsible for the development of the Batch Data Manager and SymBatch software to automate batch processing of bulk chemicals, food and pharmaceuticals. Developed the product based on the ISA SP88 batch standard.

SENIOR BATCH MARKETING MANAGER

Reporting to the Vice President of Marketing. Assigned to the Strategic Business Unit to focus on strategic planning and implementation of new batch products. Worked closely with global strategic partners (DuPont, BASF, Novartis) to develop product strategies that meet the partners long and short-term production goal and objectives.

Analex Corporation, Brook Park Ohio (October 1992 to October 1995)

LEAD FLUIDS ENGINEER/MANAGER

Responsible for Fluids Supply System and Vacuum Vent System for Droplet Combustion Experiment (DCE) designed for Spacelab. Performed component designed, fluids analyses, fabrication, cleaning, integration and verification of pressurized gas bottles, vent valve, air filter, bottle receiver/manifold assembly.

Life Systems, Inc. Beachwood Ohio (October 1984 to October 1992)

SCIENTIFIC PROGRAMMER

Developed computer simulations of the chemical/physical life-support systems developed for the manned-space program. Developed mathematical models using analytical and empirical techniques to simulate response of system to input parameters. Simulators used to test control systems and interactions between integrated systems to avoid potential damage to real systems. Assisted in the development of the 300-Series control operating system platform utilized to control and monitor the life-support systems. Responsible for the design, analysis and implementation of key segments of the software development.

PROJECT ENGINEER/PROJECT MANAGER

Responsible for the management of the Electrochemical Carbon Dioxide Concentrator (EDC) System technology. Oversaw the design and development of a technology demonstration unit to go up against competitive technologies during evaluation at the NASA Marshall Space Flight Center (MSCF) in Huntsville, AL.

Responsible for the research, design and development of a rotary drum vapor compression distillation unit for manned-spacecraft use. Designed a system to reclaim hygiene water from urine and wash water wastes for NASA Marshall Space and Flight Center (MSFC). Took design from preliminary design through the Critical Design Review. Technology is still being utilized on Space Station.

5. HONORS AND AWARDS

- 2009 Innovators Award for the Implantable Anatomic Displacement Sensing System, 2008 Innovators Award for the Suture Clip, 2007 Innovators Award for the Musculoskeletal Simulator
- Letter of Appreciation from the Director of the NASA Lewis Research Center for my contributions as Tiger Team Leader for troubleshooting and design improvements to the NASA Space Transportation System (Shuttle) Orbiter Refrigerator/Freezer (ORF) (1993)
- Certificate of Achievement from Honeywell SAVD for contributions to the Advanced Continuous Control of Life Support Systems (ACCLSS) Program with NASA Johnson Space Center (1986)

6. CERTIFICATIONS AND PROFESSIONAL REGISTRATIONS

- None

7. CURRENT MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

- None

8. SERVICE ACTIVITIES

- Associate Chair Undergraduate BME program (2017-Present)
- ABET Coordinator (2018-Present)
- High School Recruitment Events (Various)
- Various VIP Student Tours (Weekly)
- New Student Orientations (Various)
- BME Design Team Advisor

9. PRINCIPAL PUBLICATIONS

1. Short-term in vivo performance of the Cleveland Clinic PediPump left ventricular assist device, H. Fumoto, A. Shiose, C.R. Flick, L.D. Noble, D.T. Dudzinski, F. Casas, T. Takaseya, Y. Arakawa, K. Fukamachi, W.A. Smith, B.W. Duncan, Artif Org (2014).
2. Development of a Muscle Force Optimization Algorithm to Improve Center of Pressure During Simulated Walking, L.D. Noble, Electronic Dissertation: Document number: csu1301931722, Permalink: http://rave.ohiolink.edu/etdc/view?acc_num=csu1301931722 (2011)
3. Design and Validation of a General Purpose Robotic Testing System For Musculoskeletal Applications, L. D. Noble, R. W Colbrunn, D-G. Lee, A. J. van den Bogert, B. L. Davis, J. Biomech. Eng., 132:025001 (2010)

4. The PediPump: A Versatile, Implantable Pediatric Ventricular Assist Device - Update IV, B. W. Duncan, K. Fukamachi, L. D. Noble, Jr, D. T. Dudzinski, C. R. Flick, H. Fumoto, A. Shiose, Y. Arakawa, T. Takaseya, F. Casas, and W. A. Smith, *Artificial Organs*, 33(11):1005–1008, Wiley Periodicals, Inc. (2009)
5. Vapor Compression Distillation Technology for Space Station Freedom, *International Conference on Life Support and Biospherics*, Proceedings, pp. 451-460 (1992).
6. An Assessment of the Readiness of Vapor Compression Distillation for Spacecraft Wastewater Processing, SAE 911454, 21st International Conference on Environmental Systems; San Francisco, CA; July 15-18 (1991)
7. Phase Change Water Recovery for Space Station Freedom and Future Exploration Missions, SAE 901294, 20th Inter-Society Conference on Environmental Systems; Williamsburg, VA; July 9-12 (1990)

10. PROFESSIONAL DEVELOPMENT ACTIVITIES

BMES Educational Summit (May 2019)

BME Design Team Advisor Source Training (February 2019)

ALICE Training (November 2018)

BME Design Team Advisor Source Training (September 2018)

Brightspace Training (August 2017)

Springboard Training (August 2016)