UAB Grand Challenge Name: Managing an Innovative Ecosystem to Drive a Successful Grand Challenge (formerly “Idea Meets Opportunity”)

UAB Principal Investigator:

Joel L. Berry, Ph.D.
Associate Professor
Undergraduate Program Director
Department of Biomedical Engineering
Associate Director
The UAB Science and Technology Honors Program
The University of Alabama at Birmingham
Birmingham, Alabama 35294
jlberry@uab.edu | 205-996-9661

UAB Identified Team Members:

Nancy Wingo, Ph.D.
Assistant Professor
Director of Instructional Innovation
UAB School of Nursing
The University of Alabama at Birmingham
nancy10@uab.edu | 205-975-5238
Role - Director of Education

Kristen Noles, DNP, RN, CNL
Nurse Manager, Clinical Decision Unit
The University of Alabama at Birmingham
knoles@uabmc.edu
Role – Clinical Immersion Experience Officer

Sam Misko, MS
Engineering and Innovative Technology Development (EITD)
The University of Alabama at Birmingham
moradi@uab.edu | 205-934-0550
Role – Director of Software Development
Managing an Innovative Ecosystem to Drive a Successful Grand Challenge

Description of the Problem to be Addressed
The inaugural launch of the UAB Grand Challenge calls for the creation of an innovative ecosystem that is an opportunity for all members of the UAB enterprise – students, faculty, staff, clinicians, and administrators – to join forces with others outside UAB to solve a significant issue with a goal of creating better quality of life in our society. Solutions to the technological and societal problems that are important to Birmingham, the state of Alabama, and beyond will require interdisciplinary collaborations across campus, engagement of the Birmingham community, and a strategic approach to address the complexity of the problems associated with the Grand Challenge. A project of this scope has not been proposed before at UAB, and its success depends on diligent tracking of the problems, projects, innovations, data, and collaborative efforts of those involved.

The problem to be addressed is the challenge of connecting stakeholders across multiple disciplines, organizing them, and rallying them to the cause of solving the many issues that make up Grand Challenges facing us. Each problem that has been proposed as a Grand Challenge, from homelessness to opioid addiction to materials recycling, will require team formation, background research, inclusion of new stakeholders, project management, and deployment of technological tools to help increase team efficiency. Because the UAB Grand Challenge will support people engaged in problem solving from across the enterprise, we propose development and implementation of a web-based software tool that can be used in multiple sectors and across multiple institutions to facilitate collaboration and drive innovation.

The goal of this proposal is to expand development and implementation of a prototype software tool that can be used in multiple sectors to facilitate problem solving and innovation. This tool will directly address the manner in which teams of innovators from within UAB and outside the walls of UAB are formed and how projects are managed.

The first iteration of UAB Solution Studios©, our innovation platform, has been deployed in the context of UAB’s academic enterprise and UAB Hospital. Our current approach and results to date will serve as the basis for development of a more advanced and robust platform that will accelerate innovative solutions to unsolved problems across disciplines by allowing multiple stakeholders to easily connect online and form teams to address the disparate issues that make up the Grand Challenge. This tool will generate data and track team progress as we build and manage an innovative ecosystem to address complex problems, improve quality of life in our community and state, and serve as a role model of innovation to other communities.

Our experience with connecting students, faculty, and clinicians thus far has opened multiple collaborations across the UAB campus that would not have existed otherwise. Further, our web-based approach will naturally extend to other universities, clinics, community partners, and even industry in an accelerated manner. We therefore propose that the UAB Solution Studios© software be integrated into the UAB Grand Challenge as a support tool.
Planning Process

Background

UAB Solution Studios™ is an interprofessional academic program involving domains of expertise in nursing, medicine, and engineering. It is an effort to engage the changing dynamics of healthcare, health research, and product development in which classic distinctions between these fields are blurring and becoming increasingly important and relevant to one another. UAB Solution Studios™ seeks to remove classic barriers between these fields to allow a more fluid exchange of ideas and insights. As technologies and research in nursing and medicine become more multi-disciplinary in nature, UAB Solution Studios™ has become more relevant than ever in enabling and implementing innovative advances. UAB Solution Studios™ seeks to provide an effective framework to navigate this emerging terrain.

The web tool to facilitate these collaborations was first established in 2016 in Canvas, UAB’s learning management system. Clinicians and graduate nursing students with interest in posting their problem(s) for viewing by undergraduate STEM students were asked to provide a brief background of themselves, contact information, and short description of their problem. Undergraduate students who enrolled in either a sophomore level honors Clinical Innovation class or a senior level Biomedical Engineering Design class were provided access to Solution Studios. They were granted the freedom to self-select into clinical design teams and choose a specific problem. Their problem became an innovation project for one semester (honors students) or two semesters (senior design students). Students were required to gain empathy for the clinical partner through shadowing experiences, define the problem through background research, ideate solutions to the problem, build prototypes, and test the solution getting feedback from the clinical partner. The work output for all students was a detailed document describing their design process, an oral presentation of their findings, and visual or physical prototype of their innovations. More than 250 students have interacted with the program, resulting in 7 intellectual property disclosures and 2 provisional patents. The impact on students has been transformative, as many have shared that their participation in the program changed their career path and/or helped them to develop crucial skills or to enhance their personal growth in various ways.

Our early success prompted steps to move the web-based web tool out of the learning management system to a free-standing web platform with greater functionality. The UAB Solution Studios© minimum viable product (MVP) to facilitate collaboration between students and clinicians at UAB was delivered in August 2018. The MVP was deployed in two classes at UAB and garnered approximately 130 users in 2 weeks.

The current MVP enables open access for any user to post a problem and/or request to be part of solving it (Figures 1 and 2). While we have used this tool only in clinical settings so far, it could be adapted for more general use across various disciplines and communities.
Next Steps
Our planning process requires that we **further develop the UAB Solution Studios® software to allow convenient access for users across the enterprise to facilitate team formation and collaboration.** We also plan to implement features that will enable teams to use project management timelines, evidence-based processes such as systems engineering, text analytics, and machine learning (ML) systems to accelerate problem solutions. These features will also allow Grand Challenge leaders to gauge overall progress by generating back-end data for tracking projects.

Our plan is to enhance the next version of UAB Solution Studios® with features that will drive users toward increasing the probability that their innovations will fail quickly or will evolve down the proven pathways of efficient workflow management, systems engineering, and machine learning (ML) to mine background information for useful connections. A major determinant of the success of creative solutions to problems is the management of the project life cycle arising from these innovations. **We will embed features in the web tool that will allow users to start a project, monitor progress of their innovations, and determine if specifications and/or design requirements are met at key decision points in the life cycle of the innovation.** This systems approach to workflow has been used extensively in product development and has proven successful by UAB’s EITD group for meeting NASA design requirements. Though it has mostly been used for device development and customer discovery, it is applicable to all types of problem solving.

**We also plan to develop text analytics in the next version of the tool to allow users to form connections and analyze data in more robust ways.** Text analytics, also known as text mining, is a form of artificial intelligence that examines large collections of written resources to generate new information and to transform unstructured text into structured data for use in further analysis. Text mining identifies facts, relationships, and assertions that would otherwise remain buried in the mass of textual big data. These facts are extracted and transformed into structured data for analysis, visualization (e.g., HTML tables, mind maps, charts), integration with structured data in databases or warehouses, and further refinement using ML systems. **We**
believe that using text analytics and other ML systems as part of problem solving will create better odds for success across the innovation ecosystem that will make up the Grand Challenge.

**Timeline**

**October 2018**
- Funds awarded
- Engage external programmers to enhance tool functionality
- Develop tools for project management timelines (team goals and progress reports)

**November 2018**
- Beta test project management tools
- Develop tools for systems engineering (specifications, design requirements)

**December 2018**
- Beta test systems engineering tools
- Determine specifications for text analytics and machine learning

**January 2018**
- Submit full proposal (including budget for further tool development for robust functionality and ability to customize features for the final Grand Challenge team)

**Budget and Budget Justification**

| UAB Solution Studios© Development and Deployment Expenditures (6 month timeline) |
|-------------------------------------------------|--------|--------|--------|--------|
| **1. Salaries**                                  | Rate   | FTE %  | FTE Mths | $29,352 |
| Andrew Pearson                                  |        |        |          |         |
| Senior Web DevOps Programmer - $60/hr consulting | $124,800.00 | 18.0%  | 2.3     | $11,232 |
| Nicholas Bowen                                  |        |        |          |         |
| Programmer I                                    | $60,000.00 | 50.0%  | 6.0     | $15,000 |
| Chuck Malloy                                    |        |        |          |         |
| Usability Specialist/Designer - $100/hr consulting | $208,000.00 | 3.0%   | 0.8     | $3,120  |
| **Total Cost (period of planning grant)**       |        |        |          | $29,352 |

We are requesting that the entire $29,352 offered through this pilot award be used to support programming efforts to position UAB Solution Studios© to align with one or more Grand Challenge teams.

**Biosketches**
BIOGRAPHICAL SKETCH

NAME: Berry, Joel Lyman

eRA COMMONS USER NAME: jberry

POSITION TITLE: Associate Professor of Biomedical Engineering

EDUCATION/TRAINING:

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE</th>
<th>Completion</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Alabama at Birmingham</td>
<td>B.S.</td>
<td>05/1985</td>
<td>Biology</td>
</tr>
<tr>
<td>University of Alabama at Birmingham</td>
<td>B.S.</td>
<td>05/1989</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>University of Alabama at Birmingham</td>
<td>M.S.</td>
<td>05/1992</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>Wake Forest University</td>
<td>Ph.D.</td>
<td>12/2000</td>
<td>Biomedical Engineering</td>
</tr>
</tbody>
</table>

A. Personal Statement

My research career began with in vitro and in vivo modeling of the fluid and solid mechanical effects of metallic stents placed in arteries and then transitioned the fluid mechanical effects of vascular cell development in engineered arteries. My group has published on these subject and I have received 4 patents for metallic stent designs. In addition to theoretical and experimental in vitro flow modeling of stented vessels, I have designed flow bioreactors for tissue-based heart valves and tissue-based vascular grafts, the outcome of which have demonstrated that fluid shear profoundly influences cell development and function. It is from this base of knowledge and experience that my research has led to the concept of perfused, cell-seeded, prevascularized scaffolds for the purpose of overcoming oxygen diffusion limitations 3D tissue engineered constructs. My lab has developed a technique for prevascularizing the gel scaffold materials with submillimeter diameter channels. We have recently shown that these channels also support a confluent layer of endothelial cells under pulsatile flow conditions. I am also a co-founder of the UAB Solution Studios, a digital platform for interprofessional education.

B. Positions and Honors

Positions and Employment

1985-1988 Senior Research Technician, Transport/Electron Microscopy Laboratory, Division of Nephrology, The University of Alabama at Birmingham, Birmingham, Alabama
1989-1991 Chief Research Engineer, Biomechanics Laboratory, Department of Mechanical Engineering, The University of Alabama at Birmingham, Birmingham, Alabama
1992 Mechanical Engineer Laboratory of Medical Engineering, Swiss Federal Institute of Technology, Lausanne, Switzerland
1992-2001 Research Associate, Department of Medical Engineering, Wake Forest University School of Medicine, Winston-Salem, NC
2001-2007 Research Assistant Professor, Department of Biomedical Engineering, Wake Forest University School of Medicine, Winston-Salem, NC
2008-2010 Research Assistant Professor, Dept of Physics, Wake Forest University, Winston-Salem, NC
2010 - Associate Professor, Dept of Biomedical Engineering, The University of Alabama at Birmingham

Other Experience and Professional Memberships

2003 Co-founder, Angiomechanix
2004 ZRG1 CVS-F(50) NIH Cardiovascular Sciences Special Emphasis Panel
2005 NIH SBIR Cardiovascular Review Panel
2005 NIH Special Emphasis Panel/Scientific Review Group 2005/10 ZRG1 CVS-F (91) (S)
Cardiovascular Dynamics
2010 Reviewer, American Heart Association Bioengineering Study Section
2012  Associate Director, UAB Science and Technology Honors Program
2016  Director, UAB Undergraduate Program in Biomedical Engineering
2016  Reviewer, American Heart Association Bioengineering Study Section
2017  Reviewer, American Heart Association Bioengineering Study Section

Honors

1990  Tau Beta Pi, Engineering Honor Society, Alabama Gamma Chapter
1992  Member, American Society of Mechanical Engineers, Bioengineering Division

C. Contribution to Science

1. My early publications were the first to address the fact that the adverse fluid and solid mechanical effects of vascular stents in arteries may be a contributing factor to poor re-endothelialization and restenosis following the stenting procedure. These publications demonstrated that stents create flow reversals, stagnant flow, and large vortices all of which are implicated in stent thrombosis and incomplete re-endothelialization. I served as the primary investigator or co-investigator in all of these studies and received 4 United States patents where I was a primary inventor.


2. In addition to the contributions described above, with a team of collaborators, I created, validated, and documented multiple bioreactors for the purpose of endothelializing and conditioning tissue engineered blood vessels and heart valves. These studies emphasized the importance of fluid and solid mechanical parameters in conditioning these structures for implantation into animal subjects. My tissue engineered heart valve bioreactor is on permanent exhibit in the Chicago Museum of Science and Technology “You” Exhibit.


3. Vascularization is essential to any engineered tissue. I have shown that the viability of a tissue engineered breast cancer model is extended when perfused with microvessels. This has important implications for the development of these cancers in a humanized 3D model suitable for anti-cancer drug development. I have received one United States patent for this work where I am a primary inventor.


**Complete List of Published Work in MyBibliography:**

**D. Research Support**

**Ongoing Research Support**

**UAB School of Medicine Pilot Funding**  Berry (PI)  10/01/2016 – 09/30/2017

*A Multidisciplinary Approach to Engineering a Novel Technology for Precision Medicine and Cancer Drug Development*

The goal of this pilot funding is to further develop our perfused tissue surrogate/bioreactor system, particularly to include immune cells in the surrogate and to develop a liver module for co-testing cancer drug efficacy and hepatotoxicity.

Role: Co-Principal Investigator

**Completed Research Support**

**NIH R21 CA197897**  Frost/Berry (mPIs)  07/01/2015 – 06/30/2017

*Biomechanics of the Stromal Regulation of DCIS*

The goal of this study is to demonstrate the feasibility of a biomechanical model for studying extracellular matrix changes in DCIS and activation of stromal fibroblasts (shared direct and indirect costs)

Role: Multi-PIs Berry and Frost

**Department of Defense CDMRP**  Berry (PI)  01/01/2013 – 12/31/2016

*Development of an in vitro 3D Microphysiologic Breast Cancer System*

The overall goal is to develop and characterize a three-dimensional (3D), multicellular, microphysiologic breast cancer system.

Role: Co-Principal Investigator

**NIH SBIR HL108512-01A**  Moreno (PI)  09/01/2012 – 02/12/2013

*Development of a Hybrid Dynamic Stent*

The overall goal is to develop and test production methods for selectively resorbable metallic/polymer peripheral vascular stent.

Role: Co-Investigator
NAME: Wingo, Nancy Pope

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Assistant Professor; Director of Instructional Innovation; UAB School of Nursing

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.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>Completion Date MM/YYYY</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auburn University; Auburn, AL</td>
<td>B.A.</td>
<td>05/1983</td>
<td>English</td>
</tr>
<tr>
<td>Auburn University; Auburn, AL</td>
<td>M.A.</td>
<td>08/1987</td>
<td>English</td>
</tr>
<tr>
<td>University of Alabama at Birmingham</td>
<td>Ph.D.</td>
<td>04/2015</td>
<td>Educational Leadership</td>
</tr>
</tbody>
</table>

A. Personal Statement

I have taught for over 25 years in various fields, including Nursing Education, Qualitative Research, English, and Business Communications. My doctoral coursework in Educational Leadership included a concentration in distance-accessible education, and I have been consulting with faculty at the UAB School of Nursing for 5 years to help them develop innovative teaching strategies for online learners. I have written a variety of articles on teaching strategies in nursing education and online learning and a book chapter on innovative teaching methods.

I have also been part of a core leadership team to develop a unique website portal, UAB Solution Studios™, to connect clinicians, faculty, and students so that they can form collaborative teams to address significant clinical problems. My service as chair of the UAB Enabling Technologies Committee, chair of the UAB Center for Teaching and Learning Advisory Council, and member of the Advisory Council for UAB eLearning has afforded me the opportunity to understand the diverse needs and practices of UAB schools and units in online teaching and learning. This knowledge – along with my 6+ years of service as Projects Analyst to the UAB Provost - has allowed me to form strong partnerships with other UAB schools and entities to expand UAB Solution Studios™.

My research on innovation and teaching practice in distance-accessible education informs the design of the UAB Solution Studios™ digital space to ensure that it is a robust, user-friendly platform for teams to work together to design solutions to clinical problems.

B. Positions and Honors

Positions and Employment

1993-2006  Department Chair and English Instructor; Houston Academy; Dothan, AL
2006-2007  Executive Assistant to the CEO; Daxko (Software Company); Birmingham, AL
2007-2013  Projects Analyst to the Provost; University of AL at Birmingham; Birmingham, AL
2009-2011  Adjunct Instructor, Business Communications; University of AL at Birmingham School of Business; Birmingham, AL
2013-2016  Instructor, University of AL at Birmingham School of Nursing; Birmingham, AL
2016-      Assistant Professor, University of AL at Birmingham School of Nursing; Birmingham, AL
Other Experience and Professional Memberships

2012- Member, American Educational Research Association
2012- Member, American Educational Research Association, Mixed Methods SIG
2012- Member, American Educational Research Association, Online Teaching & Learning SIG
2013- Member, American Educational Research Association, Qualitative Research SIG
2013- Advisory Board, UAB Center for Teaching and Learning
2014- Member, Mixed Methods International Research Association
2014-2017 Advisory Board, UAB Division of eLearning and Professional Studies
2015- Member, Alabama Network for Women Leaders in Higher Education
2016- Director of Education, UAB Solution Studios™

Honors

2015 Outstanding PhD Student, UAB School of Education; Department of Educational Leadership
2016 Quality Matters © Certified Peer Reviewer
2017 UAB Center for Teaching and Learning Teaching Certificate

C. Contributions to Science

My contributions to science to date have centered on educational innovation and distance education in schools of nursing. I have focused my research on various aspects of adult learning, including how faculty learn to implement innovative strategies for teaching online and how students learn online and in collaborative interprofessional teams.

Faculty:


Students:


My work has addressed challenges in implementing online teaching and learning strategies for nurse educators and nursing students. Findings from my work have shown that adult learners (faculty and students) embrace asynchronous online learning because of its convenience, but they prefer to interact in face-to-face situations to discuss difficult concepts or their progress in courses. My findings inform this project in that I will ensure that the digital platform we create includes opportunities for effective asynchronous communication and project management, while capturing work that is being done in synchronous healthcare and research settings.

**NCBI Bibliography**

**Link:** [https://www.ncbi.nlm.nih.gov/sites/myncbi/1bUN5xKPVOLYQk/bibliography/54654290/public/?sort=date&direction=ascending](https://www.ncbi.nlm.nih.gov/sites/myncbi/1bUN5xKPVOLYQk/bibliography/54654290/public/?sort=date&direction=ascending).

**D. Additional Information: Research Support and/or Scholastic Performance**

**Ongoing Research Support**

UAB Center for Teaching and Learning Innovative Teaching Grant  Wingo (PI)  1/4/2016-
Kaizen: An innovative team learning experience for nursing students
The goal of this study is to learn more about nursing students’ perceptions of team competition in the Kaizen game and whether it promotes their engagement with educational material presented in Kaizen questions.

**Completed Research Support**

Dean’s Scholar Award (UAB School of Nursing) Roche (PI)  10/1/2016-3/27/2018
Enhancing Education through Gamification: Mobile App Development and the Kaizen Software Platform
The goal of this study was to develop a mobile application for Kaizen, an educational software platform, and test its usability with students.

Dean’s Scholar Award (UAB School of Nursing) Wingo (PI)  10/1/2015-9/11/2017
Evaluating the Effectiveness of Peer Review in Face-to-Face Courses
The goal of this study was to develop and test a peer review tool and an educational module to train faculty to provide supportive peer feedback.

UAB Center for Teaching and Learning Innovative Teaching Grant  Moss (PI)  1/5/2015- 1/4/2016
Enhancing Student Team Communication during Clinical Simulation and Simulation Debriefing
The goal of this study was to provide training for students to communicate effectively in teams during clinical simulations and simulation debriefings.

**Overlap: None**
BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. DO NOT EXCEED FIVE PAGES.

NAME: Noles, Kristen

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Nurse Manager

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.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>Completion Date MM/YYYY</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jacksonville State University</td>
<td>B.S.</td>
<td>04/2001</td>
<td>Nursing</td>
</tr>
<tr>
<td>University of Alabama at Birmingham</td>
<td>M.S.N.</td>
<td>08/2011</td>
<td>Nursing</td>
</tr>
</tbody>
</table>

NOTE: The Biographical Sketch may not exceed five pages. Follow the formats and instructions below.

A. Personal Statement

My nursing career has been dedicated to caring for patients and their families by improving quality, safety, and satisfaction in their hospital experience. Excellence in service has been the guiding principle in my clinical practice and this is evidenced by my major accomplishments. It is my conviction that the Solution Studios model for improving patient care through innovating around unsolved clinical problems is consistent with my approach to clinical care and it has the potential to create impactful solutions to many problems.

B. Positions and Honors

Positions and Employment

2001 - 2011 Registered Nurse, Regional Neonatal Intensive Care Unit
The University of Alabama at Birmingham, Birmingham, Alabama

2011 - 2013 Advanced Nursing Coordinator, Center for Nursing Excellence, Acute Trauma Care Unit
The University of Alabama at Birmingham, Birmingham, Alabama

2013 - 2015 Interim Nurse Manager, Orthopedic Special Care Unit
The University of Alabama at Birmingham, Birmingham, Alabama

2015 - Nurse Manager, Orthopedic Special Care Unit
The University of Alabama at Birmingham, Birmingham, Alabama

Other Experience and Professional Memberships

Sigma Theta Tau
American Organization of Nurse Executives
American Nurses Association
Co-Founder & Volunteer: “The Courage Network”
Co-Founder & Volunteer: “Green Screens”
Volunteer: The Community Foundation of Greater Birmingham, World Breast Health Fund
Volunteer: Team Kathy, Palliative Care Unit at UAB Hospital
Volunteer: Susan G. Komen Race for the Cure

C. Contribution to Science/Medicine

My publications address new ways of reducing medication errors and guidance for nurses aspiring to become nurse leaders.


**D. Research Support**

**Ongoing Research Support**

None

**Completed Research Support**

None
NAME: Misko, Samuel R

eRA COMMONS USER NAME (credential, e.g., agency login): miskosr

POSITION TITLE: Scientist II (Electrical Engineer & Project Manager)

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.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>Completion Date MM/YYYY</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auburn University</td>
<td>BS</td>
<td>12/2008</td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td></td>
<td>BS</td>
<td>12/2008</td>
<td>Wireless-Hardware Engineering</td>
</tr>
<tr>
<td>North Carolina State University</td>
<td>MS</td>
<td>08/2013</td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>University of Alabama at Birmingham</td>
<td>PhD</td>
<td>05/2020</td>
<td>Computer Engineering</td>
</tr>
</tbody>
</table>

A. Personal Statement

I have over 8 years of Electrical Engineering and project management experience, and specialize in instrumentation, measurements, and all aspects of electromechanical system design. Through my ongoing work with UAB EITD, I maintain the ability to collaborate and delegate technical development efforts with a diverse group of highly experienced engineers that have extensive experience in the design, fabrication, and long term sustainment of mission critical integrated systems for our primary customer, NASA. The UAB EITD research and production laboratories represent state-of-the-art facilities that have consistently facilitated development and production of high reliability, high efficiency designs that adhere to the AS9100 quality certification. From my work with the USAF, I developed expertise in the development and implementation of instrumentation systems for a wide range of measurements including high speed structural response and material characterization. Since arriving at UAB EITD, I have actively pursued and successfully delivered on a number of technology development efforts focused on COTS technology integration for the implementation of embedded systems for a number of medical device and environmental monitoring applications.

B. Research and/or Professional Experience

Employment
2009-2013 Instrumentation Engineer, Jacobs Technology Advanced Systems Group, Nellis AFB, NV & Tyndall AFB, FL
2013- Scientist II (Electrical Engineer & Project Manager), University of Alabama at Birmingham's (UAB) Engineering Innovation and Technical Development Group (EITD), Birmingham, AL

C. Contribution to Science

- Program Manager and Electrical/Firmware Technical Lead for a Number of Device Development Efforts to Support Lakeshore Foundation’s Research on Exercise and Health for the Disabled.
- Project Manager and Electrical/Firmware Technical Lead for Medical Device Development Effort for Small Startup Company focusing on In-home Rehabilitation.
• Created and Instructed New Undergraduate/Graduate Engineering Course for Instrumentation and Measurements for all UAB SoE/SoM students (no pre requisites).
• Project Manager and Electrical/Controls Technical Lead for Real-time Trace Metal Concentration Monitoring of Industrial Wastewaters for Department of Energy National Energy Technology Laboratory (DoE NETL).
• Recruit and Mentor Multi-Disciplinary Student Teams for a Variety of Technical Development Efforts.

Publications


Thirumalai M, Misko SR, Kirkland WB, Padalabalanarayanan S, Malone LA. Adapting the Wii Fit balance board to enable active video game play by wheelchair users: User centered design and usability. JMIR Rehabil Assist Technol. (under review).

D. Research Support

Ongoing
Lakeshore Foundation Pilot Study (UAB Acct. #: 3118198.000.412118199.3500)
Using Immersive Virtual Reality Technology to Facilitate Exercise Engagement
Overall goal: Develop virtual reality implementation of immersive game and integrate with existing exercise equipment at Lakeshore Foundation to evaluate effects on lakeshore member usage metrics such as mean equipment usage, activity intensity, and session duration.
PI: Zina Trost, Ph.D
07/01/2016-12/30/2017
Misko role: Co-PI

Lakeshore Foundation Pilot Study (UAB Acct. #: 3118199.000.412118199.3500)
Personal Tracking and Feedback Technology to Enhance Walking Program Engagement
Overall goal: Develop personal tracking and feedback technology for installation and member usage at Lakeshore Foundation to increase member interest, engagement, and satisfaction with regards to the Walk and Roll Program; as well as to encourage greater exercise intensity, session duration, frequency of participation, and overall program attendance.
PI: David A. Brown, PT, PhD
07/01/2016-12/30/2017
Misko role: Co-PI

Department of Energy Grant (DE-FE0027778)
Continuous Water Quality Sensing for Flue Gas Desulfurization Wastewater
Overall goal: Develop an integrated water sensor package for continuous water quality monitoring of flue gas desulfurization (FGD) wastewaters to include concentration measurements of multiple contaminants (i.e., trace metals: Se, As, Hg) and measurement of common water quality indicators (i.e., pH, temp, TDS, etc.).
PI: Lee Moradi, PhD
08/01/2016-01/31/2018
Misko role: Co-I, Acting Project Manager

NASA Cold Stowage Contract (NNJ15HA80B)
IDIQ Cold Stowage Solutions in Support of NASA ISS Operations
Overall goal: Design, build, and maintain family of transportable powered cold stowage devices for use by NASA in the freezing and safe transport of science to, from and on the ISS.
Completed
National Institute on Disability and Rehabilitation Research (NIDRR) Grant for Rehabilitation Engineering Research Center on Recreational Technologies (Grant #: N/A)
Development of Adapted Game Controllers to assist with Measurement of Energy Expenditure During Active Video Gaming in Individuals with Disabilities
Overall goal: Develop adapted gaming controllers to provide features and functions to increase level of accessibility for those with various forms of disability for use in research study at Lakeshore Foundation.

PI: James Rimmer, PhD
05/2015-05/2016
Misko role: Non Co-Pi Senior Personnel, Acting Project Manager for Development Efforts

Management of Motion, LLC Service Contract (Contract #: N/A)
Phase I Development of Proof of Concept Prototype Sensors and Patient Interface
Overall goal: Advance Technical Readiness Level (TRL) for the Management of Motion system from basic principles and preliminary technology concept (TRL -1/2) to a demonstrated proof of concept system in a laboratory and/or relevant environment (TRL - 4/5).

PI: Lee Moradi, PhD
08/2014-05/2015
Misko role: Non Co-Pi Senior Personnel, Acting Project Manager for Development Efforts

Management of Motion, LLC Service Contract (Contract #: N/A)
Phase II Development of Production Representative Sensors and Patient Interface
Overall goal: Advance Technical Readiness Level (TRL) for the Management of Motion system from a demonstrated proof of concept system in a laboratory and/or relevant environment (TRL - 4/5) to a production representative system for pre-clinical evaluation studies (TRL – 6/7).

PI: Lee Moradi, PhD
02/2017-08/2017
Misko role: Non Co-Pi Senior Personnel, Project Manager for Development Efforts

University of Alabama Animal Resource Program (N/A)
Animal Cage Sensor Preliminary Feasibility Studies
Overall goal: Compose preliminary system requirements specifications, research and select a number of possible COTS sensors for preliminary feasibility testing, design and execute iterative feasibility testing for identification of potential solutions and data post processing techniques.

PI: Samuel Misko
05/20/2017-08/28/2017