

TRANSLATION **BUILDER**

This newsletter is designed to provide a place for members of the APTC to share news, collaborate and network, and discover each other and the services we offer.



Investigator's Corner

This issue, we will highlight a valuable training program completed by Dr. Ronald Triolo and team

This summer, [Dr. Triolo](#) and his team, including Frank Zitko and Stephanie Nogan Bailey, completed a competitive training program for [I-Corps@Ohio](#), a statewide program to assist faculty and graduate students from Ohio universities and colleges to validate the market potential of their technologies and assist with launching startup companies. The goal of I-Corps@Ohio is to bridge the gap between academia and industry, while training in entrepreneurship and innovation.

I-Corps teaches you how to think differently. The training is not focused on your technology, but instead on future development and commercialization. Through their Customer Discovery Process, they teach a data driven method to help the team understand their potential customer's needs and how their technology solution fits those needs, as well as provide a blueprint on how to determine market size and competitors.



THE TECHNOLOGY AND MARKET POTENTIAL

The technology: Self-leveling walker (SLW) – a novel assistive device to facilitate the rehabilitation of walker dependent patients and enhance their ability to negotiate ramps, stairs, or non-level surfaces

Initial hypothesis: The SLW will enable users to negotiate stairs and ramps in the home and community utilizing a single assistive device and avoid the inconvenience and economic burden of expensive home modifications.

Limitations: Although there are 4 million total walker users in the US, the SLW may not be appropriate for ALL people with walking difficulties.

Lessons Learned:

- ❖ **Target audience is acute orthopedic patients** (400,000/year) recovering from injury or surgery in rehab and home.
- ❖ Need to harness the “power of the prescriber” – in this case, physical therapists can drive clinics to purchase the SLW
- ❖ **Out-of-pocket expense found tolerable by physical therapists and walker users is \$150-300** for this device. This is not the price of the device.

A total of 14 teams were selected to participate in the cohort. A \$15,000 grant for each team paid for travel, conference attendance, and a laptop for the interviews conducted over eight weeks.

In total, 113 interviews were conducted by Frank and Stephanie with patients, current walker users, physical therapists, Invacare for product development, regulatory and quality/risk, medical device manufacturers, and many more, both in-person and remotely.

FUTURE FUNDING OPPORTUNITIES

Future funding opportunities include the VA Innovators Network, Technology Validation and Start-up Fund, or Case-Coulter Translational Research Partnership, and ultimately SBIR or STTR funding.

THE TEAM



Dr. Ronald Triolo

Principal Investigator

- Inventor of the SLW with extensive knowledge and expertise in the research and development of devices related to the rehabilitation of individuals with sensorimotor impairments or limb loss.

Frank Zitko

Entrepreneurial Lead

- Technical Innovation Specialist and Biomedical Engineer
- Led the customer discovery process



Stephanie Nogan Bailey

Entrepreneurial Lead

- Biomedical Engineer; Current project manager (PM) for the SLW, managing all aspects including grant/investment funding, clinical evaluations, and design
- Strongly assisted in customer discovery process

Wayne Hawthorne

Executive Mentor

- Senior Licensing Manager, TTO, CWRU
- Personal experience in startup companies
- Mentored Entrepreneurial Leads throughout the customer discovery process



Dr. Walid Jalabi

Executive Mentor

- Licensing Associate, CWRU
- Mentored Entrepreneurial Leads throughout the customer discovery process

Matthias Schmidt-Bonath

Executive Mentor

- CEO, Med-Elite Innovation
- Leads business strategy and PM in high growth and global environments related to Durable Medical Equipment



Judy Kovacs

Executive Mentor

- Consultant, Med Device Product Management
- Extensive experience in the medical device industry in sales, marketing, and government contract managing

Wen H. Ko Summer Internship Program (SIP)

The 2019 Wen H. Ko SIP cohort attended Neural Engineering Center (NEC) and SOURCE seminars where they learned about IP, fellowship opportunities, applying to graduate or medical school, and creating a research poster and oral presentation. Each intern presented their research through posters at the SOURCE Intersections summer symposium. **Meet our interns below and learn about their experiences this summer.**

Esther Bedoyan; *Mentor: Dustin Tyler, PhD*

I am currently a sophomore double majoring in Electrical and Computer Engineering and Biomedical Engineering at Carnegie Mellon University (CMU). I have always been interested in biomedical devices, including prosthetics, and was fascinated by the work he [Dr. Tyler] was doing with sensory restoration in upper-limb amputee patients. *I worked on a project to assemble an experimental set-up for a tactile-feedback enabled, tele-operated robotic hand.* I worked with MATLAB and Simulink models of the controller for the robotic arm, programmed a gripper-hand for the end of the robotic arm, 3-D printed magnetic connectors for connecting subcutaneous leads from the subject to the external stimulation device, and learned how to run functional tasks using the robotic arm with surface-EMG-control of the robotic hand with able-bodied participants. *This experience taught me valuable technical skills and solidified my interest in this field and decision to pursue a career in academia.*

Lindsey Greenwood; *Mentor: Allison Hess-Dunning, PhD*

I am a junior double majoring in biomedical engineering and computer science at CWRU. This summer *I worked on microfluidic enabled drug delivery devices.* I enjoyed the process of fabricating the probes, learning Solid works, and writing my own analysis code. At the end of the summer, I created a poster to present at the SOURCE presentation and *I enjoyed dabbling with scientific writing. I had a good experience with this internship,* and I plan on continuing the work into the semester.

Madeline Lindemann; *Mentor: Andrew Shoffstall, PhD*

I am a senior mechanical engineering student at CWRU. On campus, I am involved with the varsity cross country and track teams as well as the Society of Women Engineers. Before this summer, I was an intern for a medical device company, and I am thankful that the APT Summer Internship Program was an opportunity to immerse myself in a research environment and to be able to compare both summer experiences. I was excited by this research program because the progress I make towards my individual project contributes towards improving the quality of life for US Veterans, and because of this overarching mission, *I was motivated to work hard, ask questions, and maximize my internship experience.* This summer, *I worked to develop a mixing and packaging process for an injectable neurostimulator,* and I will continue this project in the fall.

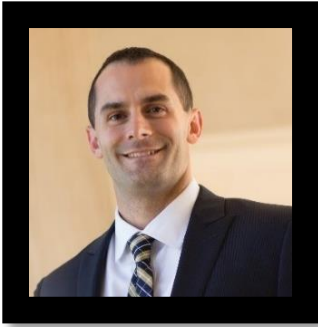
Rohan Sinha; *Mentor: Steve Majerus, PhD*

I entered the program as a 3rd year Electrical Engineering student, but never had applied that knowledge. I felt more comfortable observing rather than doing. I quickly realized that working in a lab is not like a class. There is no answer key dictating a "correct method." Instead, *research is a process of setting goals and finding increasingly practical ways of achieving them.* Before this program, I had only assembled simple circuits on a through hole board. By the end of the 10 weeks, I had performed basic signal analysis, designed and simulated analog circuits, designed multiple printed circuit boards and assembled them by reflow soldering, and conducted multiple bench experiments. I will continue my work through the school year and ready to publish a paper soon. *My participation in this program was invaluable in gaining knowledge and advancing my career in the future.* I am beyond grateful to have had the opportunity to be an intern at the VA this summer.

Evan Vesper; *Mentor: Hamid Charkhkar, PhD*

This summer I worked on the Lower Limb Sensory Restoration Project, focusing on experiments investigating how electrical stimulation that gives sensory feedback in amputee's prosthetic legs affects activation of different leg muscles. While I had done research in a bone biomechanics lab before joining this program, the APT SIP provided the perfect opportunity to do work that is more closely tied to my studies in Biomedical Engineering and Electrical Engineering. *I learned a lot about using and modifying the software used for sensory stimulation and about thinking and communicating scientifically.* My main accomplishments were 1) incorporating a sensor into our experiments that measures squatting levels to better quantify data and 2) designing a slightly different experiment that can help us understand what neural pathways are being activated in our subjects when we deliver sensory stimulus. I plan to stay involved with the project this year.

NEWS



Congratulations to [Jeffrey Capadona, PhD](#), who has been promoted to **Full Professor** of Biomedical Engineering at CWRU. Dr. Capadona has been an investigator in the APTC since 2005 and is the Project Lead for the Center's Neural Interfaces application area. Dr. Capadona's research interest is in the neurodegenerative response to implanted biomedical devices, in particular intracortical brain-machine interfaces.

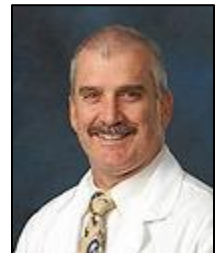
Congratulations to [Umut Gurkan, PhD](#) who has been appointed as a **Warren E Rupp Associate Professor with Tenure** in the Departments of Mechanical and Aerospace Engineering and Orthopedics at CWRU. Currently, Dr. Gurkan's most highlighted research interests are in the biophysical characteristics and abnormal blood cell adhesion in sickle cell disease (SCD) and micro/nano engineered systems to monitor and manage SCD.



Congratulations to Dr. Clay Kelly and Dr. Evi Stavrou on being selected to Cleveland Magazine's Top Doctors List of 2019

[Clay M. Kelly, MD](#) - *Physical Medicine & Rehabilitation*

Dr. Kelly serves as the Medical Director of the APT Center and is the Chief of Physical Medicine and Rehabilitation at Louis Stokes Cleveland VA Medical Center. He is also an Assistant Professor of Medicine in the Department of Physical Medicine and Rehabilitation at Case Western Reserve University.



[Evi X. Stavrou, MD](#) - *Medical Oncology & Hematology*

Dr. Stavrou is a Staff Physician in the Division of Hematology-Oncology and Director of the Anticoagulation Clinic at Louis Stokes Cleveland VA Medical Center. She is also an Assistant Professor of Medicine in the Department of Medicine at Case Western Reserve University, as well as an Oscar D. Ratnoff Professor in Medicine and Hematology.



APM&R RehabCast Podcast

[Dr. Kath Bogie](#) was recently interviewed by Dr. Ford Vox for the RehabCast Podcast about her recent publication **What Lies Beneath: Why Some Pressure Injuries May Be Unpreventable for Individuals with Spinal Cord Injury**. This is a podcast program for Archives of Physical Medicine and Rehabilitation. Dr. Bogie discussed her imaging-based approach to figuring out who is most at risk for pressure wounds. [Listen to the May/June 2019 podcast.](#)

Congratulations to Nithya Kanagasegar, BS, former project coordinator in Dr. Ronald Triolo's lab, for receiving the prestigious **NCAA Postgraduate Scholarship**, presented to elite student-athletes who excel academically and athletically and who have completed their final year of intercollegiate athletics competition. Nithya is the first recipient of the scholarship in the history of women's tennis at CWRU. She graduated with a cumulative grade-point average of 3.68 as a biomedical engineering major with a minor in chemistry. She will receive \$10K to be used for postgraduate study.

Read more about Nithya's [NCAA scholarship](#) and [other accomplishments](#), including being named All-American and the inaugural recipient of a national leadership award, in CWRU's the Daily.

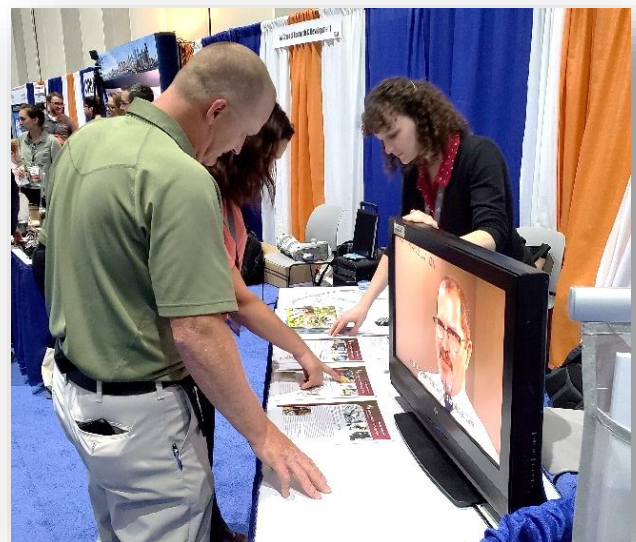


[Dr. Brooke Odle](#) was awarded the Best Trainee Poster in the Therapy Leadership section at the Academy of Spinal Cord Injury Professionals (ASCIP) conference in September. Her poster, titled **Feasibility of Neural Stimulation to Facilitate Assisted Transfers after Paralysis**. The study found that stimulation-assisted transfers reduced perceived effort for caregivers, while increasing ratings of comfort and safety for patients during the lifting portion of transfers.



American Orthotic and Prosthetic Association (AOPA) National Assembly

Researchers from the APT Center, along with a research participant in Dr. Tyler's sensory restoration project, demoed their projects and featured the technology developed at LSCVAMC as part of the **Rehab Roadshow** organized by VA Office of Research & Development. In addition, Drs. Charkhkar, Graczyk, and Shell presented their work on recent advances in restoring sensation to people with limb loss during the symposium **Prostheses that Feel: Clinical and Technical Considerations for Restoring Sensation to Upper and Lower Limb Amputees**, moderated by Dr. Tyler. AOPA hosted over 2,000 orthotic, prosthetic, and pedorthic professionals September 25-28 at the San Diego Convention Center.



Dr. Janet Gbur won a **poster award for Best Practices in Student Learning** at Youngstown State University's Continuous Improvement Celebration and Poster Event. Her poster, titled **Incorporating Technical Standards Education into Existing Engineering Materials Course Structure**, found that technical standards can be easily added to existing courses. Students found it helpful to connect the chapter materials with experiences outside the classroom.

YOUNGSTOWN STATE UNIVERSITY
stem
 College of Science, Technology, Engineering & Mathematics

Incorporating Technical Standards Education into Existing Engineering Materials Course Structure

Janet L. Gbur, Ph.D.
 Mechanical, Industrial, and Manufacturing Engineering, Youngstown State University, Youngstown, Ohio, USA

INTRODUCTION
 Standards organizations, ABET, and employers have long-recognized a need for technical standards education; however, literature shows that engineering students do not receive much exposure to the topic. This work describes an approach to weaving technical standards introduction and use into an existing course structure, tying the standards to chapter content.

Students self-reported their prior awareness and current knowledge of the topic through a survey and understanding of technical content was measured as part of in-class exercises, team homework, case study, and quiz/exam/bonus questions.

MATERIALS AND METHODS

Materials

- MECH 2606 Engineering Materials course book *Materials Science and Engineering: An Introduction*, Callister and Rethwisch, 9th Ed., 2014, John Wiley & Sons
- ASTM International Professor's Tool Kit
- ASTM standards: E8/E8M, E23, E92, E112, E384, F138
- Hands-on materials
- Tension, Charpy impact specimens (tested and untested)

Methods

- Paired chapter material to standards information
- Lectures
- 11 of 22 lectures referenced technical standards
- In class exercise
- E23 paired with ductile-to-brittle temperature transitions. Students measured failed specimens, compared fractures
- Team homework assignment
- E8/E8M paired with mechanical properties. Students measured specimens, calculated ductility
- Medical device failure analysis case study
- F138 paired with material composition and structure
- Quiz and exam questions
- Assessed fundamental knowledge and use of standards
- Assessed ability to perform calculations from E112
- Exam bonus question
- Assessed ability to connect chapter content with a product and material of the student's choosing

RESULTS

Assessments

- Lectures
 - 11 of 22 lectures included 'around the room' Q&A on technical standards lecture material
 - In class exercise
 - Not graded – Emphasis on team problem solving
 - Team homework assignment
 - Average grade 28.3/30 points, range 26-30 points
 - Medical device failure analysis case study
 - Not graded – Emphasis on team problem solving
 - Quiz and exam questions
 - Quiz: Average grade 4.3/5 points, range 0-5 points
 - Exam: Average grade 9.7/10 points, range 6-10 points
 - Exam bonus question
 - Average grade 9/10 points, range 7-10 points
- Survey (selected responses)
 - 15 respondents, strongly disagree (1) – strongly agree (5)

I knew what technical standards were before beginning this class. The introduction to technical standards is important to my major.

I would like to have more practice on using technical standards. I would like to see more case studies, problems using standards.

I think technical standards are important to my education. It would be helpful to have a learning module on technical standards.

Future Work

Recommendation

- Develop modules specific to chapter themes for Blackboard
- Develop case studies that require standards exploration
- Consider college-wide technical standards workshop

Student responses from working with the standards
 (Open questions from the survey)

What did you find most helpful?

- "How many sources there are to find standards."
- "They can be used to make finding out what went wrong with a device much easier."
- "They are very informative and descriptive."

What changes would you recommend?

- "...do an actual 'real life' example of how engineers use technical standards."
- "Describe how you would use it in a case study."
- "How to navigate through them."

What was surprising or interesting?

- "That they relate so much to the course material."
- "There is a technical standard for almost anything produced and sold to the public."
- "How much testing must go into standards."

What was least helpful?

- "How not all of them are easily available."
- "Difficult to understand and read at first"
- "A lot of information to sort through."

Sample lecture slide explaining parts of a standard

Welcome New APTC Staff!



Janet Gbur, PhD, Investigator

Dr. Gbur earned her PhD in Materials Science and Engineering from CWRU. She is a Research Associate in Materials Science and Engineering at CWRU working in the [Advanced Manufacturing and Mechanical Reliability Center \(AMMRC\)](#) and the [Nitinol Commercialization Accelerator Laboratory \(NCAL\)](#), which provide tools to better understand materials processing and mechanical reliability as well as develop a better understanding of Nitinol, a nickel-titanium alloy used in cardiovascular applications and orthodontia. Dr. Gbur is also Adjunct Faculty in the Mechanical, Industrial, and Manufacturing Engineering Department at Youngstown State University.



Emily Graczyk, PhD, Investigator

Dr. Graczyk is a Research Associate in the Department of Biomedical Engineering at CWRU where she earned her PhD in Biomedical Engineering. During her PhD training, she was awarded a National Science Foundation (NSF) Graduate Research Fellowship and recently secured independent funding from the Department of Defense and the Defense Advanced Research Projects Agency (DARPA). In 2018, Dr. Graczyk was named a DARPA Riser, one of a select group of early career investigators identified as potential future superstars whose work could impact national security.



William Rasper, BS, *Research Biomedical Engineer*

Will's duties include quality system management and consultation, and providing IT and engineering assistance for the APT Center. He received his BS degree in Biomedical Engineering from the University of Akron in 2019 and brings over a year of experience in the medical device industry.

RECENT PUBLICATIONS

Balog BM, Deng K., **Labhasetwar V**, Jones KJ, **Damaser MS**

Electrical Stimulation for Neuroregeneration in Urology: A New Therapeutic Paradigm

Current Opinion in Urology

[Link to article](#)

Bogie KM, Kobetic R, Shire DB

Utilization of lower compliance voltages for effective clinical neuromuscular electrical stimulation

Journal of Rehabilitation and Assistive Technologies Engineering

[Link to article](#)

Christie BP, Charkhkar H, Shell CE, Marasco PD, Tyler DJ, Triolo RT

Visual inputs and postural manipulations affect the location of somatosensory percepts elicited by electrical stimulation

Scientific Reports

[Link to article](#)

Consult QD - Urology & Nephrology featuring **Dr. Margot Damaser**

New Research Demonstrates the Regenerative Power of Mesenchymal Stem Cells for Ischemic Kidney Injury in Rats

[Link to article](#)

Cuberovic I, Gill A, Resnik LJ, Tyler DJ, Graczyk EL

Learning of Artificial Sensation Through Long-Term Home Use of a Sensory-Enabled Prosthesis

Frontiers of Neuroscience

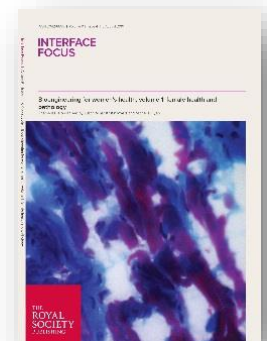
[Link to article](#)

Deng K., Balog BM, Lin DL, **Hanzlicek B**, Song Q-X, **Zhu H, Damaser MS**

Daily Bilateral Pudendal Nerve Electrical Stimulation Improves Recovery from Stress Urinary Incontinence

Interface Focus (cover) 

[Link to article](#)



Lemmer DP, Alvarado N, Henzel K, Richmond MA, McDaniel J, Graebert J,

Schwartz K, Sun J, Bogie KM

What Lies Beneath: Why Some Pressure Injuries May Be Unpreventable for Individuals with Spinal Cord Injury

Archives of Physical Medicine & Rehabilitation

[Link to article](#)

Scalamandr  A, **Bogie KM**

Chapter 18: Smart Technologies in Wound Prevention and Care.

In: Innovations and Emerging Technologies in Wound Prevention and Care. Ed, Gefen A

[Link to book](#)

Editors: Leigh RJ, Ramat S, **Shaikh A**

Mathematical Modelling in Motor Neuroscience: State of the Art and Translation to the Clinic. Ocular Motor Plant and Gaze Stabilization Mechanisms

Volume 248 of the Progress in Brain Research series

[Link to book](#)

Editors: Ramat S, **Shaikh A**

Mathematical Modelling in Motor Neuroscience: State of the Art and Translation to the Clinic. Gaze Orienting Mechanisms and Disease

Volume 249 of the Progress in Brain Research series

[Link to book](#)

✦ Dr. Shaikh is also co-author of chapters 5, 20, 22, & 24

✦ Dr. Mark Walker is co-author of chapters 24 & 26

Zhan C, Akbar M, Hower R, Wang J, **Nu overo N**, **Potkay JA**, Zellers ET

Integrated Multi-Vapor Micro Collector-Injector (μ COIN) for μ GC

IEEE Xplore: 2019 20th International Conference on Solid-State Sensors, Actuators and Microsystems & Eurosensors XXXIII (TRANSDUCERS & EUROSENSORS XXXIII)

[Link to article](#)

UPCOMING GRANT DEADLINES

- ✦ First of the month – CWRU CTSC [Core Utilization Pilot Grants](#)
- ✦ Rolling basis – Case-Coulter Translational Research Partnership (CCTRP) [Pilot Projects](#)
- ✦ Oct 12 – NIH K New Applications
- ✦ Oct 16 – NIH R21 New Applications
- ✦ Oct 16 – CWRU Technology Validation & Start-up Fund Program (CTP) [Pre-Application](#)
- ✦ Nov 1 – VA BLRD/CSRD LOI for CDA
- ✦ Nov 1 – VA CSRD LOI for Clinical Trial Merit
- ✦ Nov 1 – VA RRD LOI for Merit, RCS, CDA
- ✦ Nov 5 – NIH R01, U01 Renewal, Resubmission, Revision Applications
- ✦ Nov 6 – CWRU Technology Validation & Start-up Fund Program (CTP) [Application](#)
- ✦ Nov 12 – NIH K Renewal, Resubmission, Revision Applications
- ✦ Nov 16 – NIH R21 Renewal, Resubmission, Revision Applications
- ✦ Dec 12 – VA HSRD Merit, CDA Applications
- ✦ Dec 12 – VA RRD Merit, RCS, CDA Applications

LINKS TO STANDARD ANNOUNCEMENTS

NIH - https://grants.nih.gov/grants/guide/parent_announcements.htm

VA (intranet) - <http://vaww.research.va.gov/funding/rfa.cfm>

VA (external) - <https://www.research.va.gov/services/default.cfm>

CDMRP - <https://cdmrp.army.mil/funding/prgdefault>

ADDITIONAL FUNDING OPPORTUNITIES

- National MS Society – [General deadlines for grant applications](#)
- Funding opportunities aggregated by CWRU: <https://case.edu/research/faculty-staff/funding-opportunities>

APTC offers Business Plan templates to help with Transition Plans required in grant applications, such as the NIH. Contact Vi Huynh at vi.huynh@va.gov for more details.

Have something to share? Send YOUR good news and professional accomplishments to Rebecca Polito at rpolito@aptcenter.org to include in a future Translation Builder.

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