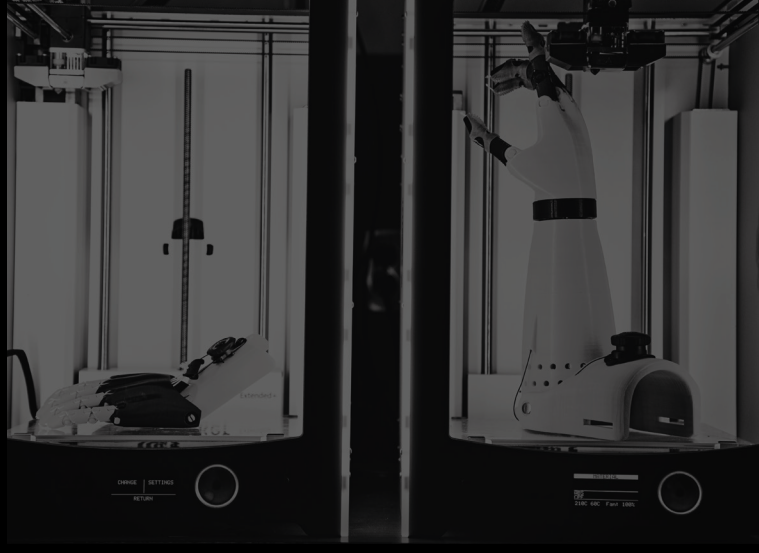
2018

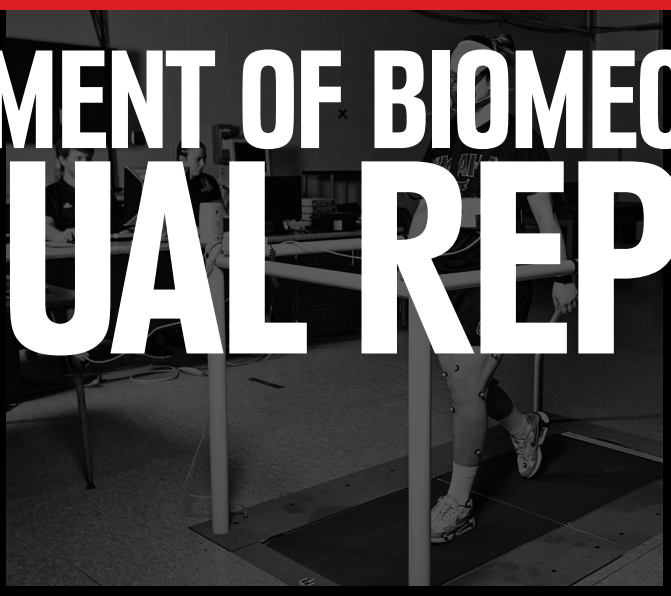
University of Nebraska at Omaha Department of Biomechanics Annual Report Spring 2018

Department of Biomechanics, University of Nebraska at Omaha

UNIVERSITY OF NEBRASKA AT OMAHA

DEPARTMENT OF BIOMECHANICS ANNUAL REPORT


University of Nebraska Omaha

SPRING 2018

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BRB FACULTY, STUDENTS, AND STAFF

Photo Taken August 2017

Front Row (L-R): Todd Leutzinger, Mukul Mukherjee, Mahdi Hassan, Farahnaz Fallah-Tafti, Jenny Kent, Amelia Lanier, Laura Campbell, Lauren Wehrle, Alyssa Averhoff, Jessica Fujan-Hansen, Daniel Jaravata, Katlyn Nimtz

Second Row (L-R): Angel Gonzalez, Joao Vaz, Benjamin Senderling, Erica Hedrick, RJ Barber, Samantha Sack, Connor Wicks, Angela Collins, Henamari Ybay

Third Row (L-R): Christos Ziliaskioudis, Kota Takahashi, TeSean Wooden, Ian Sloan, Rujani Muhamed, Jorge Zuniga, Nicholas Jaton, Austin Duncan, Lauren Bowman, David Salazar, Nikolaos Papachatzis, Jenna Yentes

Fourth Row (L-R): Jeffrey Kaipust, Philippe Malcolm, Russell Buffum Douglas Rowen, Taylor Leeder, Jeffrey Patterson, Troy Rand, Nicholas Reynolds, Christopher Copeland, Zachary Motz, Takashi Sado, Corbin Rasmussen

Fifth Row (L-R): Nate Hunt, Sam Ray, Jordan Wickstrom, Cory Frederick, Aaron Robinson, James Pierce, Sara Myers, Andreas Skiadopoulos, Keaton Young, Travis Vanderheyden, Kyle Brozek

Back Row (L-R): Mason Schleu, Brian Knarr, Prokopios Antonellis, Nick Stergiou, Shawn Daley, Blake Beier, Vivien Marmelat, William Denton

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LETTER FROM THE DIRECTOR

RETHINK THE IMPOSSIBLE

Our 2016 annual report includes so many amazing things including the formation of a new department in Biomachanics and the addition of several faculty coming from prestigious institutions such as the University of Delaware, Harvard, and UC Berkley. One would think it would be hard to top such an exciting year, but in 2017, we have surpassed our wildest dreams! I am proud to announce the approval of an expansion to the Biomechanics Research Building. The $11.6 million addition is to be privately funded and will encompass about 30,000 square feet. Groundbreaking is set for spring of 2018, with a scheduled move-in date of September 2019. This expansion will more than double our physical size and will enhance our momentum to continue this amazing growth trajectory that we have. New laboratories, new research capabilities, new pieces of equipment, biomechanics at its best.

If this news is not enough for you, I have even more as I am also proud to announce the establishment of the Division of Biomechanics and Research Development, which resides in the Biomechanics Research Building and includes the Department of Biomechanics and the Center for Research in Human Movement Variability. We are so blessed that the leadership of our university has recognized that the development of this Division will provide a more flexible structure that will further promote our environment of academic excellence. However, I am personally even more proud for the successes of my young faculty, such as Dr. Malcolm and his recent publication in Science, and all the amazing stories you will read inside this newsletter.

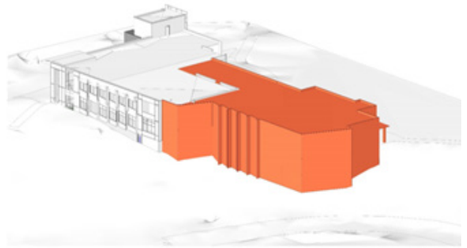
We plan to continue in this fashion. In ancient times, for those who sailed in the Mediterranean Sea the motto was “non plus ultra” (nothing more beyond). You see, the end of the world was the Strait of Gibraltar or the Pillars of Hercules, so the attitude was Go No Further or Nothing More is Left to Find! King Charles V of Spain ignored this warning and declared PLUS ULTRA (there is more beyond), pointing towards America. This is exactly what I am also saying to you. PLUS ULTRA!

The “Biomaha Field of Dreams,” where we always rethink the impossible since nothing seems truly impossible any more, is unfolding before your eyes.

Thank you,
Dr. Nick Stergiou

MAKING HISTORY AGAIN

Biomechanics at UNO is making history yet again with the establishment of the Division of Biomechanics and Research Development. On March 31, 2017, the Board of Regents of the University of Nebraska approved the creation of the Division, which resides in the Biomechanics Research Building and includes the Department of Biomechanics and Center for Research in Human Movement Variability. The Division works closely with UNeMed, UNeTech, and the Nebraska Applied Research Institute. The Division is directed by Dr. Nick Stergiou who was promoted for this purpose to the position of the Assistant Dean of the Division of Biomechanics and Research Development. The Division was created to provide a more flexible structure that will further promote our environment of academic excellence. The creation of the Division also supports the campus-wide priority for growth in research and allows for greater autonomy to accommodate the rapid growth of the Department and the Center.



BUILDING EXPANSION

It is with great excitement that we announce the approval of an expansion to the Biomechanics Research Building. The $11.6 million addition is to be privately funded and will encompass about 30,000 square feet. Groundbreaking is set for spring of 2018, with a scheduled move-in date of September 2019.

The Biomechanics Research Building opened in the fall of 2013 and had designated space for 46 professors, researchers, staffers and students, as well as seven research laboratories. The expansion will include space for a lecture hall (1,418 square feet), laboratories (6,273 square feet), a new much larger and improved Machine Shop (1,636 square feet) and offices and collaboration spaces (7,002 square feet). New research space includes a 3D Printing laboratory, a Bioinspired Robotics laboratory, a Biomechanics Outreach/ Instruction space (with basic biomechanics instrumentation for demonstrations) and a new Virtual Reality laboratory to house a new state-of-the-art CAREN (Computer Assisted Rehabilitation Environment) system.

Figure: *Cover of Science article (Photo: Rolex/Fred Merz).*

FAST EXOSKELETON OPTIMIZATION

An exoskeleton is a wearable mobile machine that allows for movement with increased strength and endurance. Dr. Philippe Malcolm, a professor from our department, wrote a scientific article regarding exoskeleton optimization that appeared in the June 23, 2017 issue of Science magazine[1], which is one of the top scientific journals in the world. The article is co-authored by Dr. Galle and Dr. De Clercq from Ghent University in Belgium. It provides a perspective on a recent study by scientists from Carnegie Mellon University where they described a way to optimize how exoskeletons work to reduce energy during walking. In their perspective article, Dr. Malcolm and his co-authors discuss how the variable ways that exoskeletons work might help learning to move. They also discuss how such learning could potentially be further improved in more variable environments such as during outdoor walking with exoskeletons.

At the Department of Biomechanics at UNO, Dr. Malcolm and his research team are working on further advancing this field by using exoskeletons to improve learning to walk in populations such as patients with peripheral artery disease.

1. P. Malcolm et al., Science 356, 1230 (2017). http://science.sciencemag.org/content/356/6344/1230

PATIENT TESTIMONIALS

Bethany Thompson's father is able to play "this little piggy" with his granddaughter with his 3D printed prosthetic device.

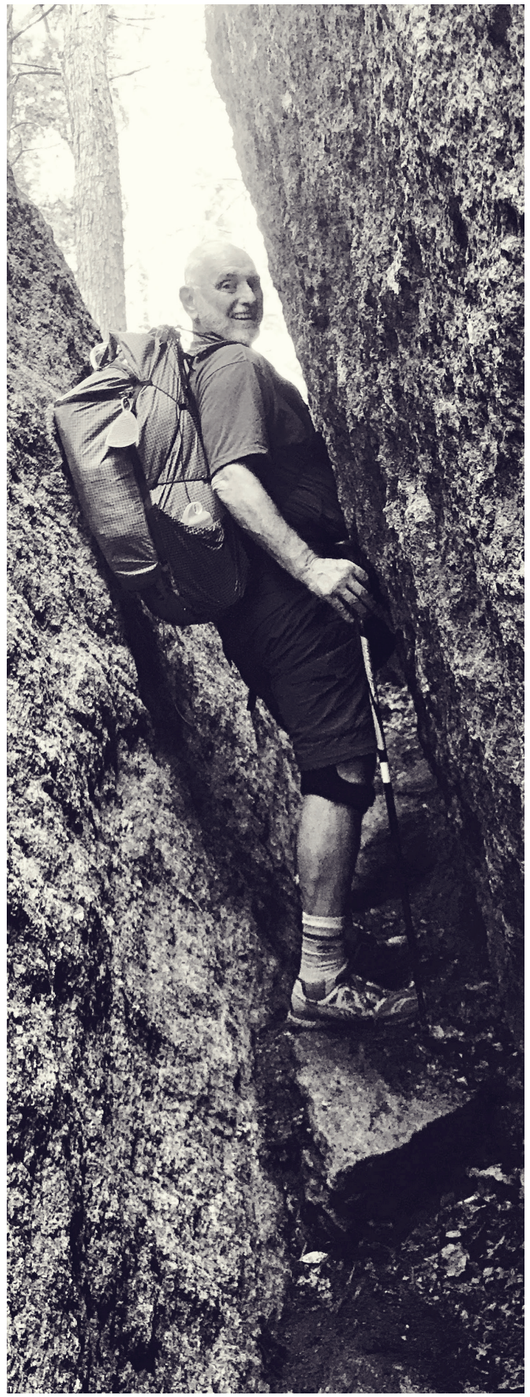
I just wanted to thank you for everything you are doing in the way of prosthetic research. My dad has the most positive outlook of anyone I know, but this has been hard. Even if he won't let anyone know it. Thanks for being a ray of hope. I'm including a link of a video of Dad with one of his thirteen grandchildren. Doing what he has done with every single one of them, it just looks a little different now. Until Dad lost his hand, we had no idea how behind the times hand prosthetics (AND insurance companies!!) are. Your work is so important to so many.

Bethany Thompson

When our daughter Layne came into this world, sixteen years ago with her left hand missing – I was not shocked but still scared and shaken at what I saw. Even though we were warned that she could have my husband's birth defect, I was still taken aback. We raised Layne to be independent. She never let her disability weigh her down. Yet, I always felt bad for her.

Today my husband sent me a video of Layne trying on her hand. After seeing her face today using her robotic hand for the first time, I no longer feel bad for Layne. Thank you for everything you and your team have done for Layne. She has posted on her Facebook her new hand and has had an amazing response. Thank you, again.

Sara Thompson



Keith Wingad completing a balance evaluation using the Neurocom located in the Biomechanics Research Building

I FELL 29 TIMES

Keith WInged is a retired veteran who hiked the Appalachian Trail in 2017 and received a balance assessment and gait analysis in the Biomechanics Reseearch Building.

How can falling 29 times be viewed as a success, especially for someone who is 66-years old when falling even once can be catastrophic? It's a success when the average number of times peers fall is 50 and the location of the falls is the Appalachian Trail.

The AT is a 2,191 mile long hiking trail that traverses the mountains of 14 states from Georgia to Maine. Hiking the AT in its entirety, called a thru-hike, equates to walking 5,000,000 steps (83 marathons) and climbing 1,000,000 feet (scaling Mount Everest 16 times). I completed this daunting task on Veteran's Day, November 11th, after six months and 22 days on the AT. There are many opportunities to fall during this journey as the AT is laced with roots, rocks, and slick boulders from constant rain or obscured by leaves.

Preparing for a thru-hike is many-faceted. Gear selection, food preparation (I dehydrated mine), physical conditioning, and a myriad of logistical concerns are required prior to embarking. And, in my case, medical issues must be dealt with. There are many medical issues common to all thru-hiker wannabees just as each of us have our own, specific concerns. For me that meant dealing with skin cancer surgery a week before I departed, thyroid issues that impeded my breathing (climbing mountains when you can't breathe is not fun), and knees that no longer have cartilage, make it unlikely that I would be able to walk 2,191 miles, let alone climb and descend the endless stream of mountains. Add to all of this was the fact that the condition of my knees coupled with my age created balance issues that would

be exacerbated by a 40 pound pack and uneven terrain. Falling was a real threat to successfully hiking the AT. Before I left for the AT, I had to eliminate or allow for these medical concerns.

The cancer surgery went well and my surgeon left me with a really cool "Z" scar on my temple. The ENT docs provided me with an inhaler that solved the breathing problem and my orthopedic doc, who infamously told his nurse before I left for the AT that I would "not make it 100 yards," helped me find a way to shore up my knees. Ultimately, my knees required three trips home to have fluid build up drained and steroid shots administered but that when combined with ace bandages, knee braces and anti-inflammatories, worked wonders and kept me moving forward with tolerable pain. That left my concerns for balance.

Divine intervention led me to a solution. My wife and I were attending an open air concert when I noticed a single tent set up on the concert grounds. I went over to investigate and found that UNO Biomechanics was handing out information. After talking with the rep, we decided I would come in for a balance and footwear analysis. What a stroke of good fortune. The Team at UNO worked their magic and when combined with all the work the VA medical team did to prepare me, I managed to pretty much avoid falling on the AT. Of the 29 falls I had, three were pretty bad and the rest fairly benign, but what is really interesting is that I had hundreds of near falls, what I call FLIPS (not a fall but more than a slip). How I avoided turning many of these into falls is, I believe, a direct consequence of the lessons learned at UNO and the knee shoring-up the VA did for me.

Interestingly, the support provided by the VA and UNO at the beginning of my hike allowed me time to build strength in my legs and with that strength came less knee pain and frequency of falling. As I built miles, I also built muscle and found that I was enjoying the hike more and more while discovering that I could do more than anyone expected, me included. The expected limitations on my ability to hike caused by my medical conditions became manageable and with that my enjoyment increased as did my understanding of my capabilities. Prior to taking my first step on the AT, I was told I needed both knees replaced and now that prescription has gone away. What a wonderful and unexpected result.

UPDATES FROM THE CENTER FOR RESEARCH IN HUMAN MOVEMENT VARIABILITY

2ND ANNUAL HUMAN MOVEMENT VARIABILITY CONFERENCE

The Second Annual Conference in Human Movement Variability was another great success! With approximately 100 participants, the program included external speakers, oral presentations, and two poster presentation sessions. Our two guest speakers were two young, talented biomechanists, Dr. Jason Gillette from Iowa State University and Dr. Alena Grabowski from University of Colorado, Boulder. Dr. Brian Schulz was an honorary speaker, and he came from Washington, D.C. and the U.S. Department of Veterans Affairs.

One of the highlights was this year's Barry T. Bates Keynote Speaker, Dr. Benoit Bardy (pictured above), who came from France where he is a professor and director of EuroMov at the University of Montpellier. His research is about coordination and control of movement in real and virtual situations.

Two poster sessions were held with almost 40 posters. Awards were given to Mr. Daniel Schloesser, UC Merced, for best oral presentation; Daniel Jaravata, UNO, for best undergraduate poster; and RJ Barber, UNO, for best graduate student poster.

Planning for the third annual conference is already underway. It will include sponsorships for the students and the addition of vendor booths.

THE MOVCENTR

The Center for Research in Human Movement Variability was officially established in 2013. To keep on trend with branding, established labs across the country, and excitement from NIH officials, a catchy abbreviated name was created with MOVCENTR. We are excited to have a more prominent and easily pronounced name that will help us establish our branding needs in the future.

A cup from the Human Movement Variability Conference with the new branding

NEW PILOT AWARDEES

ANDREAS SKIADOPOULOS, PH.D.

Department of Biomechanics | Pilot Project Awardee

Dr. Andreas Skiadopoulos came to us from the University of Extremadura, Cáceres Spain, where he completed his Ph.D. He was awarded a pilot project to investigate how simple interventions can be used to prevent falls in older adults.

JOAO R. VAZ, PH.D., P.T.

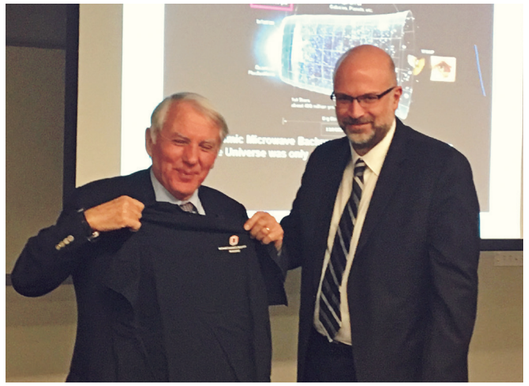
Department of Biomechanics | Pilot Project Awardee

Dr. Joao Vaz came to us from the University of Lisbon, Portugal. He is also a Physical Therapist. Before he joined the department, he was working in Portugal as an assistant professor at Universidade Europeia–Laureate International Universities and as a Physical Therapist in a private clinic. He was awarded a pilot project to investigate the relationships between human biorhythms, variability in movement, and injury prevention.

SEMINAR SERIES

The weekly seminar series had another phenomenal year. The focus of the seminar series is to call for experts related to academia and research in the areas related to biomechanics, movement disabilities, rehabilitation and others. The series includes local and nationally and internationally renowned professors and specialists presenting findings, stimulating thinking, and creating collaboration ideas for the UNO faculty and students.

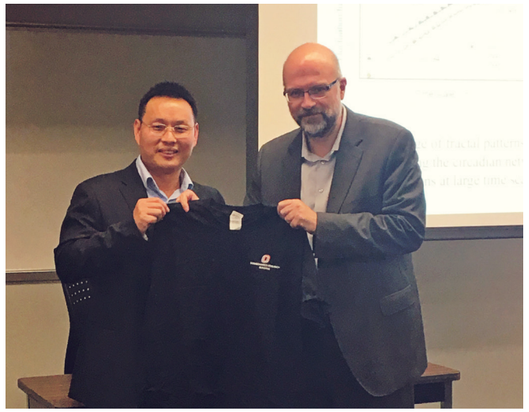
2016-2017 presenters included incredible scientists such as Dr. Dimitri Nanopoulos, Texas A&M University; Dr. William Quillen, University of South Florida; Dr. Kun Hu, Harvard Medical School; Dr. Michael Reid, University of Florida, and many others.



World-famous physicist, Dr. Dimitri Nanopoulos, presented at our Seminar Series in February, 2017

Dr. Michael Reid presented at our Seminar Series in January, 2017

Dr. William Quillen presented at our Seminar Series in December, 2016



Dr. Kun Hu presented at our Seminar Series in October, 2016

The seminar series not only provides the opportunities to listen to scientific presentations, but build collaborative relationships amongst faculty members and students. The presenters each receive discussion time with other faculty members. A social is held after the presentation to thank the visiting speaker and also to provide opportunities for further discussion. The seminar series is looking forward to another great year with the addition of participants receiving American Medical Association continuing education credits.

JUNIOR INVESTIGATORS UPDATE

Dr. Knarr's research team

CLINICAL CHARACTERIZATION OF MOVEMENT VARIABILITY IN TOTAL KNEE ARTHROPLASTY
DR. BRIAN KNARR

Over 700,000 people undergo total knee arthroplasty surgery, more commonly referred to as a knee replacement, every year. While many people report an improved quality of life and less pain after having a knee replacement, often their movement and walking activity do not return to healthy levels. My team, along with clinical collaborators such as Dr. Kent Boese from Miller Orthopedics Specialists, use a combination of biomechanics, engineering, and clinical measurements to help understand and improve outcomes after a knee replacement.

Currently, our research is focused on the use of wireless sensors to understand how movement in the real world differs from movement in a clinic or laboratory. To do this, we use a combination of traditional clinical measurements and cutting-edge engineering to collect biomechanics data in Elmwood Park, right across the street from the Biomechanics Research Building. In particular, we are interested in examining how a person's movement may change when exposed to real world surfaces such as a bumpy sidewalk or grass. We believe that traditional clinical assessments are missing key information about an individual's ability to walk by not including the daily challenges that are experienced when walking in the real world. By understanding how the real world differs from a rehabilitation clinic, we hope to help clinicians and physical therapists design new ways of improving recovery after surgery.

Dr. Mukherjee and his research team

VIRTUAL REALITY EFFECTS ON GAIT VARIABILITY AFTER STROKE
DR. MUKUL MUKHERJEE

My research team investigates how visual information received through a virtual reality environment can improve walking in stroke survivors. Over 90 stroke survivors have been recruited so far through the Department of Neurological Sciences at the UNMC and from community stroke groups. Another very interesting question we are asking is how variations in movement can be a biomarker for control of balance. Data from this research project has resulted in several spin-off projects that have received grants (NASA award for developing modular robotic devices), start new projects and enhance collaboration (e.g., University of Michigan).

Dr. Takahashi's research team

FOOT BIOMECHANICS AND THERMOREGULATION IN PERIPHERAL ARTERY DISEASE AND DIABETES
DR. KOTA TAKAHASHI

When we spend all day on our feet, whether it is standing, walking, or running, we often take for granted the amount of stress that we place on the tissue and joints within the foot. The design and function of our feet are incredibly diverse in that they help us maintain balance and upright posture, and at the same time, facilitate movement from one step to the next. But with repeated exposure to impact forces and loads, our feet are prone to tissue damage. This is especially true for individuals with abnormal physiology, such as diabetes and peripheral artery disease. Preventing tissue complications, such as ulcer formations in these patients, is an important healthcare goal because in the most severe cases, ulcers can lead to an amputation.

My research team is currently conducting a project to understand factors that influence ulcer formations in at-risk patients. Research in the past few decades have indicated that one of the best measures of predicting ulcer formations is foot temperature. For example, it is quite natural for our feet to heat up after a prolonged period of walking or running. However, when the heat production is excessive, such as in the feet of patients with diabetes and/or peripheral artery disease, this build-up of heat could predispose tissue breakdown in the affected feet. Currently, we know very little about factors that influence control of temperature during activities of daily living, such as walking. My team is trying to identify these factors and to identify how foot temperature regulation is affected in patients with diabetes and/or peripheral artery disease.

Dr. Yentes' research team

BREATHING AND WALKING COUPLING VARIABILITY IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)
DR. JENNA YENTES

Chronic obstructive pulmonary disease (COPD) is the third leading cause of death in the US and is a disease of the entire human body, not just the lungs. In the US, roughly 15 million people have been diagnosed with COPD, and a similar number of people are thought to be undiagnosed. The healthcare costs associated with care of a patient with COPD are substantially greater than a person without COPD. Exacerbations in those with COPD are episodes with acutely more severe symptoms superimposed on overall disease progression. Unfortunately, exacerbations are extremely difficult to predict and current diagnostic strategies require the fully developed symptoms to be present, which often requires their presence for two to three days. Early diagnosis of an individual at risk will have immediate clinical impact by allowing for early intervention and potentially preventing hospitalization and disability that would increase healthcare costs.

My team investigates the variability present in two different biorhythms, walking and breathing, and how their coupling relates to exacerbations in patients with COPD. Their preliminary data has shown that patients with COPD demonstrate more rigid and less variable coupling than healthy controls due to abnormal breathing rhythms. Monitoring of this coupling lead to quantifiable changes prior to a diagnosed exacerbation. Furthermore, we anticipate to use this change to calculate a clinically meaningful change in coupling that is predictive of an exacerbation. These hypotheses are based upon an increased respiratory rate in patients with COPD and a decrease in activity as being potential predictors of exacerbation. Since the absence of a strong, cost effective, objective measure to predict COPD exacerbations or diagnose them earlier is a critical barrier in the care of patients with COPD, we expect our findings will be the necessary step needed to overcome this barrier. The longer-term goal of our research is to utilize coupling as a rehabilitative strategy to increase physical activity and slow the progression of the disease.

We have created and submitted a patent for a device to measure the walking and breathing patterns in COPD patients, which we hope will objectively quantify the onset of an exacerbation. This device is currently being used in a multi-site trial and data collections will be completed by Spring 2018. In addition, we are continuing to gather more information on the coupling between breathing and walking by performing research with individuals with COPD and aged-matched controls. Through the combination of the team's hard work and assistance from participants and collaborators, we are working towards improving the quality of life in those with COPD and other pulmonary diseases.

UPDATES FROM THE DEPARTMENT OF BIOMECHANICS

HIGHLIGHTED COLLABORATION

Matthew Rizzo, M.D., F.A.A.N.

UNMC MIND AND BRAIN HEALTH LABORATORY "BLACK BOX" COLLABORATION

Our Biomechanics Machining & Prototyping Core staffed by our machinist, Mr. Travis Vanderheyden and his team, has been working with the UNMC Mind and Brain Health Lab (MBHL), led by Dr. Matt Rizzo, to provide technical oversight, installation, and maintenance of high-tech, on-the-road monitoring equipment. Our Core personnel have been working closely with UNMC MBHL to install what is being referred to as "Black Boxes," a moniker derived from the emergency black box recording equipment outfitted in most airplanes. This collaboration was initiated in mid-2015 and has allowed MBHL to have over 300 black boxes installed into participants' vehicles. Dr. Rizzo and Dr. Stergiou have also submitted and received multiple grants on this work from the NIH and Toyota.

Our Black Box installation team has facilitated over 600 visits for the program, including installation, maintenance, troubleshooting, and removal of equipment. Most of what is involved in these visits is tying the Black Box into the vehicle's electrical system so it can be properly triggered when participants are driving. In addition to the Black Box itself, a forward and rear facing dash camera is installed. Travis and his team have also begun the development of an updated version of the Black Box that will hopefully improve data integrity, ease of installation, and ease of maintenance. With the new version of the device on the horizon and a dedicated installation space planned for the expansion of the Biomechanics Research Building, this collaboration with the MBHL looks like it will have a very long and prosperous future.

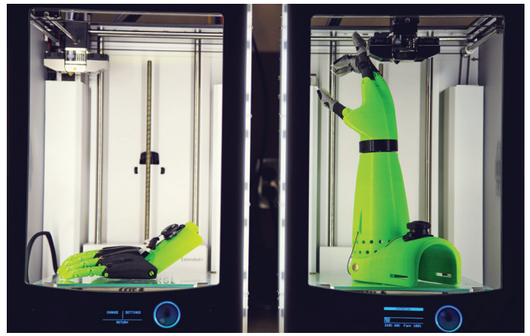
Rakesh Srivastava, M.S., CPO

COLLABORATION WITH INNOVATIVE PROSTHETICS & ORTHOTICS

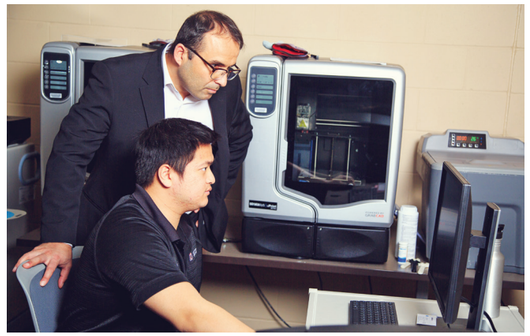
Innovative Prosthetics & Orthotics is one of the strongest industrial partners of the Department of Biomechanics. With several clinics in Nebraska (Hastings, Grand Island, and Omaha) and a solid presence in India, Innovative Prosthetics & Orthotics provides comprehensive prosthetics & orthotics services. It is currently owned by Rakesh Srivastava, M.S., CPO. Innovative Prosthetics & Orthotics is committed to pioneering the use of emerging technology, research, and education to better serve their patients. In collaboration with Dr. Jorge Zuniga's research team, Innovative Prosthetics & Orthotics is the only prosthetic facility in the state of Nebraska and one of the few in the nation to engage in the research and development of low-cost, 3D printed prostheses. In collaboration with Innovative Prosthetics & Orthotics, we are resubmitting a Phase I NIH STTR application for $223,000. If it is awarded, we will apply for a $100,000 matching grant from the State of Nebraska, and prepare our Phase II application for $1,500,000.

Innovative Prosthetics & Orthotics has a long history in social innovation. In collaboration with the Department of Biomechanics, Innovative Prosthetics & Orthotics performs charity work in India and the USA by providing, prosthetic devices at little or no cost to underserved populations. Mr. Rakesh Srivastava is also a valuable asset providing his technical advice and expertise on the development of our new graduate programs and sponsoring students that work at the Department of Biomechanics.

NEW CAPABILITIES IN THE BRB



The machine shop team



The 3D Printing Laboratory. Dr. Zuniga is pictured working with a graduate student, Mr. Than.

3D PRINTING LABORATORY

The 3D Printing Laboratory is the main research space that is used for the completion of 3D printed prosthetics and devices. It was essentially developed from scratch by Dr. Jorge Zuniga and his research team with funds from the NIH, NSF EPSCOR and the Nebraska Research Initiative. The 3D Printing Laboratory is housed in a 13' x 22' room equipped with an industrial PolyJet 3D printer (Objet260, Connex3, Stratasys, Minnesota, USA), two semi-industrial 3D printers (Uprint SE Plus, Stratasys, Minnesota, USA), a custom 3D printer machine with dual extruder, eight desktop 3D printers (Ultimaker Extended, Nehterlands), and one specialized orthopedic 3D printer (Orthotype by Innovative Prostheics & Orthotics, Hastings, USA). In this laboratory, we also have a portable brain imaging device, Functional Near-Infrared Spectroscopy (fNIRS). This system (ETG-4000, 24 Channel Optical Topography System, Hitachi, Japan) enables imaging of the brain to examine how amputees are engaging the prostheses with their nervous system.

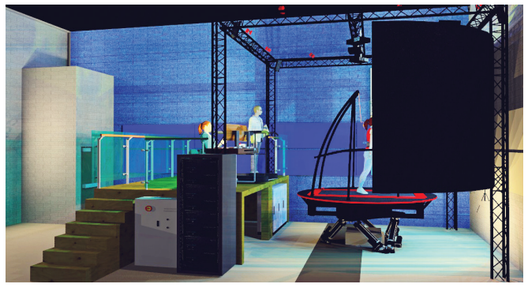
UPDATES IN THE MACHINING AND PROTOTYPING CORE FACILITY

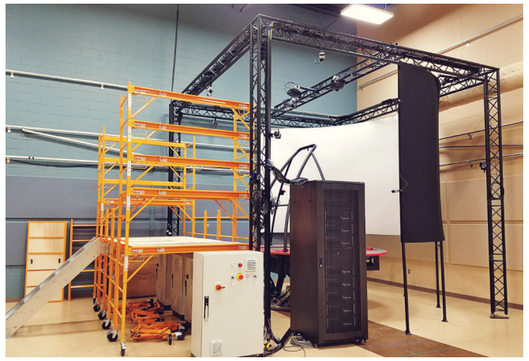
The Machining and Prototyping Core is fast approaching as details regarding service structures and rates are finalized and team members, led by machinist Travis Vanderheyden, pursue collaborations and patents that could bring the core that much closer to its goal: independent sustainability. The new core will be the first of its kind at the Omaha campus and has already proven its potential over the past two years by achieving monumental progress on device design and development as well as long term collaborations with the regional research community. Though this core is planned to be one of three new service Cores coming to UNO by means of the Biomechanics Research Building, it is so far the most matured among them.

Services the Machining and Prototyping Core plans to offer include every step of the design and development process for new or uniquely modified devices. In addition to the prototyping aspect, our spaces are outfitted with a large host of equipment that can facilitate traditional machining and fabricating of woods, plastics, metals, and composite materials. The 3D-printing capabilities within the building will also be offered under the umbrella of the Machining & Prototyping Core which will not only include printing services, but design for additive manufacturing guidance that ranges from conceptual design to finished product.

The primary offices and labs for the Machining and Prototyping Core include the Machine Shop, Electronics Prototyping Workshop area, and the 3D Printing Laboratory, for a total of 1,100 square feet. With the expansion of the Biomechanics Research Building, these spaces will see massive expansion totaling closer to 3,500 square feet. With new equipment, new spaces, and capable personnel, the Machining and Prototyping Core will be well on its way toward the goal of being independently sustainable in the upcoming years.

NEW EQUIPMENT IN THE BRB



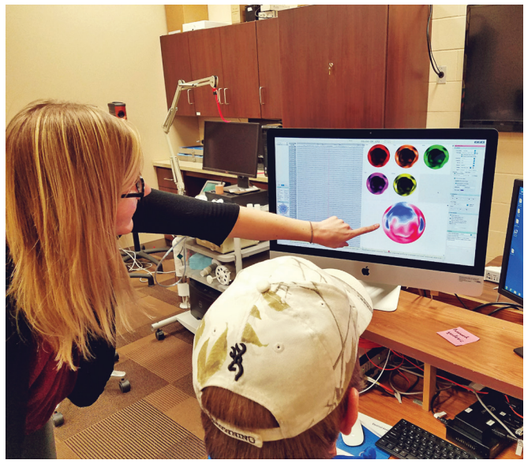


CAREN

Our new Computer Assisted Rehabilitation Environment (CAREN), purchased through a grant from the Nebraska Research Initiative, brings the second virtual reality system to the Department of Biomechanics. The upgraded system brings us a newer instrumented six degrees of freedom treadmill, a larger screen, and an additional 10-camera Vicon motion capture system. It is currently installed in our Main Gait Laboratory, but it has a dedicated space in our expansion.

Our first system was pieced together over time and saw separate upgrades to its environment rendering system, motion capture technology, and screen. It uses a dual-belt Bertec treadmill. Our new CAREN was purchased solely from Motekforce Link. It is the same system used at several military centers including Walter Reed, Brooke Army Medical Center, and the Naval Health Research Center.

With this new system, we will be able to better study the effects of visual and physical perturbations on standing posture, walking, and running. It also makes us more capable of providing upper and lower limb rehabilitation services outside of the University.

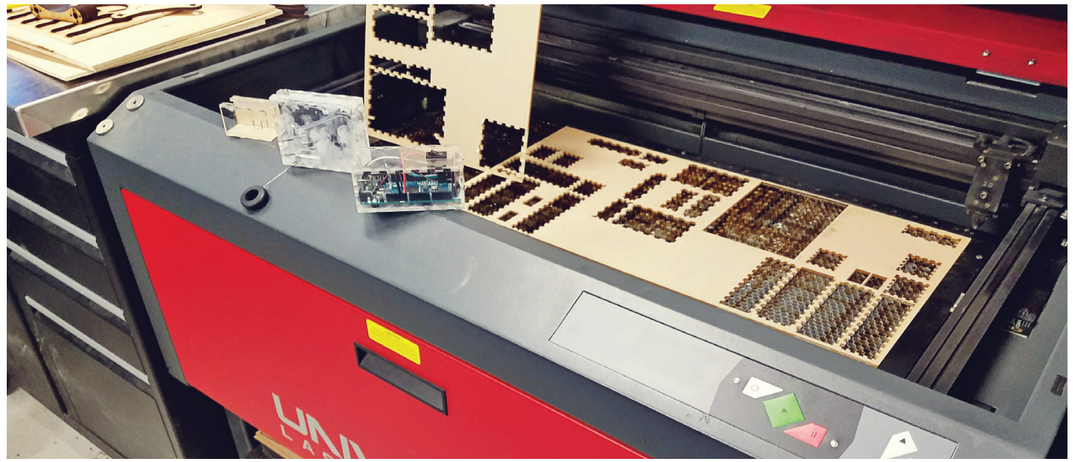


EEG

Through a Nebraska Research Initiative grant, we purchased an electroencephalogram (EEG) from Electrical Geodesics, Inc. This device measures the electrical activity in the brain through 130 electrodes. Along with our fNIRS device, this explands our ability to measure cognition and its relation to movement. This could be used to study infants with movement delays, stroke patients, or amputees.

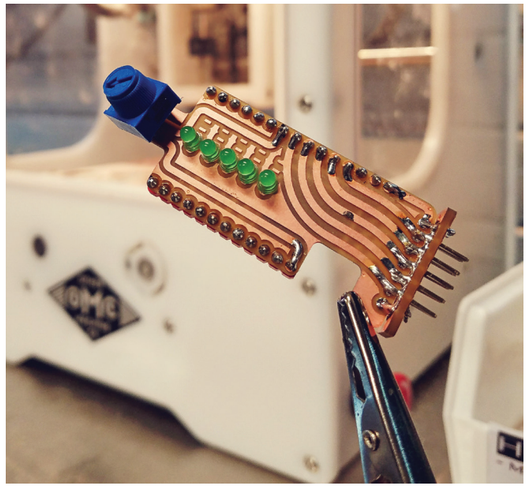
PY6 LOAD CELLS

We also purchased two PY6 load cells from Bertec. One of these has been used to instrument a cane. This will allow Dr. Knarr's research group to quantify how much his subjects rely on the cane during walking.



Laser Cutter

Objet 260 3D Printer



PCB Mill custom circuit board

MACHINING AND PROTOTYPING CAPABILITIES

Our 3D printing and prototyping capabilities have expanded. As of last year, we had nine 3D printers. Now we have an additional Objet260 from Stratasys that uses polyjet technology. This printer creates layers of photopolymer that are UV cured to create a solid object. It makes a smoother and more accurate part compared to our other fusion deposition modeling (FDM) printers. Our other new printers are a Rostock Max V3 and Robo FDM printers.

New to the Machine Shop is a PCB Mill. With this, we can create custom circuit boards. It is currently being used for Dr. Malcolm's Gait-o-Gram project and other small projects. Our students are also learning to use it through AutoDesk Eagle software.

The Machine Shop has also acquired a laser cutter from Universal Laser Systems. It can cut plastics, foam, sheet metal, wood, and other materials. Students are also learning to use this through Adobe Illustrator. It has been used to create outsoles for Dr. Malcolm's shoe research, cases for Dr. Hunt's slip study, and other projects.

BIOMECHANICS AND UNeTECH

JOE RUNGE, M.S., J.D.

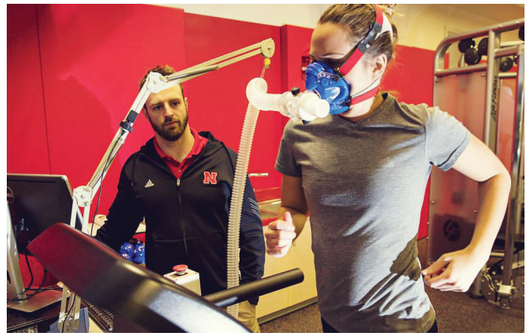
The Department of Biomechanics continues to be one of the most innovative departments in the University of Nebraska. The department's interdisciplinary faculty, its culture of problem solving, and its hypothesis-driven science make it fertile ground for new inventions, new products, and new solutions.

UNeTech continues to work with the Department of Biomechanics on a clinical study for the COPD system. The COPD project shows enormous and transformative capability to improve the lives of patients suffering from COPD. It may better monitor their disease and even make exacerbations less deadly. Substantial work remains, however, to translate the work in the laboratory into a product that patients can use.

The COPD project demonstrates the need for the UNeTech Institute. Compelling research, with enormous potential and commercial interest needs support for ongoing development to create a product. Traditional research grants do not support the ongoing development required to translate fascinating results into essential products. Dr. Yentes and her team currently use the UNeTech funds to coordinate clinical partners, computer scientists, and commercial partners – nationwide.

UNeTech has been the rare source of funds to start that transition from laboratory to marketplace. In 2017, the UNeTech institute became something more – an incubator for early stage companies. Among the first class of startups in the incubator is Avert. Run by local entrepreneur Preston Badeer, Avert uses research from the Department of Biomechanics related to postural stability for the assessment of concussion. UNeTech continues to identify new and innovative research that can produce biomedical products. One of the most reliable places to find that innovation is the Department of Biomechanics at UNO.

WHERE ARE THEY NOW?



RYAN HASENKAMP, M.S.

I am currently at the Nebraska Athletic Performance Lab in Lincoln, NE working with student athletes within the University of Nebraska-Lincoln. As someone who was born and raised in Nebraska and grew up a die-hard Husker fan, this opportunity has been a dream come true. I can whole-heartedly say that I would never be in this position if it were not for Dr. Stergiou and the Biomechanics Research Building (BRB).

I remember when I first started in the BRB in 2009. The lab was much different than it is today. The laboratory was in the old HPER building (before it was renovated). Our graduate students had to share tiny closets down the hall as office space. At the time, I was an undergraduate student who was completely naïve to anything biomechanics. I remember when I started, thinking that I just needed a job, not realizing that I was stumbling into what would be the beginnings of a career. I managed to stick around for six years throughout a bachelor's and a master's degree. Now, almost nine years later, I like to think that my own personal and professional growth since 2009 has mimicked the growth of the BRB. We have both come a long way from those humble beginnings.

Even during my time at UNO, I have always had a strong passion for training and fitness. To this day, I train and compete in powerlifting (this past year, I managed to set an AAU Nebraska state record in the deadlift with a 567.2 lb lift at a body weight of 181 lbs). When I had the opportunity to not only work in a sport performance lab, but to work for the Huskers, it almost seemed a perfect scenario for me.

At Nebraska, we have 22 sports and over 600 student athletes with whom we work. Our lab is a unique situation where we are funded through the athletic department. Instead of our focus being on grants and publications, our focus is on our student athletes. My goal is to bring a scientific, evidence-based approach to sport performance. It is apparent that the sport performance field is littered with dogmatic practices and pseudo-science. Such practices and misinformation can be detrimental to athletes' performance. I think that my time at BRB (especially doctoral seminars with Dr. Stergiou at 7 A.M.) has prepared me to be a proper scientist and to recognize the pseudoscience that is so prevalent in sport performance. At the end of the day, it is all about helping the student athletes. I would not be here without Dr. Stergiou and the BRB. For that, I am eternally grateful.

WHY CHOOSE THE BRB?

ZACHARY MEADE

If you had asked me three years ago what biomechanics was, I would have given you a blank stare. If you ask me today, I will tell you it is the coolest thing ever. Some might describe it more eloquently as an intersection of biology and engineering where biological movement and processes are investigated. The Biomechanics Research Building provides an outlet for me to continue serving after my military service.

After high school, I had a calling to serve my country and community by enlisting in the United States Army. I was shipped to Fort Jackson, SC for basic training, then to Eglin Air Force Base, FL for advanced individual training (AIT). During AIT, I underwent intense training to become an explosive ordnance disposal (EOD) technician, also referred to as a bomb squad technician. I trained for every scenario, ranging from guided missiles to chemical weapons. One of the most valuable lessons learned during this training was the importance of trust: trust in yourself, trust in your team, and trust in your equipment.

Upon successful completion of EOD school, the military relocated me to the middle of nowhere: Fort Polk, LA. The military bomb squad is responsible for any military explosives found on or off base, to include improvised explosive devices (IEDs), or old training explosives from WW1 and WW2. Fort Polk, and the whole of Louisiana, was heavily used during the civil war and used as explosives training and tests grounds throughout this country's history. As a bomb squad technician in the swamps of Louisiana, we had many interesting emergency response calls from local authorities. Some of these calls included civil war cannon balls filled with black powder, to hand grenades brought home from the Korean war. As I settled into my new role as a bomb squad technician, many of my peers became injured on the battlefield, and I became familiar with trauma-related injuries and amputations.

Throughout my time in Louisiana, I realized that I wanted to give back to the military community in ways my current role did not allow. Knowing so many that had debilitating wounds and amputations, I decided to leave active duty and pursue an education in hopes of working with multifunctional prostheses to give back to those that sacrificed so much for this country. My beautiful wife and I moved to her home town of Omaha, Nebraska. I began an electrical engineering (EE) program with hopes of attending medical school, and volunteered as an EMT and firefighter at Boys Town. I loved working as an EMT, and loved the knowledge in my EE program, but struggled to find a way to combine the two mindsets. Then I learned about the Biomechanics Research Building.

Touring the building, I was inspired by the way they leveraged the use of advanced technology to conduct innovative research into prostheses, exoskeletons, and motor development. Desiring to be a part of the groundbreaking research at the Biomechanics Research Building, I quickly offered to volunteer my time. I knew this was my home. The Biomechanics Research Building offered an outlet for my curiosity, creativity, and my compassion.

The Biomechanics Research Building is a place where my dream to create novel technologies to help my brothers and sisters in arms became a reality. My dream was shared and embraced by others. I received training and was entrusted to work on a project to improve lower limb prostheses. The faculty mentored me and gave me the skills necessary to successfully write an internal grant and become the principle investigator of my own research project. Very few places of this caliber offer such opportunities for undergraduate and graduate students alike. I had finally arrived at the intersection of biology and engineering, where my ambitions of helping those that had served this country expanded to helping everyone who suffered from devastating wounds — military and civilian.

I chose the Biomechanics Research Building because it was more than a research lab; it was a family that allowed me to continue service after military service and helped me find and fulfill my purpose.

PURSUING A BS IN BIOMECHANICS

CHARLES IAN SLOAN

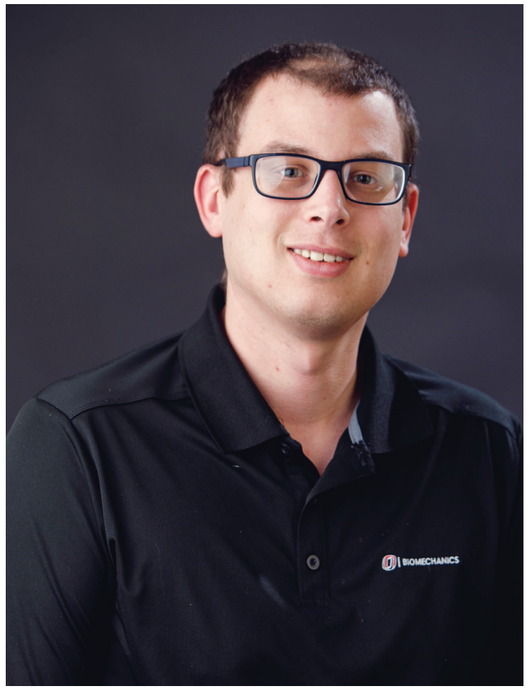
Year: Sophomore
Graduating: May 2020

I chose biomechanics to pursue my passion for studying human movement and how to improve someone's everyday life. I want to focus on prosthetics for my career and learning how people move was a key piece to this path.

Having the opportunity to work in the building has been a huge factor in helping me pursue my degree in biomechanics. I started here by working on a project for falls in older adults, where I was first exposed to the concepts of biomechanics. I also was able to get hands-on time with the equipment here, which is equipment that I could see later in my career. Since then, I have participated in three different projects. I am currently on Dr. Stergiou's team helping on various projects. He puts an immense amount of trust in me and is giving me difficult tasks to do.

Being able to participate in biomechanics research so early in my college career has been amazing and has helped me to get real life experience. Every day is a learning experience, and I appreciate being able to participate in this research. I plan to take the knowledge from here and apply it every day. My future plan is to earn my Master's in Biomechanics and move on to professional school for prosthetic fabrication. After becoming a prosthetist, I hope to come back and earn my Ph.D. in biomechanics so I can teach and do research as well. I want to give undergraduates the same opportunity that I have now and participate in research.

NEW HIRES IN THE DEPARTMENT



ANDREW KERN, PH.D.

Dr. Andrew Kern, Research Associate in Biomechanics, completed his Ph.D. in Biomedical Engineering from the University of Iowa. He is currently working with Dr. Kota Takahashi to discover the relationship between foot biomechanics and temperature regulation in patients at risk for diabetic ulcer formation. His other research interests include computer-assisted surgery in orthopaedic trauma and the use of novel computational approaches to improve treatment of musculoskeletal diseases.

MR. MAHDI HASSAN

Mahdi Hassan joined the department as a laboratory technician in April 2017. Prior to this appointment, he worked as a Research Assistant in the physical therapy department at University of North Texas Health Science Center. He worked as an assistant project engineer in Dhaka, Bangladesh before coming to the United States in 2013. He has a master's degree in industrial engineering with emphasis in biomechanics from the Wichita State University in Wichita, KS. He earned his bachelor's degree in civil engineering from the Ahsanullah University of Science and Technology in Dhaka, Bangladesh.

MRS. JORDAN WICKSTROM

Mrs. Jordan Wickstrom, lecturer in the department, is completing her Ph.D. in 2018 in biomechanics at UNO. She accepted a special appointment to be a one-year lecturer within the department. Her current research investigates children at-risk for and diagnosed with Autism Spectrum Disorder (ASD). Mrs. Wickstrom's short-term career goal is to establish a research line as a professor that is aimed at increasing our capabilities in understanding ASD as well as improving current diagnostic and therapeutic protocols for this population. Her long-term career goal is to start a non-profit organization focused on 1) educating parents of children with ASD and 2) resolving the communication gaps amongst parents, pediatricians, clinicians, and researchers in order to make sufficient advancements toward helping individuals with ASD.

IT'S A FACT!

1. The Division of Biomechanics and Research Development was approved by the Board of Regents of the University of Nebraska on March 31, 2017. The approval of the Division also established Dr. Nick Stergiou as Assistant Dean of the Division.

2. As of December 2017, we had 31 students enrolled in the BS in Biomechanics. That is more than double the amount of students from last year.

3. As of December 2017, the Division has 10 faculty members, 3 postdoctoral research associates, 10 staff members, 7 doctoral graduate assistants, and 19 master's graduate assistants.

4. The expansion to the Biomechanics Research Building was approved and we started to break ground spring 2018.

5. The department created 11 new undergraduate courses as part of the revised curriculum to the B.S. in biomechanics. Courses include:

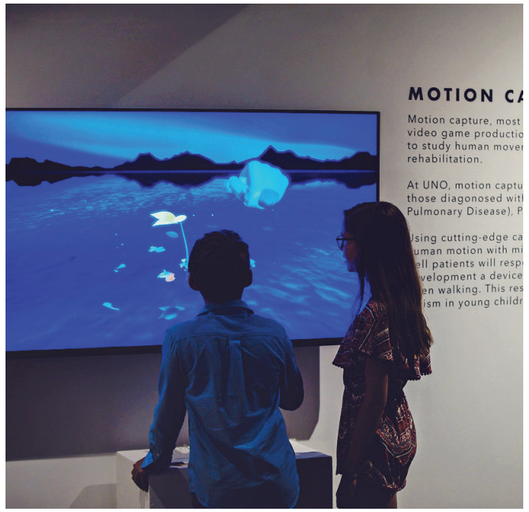
    - Introduction to Biomechanics
    - Ethics of Scientific Research
    - Analytical Methods in Biomechanics
    - Biomechanical Statics and Dynamics
    - Bioinspired Robotics
    - Orthopaedic Biomechanics
    - Neuromechanics of Human Movement
    - Methods in Biomechanics I
    - Methods in Biomechanics II
    - Capstone Design for Biomechanics I
    - Capstone Design for Biomechanics II

6. As of December 2017, the Division has had 27,901 downloads of the 191 papers currently listed in the UNO Digital Commons database.

7. In 2016, the Biomechanics Facebook page had 616 followers. The Twitter page had 44,937 tweet impressions and 70 new followers. As of December 2017, the Facebook page had 737 followers and the Twitter page had 440 followers.

EXCITING EVENTS

KINETIC AT KANEKO



KANEKO is an innovative and interactive art space that hosts art installations for the greater Omaha community. KANEKO serves as a connection between artists, scientists, and the community through performances, speakers, and art installations. The Department of Biomechanics collaborated with KANEKO to host a gallery featured in the summer 2017 exhibition, KINETIC. KINETIC explored the art and science of movement through a number of artistic and scientific exhibits. The exhibits varied from the large-scale hand carved moving sculptures created by John Buck to a garden of interactive flowers to hands-on demonstrations featuring the research conducted at the Biomechanics Research Building. The biomechanics exhibit featured six installations that highlighted different aspects of current ongoing research. One installation featured Virtual Reality headsets with environments that are currently in use in the Virtual Reality lab. Another installation included Leap Motion sensors to demonstrate how motion capture is utilized to understand human movement variability. In addition to the KINETIC exhibit, which was featured at KANEKO from June to October of 2017, Dr. Nick Stergiou participated in the Great Minds Speaker Series. KINETIC broke records as the highest viewed exhibit in KANEKO history with a total of 16,734 visitors and 7,000 student participants of different youth engagement workshops and was featured in the Omaha World Herald. Overall, the endeavor was an exciting new way to connect the community of Omaha with the research happening at the Biomechanics Research Building.

Photos by Ben Semisch

OLYMPIAD OF THE MIND

Dr. Stergiou was invited to participate in the 9th Olympiad of the Mind in September of 2017. This was a great honor as several of the invitees are Nobel Prize winners and other significant scientists. They usually invite only a handful of people that discuss a topic of global importance. This Olympiad's topic was "Learning to Live Together" and took place at Chania, Crete, Greece.

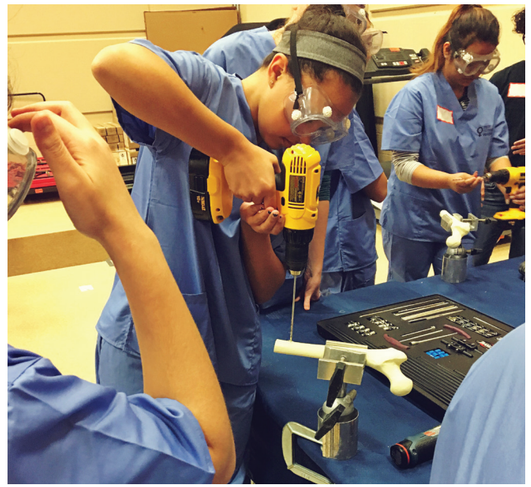
Dr. Stergiou with participants of Olympiad of the Mind

Dr. Stergiou with Nobel Prize Winner Dr. Yuan T. Lee. He won the Nobel Prize in Chemistry in 1986 for his contributions to the dynamics of chemical elementary processes.

Dr. Stergiou with Dr. Scott Kelso Professor of Complex Systems and Brain Sciences at Florida Atlantic University (FAU) in Boca Raton, Florida and The University of Ulster (Magee Campus) in Derry, N. Ireland.

STEM AND BIOMECHANICS

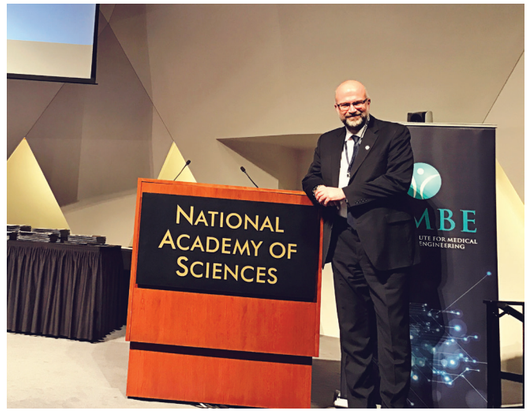
The Department of Biomechanics collaborates in many different ways with other departments at UNO and the greater Omaha community. This year we have hosted numerous tours reaching out to over 100 Pre-K through 12th graders, including schools like Christ the King School, Westside Community Schools, and Central High School. In addition to hosting tours, our department works closely with elementary, middle, and high school teachers to help optimize their classrooms. We are working on assisting Scotus Catholic School in Columbus, NE as they develop an exciting new STEAM lab. This past November, we hosted a Math Teacher's Circle event for local middle school and high school math teachers where we toured the Biomechanics Research Building and faculty worked with local teachers to complete biomechanics and math focused activities. In recent years, the American Society of Biomechanics has begun National Biomechanics Day, where research scientists are encouraged to open up their labs for students to explore. This past year, we hosted around 90 students in the Biomechanics Research Building for a day of fun and science. Participants were able to test their balance, measure their step length, and learn about how their muscles use electricity to help them move their bodies. These fun and exciting events give our faculty and students the ability to interact with the community and show them just how exciting the field of biomechanics can be!



PERRY INITIATIVE

For the first time ever, the UNO Department of Biomechanics was fortunate enough to host the Perry Initiative Outreach program. This was done in collaboration with the UNMC Department of Orthopaedic Surgery and Rehabilitation. The program was a one-day event where local female high school students worked with undergraduate and graduate students, engineers, and surgeons to complete six mock surgeries. The Perry Initiative was created by a mechanical engineering professor and an orthopaedic surgeon, both women, after they noticed they had very few female colleagues. The Association of American Medical Colleges reports only 5 percent of U.S. orthopaedic surgeons are female. Additionally, only 12.4 percent of engineering faculty are women. To fill this gap and create a pipeline towards these careers paths the Perry Initiative Outreach program was developed. Their goal was to introduce more young women to the variety of career opportunities they may not know about and recruit more women into these exciting fields. In completing six mock surgical activities, participants are able to learn about the underlying STEM principles that inform both engineers, as they design medical devices, and surgeons, as they operate on patients. This year, the event was held at the Biomechanics Research Building, where we hosted 40 local area high school juniors and seniors, from 12 different Omaha and Lincoln area schools. The event included three speakers: Dr. Susan Scherl and Dr. Maegan Wallace, both pediatric orthopaedic surgeons, and Dr. Amelia Lanier, a biomechanist at UNO. The participants completed mock surgeries including suturing, femur fracture fixation, wrist fracture casting, and knee arthroscopy. In the coming years, the UNO Department of Biomechanics and UNMC will continue to jointly host this event and connect with students across Omaha and hopefully all of Nebraska.

AIMBE INDUCTION



Dr. Stergiou as he is called to the stage. The event took place at the National Academy of Sciences.

Dr. Stergiou was elected to the prestigious American Institute for Medical and Biological Engineering (AIMBE) College of Fellows, Class of 2017. Dr. Stergiou was formally inducted during AIMBE's annual meeting at the National Academy of Sciences Great Hall in Washington, D.C. He was elected by his peers for his outstanding professional and public service accomplishments, including contributions to the application of nonlinear analysis to the study of human movement and the promotion of biomechanics. The AIMBE College of Fellows is comprised of the most accomplished and distinguished engineering and medical school chairs, research directors, professors, innovators, and successful entrepreneurs, making up the top 2 percent of medical and biological engineers in the country. AIMBE is a non-profit organization, providing leadership and advocacy in medical and biological engineering for the benefit of society.

ASB FELLOW

Dr. Nick Stergiou at the 2013 ASB Annual Meeting, when it was held in Omaha

Dr. Stergiou was elected in 2017 as a Fellow of the American Society of Biomechanics (ASB). He considers this as a truly great honor since this is the society that he has been a member of since he was a graduate student. He has always said that if you call yourself a biomechanist, you better support ASB. ASB created the status of Fellow to recognize professional achievement and service of the top members of the Society and to encourage continued service to the Society in a leadership role. To be considered for Fellow status, an applicant must have been a member of the Society in good standing for at least ten years, has a consistent and significant record of service to and participation in ASB, is expected to remain active in ASB, and has made significant research and scientific contributions in biomechanics. The election process depends on a majority vote by the Fellows Nomination Review Committee and a subsequent 2/3 votes by the ASB Executive Board. Dr. Stergiou will be accepting the award at the 2018 ASB Annual Meeting in Rochester, MN.

NE3D HEALTH

NE3D HEALTH GROUP (UNO, UNMC, CHILDREN'S HOSPITAL AND INDUSTRY)

The NE3D Health Group (pronounced "Need Health") is a community of medical research and clinical 3D printing experts. Founded by Dr. Jorge Zuniga from the Department of Biomechanics, this group includes faculty and staff from UNO, UNMC, Children Hospital and industry partners such as Assistology LLC and Innovative Prosthetics & Orthotics. Members of NE3D health are committed to stewardship, cultivation and encouragement of inventions, ideas and processes, with the objective of enhancing mental and physical human health and well being. The vision of NE3D Health is to advance and promote the different biotechnologies related to health taking place in the state of Nebraska. The most iconic project performed by this group was the development of a 3D printed anatomical model for a pediatric patient with a developing tumor in the cervical area. This tumor (Schwannoma plexiforme) was growing rapidly and aggressively compressing the spine of the patient, resulting in the loss of mobility of the hands. A head and neck specialist from the Institute of Neurophysiology of Santiago, Chile, needed an accurate anatomical model of the cervical area to prepare an implant and plan this complex surgery. The family and the Institute of Neurophysiology of Santiago did not have the resources to access anatomical modeling services. The NE3D Health group led by the UNO Department of Biomechanics, Children's Hospital of Omaha, and UNMC was crucial to the success of this case. Our team was able to provide an accurate 3D printed anatomical model for the vertebrae C1 to T4 where the tumor was located. The Chilean surgical team used this model for pre-surgical planning with great success and reported a significant reduction in the operating room time and in personnel time leading to a highly successful surgery.

BEYOND OUR BORDERS

Dr. Stergiou pictured with three Professors; Dr. Athanassios Tziamourtas, Dr. Thomas Kourtesis, and Dr. Giannis Theodorakis (from right to left).

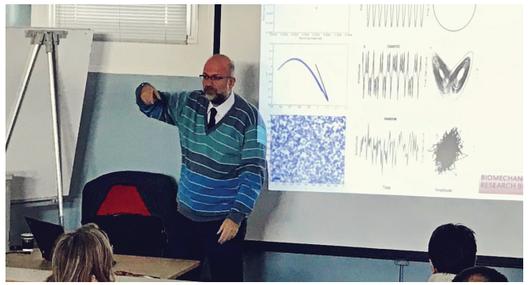
Dr. Stergiou with Dr. George Tzetzis, Director of the School of Sciences in Physical Education and Sports, and Dr. Vaso Hatzitaki, who hosted Dr. Stergiou.

Lecture at Democritus University in Greece

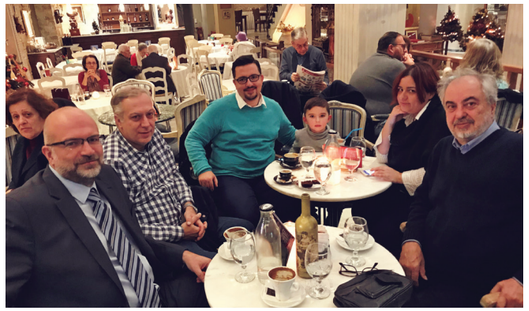
Greek Nonlinear Analysis Workshop

DIASPORA FULBRIGHT SCHOLARSHIP FOR GREECE

This year, Dr. Stergiou was selected for the Diaspora Fellowship Program as a FULBRIGHT Scholar and Fellow. Launched in 2016, this Fellowship Program is managed by the Institute of International Education in collaboration with the Fulbright Foundation and is funded by the Stavros Niarchos Foundation. As part of this program, Dr. Stergiou joined Professor Vassilia Hatzitaki in the Aristotle University of Thessaloniki at Macedonia Greece to explore new and exciting ways to advance biomechanics research. He also provided mentorship to students in Greece that could help them tackle the most pressing problems in the field of biomechanics. Faculty and staff at Aristotle University were also engaged by Dr. Stergiou in learning new and exciting teaching techniques and advice on how to secure grant funding. Dr. Stergiou was one of thirty Greek- and Cypriot-born scholars hailing from a cross-section of 28 prominent United States and Canadian universities that travelled to Greece to conduct academic projects with their peers at Greek universities as part of the Greek Diaspora Fellowship Program. As part of the partnership, Dr. Stergiou worked in parallel with researchers from Harvard University, Rutgers University, Yale University, Georgia Institute of Technology, University of Pennsylvania, and Purdue University, just to name a few of the other institutions identified for funding. The Greek Diaspora Fellowship Program is designed to help avert Greece's brain drain and develop long-term, mutually-beneficial collaborations between universities in Greece and the United States and Canada.



Greek Nonlinear Analysis Workshop



Dr. Stergiou with collegues from the University of Patras

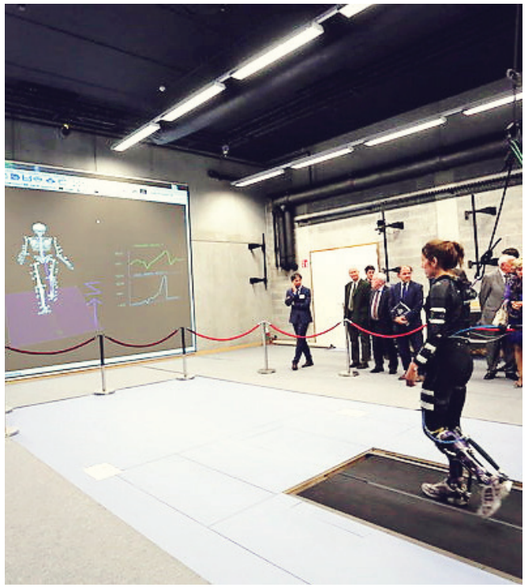
DR. STERGIOU VISITS BELGIUM

Dr. Stergiou was invited by Professor Thierry Lejeune, M.D., Ph.D., who is the Chair of Médecine Physique et Réadaptation of the Cliniques Universitaires Saint-Luc of the Université catholique de Louvain to give a research seminar. He also was in the dissertation committee of his student Thibault Warlop who defended his dissertation. Thibault is now Dr. Warlop as he did a fantastic research study with multiple publications.

Dr. Stergiou with the research team of Professor Lejeune following discussion of their projects and possible collaborations

Dr. Stergiou with Professor Thierry Lejeune and his student Thibault Warlop

Dr. Stergiou with Thibault Warlop



Dr. Dirk De Clercq demonstrates real-time motion capture while a participant is walking with an exoskeleton at the Jaques Rogge Sports Lab at Ghent University (2).

COLLABORATION WITH DR. DE CLERCQ FROM GHENT UNIVERSITY (BELGIUM)

Dr. Philippe Malcolm continues a collaboration with the Laboratory of Movement Science at Ghent University in Belgium directed by his former Ph.D. advisor, Dr. Dirk De Clercq (1).

One of the collaboration projects is a neuromechanical study of walking in an exoskeleton. In 2013, while still at Ghent University, Dr. Malcolm developed the first exoskeleton that reduces the metabolic cost of walking. During the following years, Dr. Galle from Ghent University collected a comprehensive biomechanical dataset of walking with various assistance patterns. Further research at Ghent University focuses on using exoskeletons for clinical populations such as the elderly, and in follow-up analyses conducted at UNO, Dr. Malcolm is investigating how to optimize exoskeleton actuation patterns for reducing movement variability.

Another collaboration project led by Dr. Breine is the investigation of foot strike patterns in running. Together, Dr. Malcolm and colleagues from Ghent University published multiple articles in 2017, including one perspective in Science magazine.

References:

1. Lab of Movement Science at Ghent University, https://www.ugent.be/ge/bsw/en/research/biomechanics.

2. Jacques Rogge Sports Science Laboratory, www.ugent.be/ge/bsw/en/sportlab.

PORTUGAL

Dr. Stergiou gave the Third European Workshop on Nonlinear Analysis at the University of Lisbon in Lisbon Portugal in June 2017. This workshop was organized with Professor Pedro Pezarat-Correia of the Faculdade de Motricidade Humana of the Universidade de Lisboa. The workshop included speakers Dr. Ana Diniz, Dr. Joao Rocha Vaz, Dr. Luis Silva, and Dr. Orlando Fernandes. It was attended by scientists from Portugal, France, Greece, England, and Turkey.

GREECE

Dr. Stergiou was the keynote speaker of the 25th International Congress on Physical Education and Sport (ICPES) that took place in May 2017. This Congress is organized by the Department of Physical Education and Sports Sciences of the Democritus University, which is located at Komotini of the area of Thrace in Greece. Support for his visit was also provided from the US Embassy in Greece.

UNITED KINGDOM

Dr. Stergiou was invited to give a research seminar as part of the Centre for Human and Applied Physiological Sciences (CHAPS) Seminar Series at Kings College London in April 2017. After the seminar Dr. Stergiou enjoyed tea with Kings College London faculty, Dr. Federico Formenti and Professor Stephen Harridge, friends from several universities around England who came to attend his talk, along with his Elsevier publisher Ms. Fiona Geraghty.

Dr. Stergiou with Dr. Federico Formenti

THE NETHERLANDS

Dr. Vivien Marmelat is collaborating with Drs. Ruud den Hartigh and Ralf Cox from the Department of Psychology at the University of Groningen (The Netherlands). They recently evidenced that two athletes performing indoor rowing side-by-side coordinate their behavior across multiple time scales, instead of merely locally adjusting to each other's movements. The results of this study have been published in Human Movement Science.

Dr. Stergiou also visited the Research Institute MOVE at the Vrije University in Amsterdam in May 2017. He gave a research seminar, and he toured the facilities with Professor Andreas Daffertshofer. He also had the opportunity to spend time with his colleagues Professors Peter Beek and Jaap van Dieen, and with Drs. Sjoerd Bruijn, Melvyn Roerdink, and Nadia Dominici.

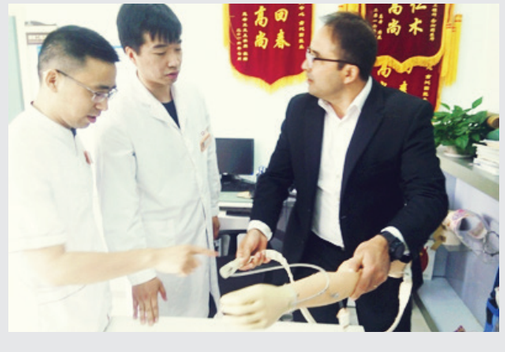
Dr. Stergiou with Dr. Nadia Dominici

Dr. Daffeertshofer giving Dr. Stergiou a tour of the research facilities

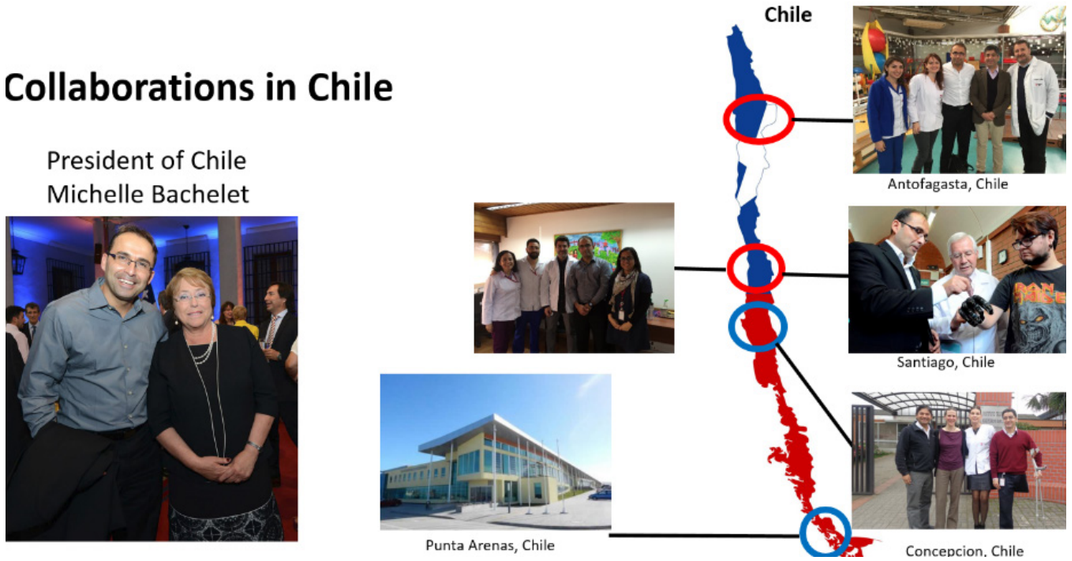
Dr. Stergiou with Dr. Melvyn Roerdink

VISIT TO CHINA

In May of 2017, Dr. Jorge M. Zuniga visited Tongji University, First Rehabilitation Hospital, and Sunshine Rehabilitation Hospitals located in Shanghai, China. Dr. Zuniga presented the research performed in the Department of Biomechanics and established possible research collaborations with these institutions.



Prosthetic Laboratory at Sunshine Rehabilitation Hospital, Shanghai, China.



COLLABORATION WITH CHILE

Dr. Zuniga continues his collaboration with Teleton-Chile, which is the largest pediatric rehabilitation institution in South America.

Dr. Zuniga provides technical support to four different 3D printing laboratories in Chile.

OUTREACH

LIGHTS ON AFTER SCHOOL

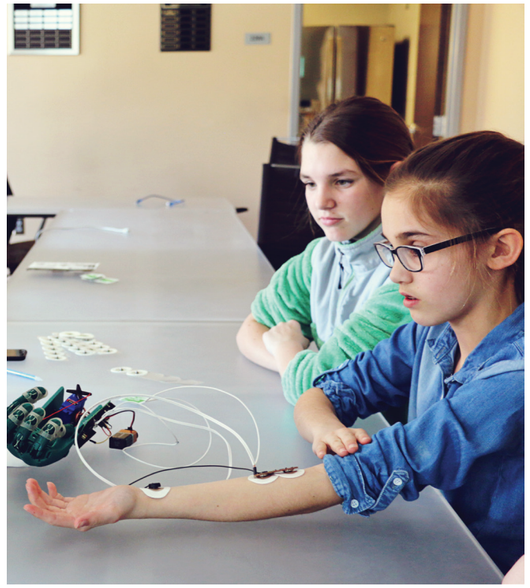
Faculty, staff, and students once again attended the Lights on After School event hosted at UNO. The purpose of this event is to highlight after school programs and their significance in helping children learn.

NEBRASKA SCIENCE FESTIVAL
APRIL 22, 2017

Dr. Kota Takahashi's team participated in the Nebraska Science Fest once again in 2017.

NATIONAL BIOMECHANICS DAY

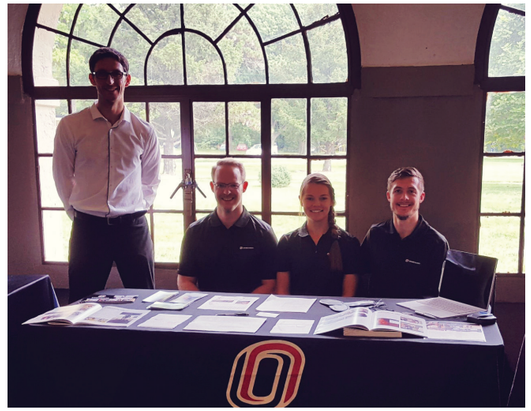
National Biomechanics Day is a world-wide event celebrating the field of Biomechanics! Research scientists are encouraged to open up their labs for students to explore. This past year we hosted around 90 students from the greater Omaha area in the Biomechanics Research Building for a day of biomechanical exploration. Students tested their balance, measured their step length, and learned how their muscles use electricity to help them move their bodies.



INVENT-A-THON

The UNMC Makers Club, led by Dr. Jorge Zuniga, hosted its second annual Invent-a-thon, where high school students were introduced to 3D printing. Students were given a real-world medical problem and were required to solve it with a 3D printed device.

Dr. Jorge Zuniga is pictured with participants from the 2017 Invent-a-thon



PARKINSON'S DISEASE OUTREACH

Dr. Marmelat's team participated in "Walk the Park for Parkinson's", an event organized by Parkinson's Nebraska involving more than 300 participants, the majority of whom were affected by Parkinson's disease (PD), and their relatives. The team was present to communicate the outstanding research going on in the Department of Biomechanics, in particular about the research studies investigating locomotor control in PD.

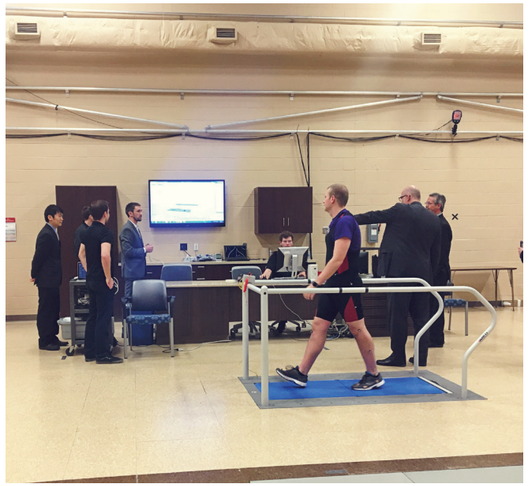
Dr. Marmelat also had the opportunity to communicate his research and recruit participants during the 2017 Parkinson's disease symposium for family and caregivers, organized by UNMC. Around a thousand people were present, and more than a hundred expressed their interest in participating in research studies led by Dr. Marmelat or his collaborators at UNMC.

TOURS OF THE BIOMECHANICS RESEARCH BUILDING

Faculty, staff, and students lead and participate in tours every single week at the Biomechanics Research Building.

Former Secretary of Defense Chuck Hagel tours the Biomechanics Research Building

Dr. Amelia Lanier and Mr. Ben Senderling conduct a job shadow for a local middle school student



Faculty, staff, and students participate in a tour with personnel from University of Nebraska central administration

Dr. Brian Knarr leads a tour of attendees of the University of Nebraska Federal Team Meeting

Dr. Nick Stergiou leads a tour for staff from a local politician's office

Dr. Zuniga hosts a tour with local high school students

Mr. Jeff Kaipust leads a tour for personnel from UNEMED

HIGHLIGHTS

AWARDS, GRANTS, AND SCHOLARSHIPS

Students, staff, and faculty's dedication is apparent with the numerous grants, scholarships, and awards they receive. Much of the research performed in the Biomechanics Research Building would not be possible without these grants, scholarships, and awards.

FUSE GRANTS
Walker Arce
Alyssa Averhoff
Lauren Bowman
Zachary Meade
Mason Schleu
Lauren Wehrle
Connor Wicks
Henamari Ybay

UCRCA GRANTS
Alyssa Averhoff
Jenny Kent
Jordan Wickstrom

GRACA GRANTS
Robert Barber
Shawn Daley
Austin Duncan
Abderrahman Ouattas
James Pierce
Nicholas Reynolds
Jordan Wickstrom

VAYA STERGIOU DISTINGUISHED SCHOLARSHIP IN BIOMECHANICS
Samantha Sack

2017-18 NASA NEBRASKA SPACE GRANT FELLOWSHIP
Daniel Jaravata
TeSean Wooden
Walker Arce
Robert Barber
Drew Dudley
Angel Gonzalez
Zachary Motz
James Pierce

2017 OFFICE OF RESEARCH AND CREATIVE ACTIVITY BEST UNDERGRATUATE POSTER PRESENTATION
Jordan Freeman

2017 OFFICE OF RESEARCH AND CREATIVE ACTIVITY MERITOUS GRATUATE POSTER PRESENTATION
Robert Barber

2017 OFFICE OF RESEARCH AND CREATIVE ACTIVITY HONORABLE MENTION GRADUATE STUDENT POSTER PRESENTATION
Sarah Baker

2017 DEPARTMENT OF BIOMECHANICS OUTSTANDING UNDERGRADUATE STUDENT
Boman Groff

2017 DEPARTMENT OF BIOMECHANICS OUTSTANDING GRADUATE STUDENT
Molly Schieber

BARRY GOLDWATER SCHOLARSHIP
Zachary Meade

NSF GRADUATE RESEARCH FELLOWSHIP
Chase Rock

2017-18 UNO COMPETITIVE GRADUATE FELLOWSHIP
Farahnaz Fallah Tafti

BUFFETT EARLY CHILDHOOD INSTITUTE GRADUATE SCHOLARS PROGRAM
Jordan Wickstrom

2017 UNO EMPLOYEE OF THE YEAR
Jeffrey Kaipust

UNIVERSITY OF NEBRASKA KUDOS AWARD
Jeffrey Kaipust

NASA NEBRASKA MINI-GRANT
Dr. Amelia Lanier and Dr. Kota Takahashi

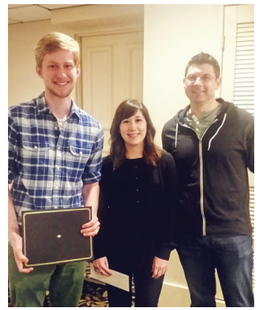
2017 HUMAN MOVEMENT VARIABILITY CONFERENCE BEST ORAL PRESENTATION
Daniel Schloesser

2017 HUMAN MOVEMENT VARIABILITY CONFERENCE BEST UNDERGRADUATE STUDENT POSTER PRESENTATION
Daniel Jaravata

2017 HUMAN MOVEMENT VARIABILITY CONFERENCE BEST GRADUATE STUDENT POSTER PRESENTATION
Robert Barber

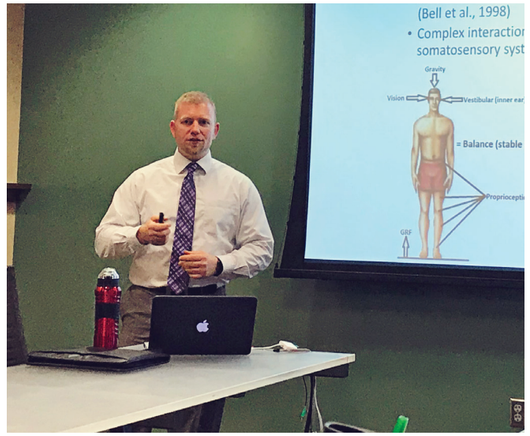
2017 Vaya Stergiou Distinguished Scholarship in Biomechanics winner Samantha Sack with Dr. Stergiou

Department of Biomechanics Outstanding Graduate Student Award Winner Molly Schieber



Department of Biomechanics Outstanding Undergraduate Student Award Winner Boman Groff (left) with staff members Laura Campbell and Jeffrey Kaipust

THESIS AND DISSERTATION PROPOSALS AND DEFENSES



ROBERT BARBER

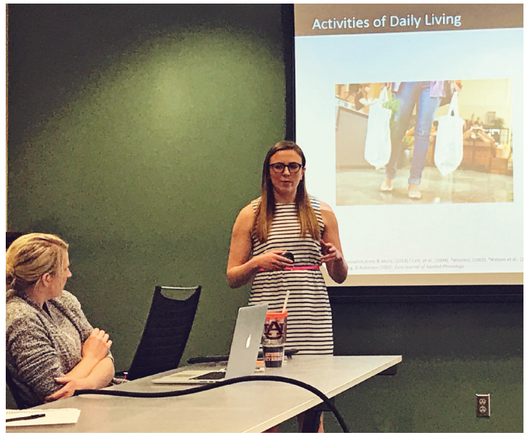
Proposal: November 30, 2017
Balance in smokers versus never smokers

NICHOLAS REYNOLDS

Proposal: June 12, 2017
Defense: November 20, 2017
Influence of neuromuscular fatigue on the reliability of gait variability measures

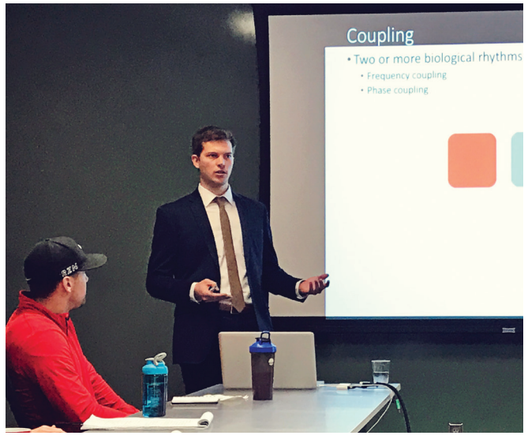
SAMUEL RAY

Proposal: December 13, 2017
Augmenting Human Muscle Performance Through Added Foot Stiffness



SIDNEY BAUDENDISTEL

Proposal: December 1, 2016
Defense: April 12, 2017
An Investigation in Muscle Activation During Load Carrying

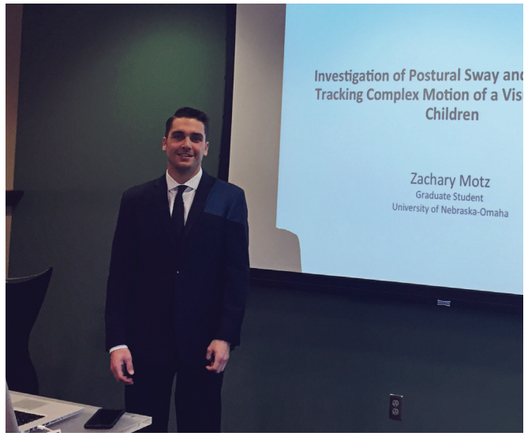


WILLIAM DENTON

Defense: Aoril 18, 2017
Comparison of uphill walking and visual uphill environments on energy expenditure and locomotor-respiratory coupling

KRISTEN WATSON

Defense: April 12, 2017
The Effects of Task Difficult and Vision During Dual-Motor Tasking on Gait in Young and Older Healthy Adults



ZACHARY MOTZ

Defense: November 29, 2016
Investigation of Postural Sway and Gaze While Tracking Complex Motion of a Visual Target in Children

THESIS AND DISSERTATION PROPOSALS AND DEFENSES CONTINUED

MOLLY SCHIEBER
Proposal: December 16, 2016
Defense: August 8, 2017
Tradeoffs in attention during dual-task gait

JORDAN WICKSTROM
Proposal: December 5, 2016
Investigating the Interaction between Social and Motor Processes in Infants At-Risk for Autism

KAITLYN NIMTZ
Proposal: December 8, 2017
The relationship between linear and nonlinear analysis in activity data and how they relate to clinical measures in older adults

JENNY KENT
Proposal: October 4, 2017
The implications of lower limb impediment for our ability to walk on uneven terrain

JAMES PIERCE
Proposal: October 11, 2017
Prosthetics and Motor Function: Implications for Coordination and Brain Activity

BRYON APPLEQUIST
Proposal: January 9, 2017
The Development of Gait Dynamics and Gait Coordination in Children

NIKOLAOS PAPACHATZIS
Proposal: April 18, 2017
Defense: November 22, 2017
Modulation of foot mechanical work during walking with added mass

TROY RAND
Proposal: December 2, 2016
The effect of multisensory perturbations on postural entrainment to a moving room and support surface translations.

CHASE ROCK
Proposal: January 19, 2017
Defense: August 2, 2017
Relationship Between Step-to-Step Variability and Metabolic Cost of Transport in Human Walking

JESSICA FUJAN-HANSEN
Proposal: December 8, 2017
The Impact of Age on Gait Asymmetry Post-Stroke

SEMINAR SERIES

FEDERICO FORMENTI, PH.D.
King's College London
August 19, 2016

"Biomechanics and Energetics of Human Locomotion: Skis, Ice Skates, Medieval Armour, and High Altitude (Not All Together)"

JENNIFER KUCERA, MS, CIP
University of Nebraska Medical Center
August 26, 2016

"Demystifying the IRB Process from Submission to Analysis"

DAN HERMAN, PH.D.
University of Florida
September 2, 2016

"Brains and Sprains: How Neurocognition and Concussions May Affect Neuromuscular Control and Musculoskeletal Injury Risk"

DAVID REINKENSMEYER, PH.D.
University of California, Irvine
September 9, 2016

"Robotics and Wearable Sensors for Neurorehabilitation"

ELIZABETH WELLSANDT, PH.D.
University of Nebraska Medical Center
September 16, 2016

"The Fading Athlete with an Old Knee: Investigation of Factors After Anterior Cruciate Ligament Injury Related to the Development of Knee Osteoarthritis"

ALEXEY KAMENSKIY, PH.D.
University of Nebraska Medical Center
September 30, 2016

"Biomechanics of the Femoropoplitealartery: The Role of Engineering in Improving Treatment Modalities for Peripheral Arterial Disease"

JENNA YENTES, PH.D.
University of Nebraska at Omaha
October 7, 2016

"Most Presentations Stink"

CHRIS HAAS, PH.D.
University of Florida
October 21, 2016

"Gait Impairment in Parkinson's Disease: Can We Restore the Spring in Your Step?"

SEMINAR SERIES CONTINUED

KUN HU, PH.D.
Harvard Medical School
October 28, 2016

"Fractal Physiology: Application in Sleep and Circadian Research"

ADRIAN KOESTERS, PH.D.
University of Nebraska Medical Center
November 4, 2016

"You Keep Using that Word: Simple, Direct Language for Effective Academic Writing"

JOSEPH SIU, PH.D.
University of Nebraska Medical Center
November 11, 2016

"From Dual-Task Performance to Allocation Attention Ability"

JOSEPH THRELKELD, PH.D.
Creighton University
November 18, 2016

"Weakness and Fatigability in Parkinson's Disease"

WILLIAM QUILLEN, PH.D.
University of South Florida
December 2, 2016

"Rehabilitation and/or Science-Why Not Both?"

RACHEL SEIDLER, PH.D.
University of Michigan
December 9, 2016

"Cognitive Contributions to Motor Learning"

MICHAEL REID, PH.D.
University of Florida
January 13, 2017

"Fast Cars and Big Cigars- The Inside Story on Academic Leadership"

JAY ALBERTS, PH.D.
Cleveland Clinic
January 20, 2017

"Bringing Biomechanics to the Bedside (Concussion, PD and MS Studies We Are Translating to Patient Care)"

ROBERT SAINBURG, PH.D.
Penn State University
January 27, 2017

"Motor Lateralization Predicts Hemisphere Specific Deficits in Contralesional, Ipsilesional and Bimanual Movement in Stroke"

ARTHUR MAERLENDER, PH.D.
University of Nebraska-Lincoln
February 3, 2017

"Moving Concussion Research Forward in Nebraska and Nationally"

DIMITRI NANOPOULOS, PH.D.
Texas A&M University
February 10, 2017

"Cosmic Symphony"

KATARZYNA CHAWARSKA, PH.D.
Yale School of Medicine
February 17, 2017

"Attentional Signatures of Autism in Infancy"

JESSIE HUISINGA, PH.D.
Kansas University Medical Center
February 24, 2017

"You Can Be a Successful Scientist and Still Make Mistakes"

JENNIFER SOKOL BRACH, PH.D.
University of Pittsburgh
March 10, 2017

"Effectiveness of Motor Skill of Walking Group Exercise in Older Adults: A Cluster Randomized Trial"

DARCY REISMAN, PH.D.
University of Delaware
March 17, 2017

"Facilitating Recovery from Stroke Through Research: The Benefits of Interdisciplinary and Collaborative Science"

CAROLEE WINSTEIN, PH.D.
University of Southern California
March 31, 2017

"Past, Present, and Future of Neurologic Physical Therapy"

SEMINAR SERIES CONT.

JENNIFER MERICKEL, PH.D.
University of Nebraska Medical Center
April 14, 2017

"Combing Vehicle and Physiologic Sensors to Quantify Risk in Drivers with Diabetes"

BRAD BOWSER, PH.D.
South Dakota State University
April 21, 2017

"Examining Movement Mechanics and Stability; An Essential Component to Developing Effective Rehabilitation Programs for Persons with Multiple Sclerosis"

CONFERENCES, MEETINGS AND WORKSHOPS

SECOND ANNUAL HUMAN MOVEMENT VARIABILITY CONFERENCE

June 1, 2017, Omaha, NE

The Center for Research in Human Movement Variability hosted the Second Annual Human Movement Variability Conference on June 1, 2017. Faculty and students conducted oral presentations, in addition to poster presentations this year.

AMERICAN SOCIETY OF BIOMECHANICS ANNUAL MEETING

August 8-11, 2017, Boulder, CO

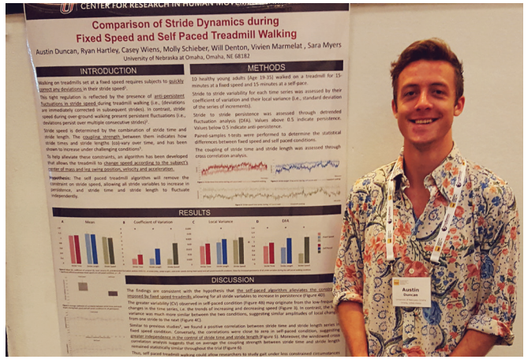
Prokopios Antonellis presenting at ASB

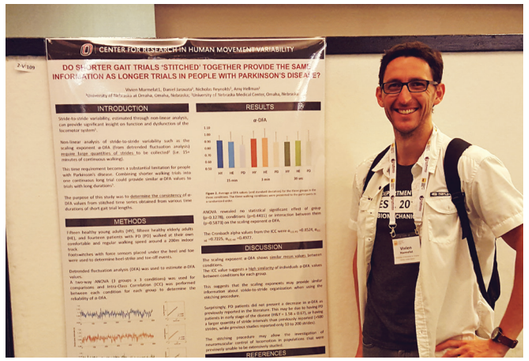
COBRE CENTRAL STATES MEETING

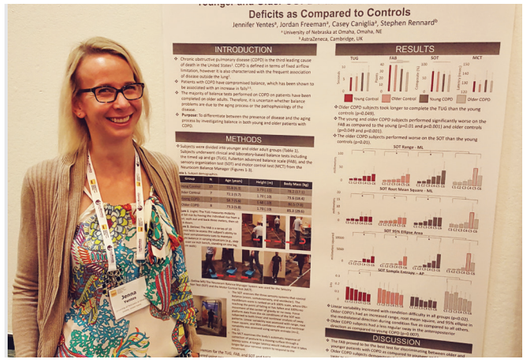
June 7-9 2017, Sioux Fall, SD

INTERNATIONAL SOCIETY FOR POSTURE AND GAIT RESEARCH WORLD CONGRESS

June 25-29, 2017, Ft. Lauderdale, FL







NONLINEAR ANALYSIS WORKSHOP

July 31-August 4, 2017, Omaha, NE

Every summer the Division of Biomechanics and Research Development hosts the Nonlinear Analysis Workshop at the University of Nebraska at Omaha campus. The workshop introduces research scientists, clinicians, educators, and students to nonlinear analysis methods of biological time series data.

ROCKY MOUNTAIN AMERICAN SOCIETY OF BIOMECHANICS ANNUAL MEETING

April 7-8, 2017, Estes Park, CO

UNO STUDENT RESEARCH AND CREATIVE ACTIVITY FAIR

March 3, 2017

The Research and Creative Activity Fair is an annual showcase of student-centered scholastic endeavors and achievements.

Jordan Wickstrom
Investigating the Interaction Between Social and Motor Processes in Children with Autism

Troy Rand
Temporal correlations of support surface movement affect the control of center of pressure velocity

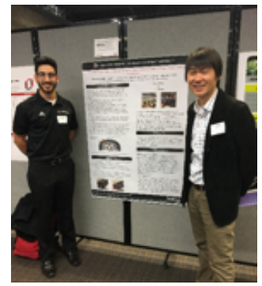
Austin Duncan
Bridging the Gap: Individual Relationships of Gait Variability and Adaptability

Brandon Bischoff
Stitching Together Short Gait Trials for Understanding Stride-to-Stride Organization Over Time

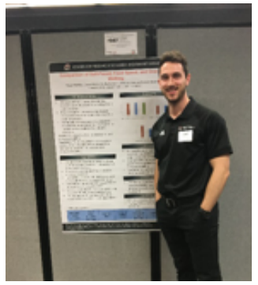
Casey Caniglia
Creating a standard in at-home pulmonary exercise maintenance program: A pilot study

Jenny Kent
The Stochastic Resonance paradigm- A means to restore sensation and function after lower limb loss

Alli Kalina
The Effects of Walking Speed on Gait Propulsion When Wearing an Ankle-Foot Orthosis

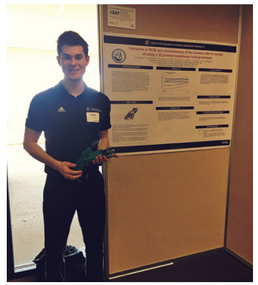


Samuel Maaiah
The effect of auditory stimulation on human movement variability and associated cortical involvement

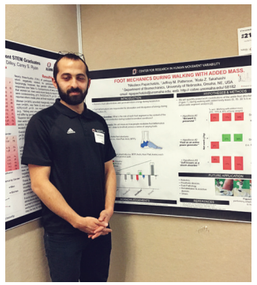


Ryan Harley
Comparison of Self-Paced, Fixed Speed, and Overground Walking

James Pierce
Development of Low Cost 3D Printed Transitional Prostheses

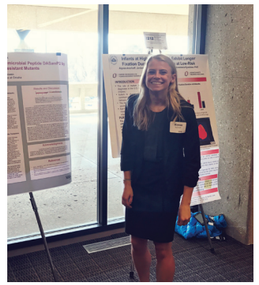


Drew Dudley
Increases in ROM and Circumference of the Forearm After 6 Months of Using a 3d Printed Transitional Hand Prosthetic

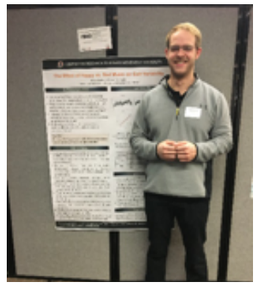


Nikolaos Papachatzis
Foot Mechanics During Walking with Added Mass

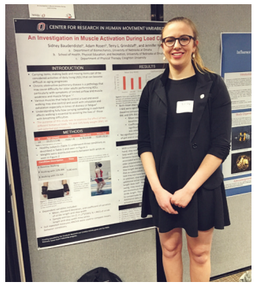
Taylor Leeder
Effects of Serial Subtraction on Elderly Gait-Speed in a Virtual Reality Setting



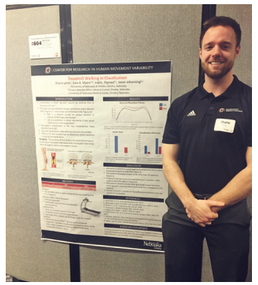
Alyssa Averhoff
Infants at High-Risk for ASD Exhibit Greater Fixation Durations than Infants at Low-Risk



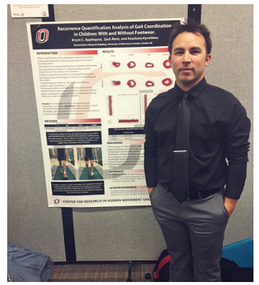
Shawn Daley
The Effect of Happy vs Sad Music on Gait Variability



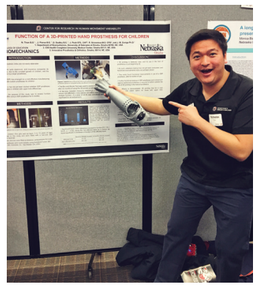
Sidney Baudendistel
An Investigation in Muscle Activation During Load Carrying



Shane Lentz
Treadmill Walking in Claudication

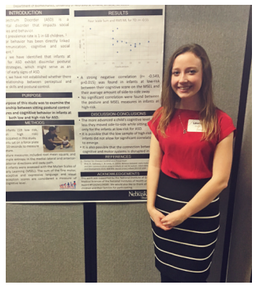


Bryon Applequist
Recurrence Quantification Analysis of Gait Coordination in Children: With and Without Footwear



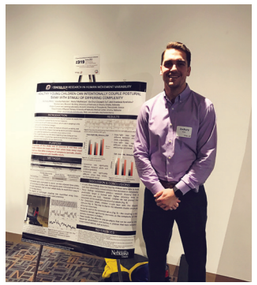
Nicholas Than
Upper-limb prosthetics

Connor Wicks
Between-day reliability of daily activity fluctuations in young adults at baseline and 6-months follow-up

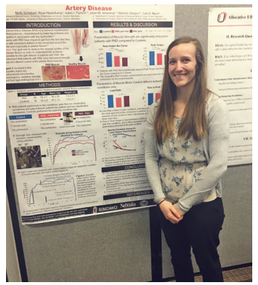


Lauren Wehrle
Relationship between Cognitive Level and Sitting Posture in Infants at low and high risk for ASD

Amelia Lanier
ACL reconstruction results in alterations to force control variability during visual feedback of multidirectional force production

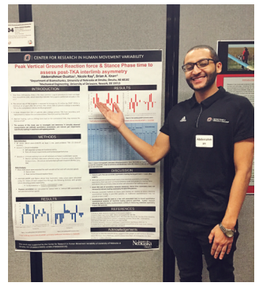


Zachary Motz
Healthy young children can intentionally couple postural sway with stimuli of differing complexity



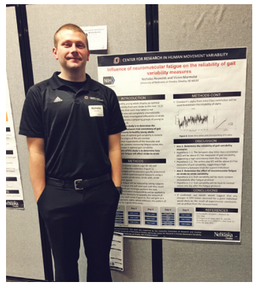
Molly Schieber
Muscle Strength and Motor Control Characteristics at the Ankle are Altered in Peripheral Artery Disease

Angel Gonzalez
Software-Based Teaching of biomechanics to Engage Undergraduate Students



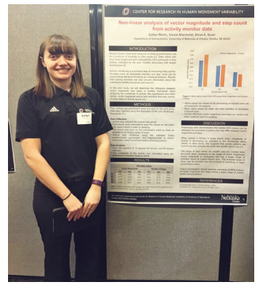
Abderrahman Ouattas
Peak Vertical Ground Reaction force & Stance Phase time to assess post-TKA interlimb asymmetry

Henamari Ybay
Range of Motion and Walking Distances in Subjects with Peripheral Artery Disease

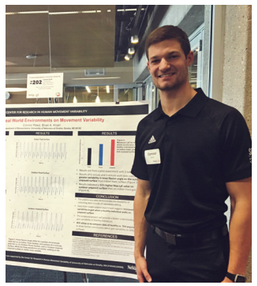


Nicholas Reynolds
Influence of neuromuscular fatigue on the reliability of gait variability measures

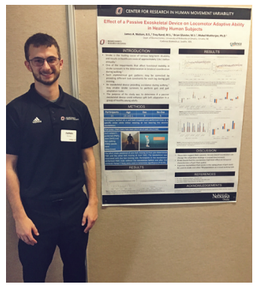
Sarah Baker
Gait biomechanics in patients with peripheral artery disease after revascularization



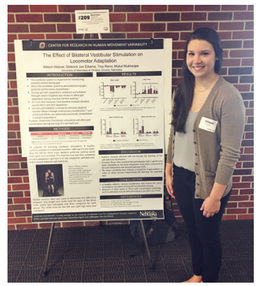
Katlyn Nimtz
Non-linear analysis of vector magnitude and step count from activity monitor data



Connor Reed
Impact of Real World Environments on Movement Variability



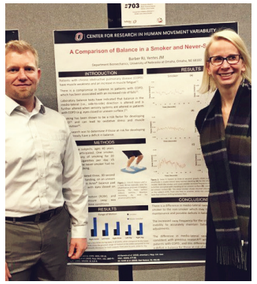
James Nielsen
The effect of a passive exoskeletal device on locomotor adaptive ability in healthy human subjects



Allison Hoover
The Effect of Bilaterial Vestibular Stimulation on Locomotor Adaptation

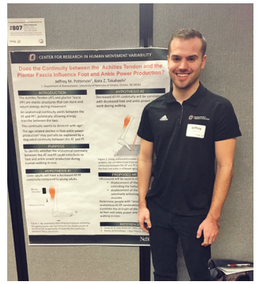
Jordan Freeman
An investigation into the correlations between step width variability and balance deficits in patients with chronic obstructive pulmonary disease

Jessica Fujan-Hansen
Asymmetry in the complexity of gait in younger stroke populations: A Preliminary Study



Robert Barber
Comparison of Balance Between a Smoker and a Never-smoker

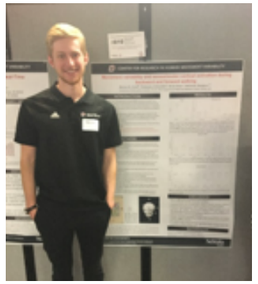
Farahanaz Fallah Tafti
Dual-Tasking and the effect of short-term training on risk of falling in patients with COPD



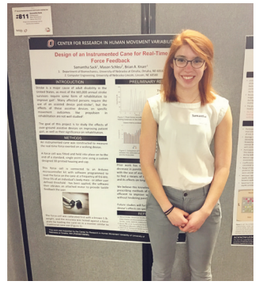
Jeffrey Patterson
Does the Continuity between the Achiles Tendon and the Plantar Fascia Influence Foot and Ankle Power Production?

Zachary Meade
Validation of Postural Sway Measurements of the Wii

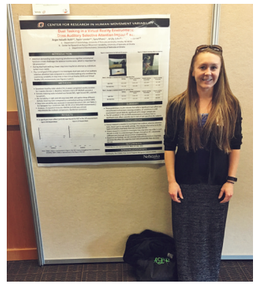
Mason Schleu
Quantifying Static and Dynamic Stability Using Mobile Sensors



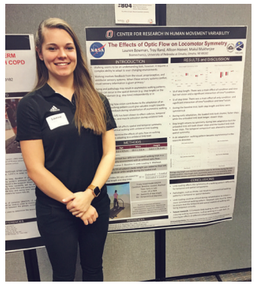
Boman Groff
Movement variability and sensorimotor cortical activation during backward and forward walking



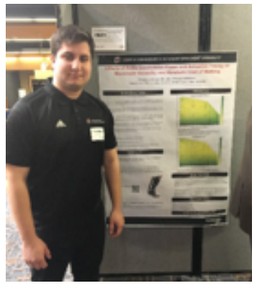
Samantha Sack
Design of an instrumented cane for real-time force feedback



Angeline Helseth
Effects of Dual Tasking on Auditory Selective Attention in Three Different Environments



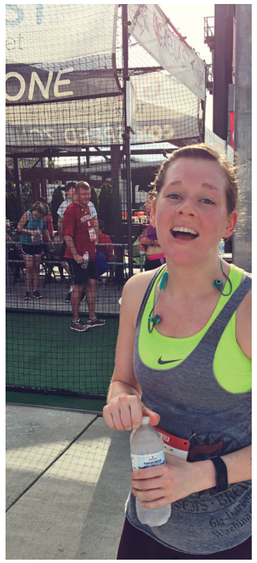
Lauren Bowman
The effects of optic flow on locomotor symmetry



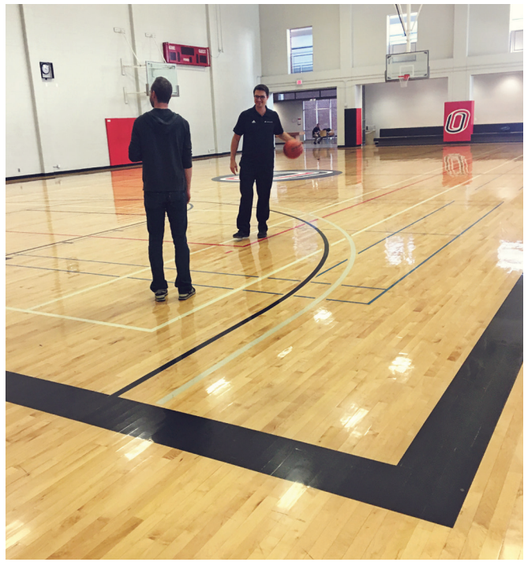
Prokopios Antonellis
Effects of Ankle Exoskeleton Power and Actuation Timing on Movement Variability and Metabolic Cost of Walking

FUN STUFF

Graduate Students Katlyn Nimtz and Abderrahman Ouattas over holiday break in Colorado.



Outreach Coordinator, Dr. Amelia Lanier, and Assistant Professor, Dr. Vivien Marmelat, participating in local running events!



Faculty members Dr. Brian Knarr and Dr. Nate Hunt playing basketball on campus

FUN STUFF CONTINUED

Faculty and Staff at the College of Education holiday party

Faculty and Staff visit the Omaha Henry Doorly Zoo to discuss potential education collaborations

Dean Nancy Edick and Dr. Stergiou at the College of Education holiday party

Dr. Nick Stergiou was awarded the Chancellor's Medal at May 2017 Commencement

Dr. Stergiou receiving the Chancellor's Medal

Dr. Stergiou with staff members Laura Campbell (left) and Angela Collins (right) at commencement

FUN STUFF CONTINUED

Undergraduate student Casey Caniglia (right) graduates with his bachelor's degree

Graduate Student Sarah Baker (left) receives her master's degree

Kristen Watson (left) and Sidney Baudendistel (right) with their mentor Dr. Jenna Yentes (center), graduate with their master's degrees

Graduate Student Nicholas Than graduates with a master's degree

Graduate Student Molly Schieber receives her master's degree

Undergraduate student Jordan Freeman (left) graduates with a bachelor's degree

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For over 25 years, the revolutionary research taking place at UNO's Biomechanics Research Building (BRB) has led to a new understanding of human movement – how we stand, walk, and physically interact with our environment.

The only facility of its kind in the world, BRB has earned an international reputation for excellence in basic and clinical research. For example, its research in cerebral palsy and peripheral arterial disease has influenced the treatment and therapy options available to persons living with these disabilities. BRB has patented the wireless Gait-O-Gram, a biomedical instrument designed to measure an individual's walking parameters. Current research efforts are underway in the areas of robotic assisted surgery, chronic obstructive pulmonary disease, Autism, stroke and mobility issues facing elderly populations.

These achievements bring additional opportunities to advance biomechanics research in ways that aren't even known today. However, this continued growth requires private support beyond what State of Nebraska funding can provide.

Private support for new equipment, student scholarships/fellowships and faculty support is critical to continue building upon the work taking place at BRB. Your gift to any of the areas indicated on the corresponding pledge card will help advance these efforts now and into the future.

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