ATHLETE ENGINEERING AT MSU™

MISSISSIPPI STATE UNIVERSITY
CENTER FOR ADVANCED VEHICULAR SYSTEMS

It's all about relationships

We are better together

Athlete Engineering
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Athlete Engineering partners with divisions of the Air Force

Athlete Engineering had the pleasure of hosting members from the 14th Flying Training Wing, the 19th Air Force, and the Air Force Research Laboratory on Thursday, February 10. Throughout their day in Starkville, our visitors had the opportunity to visit some of MSU's state-of-the-art athletic facilities, tour the Human Performance Lab at CAVS, and end the day at the Raspet Flight Research Laboratory.

Tour at the Raspet Flight Research Laboratory.

Over lunch, we heard from Colonel Seth W. Graham of the 14th Flying Training Wing and Major Carolyn Price Moore, who is the Aerospace Physiology Curriculum Program Manager. They shared areas of potential improvement where our partnership could lead to advancements in technologies and wearables used by Air Force personnel. Our hope is that through this mutually beneficial partnership, we will be able to use our tools, knowledge, and research capabilities to generate new forms of wearable devices and other human performance technologies to improve the safety and performance of tactical athletes in all branches of the military.

We would like to thank our new partners in the Air Force for visiting us and hope that this collaboration leads to exciting opportunities for both of our organizations in the near future!

Tour of MSU athletic facilities.

The future of medical devices in virtual reality systems

As a program that is committed to the exploration of wearables that cater to every type of human athlete in any field, Athlete Engineering is proud to partner with epidemiologist, Associate Professor, and Assistant Dean of Scholarly Innovation for the John D. Bower School of Population Health and Department of Population Health Science at the University of Mississippi Medical Center.

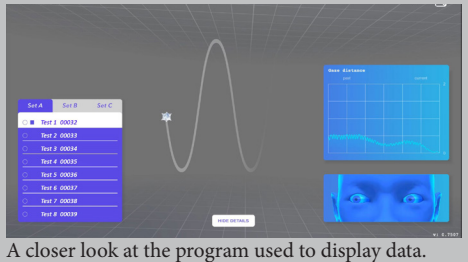
Since 2017 Dr. Reneker has been developing a virtual reality product and software program that is intended to help identify individuals who could be suffering from a concussion. Through a series of eight tests, the virtual reality device detects and records human factors such as eye movement velocity, gaze fixation, and postural sway. However, as developments on this project continue, new avenues for device use are emerging in more tactical fields. During the Air Force's visit to CAVS, Dr. Reneker was able to demonstrate several tests in her virtual reality program that evaluated a participants sensory-motor control.

"What we have found is that a lot of tests we're using to detect concussions could also be used to look at differences in abilities between people," said Reneker.

A participant wearing the virtual reality set while live data is being displayed on the computer.

"They are markers of more than just visual function, they are markers of cognition. If everyone took these tests as a baseline when entering the Air Force, after training they could take the tests again and we would see how much they improved," said Reneker.

We are proud to have Dr. Reneker as a continued partner and look forward to many collaborative research opportunities in the future to further shape the wearables industry!



A closer look at the program used to display data.

Connecting the dots between athletics and engineering

Mississippi State's Executive Senior Associate Athletic Director for Sports Medicine and Performance, Mary McLendon, is a longtime partner of Athlete Engineering and is a key player in connecting our program to the athletics department.

One of the most common setbacks for professionals working in the realm of sports science is being able to build lasting relationships with athletic entities. Since its founding in 2017, Athlete Engineering and the MSU athletics department have worked together to create innovative and collaborative research initiatives to better the lives of sports athletes for years to come. Our ability to work as partners would not be possible without the guidance from McLendon.

"Over the years I think we have come to this happy middle ground; a balance between the art and the science of athletics," said McLendon. "The art being the relationships and how we build that with our student athletes and the science of being able to provide something that we can't always assess from sight or from talking with the student athletes."

Testing wearables for sports-athletes.
- Photo by Megan Bean, Mississippi State University

Through this partnership, coaches have access to new forms of wearable technology that they can utilize to improve performance among their athletes. Athletes are able to train more efficiently based on the sheer amounts of data collected from any given workout. Our researchers are then able to work with that data to validate the wearables and ensure that the measurements the coaching staff are receiving are accurate. This unique tie between academics and athletics at MSU is paving the way for further advancements in collegiate sports.

"The athletes know that all of this data is enhancing what the strength coach wants to provide to them," said McLendon. "It's really neat to watch."

A look at minimalist military footwear

Researchers at the Neuromechanics Laboratory in the Department of Kinesiology within the College of Education here at MSU dedicate their research to understanding the dynamics of falling down and how to best mitigate fall-related injuries. Military personnel are exposed to job-related physical hazards which can lead to an increased probability of slips and falls. The types of personal protective equipment worn by military personnel can also impact the probability of slip and fall related injuries. Our researchers conducted a series of studies to see if a minimalistic military footwear design helped to reduce probability of slips and falls compared to a standard tactical design.

The purpose of this study was to examine the slipping lower extremity's joint kinematics, kinetics and muscle activity during unexpected and expected slip events while wearing two types of military footwear, a minimalist tactical military boot and a standard tactical military boot, before and after a simulated load carrying military workload. Results show that the type of footwear and the type of gait-slip trial, rather than the load carriage workload had a significant impact on slip initiation biomechanics. These findings along with previous findings from the Neuromechanics Laboratory suggest that the minimalist boot may be more appropriate when military personnel could experience slippery conditions, especially with no prior knowledge of the slips.

Military boots used in the study.

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