



EXOSKELETON REPORT

VOL 1

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ISSUE NO 1

EXO GAMES

FIRST ASTM
SPONSORED
STUDENT COMPETITION

WEBRANKINGS

ARE MORE PEOPLE
SEARCHING FOR
EXOSKELETON INFO

ACQUISITIONS

REWALK PURCHASES
ALTERG ANTI
GRAVITY TREADMILL





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EXOSKELETON NEWS

An overview of the most interesting news from the world of exoskeletons, exosuits, and wearable robotics.

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Have more people discovered practical exoskeleton technology in the last year?

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ON THE HORIZON

Upcoming exoskeleton-related development, shows, conferences, and events.

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YOUR THOUGHTS

Urgent open-ended questions to you, our readers.

Cover Image: ExoGames trophy and 3D printed stand, courtesy of Mathew Dickinson, August 2023

Header Image (above): ExoGames banner, courtesy of Mathew Dickinson, August 2023



EXOSKELETON NEWS

Exo Games 2023

Exoskeleton technology remains expensive and unreachable to many students across the globe. It is amazing what the five student teams were able to create and demonstrate with limited time and budget. Events like the Exo Games can fire up and excite the next generation of wearable technology developers that will shape the future.

ReWalk Acquisition of AlterG

Once an exoskeleton producer itself, the Bay Area company AlterG now finds itself under the umbrella of one of the first exoskeleton companies.

EXSKALLERATE Foresight Study

A convincing study on what the future could look like with and without a coordinated effort to nurture the exoskeleton industry.

Headline News

Milestones, presentations, new websites, and more.

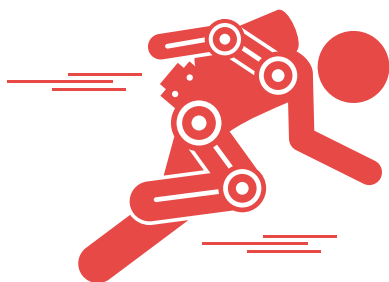
On The Horizon:

Auxivo teases a new upper-body occupational exoskeleton and a possible reclassification of FDA-approved gait-assist exoskeletons that may lead to easier reimbursements.

STUDENTS FROM AROUND THE WORLD MEET AT THE FIRST EXO GAMES

The University of Central Lancashire (UCLan) hosted the first Exo Games in collaboration with ASTM International's Exo Technology Center of Excellence (ET CoE). Located just North of the cities of Manchester and Liverpool, UCLan hosted five student teams from the UK, United States, Belgium, and Brazil which went head-to-head completing tasks designed to challenge their wearable devices and users.

Each university team was tasked with creating an exosuit that is fully integrated with an existing off-the-shelf fall protection harness. The teams then traveled to England to compete against one another against challenges designed around published ASTM exoskeleton standards. Each team was awarded points based on balance, consistency, safety, and adherence to the Exo Games specifications. Students had access to the over 30 exoskeleton standards published by ASTM Committee F48 on Exoskeleton and Exosuits to guide their designs, covering topics like wear, ergonomics, environmental conditions, and load handling.



Top Right:

Vrije Universiteit Brussel
Challenge: Warehouse Re-Palletizing
Photograph by Nora Nimmerichter



"The Exo Games was a huge success as a student STEM initiative where we brought together some amazing student teams and over multiple days tested their exoskeleton designs against ASTM's internationally recognized standards..."

...The Exo Games demonstrated that like diamonds, creativity, innovation, and brilliance comes from just the right amount of pressure applied to quality people. We saw some inspired designs from the teams that had the constraints of a \$2000 USD build limit, technical specifications to meet, and standard test methods to complete," said Nora Nimmerichter, Staff Manager at ASTM International



Left to Right: Clemson University, Texas A&M University, University of Central Lancashire (UCLan), Universidade Tecnológica Federal do Paraná Pontifícia Universidade Católica, and Vrije Universiteit Brussel

The friendly competition saw the University of Central Lancashire take first place, followed by the Vrije Universiteit Brussel in second and Clemson University in third.



Additional awards were also merited to:

Teams' Choice Award - Federal University of Technology - Parana and Pontifícia Universidade Católica do Paraná

Poster Competition Award - University of Central Lancashire

Presentation Competition Award - Clemson University

Design Competition Award - Vrije Universiteit Brussel

Right:

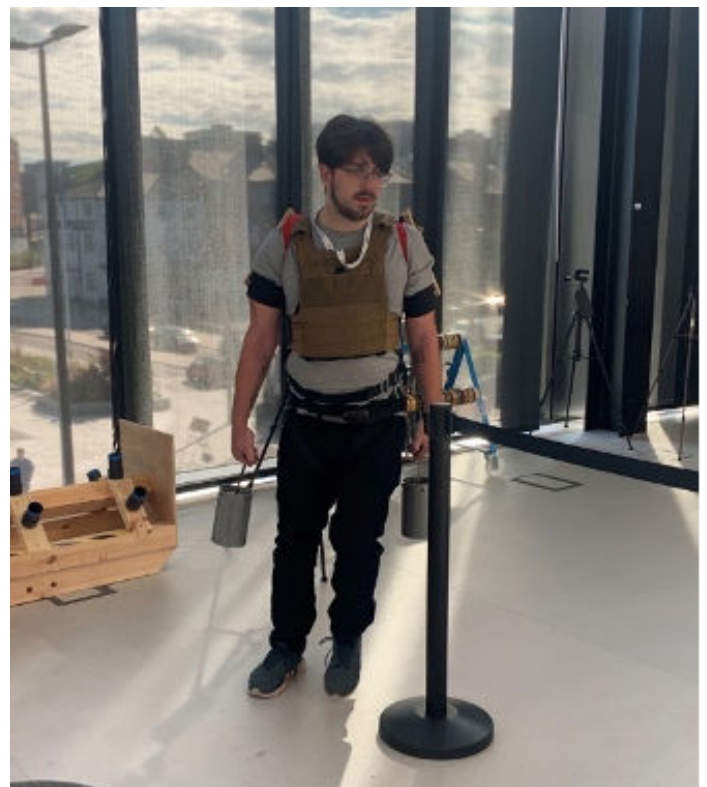
Universidade Tecnológica Federal do Paraná (UTFPR) Pontifícia Universidade Católica (PUC)

Challenge: Bomb Squad Walk

Photograph by Bill Billotte

William Billotte, Director of Global Exo Technology Programs at ASTM, was one of the event's judges and described how it helps solidify students' working knowledge of the field.

"We're very passionate about STEM and through this event we're connecting innovation and research with standards to help the students understand how they all work together," says Billotte. "The Exo Games is a way to bring together the passion, the ideas and inspire people to do better."



Established in 2019, ASTM's Center of Excellence in Exo Technology (ET CoE) focuses on accelerating exo standards through research, education, workforce development, training certifications, and connecting global exo communities.

MORE INFO

You can learn more about this and other projects and initiatives by the ET CoE by visiting their website: www.etcoe.org

ASTM not only welcomes participation from student members but in fact, has an exoskeleton student chapter at UCLan with chapter advisor, Matthew Dickinson, Ph.D., who also serves as member secretary of ASTM's exoskeletons and exosuits committee (F48).



Early-stage preparations are already underway for the next Exo Games 2024.

"The opportunity to engage with university students at the first annual Exo Games, hosted at the University of Central Lancashire and ASTM International was of pure joy for me. First, as a researcher in human factors and ergonomics, it gave me the opportunity to share firsthand with our future product researchers and designers why research in human-centered design with exoskeletons is of utmost importance. Second, it gave me an opportunity to engage collaboratively with my design peers in other fields of engineering and science to demonstrate the bottom line of how to design for safety and effectiveness of these emerging technologies. Congratulations to all of the participants and event winners and well done to each of them!!!"

Said, Exo Games judge Christopher Reid
Boeing Technical Fellow - Human Factors & Ergonomics



ReWalk Robotics Acquires AlterG



Last month, the exoskeleton giant ReWalk Robotics which is known for the ReWalk and ReStore gait assist powered exoskeletons acquired AlterG. AlterG is best known for its Anti-Gravity system, a treadmill that can inflate an airbag which lifts up the user and compensates for gravity on the user. This approach may lead to faster recovery time in people such as professional athletes, getting them back to full health faster than traditional physical rehabilitation.

Ironically, AlterG once had its own in-house exoskeleton, the Bionic Leg. The Bionic Leg was a powered knee-only exoskeleton that didn't have any external batteries or controllers. This allowed for the Bionic Leg to be fitted inside the pressurized air compartment of the Anti-Gravity system and assist with early mobilization of the knee. In a twist of fate, AlterG has now been acquired by an exoskeleton company, that coincidentally, also offers a powered knee exoskeleton.

ReWalk has acquired AlterG for approximately \$19 million in cash. The Anti-Gravity system is already installed in more than 4,000 facilities around the world. A significant number easily rivaling that of lower-body exoskeletons by any single major exo producer.

The AlterG product uses a “unique, gravity-defying, NASA-derived Differential Air Pressure technology to reduce the effects of gravity and allow people to move in new ways with finely calibrated support and reduced pain.” While it sounds complicated, the system is simpler to fit and adjust than a gait-assist exoskeleton and the ease-of-use can likely be partially responsible for its wide use.

“We are exceedingly pleased to have now formally combined the unique and complementary strengths of our two organizations,” said Larry Jasinski, Chief Executive Officer (“CEO”) of ReWalk.

Connected to the acquisition, Charles Remsberg, former CEO of AlterG, will be appointed as Chief Sales Officer of ReWalk. AlterG was founded in 2005 with offices in Fremont, California, coincidentally 10 miles (16km) away from ExR. Now its technology stands to benefit from the additional synergies in physical rehabilitation technology and distribution networks that this fusion brings to the table.

Above: Via 400X Anti-Gravity Treadmill via Wikimedia Commons
Image by [Ajglincher](#)
Licensed under [CC BY-SA 4.0](#)

EXSKALLERATE Foresight Study




EXSKALLERATE, a 3.5-year European project funded by Interreg North Sea Region, has published a 38-page report that serves to demonstrate a clear long-term business case for occupation (industrial) exoskeletons in the context of an aging European workforce. The study highlights that while governments may increase the retirement age, workers will continue to exit the workforce due to injury or physical limitations.

The report then outlines two paths forward. One where the EU does nothing and exoskeleton development and deployment continues at its current pace. And a second path that brings the economic advantages of a healthier workforce that is empowered to work, if they choose so, sooner to the EU.

The study does an elegant job of capturing the positives and negatives of exoskeleton technology. It also highlights the risks of small and medium enterprises being excluded from the advantages of exo technology if more robust testing and standardization of the field don't take place in the near future. This is work that can be more effectively coordinated and accelerated under an umbrella organization.

Many of the conclusions and observations in the report can be applied to countries without an aging workforce too by substituting an aging workforce with one that isn't empowered with the needed information and resources to include the latest ergonomic technology at their workplaces.



 You can find the full report at:
<https://www.exskallerate.eu/>

Left: Modified Map of Europe by Gleb Tagirov via Canva Pro

Above: Image by robuart via Canva



Exos @ Swiss Medtech Expo 2023: Gogo Mobility Robots completed a successful demonstration of the HANK lower-limb rehabilitation-powered exoskeleton at the trade fair that features more than 200 exhibitors.

Celebrating

— 10 YEARS —

Laevo Exoskeletons turns 10 years old! The company is known for its back-support rigid exoskeletons. How quickly time flies! Congratulations to the Laevo team for reaching this monumental milestone!



Reeve, maker of the DREEVEN active knee exoskeleton celebrates the opening of a brand new website that aims to be better reflect the designs and ambitions of the team.

[http://](https://reev.care)  <https://reev.care>



When you think of self-balancing medical-powered exoskeletons you probably think of the Rex or Wandercraft first. However, this week, the exo by the Canadian developer for independent human mobility Human In Motion Robotics left its mark on the world by being used to cut the ribbon at the Rally for Rehab at Toronto Rehab's Rumsey Centre site! Furthermore, Phase 2 clinical trials with the device are scheduled to start next week at the Toronto Rehab's Lyndhurst Centre.



HeroWear presents the Apex 2 back-assist exosuit at The International Foodservice Distributors Association (IFDA) Solutions Conference at the Fort Worth Convention Center in Fort Worth, Texas.

Above: Road to Horizon by quickshooting via Getty Images



Daiya Industry exhibited the DARWING Hakobeldue pneumatic artificial muscle powered back-assist exosuit at the Assist Suit Summit in Osaka. The total eight presenting companies are listed as ALKERIS CO., LTD., INNOPHYS CO., LTD., KAJI CO., LTD., DAIDO CO., LTD., DIA KOGYO CO., LTD., KURASHIKI SPINNING CO., LTD. NIPPON SIGMAX CO., LTD., KIKUCHI MANUFACTURING CO., LTD. Some of the companies are distributors while others are original manufacturers. The wearables ranged from chairless chairs to shoulder and back assist exoskeletons and exosuits.

The event was organized by the Assist Suit Association, established in November 2022, by worker assist suit-related companies to work together to improve awareness of these types of products, create a market, and conduct educational activities. (Matching the conclusions of EXSKALLERATE for the EU region, see [page 8](#)).

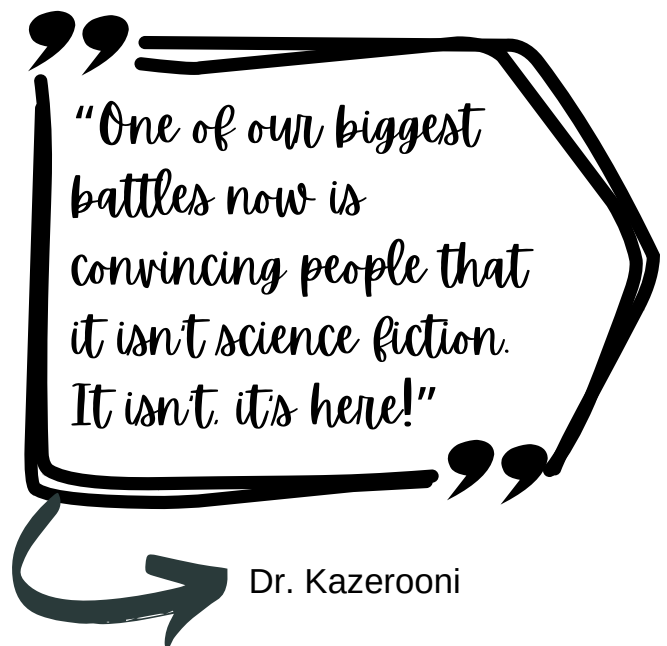
The one-day event was designed for managers, officials, professionals, and interested parties to have convenient hands-on access to exoskeletons.

Canadian Institute for Safety, Wellness, and Performance (CISWP)'s and Conestoga College are running an applied research project evaluating the impact of occupational exoskeletons.



The goal of the project is to fill in some of the gaps between research projects and construction workers in Canada. As of last year, lab-based exoskeleton studies outnumbered field studies in an almost ten-to-one ratio!

CISWP is looking for more partners. Interested organizations can contact ciswp@conestogac.on.ca.



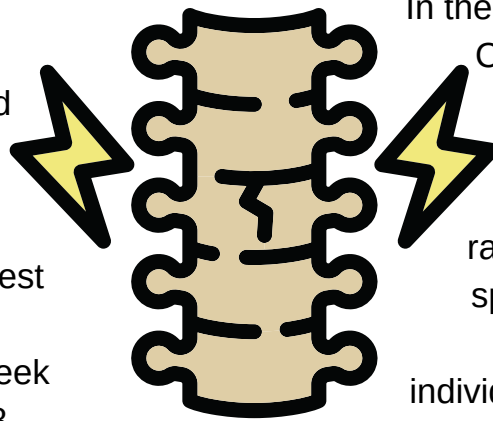
"One of our biggest battles now is convincing people that it isn't science fiction. It isn't, it's here!"

Dr. Kazerooni



On The Horizon

Auxivo AG teases a new occupational exoskeleton, the OmniSuit®. We are probably just as excited as you are to find out more!



In the United States, Spinal Cord Injury Awareness Month is observed in September. Its primary purpose is to raise awareness about spinal cord injuries, the challenges faced by individuals living with these injuries, and the importance of research, prevention, and treatment.

Fourier Intelligence will present their newest lower-body gait assist powered medical exoskeleton the ExoMotus™ at RehabWeek 2023 in Singapore from September 24-28.

November

Apparently, this November the Centers for Medicare and Medicaid Services (CMS) is finalizing a proposed rule that would establish exoskeletons as a 'brace' within the 'Leg, Arm, Neck and Back Brace' Medicare benefit category.

This has the potential to completely change how coverage for powered exoskeletons is calculated. Special thanks to I GOT LEGS, for raising attention to this possibility.



- CHICAGO -

Bionic Power presents this week its pediatric knee powered exoskeleton, the Agilik, at the annual meeting of the American Academy for Cerebral Palsy and Developmental Medicine in Chicago.

Above: Road to Horizon by quickshooting via Getty Images

EXOSKELETON EVENTS CALENDAR



SEP 13 September 13 - September 15
12th F48 Meeting, Fall 2023



SEP 13 September 13 - September 16
REHACARE 2023



OCT 23 All day
ErgoX 2023

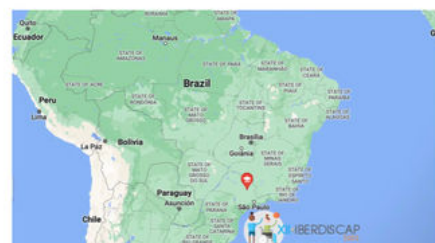
WearRAcon
EUROPE



OCT 24 October 24 - October 25
WearRAcon Europe 2023



OCT 24 October 24 - October 25
ExoBerlin 2023



NOV 20 November 20 - November 22
IBERDISCAP 2023
Conference



Find out more about these upcoming events at the [ExoskeletonReport.com](https://www.ExoskeletonReport.com) Events Calendar.

ErgoX 2023 Exoskeleton Track 23%

WearRAcon Europe at A+A 40%

ExoBerlin 2023 15%

Not aware of any of these. 21%

SURVEY



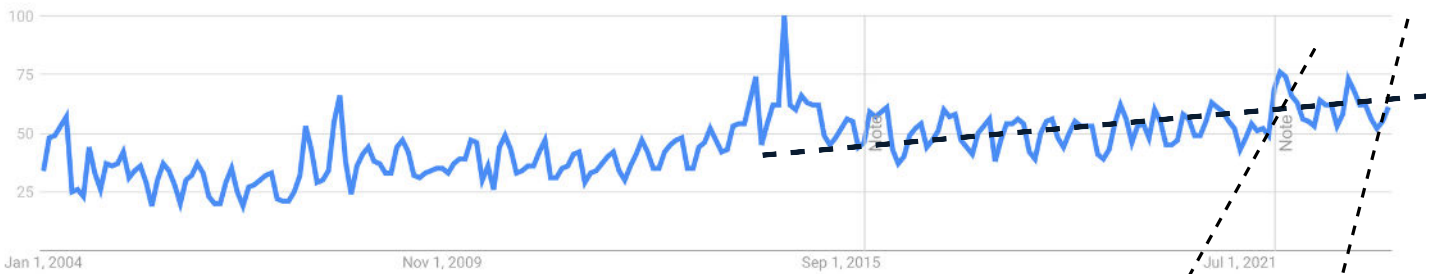
Our eagle-eyed readers may have noticed that this October there will be not one, not two, but three overlapping exoskeleton events. We ran our first-ever LinkedIn-based survey and it appears that our followers are most interested or at least best aware of WearRAcon Europe which will be a part of the A+A conference.



Exoskeleton Web Traffic Statistics

Calculating the growth of the exoskeleton industry continues to be a challenge. One metric that there is access to is web traffic statistics. In June 2022 the ExR team ran a monthly view study using SimilarWeb for 125 of the top exoskeleton producers. The exercise was then repeated in July of 2023. The results: There was a 20% increase in web traffic across the exoskeleton producer’s website.

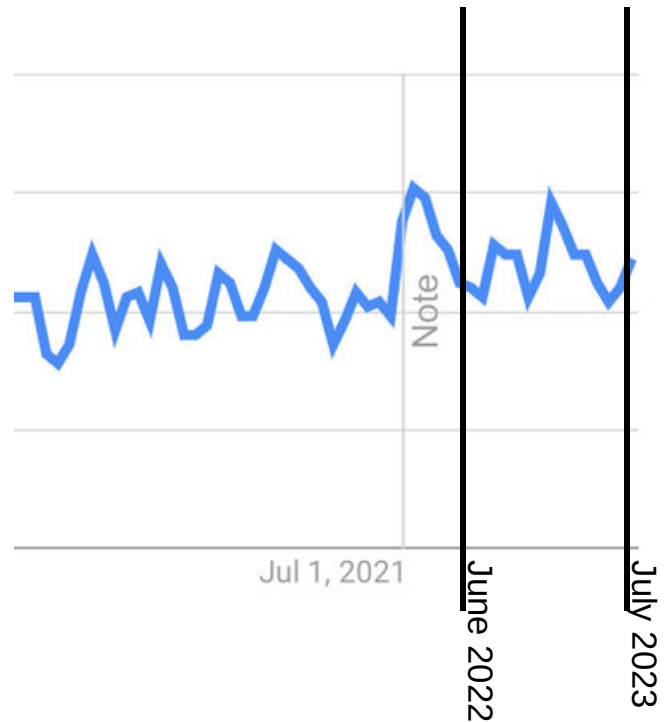
How does this compare with Google Trends search data?



Above: Google Trends data for world wide searches for “exoskeleton.” 2004-present

Google Trends confirms the positive trend of increasing web search traffic on “exoskeletons” (which of course can be insect or mechanical). The data set from Google shows a much greater monthly variability, questioning exactly how much can be concluded from just picking two months at random.

Overall, however, this data would suggest that in the last year, there have been more visitors searching and landing on exoskeleton producer websites.



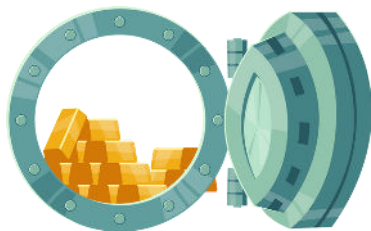
Open - Ended Question

Where are the success stories?

Since 2015 the Exoskeleton Report has been one of many entities highlighting the possibilities for exoskeleton technology to make the lives of billions of people around the world better. We ask the question, we have gone through a digital revolution that completely changed how we communicate, exchange information, and live our lives. So why not go through a physical revolution that redefines acceptable work risk, aging, independent living, warfare, exercise, and even how we interact with public transportation!?



An Exo Applications Vault



Even after all these years, it is not clear how we can build an exoskeleton applications vault: a collection of stories of people discovering and utilizing exoskeleton, exosuit, or wearable robotics technology to make their lives better.

We hear of pilot programs and various acceptance and rejection rates, but not of personal stories of users or perhaps entire departments.

How do we as a community capture user and customer stories of successful exoskeleton implementation, or even ones that fell short with some level of postmortem analysis of what likely went wrong?



Where are the personal stories of exo users?



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The Exoskeleton Report (ExR) e-magazine is written and produced by Borislav (Bobby) Marinov and the Exoskeleton Report.

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Reach out:

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Above: About Us... by Rolling Camera via Getty Images