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THE GROWING MARKET FOR EXOSKELETON TECHNOLOGY

Annotation: In recent years, the field of exoskeleton technology has gained tremendous traction, captivating the attention of various sectors including healthcare, manufacturing, and defense. As industries continue to evolve, the demand for innovative solutions to enhance human capabilities is on the rise. This surge in interest is paving the way for an explosive growth trajectory for exoskeletons, which are designed to augment physical performance and assist individuals with mobility impairments.

Keywords: Industrial, healthcare, market, investment, technological.

Introduction: The market for exoskeleton technology has been experiencing significant growth in recent years, driven by advancements in robotics, increasing demand for rehabilitation solutions, and the need for enhanced physical capabilities in various sectors. Here are some key aspects contributing to the growth of this market:

- **Healthcare Applications:** One of the primary drivers of exoskeleton technology is its application in healthcare, particularly in rehabilitation for individuals with mobility impairments. Exoskeletons can assist patients recovering from strokes, spinal cord injuries, or other mobility-related conditions, enabling them to regain movement and independence.
- **Industrial Use:** In industries such as manufacturing, construction, and logistics, exoskeletons are being used to reduce the physical strain on workers, enhance productivity, and minimize the risk of musculoskeletal injuries. These wearable devices can help workers lift heavy objects, maintain proper posture, and reduce fatigue during physically demanding tasks.
- **Military and Defense:** Military organizations are exploring exoskeleton technology to enhance soldiers' capabilities, allowing them to carry heavier loads over longer distances and improve endurance in the field. This application has the potential to improve operational efficiency and reduce injury rates among personnel.
- **Technological Advancements:** Rapid advancements in materials science, robotics, and artificial intelligence are improving the design and functionality of exoskeletons. Lightweight materials, better sensors, and improved battery life are making these devices more practical and effective.
- **Increased Investment and Research:** There has been a surge in investment in exoskeleton technology from both private companies and government entities. Research collaborations between universities, corporations, and healthcare providers are also contributing to the development of innovative solutions.
- **Regulatory Support:** As exoskeletons gain acceptance in various sectors, regulatory bodies are beginning to establish guidelines and standards for their use. This support can boost consumer confidence and encourage broader adoption.
- **Aging Population:** With an aging global population, there is a growing need for assistive technologies that can enhance mobility and independence for older adults. Exoskeletons can play a crucial role in helping this demographic maintain an active lifestyle.

- **Market Competitiveness:** The exoskeleton market is becoming increasingly competitive, with numerous startups and established companies entering the space. This competition is driving innovation and leading to the development of more affordable and effective solutions.

Exoskeletons have transitioned from being a science-fiction concept to a tangible reality. These wearable devices, typically constructed from materials like lightweight metal and soft robotics, are engineered to mimic the motion of human joints while providing additional support. The applications of this technology are multifaceted and hold considerable promise for improving quality of life, increasing productivity, and reducing injury risks in various settings. One of the most notable markets for exoskeleton technology is healthcare. Patients recovering from surgeries or injuries often struggle with mobility. Exoskeletons can assist in rehabilitation by enabling patients to engage in physical therapy routines that may otherwise be overwhelming. For instance, companies like Ekso Bionics have developed robotic exoskeletons that allow individuals with paraplegia to stand and walk, providing both physical benefits and psychological motivation. The emotional impact of standing up and moving independently cannot be overstated, highlighting the profound implications of this technology. The manufacturing and construction industries also present considerable opportunities for exoskeletons. As these sectors face challenges related to labor shortages and high injury rates, exoskeletons can help mitigate these issues. By reducing the physical strain on workers, these devices lower the risk of musculoskeletal injuries, which are prevalent in jobs that involve heavy lifting or repetitive motions. For example, firms like suitX have introduced wearable exoskeletons that significantly alleviate stress on the back and legs, allowing workers to operate efficiently for more extended periods without fatigue.

In the realm of defense, exoskeleton technology captures attention for its potential to enhance soldier performance. Military organizations worldwide are investing in research and development to create systems that can augment the strength and endurance of soldiers during operations. For instance, the U.S. Army is exploring exoskeletons that can enable soldiers to carry heavier loads without compromising agility, thereby improving overall mission effectiveness.

The global market for exoskeletons is expected to experience exponential growth in the coming years. According to recent reports, the exoskeleton market could reach \$2.5 billion by 2025. This growth is fueled by increasing investments from both private and governmental entities, as they recognize the vast potential of exoskeleton technology. Key players in the automotive, healthcare, and defense sectors are actively involved in creating collaborations and partnerships to propel advancements in this field. Despite the exciting prospects, challenges remain. Issues related to cost, comfort, and usability can hinder widespread adoption. Manufacturers must focus on creating more affordable, lightweight, and user-friendly devices that cater to a broader audience. As technology continues to advance, ongoing research and refinement are essential for realizing the full potential of exoskeletons.

The rising adoption of exoskeletons from healthcare and increasing investment in the advancement of exoskeleton technology are the major driving factors for the growth of the exoskeleton industry. Moreover, the introduction of soft actuators in exoskeletons and the rising adoption of human augmentation equipment in industrial and military sectors are also expected to drive the growth of the market in the near future.

With technological advancements, the demand for robots is being influenced by the specification of what they are built of and their potential applications. Continuous research and development in the field of electrical and electronic engineering have resulted in the introduction of improved materials,

sensors and actuators, control systems, and software technologies. These advanced components have facilitated the development of innovative, improved, very low-power-consuming, self-powered, lightweight, less complex, and portable exoskeletons. Assistive devices are an essential part of healthcare, and several healthcare systems in different countries provide these devices. With a rise in the trend of using robots in healthcare practices, healthcare insurance providers have begun to include robotic devices, including exoskeletons, in their health insurance coverage. In 2018, the ReWalk 6.0 personal exoskeleton system was listed in the Medical Device Directory (MDD) of the National Association of Statutory Health Insurance Funds in Germany, which includes all approved devices for insurance procurement.

Overall, the exoskeleton technology market is poised for continued growth as it addresses the needs of various sectors, enhances human capabilities, and improves quality of life for individuals with mobility challenges. As the technology matures and becomes more integrated into everyday applications, its impact is expected to expand significantly.

In conclusion, the burgeoning market for exoskeleton technology presents a unique opportunity to revolutionize industries and improve lives. By enhancing mobility and reducing physical strain, exoskeletons epitomize the intersection of innovation and human improvement. As developments accelerate, we stand on the precipice of a future where exoskeletons become commonplace, paving the way for enhanced human capabilities and transformed lifestyles.

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