Reinventing Walking and Preventing Work-related Injuries through Intelligent Exoskeletons: suitX

We are passionate about helping people improve their quality of life through intelligent robotic exoskeletons: Dr. Homayoon Kazerooni

“Our exoskeletons have been developed to solve common consumer problems, and users have choices; they have the freedom to choose a module tailored for their intended activity.”

Berkeley alumnus Austin Whitney will never forget his graduation day. Most people don’t forget their graduation day, however, for Austin, it was the day his dream became a reality. His dream was to walk across the stage at his graduation and accept his diploma standing up like all the other students could. Austin is a paraplegic and his remarkable walk was the result of the extraordinary efforts and dedication of one man and his team of graduate students; that man is Dr. Kazerooni, the founder of suitX.

In 2007, Austin Whitney was paralyzed from the waist down in a car crash. When he was accepted into UC Berkeley, he met with Dr. Kazerooni, a professor of mechanical engineering. Determined to help Austin, Dr. Kazerooni and his team of researchers created an exoskeleton. This exoskeleton is a type of wearable robotic suit to improve the mobility of paraplegics and others with mobility disorders. Armored with the exoskeleton, in May 2011, Austin walked to accept his diploma amidst applause, tears, and roar.

This Berkeley research was the foundation for the Phoenix; a medical exoskeleton manufactured at suitX. Based in Emeryville California, suitX
Dr. Homayoon Kazerooni, CEO develops robotic exoskeletons for the medical and industrial markets. Established in 2012, the robotics company is responsible for the Phoenix exoskeleton that enables stroke patients and individuals with spinal cord injuries to walk. The suit returns movement to wearers’ hips and knees with small motors attached to standard orthotics. Wearers can control the movement of each leg and walk at up to 1.1 miles per hour.

suitX also produces the MAX, a modular, accessible exoskeleton that reduces injury and strain amongst industrial workers. The MAX is a versatile system that can allow workers to complete shoulder, lower back, and leg intensive tasks with reduced injury risk while remaining comfortable enough to wear all day. MAX is composed of three exoskeleton modules: backX, shoulderX and legX. Each module can be worn independently and in any combination depending on need. All modules intelligently engage when you need them, and don’t impede you otherwise. Ascending and descending stairs and ladders, driving, and biking are completely unimpeded.

suitX: The Benchmark for Exoskeletons suitX builds modular, affordable exoskeletons to help people with disabilities regain their mobility, and to help workers avoid repetitive stress injuries on the job. Dr. Kazerooni stated: “We started suitX out of our passion to develop low-cost consumer bionic products to improve the quality of life for people around the world.”

The company’s current exoskeleton technology is partially the product of an engineering program initiated by the White House called the National Robotics Initiative (NRI). In 2010, President Obama launched the NRI to accelerate the development of robotics technology that works cooperatively with humans, transforming the way people work.

suitX also has a goal to make rehabilitation exoskeletons for children with Cerebral Palsy to help them learn to walk during their critical periods of brain development. To this end, suitX was awarded the one-million-dollar top prize in the UAE AI and Robotics for Good Competition in February 2016.

A Glimpse at suitX’s Innovative Products suitX’s medical exoskeleton, Phoenix, is currently in clinical evaluation. The industrial exoskeleton, Max, has been the first to go to market for industrial use. To date, over 350 MAX exoskeletons have been deployed successfully in the US and internationally in various industrial facilities.

The Phoenix exoskeleton is the world’s lightest and most advanced medical exoskeleton designed to help people with mobility disorders to be upright and mobile. The suit is modular and adjustable so it can adapt to, say, a relatively tall person who just needs

Plaudits for the Progenitor

Dr. Homayoon Kazerooni, CEO: Dr. Kazerooni, also known as ‘Dr. Kaz’ at UC Berkeley, has 27-year tenure with the university and is the director of the Berkeley Robotics and Human Engineering Laboratory. He graduated with a doctorate from Massachusetts Institute of Technology.

Dr. Kazerooni founded Ekso Bionics in 2005, whose medical device Ekso GT™ was cleared by the FDA for rehabilitation of people with lower back spinal cord injuries and stroke. He left Ekso Bionics in 2011 and subsequently founded suitX to create more intelligent and accessible exoskeleton and other bionics products.

Dr. Kazerooni has been the recipient of numerous awards including Discover Magazine’s Technological Innovation Award, and the outstanding ASME Investigator Award. He has published more than 300 articles and patents in his field and given more than 130 plenary lectures internationally.
mobility assistance for one knee. A battery pack worn as a backpack powers the exoskeleton for up to eight hours. An app can be used to track the patient’s walking data. suitX has mainly worked with patients with spinal cord injuries, who can use the Phoenix to walk again.

MAX (Modular Agile Exoskeleton), an exoskeleton for industrial workers, is already on the market, having launched in November 2016. Workers who carry out repetitive manual labor (lifting, welding, construction, etc.) benefit from an assistive exoskeleton that reduces the stress and strains to avoid injuries due to their repetitive maneuvers. Also, MAX doesn’t prevent the user from doing normal activities while wearing it, such as climbing a flight of stairs or driving. The exoskeleton increases the workers’ productivity while decreasing the risk of injuries by reducing muscle strain on employees working in various industrial settings.

A recent study by researchers at the University of California, Berkeley showed the backXmodule of the MAX system augmented users with an average 60 percent reduction in muscle activities at four of the lower back muscle groups.

MAX has won numerous awards including two Saint-Gobain Nova Innovation and Edison Awards for its intelligent design, effectiveness, and affordability.

suitX: Inspiring Hope and Bringing Happiness

The company’s technology is changing lives and bringing hope to those who have suffered from serious mobility challenges. Paraplegics and stroke patients can learn to walk again without being bound to a wheelchair for their entire lives. One Reddit user commenting on the release of Phoenix said: “I was struck with severe upper body/upper extremity neuromuscular disabilities 10 years ago. suitX’s exoskeleton might give me back the ability to open doors again. I keep tearing up at the very thought that this might even be a possibility.”

suitX’s passionate employees (most of them are former Berkeley students and postdoctoral fellows) strive to make an affordable, minimal robotics suit to serve individuals with mobility disorders and workers. The firm builds smart, lightweight, comfortable, durable exoskeletons at a price point that opens the accessibility of the exoskeleton technology to many people worldwide. suitX is currently raising series B investment to expand its global sales and manufacturing of its industrial and medical exoskeletons; MAX and phoenix.