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Aergo: The World's First Responsive Postural Support System

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Abstract: A start-up based in London, called Aergo, is developing a novel postural support system that has the potential to change the lives of people with physical disabilities. The system aims to maintain and correct the seating posture of individuals who are unable to do so themselves. It is designed to be comfortable, integrated into different seats, and easy to transport. Here, I will introduce Aergo's postural support system, discuss the motivation behind their product, the technology, their current commercial status, and their plans for future development.

Keywords: Aergo, postural support, smart technology, air cells, automation, independence

1. Who is Aergo?

Aergo is based at the Royal College of Arts in London and is developing a postural support system for people with physical disabilities. Currently, other postural support systems on the market are bulky, expensive, unattractive and limited by static features that cannot quickly adjust to changes in a user's posture. Aergo has created a portable system that is inexpensive, can be easily assembled in different wheelchairs, looks discrete, and can dynamically correct posture and relieve discomfort from prolonged sitting. The system is comprised of multiple air cells that inflate or deflate to maintain posture. Each air cell has a built-in pressure sensor that detects slumping of the user's body. This system has a huge potential for correcting and maintaining posture in many individuals as well as in people with physical disabilities, including elderly, amputees, and people sitting for prolonged periods in office jobs.

2. The motivation

Aergo was founded in 2015 by two Masters' students, Sheana Yu and Dan Garrett. Sheana, now CEO of the company, is a product designer by training. Her Master's was in Global Innovation

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Design at Imperial College London in collaboration with the Royal College of Art. Her interest is in designing objects that are useful in society and have a social impact. She volunteers for charities, such as the Red Cross, and her designs are inspired by creative ways of solving social problems. For one her Masters' projects, she visited Treloar's School in London, a school supporting children with physical disabilities. She was introduced to a 14-year old, called Isaac, with cerebral palsy who was slouching in his wheelchair and had to be constantly adjusted in his seat by his carer. Just from his slouching, Sheana initially thought he would also have difficulties understanding her, but she quickly realised he responded just as intelligently as the other children. Teachers and carers at Treloar's School have noticed that people assume children with abnormal seating posture have lower intelligence. This can lower a child's self-confidence and affect their ability to interact socially. After this encounter, Sheana was committed to designing a postural support system that would help children like Isaac boost their self-confidence.

People with physical disabilities that affect their seating posture generally rely on support systems that are moulded to the shape of their back and torso. These are usually expensive, difficult to take apart and assemble, and are cumbersome to transport. More crucially, they are not particularly effective in maintaining posture in the long-term and carers are required to adjust people when they slump. Sheana and Dan came up with the idea of having air cells around a person's body that can dynamically inflate and deflate to support posture. To test their concept, they built their first prototype from blood pressure monitors and air bags fitted into a second-hand wheelchair. Computer software was then developed that could monitor the pressure of the air cells in real time. In early 2016, once their prototype and business plan were in place, they received funding from an angel investor, which set them up to design and develop their product further and hire more employees to do so. In addition, they have received funding from the Wates Foundation Grant and the James Dyson Foundation to cover the costs of patenting their postural support system.

1. The technology

The postural support design is based on four major themes: maintaining posture, comfort, independence and usability.

Maintaining Posture

The support system is composed of air cells that can inflate and deflate to correct a user's posture. Each air pocket also has a built-in pressure sensor that detects and alerts slumping of the user's body. In the future, Aergo plans to integrate a Smart System where air cells will automatically inflate or deflate to adjust a user to the correct position in response to these alerts (Figure 1.1 & 1.2).

Comfort

One issue that has been found in individuals lying or sitting against pressured air cells for a prolonged period is they are at higher risk of developing pressure ulcers [1]. The pressure disrupts the blood flow, starving the skin of oxygen. The skin then breaks down, leading to an ulcer. The system already has in place an air cycling system where the air cells can be activated to repetitively deflate and inflate, relieving chronic pressure against the skin (Figure 1.3).

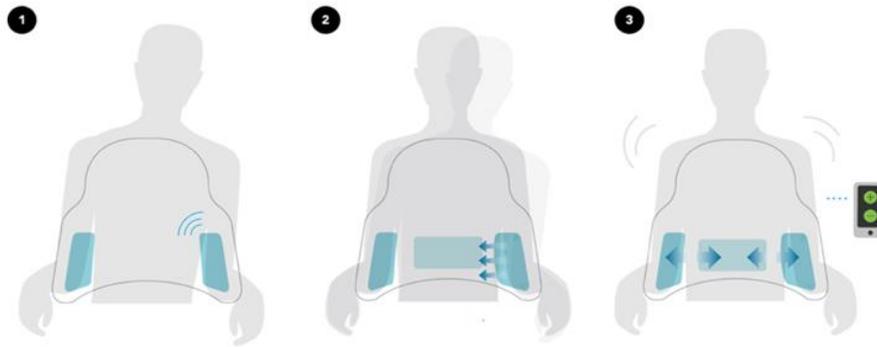


Figure 1. Postural support system: 1) Air cell detects and alerts slumping and postural change; 2) Air cell corrects posture by deflating or inflating; 3) Air cycling mode where air cells deflate and inflate repetitively to prevent the risk of pressure ulcers [2].

Independence

In the current system, the user can change the pressure settings and activate the air cycling mode using a remote control connected to the air cells. This gives the user greater control on their posture and carers and physiotherapists are less relied upon to constantly adjust them in their seats. However, it is important for physiotherapists and clinicians to be able to give advice and personalised plans for users. An Aergo App is also under development to control the air cells wirelessly and remotely by physiotherapists and carers (Figure 2).

Usability

Another advantage that the Aergo system has over more common bulky postural support moulds, is it can be easily removed from a seat and re-assembled in other seats. It is also very portable, allowing for easier transport. The design is discrete and does not draw attention to a user's physical disability. The cover and lining of the system are made from breathable material, an under-layer of waterproof Dartex, and customisable zips for adjusting air cells and adding extensions for different body shapes.



Figure 2. Aergo App to monitor and control air cells remotely [2].

2. Where are they now?

On March 28th, Aergo soft-launched their postural support system (Figure 3). In the months following up to the launch, they have been validating their product, with priority in CE certification, and risk assessments to set product liability conditions.

The company now has increased to a team of five: Sheana Yu, CEO and founder; Justin Pither, CTO; Jing Ouyang, Clinical Lead; Tim Tang, Business Developer; and Iker Babace, Industrial Designer. They also receive expert advice on integrating their system in different seats and procurement and collaborate with Liverpool University Hospital for testing their system on volunteers. They will be hiring a new sales team after more investment and making their product available for the public to buy online in the future.

Although having been incorporated less than two years ago, Aergo is gaining a momentum of interest and requests from suppliers, hospitals and charities through business networks and events, including the Posture Mobility Group Conference and Naidex Mobility and Disability Event. The postural support system has had interest overseas, with an individual from Taiwan contacting them after allegedly watching a very short (less than one minute long) feature from a television documentary on James Dyson. From this small encounter, it will be interesting to see how immediate the interest will be from the public once they fully launch their product.



Figure 3. Aergo's first postural support system (excluding wheelchair) launched 28th March 2017 [2].

3. Looking to the future

In addition to marketing their postural support system, Aergo is developing patent-pending platform technologies, which can be integrated into other weight-supporting surfaces to provide flexible means of postural support. The development of the postural support system has been focussed mainly on supporting posture in patients with neuromuscular disease, but it is anticipated this system will be used for elderly individuals with arthritis and lower mobility, amputees, and for relieving general postural discomfort and back pain.

With currently so much opportunity for innovation, it is an exciting time to create an impactful start-up, but it is by no means an easy process. Sheana shares her advice on how to start and maintain a successful start-up. Firstly, she advises remaining positive, even in times of adversity.

Secondly, to not be afraid of failing and to treat every success or failure as a learning experience. Lastly, to keep in mind the final goal, as it can be easy to lose track within a quagmire of business expectations and deadlines.

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The company



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