



PreScouter

Drivers and Innovations in the Adaptive Clothing Market

Research Support Service

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What is current state of the adaptive clothing market and what is driving its growth?

Adaptive clothing, aka functional adaptive clothing or apparel, is clothing designed specifically for individuals who struggle with dressing themselves or dressing others. Hence, adaptive clothing users may include the elderly, individuals with physical disabilities, individuals with conditions such as dementia and Alzheimers, and individuals with sensory issues who are sensitive to certain textures and materials.

In the coming years, there will be increased demand and opportunity to enhance the lives of adaptive clothing users while enabling their independence. With recent developments in smart technologies, companies and research groups alike have been hard at work devising ways to make clothing increasingly adaptive, comfortable, and inclusive.

In the context of emerging commercial technologies across various verticals, what is the current state of the adaptive clothing market and what is driving its growth?

While innovations in adaptive clothing for athletes are relevant to this space, the focus here is on technologies that enable the disabled and elderly population to live healthier, safer and more independent lives.

Executive Summary

International fashion industry network FashionUnited estimates that the total apparel market is worth approximately \$3 trillion globally, and adaptive clothing represents approximately 1% of the total market - a stat that translates to **an opportunity of \$30 billion**. However, these numbers do not factor in the potential mainstream uses of emerging technologies across various verticals that can be leveraged to develop stress-free, hi-tech, adaptive clothing.

“Adaptive wear is a large, underserved market that continues to grow in population size,” says [Maura Horton, founder of MagnaReady](#), which specializes in magnetically infused Oxford shirts.

Historically, adaptive clothing has existed as a niche industry that has not been integrated with mainstream brands.

Challenges have included the following:

- The lack of options for adults
- The lack of aesthetically inclusive options
- Inherently higher costs of adaptive clothing due to low production volumes

(This report represents two stage-gated rounds of research representing two client-meetings.)

Executive Summary

Key players in the global adaptive market are now widening their focus to offer improvements in fashion and style quotients in addition to the core adaptive functionality provided by the product.

- Brands such as *Tommy Hilfiger* and *Target* have been designing such clothes with an emphasis on design, comfort and functionality.
- Other companies are entering the market with an emphasis on technological contributions.

Recent tech developments from multiple verticals, such as increasingly miniaturized and powerful personal electronics, accurate tracking networks, novel textile materials for performance, and low weight/high strength alloys and composites can be leveraged and packaged into functional clothing options that can greatly assist caregivers and enhance the independence of adaptive clothing users.

In particular, the ever increasing accuracy and precision of **biometric data acquisition** driven by research in the healthcare sector (glucose monitoring, ECG monitoring, pulse oximetry, blood pressuring monitoring, non-invasive drug delivery patches) present opportunities for inclusion in wearables. Such tech developments in parallel with social shifts in increased inclusivity and decreased ageism are driving growth in the adaptive clothing market.

Executive Summary

Other technologies near commercialization from the academic sector include **electronic skins** that contain sensors that conform directly to the skin, shape memory polymers for clothing that adapt to their external conditions, and the **integration of AI with clothing** to enable independent living (medication adherence, medical alerts, etc.).

An increase in the global aging population coupled with an increase in Alzheimer's and dementia prevalence necessitates the development of additional markets that can cater to these demographics. **The rise of rehabilitation devices and smart textile markets, the increased reliance on electronic health records, and the rapidly growing global demand for wearable devices will provide the impetus for further development of the adaptive clothing sector.**

The Adaptive Clothing Technologies Covered



TRACKING

Precise positioning
Caregiver/family
alerts



PROTECTION

Human activity
monitoring (lying,
bending, running)
Fall prevention &
reporting



BIOMETRIC MONITORING

Vital sign monitoring
(respiration rate, heart
rate, etc.)
Blood glucose



AESTHETIC

Custom designs
Modern trends
Rebranding of
disability



ADAPTIVE CLOTHING TECHNOLOGIES

PRESCOUTER

Intelligence Brief
2019



ASSISTIVE / CONDITION-BASED

Prescription adherence
Continence care
Mobility assistance

A Summary Table of the New Innovations Covered in the Adaptive Clothing Space

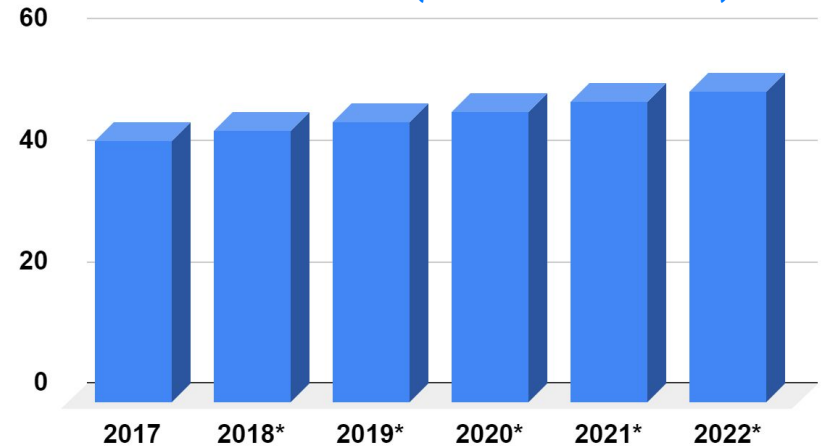
Company Name	Technology	Type	Vertical	Page
Bezgraniz Couture	Adaptive Clothing	Aesthetic	Smart clothing	20
Cancer Be Glammed	Chemo Cloths	Assistive/Condition-based	Smart clothing	22
SuitX	PHOENIX Medical exoskeleton	Assistive/Condition-based	Electronic	24
Honda	Walking Assist Devices	Assistive/Condition-based	Electronic	26
Rematee	Anti-snore Bumper Belt	Assistive/Condition-based	Smart clothing	29
AliMed	Hip protectors, ankle-foot orthosis, controlled ankle movement walker boots	Protection	Smart clothing	31
Active Protective	Protective belt	Protection	Electronic	33
Tactile Navigation Tools	Assistive technology for visually impaired	Protection	Electronic	35
Hexoskin	body sensors into comfortable garments for precise health tracking.	Biometric	Electronic	37
Reemo Health	Smart wearables	Biometric	Electronic	39
OmSignal	Heart failure and seizure prevention / Cardiac monitor clothing	Biometric	Smart clothing	41
Seneca Sense	Smart diapers	Assistive/Condition-based	Consumer goods	43
Proximity Care	Bluetooth safety badge	Tracking	Electronic	45
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Footfalls & Heartbeats	Smart compression bandages	Assistive/Condition-based	Smart clothing	49
Shreddies	Flatulence filtering undergarments	Other	Smart clothing	51

An Introduction to Adaptive Clothing

Market Overview

The [global adaptive clothing market](#) was valued at US\$ 278.87 billion in 2017 and is projected to exhibit a CAGR of 4.1% over the forecast period (2018–2026). Megatrends that intersect with the demand and growth of the adaptive clothing market include the following: aging, population, personalization, inclusivity, and wearables.

Adaptive apparel market in the United States from 2017 to 2022 (in billion U.S. dollars)*

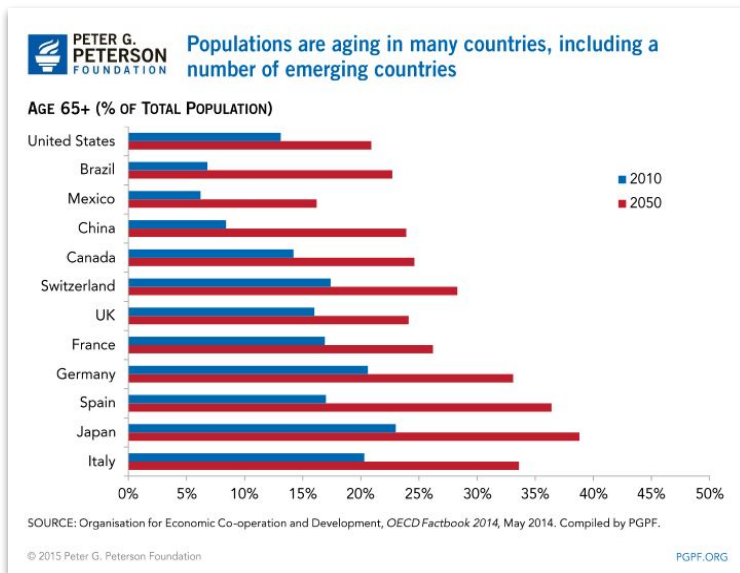


ADAPTIVE CLOTHING

Market Drivers

1

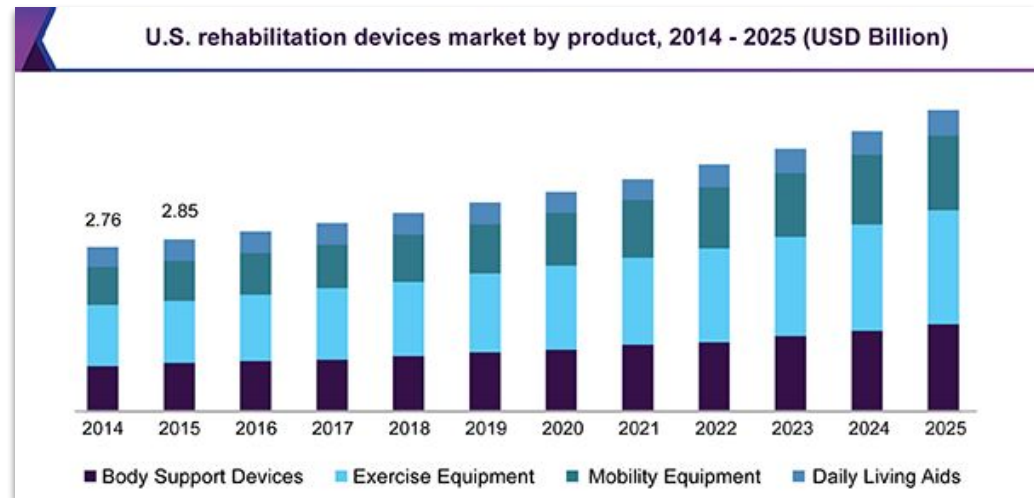
Rise in global aging population



Source: [Peter G. Peterson Foundation](#)

2

Rehabilitation device market expected to surpass \$17.5 billion by 2025



Source: [Grand View Research](#)

SOLUTIONS/OPPORTUNITIES

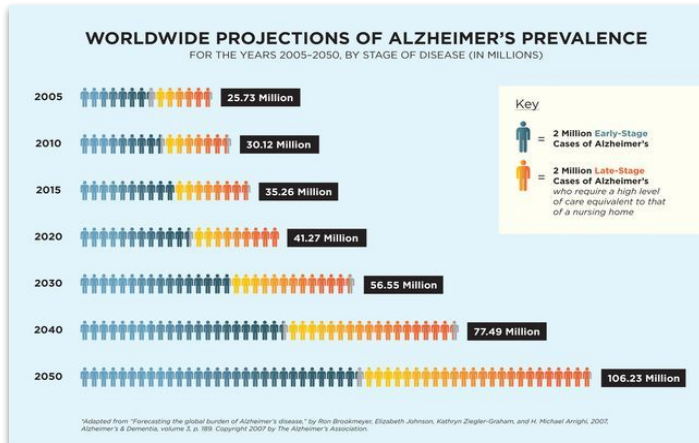
Innovations for the elderly and their caregivers

Innovations in protective and assistive devices

Market Drivers

3

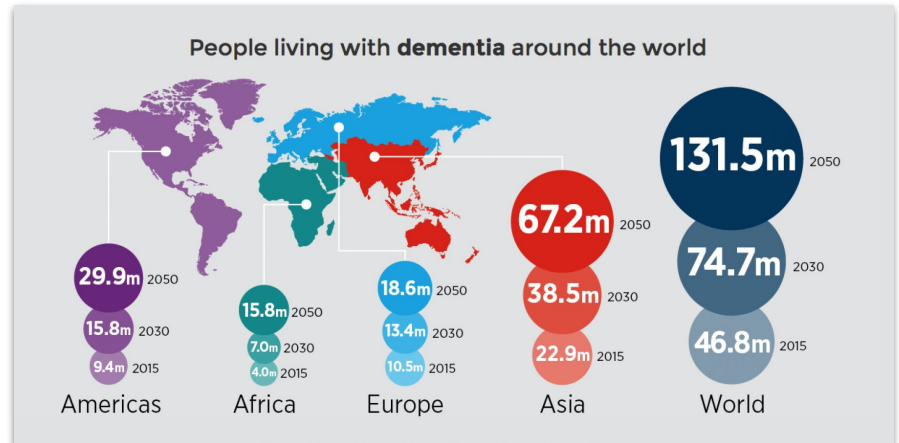
Increased worldwide prevalence of Alzheimer's



Source: [UCLA](#)

4

Increased worldwide prevalence of dementia



Source: [NCD Alliance](#)

SOLUTIONS/OPPORTUNITIES

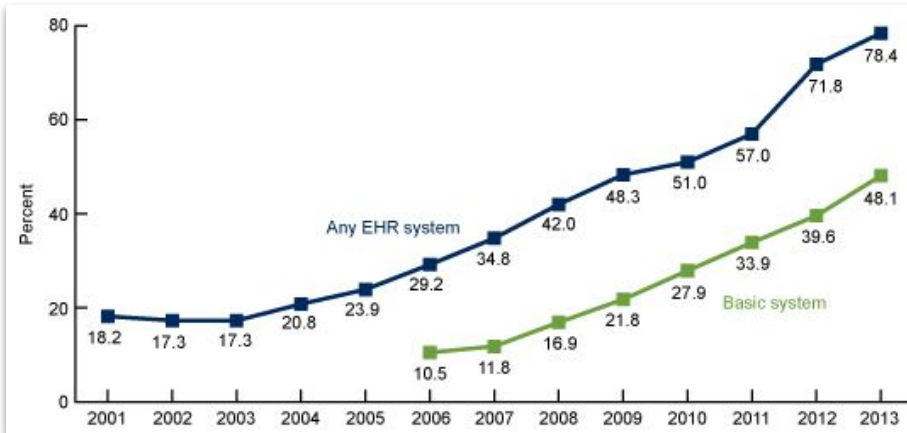
Innovations for individuals with Alzheimer's and their caregivers

Innovations for individuals with dementia and their caregivers

Market Drivers

5

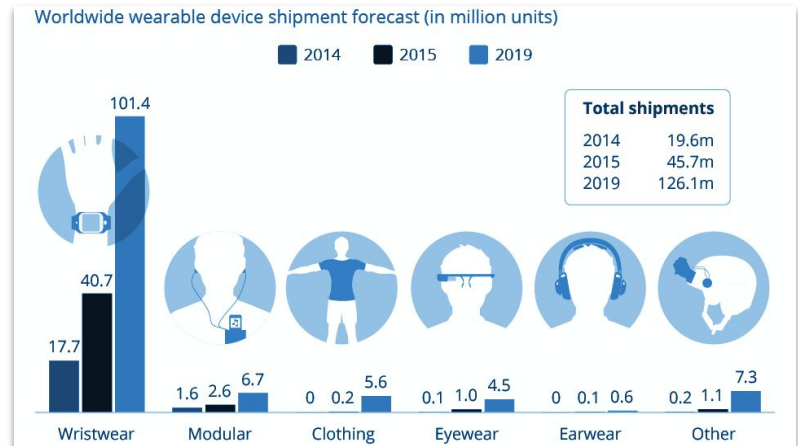
Increasing number of physicians now use Electronic Health Records



Source: [CDC](#)

6

Increasing use of wearable devices



Source: [Statista](#)

SOLUTIONS/OPPORTUNITIES

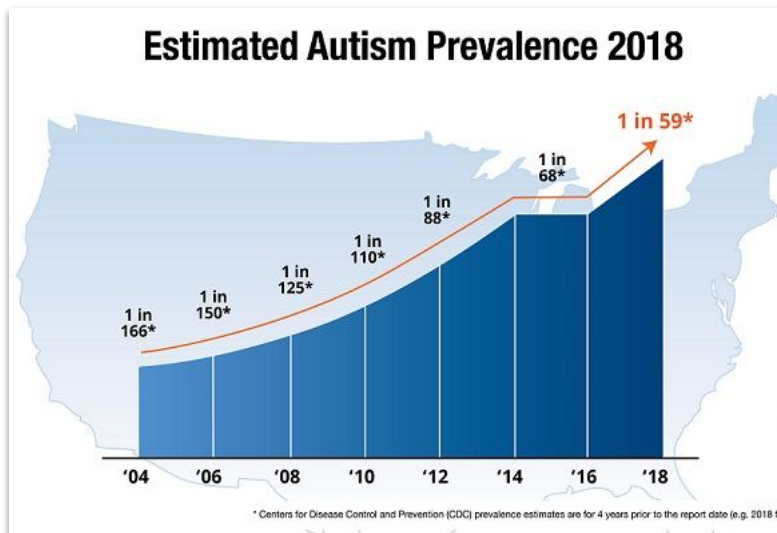
Devices that seamlessly integrate healthcare data with the end users and their caregivers

Greater independence and quality of life for end users and peace of mind for loved ones

Market Drivers

7

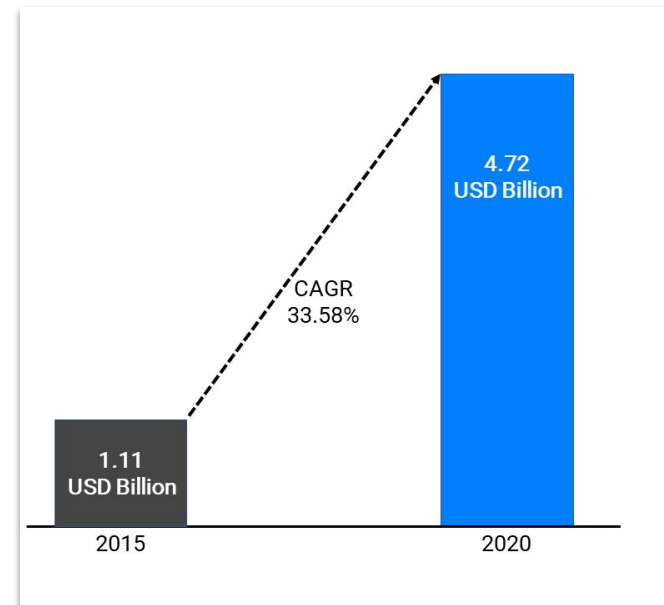
Increase in Autism prevalence



Source: [Autism Speaks](#)

8

Growing smart textiles market



Source: [MarketsandMarkets](#)

SOLUTIONS/OPPORTUNITIES

Innovations for individuals with autism and their caregivers

Opportunities to address unmet needs in the adaptive clothing space

Historic Key Players

Overview: Historically, adaptive clothing has existed as a niche industry that has not been integrated with mainstream brands. Many examples exist of consumers developing their own products to address the unmet needs of this growing market. Caregivers have created various garments, fasteners and solutions in order to help loved ones living with physical challenges maintain their independence and perform daily tasks that most of us take for granted.

Adaptive items use different features such as Velcro closures and magnetic buttons to make dressing easier, while still having the outward appearance of typical clothing. Other tweaks include replacing standard tags with tagless options and using flat seams to increase comfort on the skin.

Adaptive Clothing Historic Key Players



Historic Key Players

Examples of Historic Key Players:

Silvert's Adaptive Clothing & Footwear is one of the major market leaders that makes clothes for people suffering with mobility issues, arthritis, scoliosis, podiatry concerns, and incontinence. Primarily serving retirement homes and long-term care facilities, their website allows the user to navigate by selecting their specific disability, which then guides the user to items specifically designed for their needs.

Smart Adaptive Clothing was founded in 2017 and primarily offers easy-fastening clothing options for the elderly and disabled, with an emphasis on establishing dignity and independence.

Wheelchair Apparel: A mid-sized U.S. based retailer that offers custom apparel handwoven by tailors for people with mobility issues and for those on a wheelchair. They offer a wide range of style customizations.



Figure: (Top) Wheelchair pant clothing; (Bottom) Arthritis pants with easy access side opening. Source: [Silvert's](#)

Current Innovations from Key Style Brands

Recent adaptive apparel lines are making fashion more inclusive. Key players in the global adaptive clothing market are focused on offering fashionable and stylish adaptive clothes, owing to increasing demand for such clothes from consumers.

- **Tommy Hilfiger:** Tommy Hilfiger's Tommy Adaptive Spring 2018 collection, an update of their initial October launch, features clothes for children and adults of differing physical abilities, including those with prostheses or braces.
- **Target:** The Cat & Jack collection includes diaper-friendly leggings and bodysuits, outerwear with zip-off sleeves, and other adaptable options. Universal Thread offers denim with flattened seams and wider legs as well as tagless tops.
- **Zappos:** Zappos.com launched an adaptive line last year, which includes clothing such as pull-on pants and orthopedic-friendly and easy on/off shoes for both kids and adults.



Figure: Tommy Hilfiger Adaptive Seated Jeans with Velcro closure. Source: [Zappos](#)

New Technologies and Startups for Adaptive Clothing

New Technologies and Startups in the Adaptive Clothing Space

How is the adaptive clothing market changing in light of the new technologies and startups we have identified?

The global increase in aging population, rehabilitation devices (wheelchairs and mobility aids), and neurodegenerative disorder (Alzheimer's prevalence, dementia, autism) are critical market forces that will fuel the adaptive clothing market. AI-powered technological advances and increased reliance of medical professionals to monitor patient compliance remotely through biometric means are other trends that will force industry to develop smart clothing.

The major focus of adaptive clothing industry has been on:

- Apparel that facilitates easy-to-wear functionality for disabled population while retaining dignity and confidence
- Biometrics and tracking features that link the user to caregivers and emergency responders
- Clothing that provides quick deployment of protective mechanisms based on user movements that may compromise their safety

New Technologies and Startups in the Adaptive Clothing Space

Long standing market leaders that sell aesthetically pleasing adaptive clothing will be challenged by small- to mid-level industry entrants that are focusing on improving the fashion quotient of clothing for elderly and the disabled users while offering other tracking and biometric functionalities. There are a subset of adaptive clothing products that transcend these boundaries and offer aesthetics, protection, tracking, and comfort at the same time.

Small- to mid-level industry entrants that offer aesthetics, protection, tracking and comfort will challenge the long standing market leaders.

The development of multifunctional products that are capable of catering to a diverse set of needs and functionalities for both users and caregivers alike will have the potential to do well in this market.

Bezgraniz Couture



Founded: 2010

Type of business: Privately held, Fashion Apparel

Headquarters: Moscow, Russia

Category: Aesthetic

Website: <http://bezgranizcouture.com/>

Company overview: Russian brand that was established with the philosophy to bring fashion apparel that improves quality of life for people with different types of disabilities, their families, and friends.

Target Market: Public leaders with and without disabilities, celebrities, paralympians, models, and, and people who inspire others by their perseverance and will power.

Key Strengths: Organizes innovative education and art projects, design contests, and fashion shows specifically targeted at improving confidence, fashion quotient, and self-worth of members of the disabled community



Source: Bezgraniz Couture

Projects

- **Fashion Beyond Borders:** Fashion designers tailor comfortable and exuberant fashionable collections for disabled people. A first-of-kind show presented professional apparel collections designed for people with different types of disabilities. Models typically include those that have mobility challenges (wheelchairs), visually impaired, suffer from cerebral palsy or Down Syndrome, vertically challenged, amputees.
- **Acropolis** is an award-winning art project combining nuances of art and photography. It aims at assembling inspirational pieces of art that combines the “classical spirit of ancient sculpture with the bodies of models with disabilities”. The final exhibit presents these concepts in aesthetic ways on a canvas. In this special project, models with disabilities mimic the famous figures of the statues of Acropolis.
- Other Notable projects: Novelty I Trailblazers, WearABLE Future, Extraterrestrials, Revolutionaries, Education programs



Figure: (Top) Models in the Fashion Beyond Borders fashion show for the disabled; (Bottom) Image from Acropolis art project. Source: [Bezgraniz Couture](http://BezgranizCouture.com)

Cancer Be Glammed



Founded: 2009

Type of business: Privately held, Fashion Apparel

Headquarters:

Category: Assistive/Condition Based & Aesthetic

Website: <http://www.cancerbeglammed.com/>

Company Overview: Cancer Be Glammed (CBG) was established with a mission to assist women diagnosed with all forms of cancer recover with dignity, self-esteem, and style. Started by two mothers and close friends who noticed that it is very difficult to keep patients motivated and boost morale because of loss of confidence and dignity while recovering from the side effects of cancer treatment.

Target Market: Markets practical-but-fashionable apparel/recovery products that allow women to retain a sense of style, reclaim a sense of confidence, and maintain fashion quotient.

Key Strengths: Products prepare women for the non-medical, appearance-related side effects of surgery and treatment and provide them with easy-access to fashionable recovery products and lifestyle solutions.



Figure: CBG's RonWear Port-able clothing. Source: [CBG](http://www.cancerbeglammed.com/)

Technology

- Known for fashionable apparel designed for easy port (long term catheters used to deliver drugs) access. This specialty clothing allows you to receive chemotherapy treatment without having to remove clothing.
- Other popular product categories include Hospital Glam, Post Op Clothing & Products, R & R: Rest & Recover, Chemo Couture, Recovery Bras & Camisoles, Mastectomy Bras & Accessories, Breast Forms & Shapers, Mastectomy Apparel, Mastectomy Swimwear, Lymphedema Sleeves & Gauntlets, Designer Hospital Gowns & Robes
- Masthead - a comfy post surgical bra with front closures, including The Elizabeth Bra for drain management.



Figure: Specialty bra with easy port access. Source: [Cancer Be Glammed](https://www.cancerbeglammed.com)

SUIT X from US Bionics



Founded: 2011

Headquarters: Berkeley, CA, USA

Website: <https://www.suitx.com/>

Type of business: Privately held, accessible exoskeletons

Category: Assistive/Condition Based

Company Overview: The key mission of the company is to conduct research and development with a goal of bringing to market modular, affordable, and intelligent exoskeletons that can improve quality of life for people with disabilities.

Target Market: US Bionics, Inc., trading as suitX, designs and develops advanced accessible exoskeletons for industrial, medical, and military markets.

Products: The company offers

- BackX - minimizing risk of work related back injuries;
- LegX - enables the wearer to squat repeatedly for prolonged periods of time by reducing the strain on the knee joint and the quadricep muscles;
- Shoulder, an industrial arm exoskeleton that empowers the wearer to perform chest to ceiling level activities for longer durations;
- MAX, a modular eXoskeleton designed to provide a flexibility solution that can be adapted for various workplace tasks.

Technology

SuitX is a framework that helps a disabled person walk. The device which belongs to a class of engineering marvels called exoskeletons, uses a series of strategically placed actuators (part of any machine that moves the attached components). The actuators are optimally positioned at knee and hip joints and help the wearer in achieving ground clearance during swinging actions and support an upright stance.

At 12.25 Kg, SuitX is one of the lightest exoskeletons available on the market and can allow the wearer to reach a maximum speed of 1.1 miles/hour. The flexible suit can be worn in a wheelchair and can be adapted to individual user characteristics (height, weight, etc). It is a great product for supporting rehab exercises in both home-based and clinical settings.

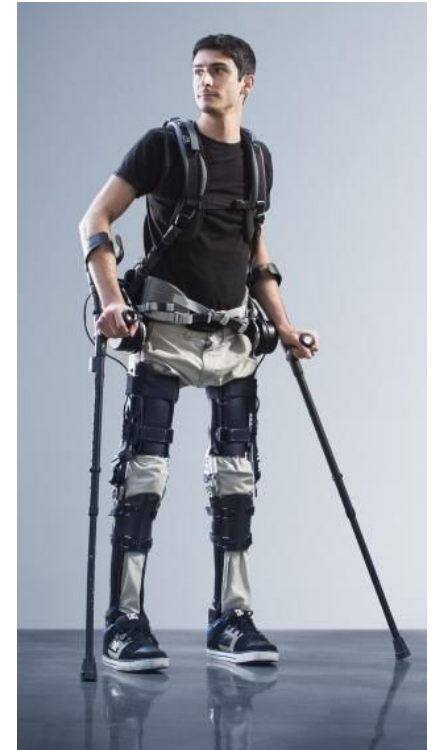


Figure: Images of SuitX's PHOENIX Medical Exoskeleton. Source: [SuitX](#)



Honda - Walking Assist Device



Founded: 1948

Type of business: Publicly traded, Automobiles

Headquarters: Tokyo, Japan

Category: Assistive/Condition Based

Website: <https://global.honda/products/power/walkingassist.html>

Company Overview: Honda is a globally recognized Japanese public multinational conglomerate which manufactures automobiles, aircrafts, motorcycles, and power equipments.

Timeline of Developments: Honda has been gradually gaining a foothold in assistive devices and foraying into the rehab market:

- **2014** - Honda tested its walking assist devices in a clinical trial at the Shirley Ryan AbilityLab (formerly the Rehabilitation Institute of Chicago)
- **Nov. 2015** - Sales of the Walking Assist Device leased to rehabilitation clinics in Japan. Device is currently being used in approximately 250 facilities throughout Japan.
- **Jan. 2018** - Obtained device certification in Europe (CE Marking)
- **Jan. 2019** - Received Premarket Notification from the U.S. Food and Drug Administration (FDA)

Honda - Walking Assist Devices



Technology

Honda Walking Assist is a mobility training device that facilitates walking. It is based on the concept of the inverted pendulum model and biophysics principles which enable bipedal walking. It is powered by three interlocking components:

- Hip frame: which houses the control computer and a high-strength battery,
- Motors that are strategically placed on both sides: transfers the force generated by the motors to the legs, and
- A thigh frame which guides the initiation, swinging and and kicking actions of the lower legs.



Figure: Images of the Honda Walking Assist device. Source: [Honda](https://www.honda.com/robotics)

Additional Exoskeleton Manufacturers

Other Exoskeleton Manufacturers



CYBERDYNE



Rematee Sleep Solutions



Founded: 2007

Headquarters: Vancouver, BC, CA.

Website: <https://rematee.com/>

Type of business: Startup, Privately Held, Medical Device

Category: Assistive/Condition Based

Company Overview: Rematee was developed by an entrepreneur (Sean Kerklaan, Inventor & Owner) struggling to find anti-snoring solutions. Starting with the prototype of a tennis ball, T-shirt, and a roll of duct tape, Kerklaan went on to develop a Positional Therapy idea and launched the flagship product at the 'West Coast Women's Tradeshow' in September, 2007.

The company reports having over 2,000 sleep-centers, sleep-doctors, and sleep-dentists regularly using Rematee to treat their patients' sleep apnea.

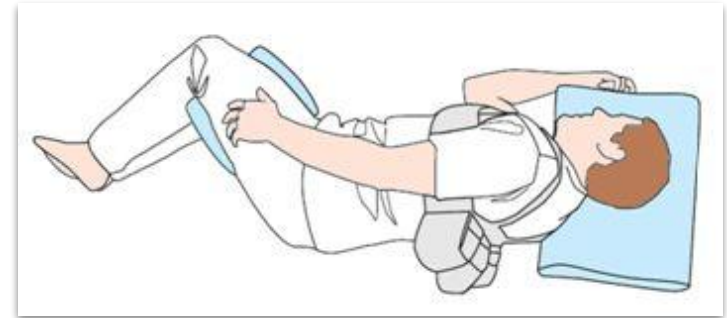


Figure: A drawing of a person sleeping while wearing Rematee's Bumper Belt.

Source: [Rematee](https://rematee.com/)

Technology

- Rematee's bumper belt is a one-of-a-kind positional device used to treat snoring and sleep-related breathing disorders.
- The Anti-Snore Shirt and Bumper Belt positions the sleeper and prevents them from “rolling over” while ensuring that that the restrictive movements are not severe enough to awaken the user.
- Does not have FDA approval
- Extensive clinical trials are underway to determine if positional sleeping solutions can be used to treat sleep apnea.



Figure: (1) Anti-Snore Shirt, (2) Bumper Belt, (3) Image showing how the Bumper Belt is worn. Source: [Rematee](https://rematee.com)

AliMed



Founded: 1970

Headquarters: Dedham, MA, USA

Website: <https://www.alimed.com/>

Type of business: Privately held, Medical Device and Equipments

Category: Protective

Company Overview: AliMed is a large manufacturer of medical devices and equipment. It has a long history and reputation on developing innovative healthcare products designed to improve patient outcomes.

Target Market: AliMed deals with the following four key areas: acute care, orthopaedics, rehabilitation, and nursing.

Main Products Areas:

- Medical devices
- Rehabilitation products
- Mobility devices
- Wheelchair cushions
- Upper and lower extremity orthoses
- X-ray and operating room accessories
- Orthopedics
- Fall management alarms

Adaptive Technologies

Hip protectors:

- Shock-absorbing undergarments that help reduce the risk of injury and fractures.
- Ideal for people who are considered fall risks and elderly individuals.



Ankle-foot orthosis:

- A support intended to position and facilitate motion of the ankle while compensating for weakness and deformities.
- Used to provide a framework of support for weak limbs, and reduce the instances of foot drop that are seen in neurologic and musculoskeletal disorders.



Controlled ankle movement walker boots:

- Foot braces that facilitate walking in subjects that have suffered grievous injuries
- Minimizes movement of the hinge of the ankle, providing rest and protection of the damaged area until it has had time to heal and recuperate.



Figure: (1) Hip protector; (2) Ankle-foot orthosis (AFO); (3) Controlled Ankle Movement (CAM) Walker boots. Source: [AliMed](https://www.ali-med.com)

ActiveProtective Fall Protection Belts



Founded: n/a

Headquarters: Fort Washington, PA USA

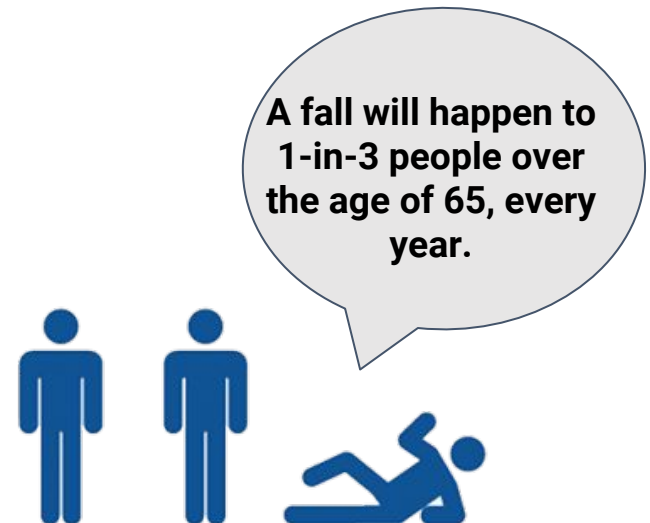
Website: <https://activeprotective.com/>

Type of business: Privately held, Medical Device

Category: Protective

Company Overview: ActiveProtective was founded with a goal to prevent hip fractures and limit their devastating consequences among older adults by the use of wearable technology. It was founded by Dr. Robert Buckman, a former trauma surgeon at Temple University Hospital and St Mary Medical Center in Langhorne, Pennsylvania.

Target Market: The product is aimed at providing protection to patients and residents with high-fall risk in rehab, continuing care and senior living communities. The company recently raised over \$4.6 million with "Generator Ventures" acting as the major investor.



Technology

The company has developed a belt that can accurately detect fall-like motion and automatically deploy airbags over the hip, immediately prior to impact. The 3D motion sensors determine the stereotypical motions and accelerations that dictate everyday activities, and predict 'deviations' from what is allowable in a fraction-of-a-second.

This technology relies on the concept of “fall disambiguation” that allows the device to determine falls with high accuracy and intervene by quickly deploying protective micro-airbags. The company claims to reduce impact force by 90%.

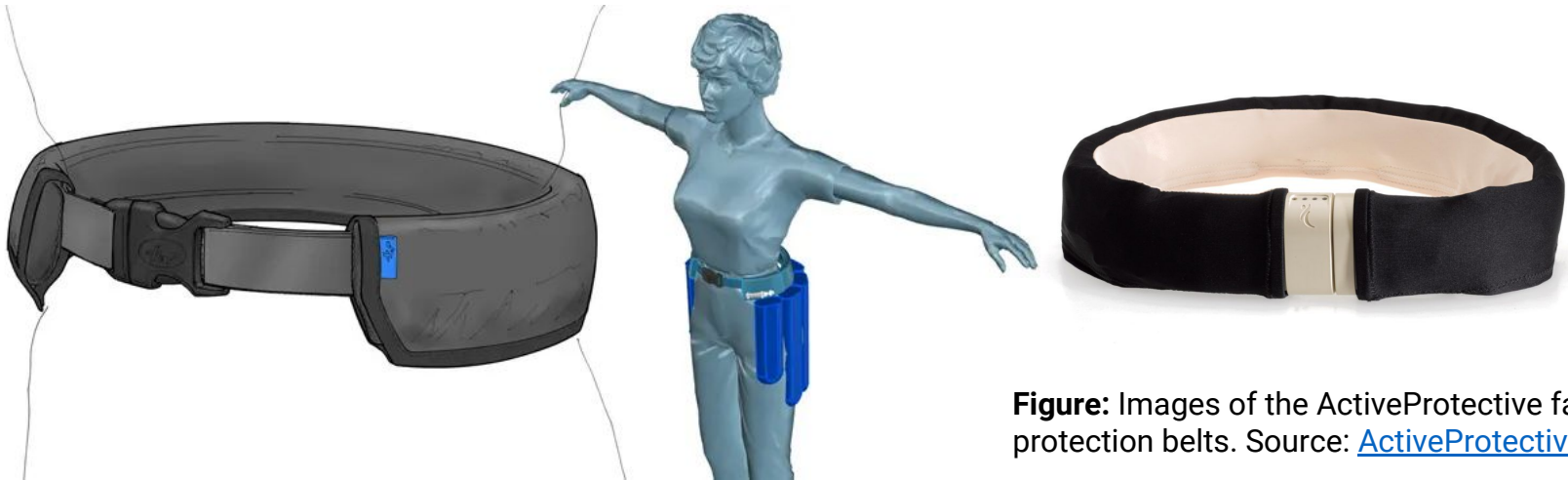


Figure: Images of the ActiveProtective fall protection belts. Source: [ActiveProtective](https://www.activeprotective.com)

Tactile Navigation Tools - Eyeronman



Founded: 2013

Headquarters: New York, NY, USA

Website: <https://tactilenavigationtools.com/>

Type of business: Privately Held, wearable components

Category: Protective

Company Overview: Tactile Navigation Tools engineers and designs technology aimed at improving mobility for the visually impaired and provide assistance for individuals in need of "visual" enhancement.

Target Market: The company's tools are designed to serve those who are blind, people with low vision, and those civil servants who transiently have their visual system incapacitated (e.g. during fires or rescue missions).

Products: Products range from enhanced mechanical cane solutions to hands-free, wearable obstacle detection apparel, and peripheral awareness devices.



Source: [Tactile Navigation Tools](https://tactilenavigationtools.com/)

Technology

The Eyeronman is a wearable platform with a variety of sensors retrofitted directly into an article of exterior clothing. It is engineered to detect environmental and external obstacles and maximize safety by facilitating superior situational awareness.

How it works: Information is transmitted to the user via a vibrational belt that is worn as a second, internal layer. The hands-free vibro-tactile feedback system translates the sensor data to tactile information. The vibrations allow the the user to find and avoid obstacles, navigate surroundings, get a sense of dangers in the environment around them, and roughly predict the distance/direction of objects or people.

It can be useful for the visually impaired, as well as soldiers in combat, policemen, and firefighters who transiently have their vision impaired by smoke from fires, arrests at night, explosions, etc.



Figure: The two components of the Eyeronman wearable. Source: [Tactile Navigation Tools](#)

Hexoskin Smart Garments



Founded: 2006

Headquarters: Montreal, Canada

Website: <https://hexoskin.com/>

Type of business: Privately Held, Medical Device

Category: Biometric

Company Overview: Hexoskin is a leader in non-invasive sensors, software, data science, & AI services that go into biometric apparels and clothing. The company's mission is to develop body-worn sensors that are accessible, cater to a broad market, and enable the precise collection health data.

Target Market: Hexoskin provides solutions and services directly to customers & researchers, and through B2B contracts in security, defense & aerospace, first responders, pharmaceutical, academics, and healthcare organizations.



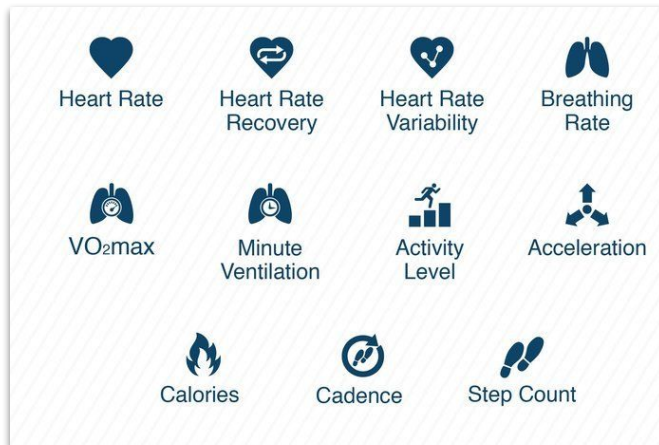
Figure: Hexoskin Smart Shirt kit.
Source: [Hexoskin](https://hexoskin.com/)

Technology

Hexoskin tracks and records various parameters including heart rate, breathing, and movement. It can also monitor stress, effort, fatigue, QRS events, heart rate recovery, calories burned, minute ventilation (L/min), and sleep quality. The fabric is comfortable, durable, odor-resistant, machine washable, amenable to quick drying, breathable, lightweight, chlorine resistant, offers UV protection and safe for use in contact sports.

The device connects to Bluetooth compatible devices and securely stores data.

(1)



(2)



Figure: (1) The parameters Hexoskin measures; (2) The Hexoskin platform. Source: [Hexoskin](https://hexoskin.com)

Reemo Health



Founded: 2013

Headquarters: Minneapolis, MN, USA

Website: <https://reemohealth.com>

Type of business: Privately Held, Medical Device

Category: Biometric

Company Overview: Reemo Health helps healthcare organizations improve the aging experience by empowering the 65+ demographic to be supported, connected, and independent. The company offers solutions that combine wearable technology, with advanced personal emergency response system (PERS) technologies coupled with advanced health analytics - providing a unique, novel, and well-connected caregiving solution.

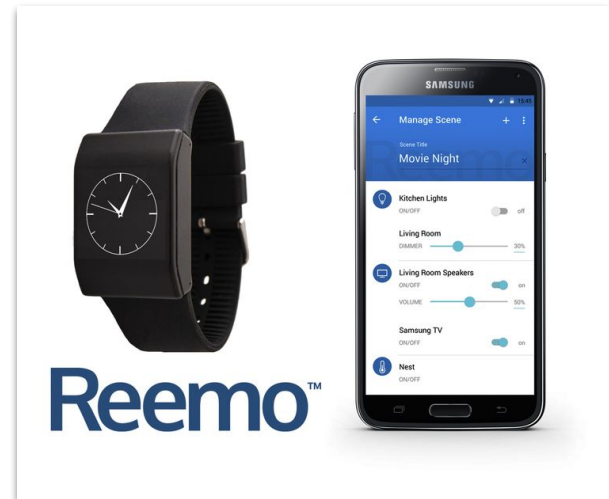


Figure: The Reemo Health watch and app. Source: [Reemo Health](https://reemohealth.com)

Technology

Reemo Health's technology offers senior citizens various functionalities including wellness information, messaging capabilities, and gesture-controlled home automation. The personalized data solution delivers key health information in real-time to allow for informed care decisions.

Reemo's smartwatch can record longitudinal data in between visits through native sensors, bluetooth integration of clinical devices, and two-way messaging. This provides the care team insights into the patient's activity, mobility, and overall clinical adherence to their personal care plan.

The speakerphone on the watch allows hands-free 2 way communication. The company's live concierge help gives 24/7/365 access to a live operator who can connect the user with a support network or emergency services.

Figure: The Reemo Health watch with specs. Source: [Reemo Health](https://reemohealth.com)



OMsignal Biometric Smartwear



Founded: 2011

Headquarters: Montreal, Canada

Website: <https://omsignal.com/>

Type of business: Privately Held, Medical Device

Category: Biometric

Company Overview: OMsignal is a leader in smart garments. It has developed a broad variety smart clothing lines catering to general consumers as well as medical markets. The company's mission is to promote health and wellness in daily lives through an advanced biosensing apparel platform.

Target Market: OMsignal does not sell directly to consumers. However, it sells to a broad range of of companies in the health, wellness, worker safety, and sports industry.



Source: [OMsignal](https://omsignal.com/)

Technology

The platform allows vendors to pair comfortable and everyday apparel with biometric capabilities that captures medical-grade data by employing high-grade AI algorithms and technology. It picks up the body's signals using strategically positioned sensors that measure respiration, ECG, and physical activity. The rich, context-based data is sent to the Cloud to be further analysed, using advanced algorithms and AI.

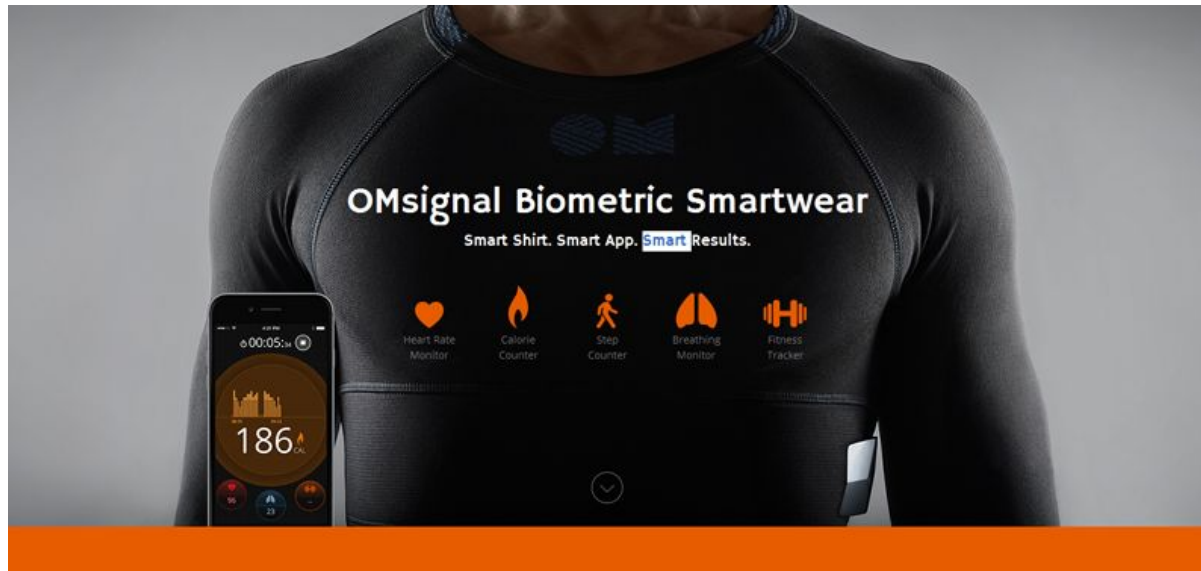


Figure: The OMsignal Biometric smart shirt. Source: [OMsignal](#)

Seneca Sense Technologies - WE SENSE™



Founded: 2018

Headquarters: Montreal, Canada

Website: <http://www.senecasense.com/>

Type of business: Privately Held, Small Startups

Category: Biometric

Company Overview: The goal of the company is to improve the standards of continence management through real-time guidance and smart devices that facilitate real-time, electronic communication between a patient and a healthcare provider (aka connected care services). Seneca Sense is a vertically integrated company that does all mechanical, software, & electronic engineering activities in-house and also handles manufacturing aspects of their technology.

Target Market: The solutions are aimed to help elderly people suffering from incontinence.



Figure: WE SENSE™ device and app.
Source: [Seneca Sense Technologies](http://www.senecasense.com/)

Technology

The WE SENSE™ technology includes a sensor that, when placed in an adult brief or protective underwear, transmits incontinence information wirelessly to a server through an app. This translates to 63% less time spent in a wet brief, 29 minutes of labor savings/resident/day, and 21% less briefs per resident per day (based on trials conducted by Seneca Sense in the USA and Canada between November 2017 and November 2018)

This is valuable in terms of reducing waste disposal, avoiding unnecessary brief changes, and improved staff utilization. Here's how it works:



1) Wetness event occurs



2) App detects change and sends to server



3) A signal is sent via wifi to user



4) When the brief reaches the pre-determined capacity, an alert is sent to the caregiver



5) The caregiver changes the brief

Proximity Care



Founded: 2014

Headquarters: London, UK

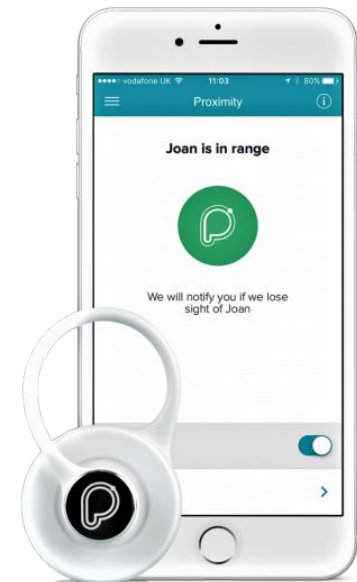
Website: <https://www.proximitycare.co.uk/>

Type of business: Privately Held,
Small Startup

Category: Tracking

Company Overview: The company was founded by Natalie Price in 2014 with a vision to take care of dementia problems. The guiding philosophy of the company is to use the latest technology to find solutions to problems for people suffering with dementia.

For almost 44 million people living with dementia worldwide, one of the biggest threats that impacts the safety of these patients is the fear of “wandering”, a common side effect of the disease. This causes great anxiety to caregivers/families and significantly increases risk of injuries and harm to the patient. Proximity Care’s tracking solution is currently being used in 17 care homes in Denmark.



Source: [Proximity Care](https://www.proximitycare.co.uk/)

Technology

The Proximity Button is worn by the person with dementia or memory problems. It connects to the phone of the caregiver and sends alerts if the wearer wanders-off or is in distress.

The Proximity Button is powered by a coin cell battery, with a battery life of approximately 6 months.



Figure: Images of the Proximity Care button. Source: [Proximity Care](#)

AngelSense



Founded: 2013

Headquarters: New Jersey, USA

Website: <https://www.angelsense.com/>

Type of business: Privately Held

Category: Tracking

Company Overview: Founded in 2013, the guiding philosophy of the company is that every child is special and deserves to be safe at all times. The idea behind the product is for children to enjoy a sense of security at all times. Parents report that AngelSense brings unmatched composure and peace of mind and deepens the connection with their child.

Target Market: The company makes a GPS Tracker & Voice-Monitoring solution designed for children with special needs. It can also be adapted for dementia and Alzheimer's patients.



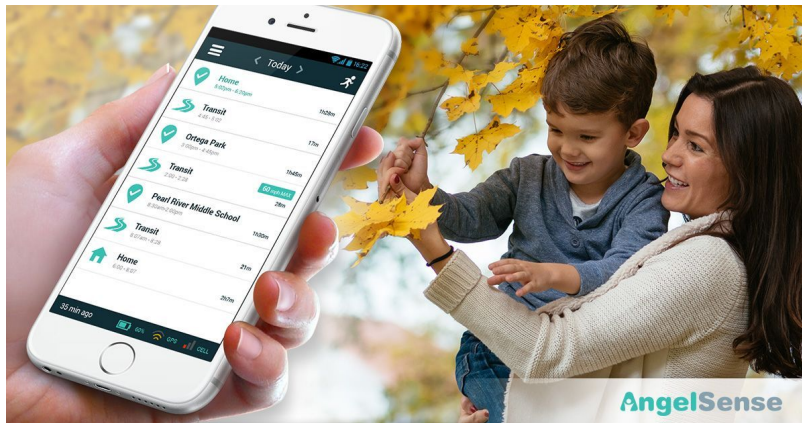
Source: [Angel Sense](https://www.angelsense.com/)

Technology

The AngelSense Guardian GPS tracking device is a simplified GPS-enabled phone that is housed in a water-resistant case. The technology uses geofencing and tracking to deliver a child's location in real-time, with a quick 10-second refresh rate.

The tracker comes in a versatile wearable sleeve that can be placed anywhere on the child, such as the waistline, an inside pocket, the pant leg, a hoodie or light jacket or secured inside a backpack. The tracker comes with three fasteners and can only be removed by using a magnetic parent key that is included in the case.

(1)



(2)

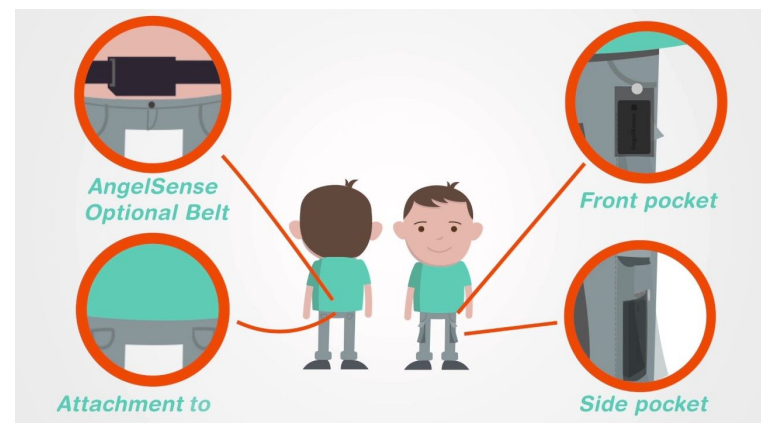


Figure: (1) AngelSense app; (2) The different places the tracking device can be placed. Source: [AngelSense](https://www.angelsense.com)

Footfalls & Heartbeats

Footfalls & Heartbeats

Founded: 2010

Headquarters: Auckland. New Zealand

Website: <https://www.footfallsandheartbeats.com/>

Type of business: Privately Owned

Category: Biometric, Tracking, Smart Textiles

Company Overview: The company was established by New Zealand-based award winning chemist, Simon McMaster. Footfalls & Heartbeats develops and manufactures textile structures that act as sensors and do not require wires or miniature electronics. It is currently on a scouting phase, hunting for potential clients, funding partners, technology partners, and collaborative partnerships (emphasis on identifying fruitful relationships in industry sectors such as health, sports, rehabilitation, aged care, aerospace and automobile industries).

Key Strengths: Key strength include conducting research on “intelligent” and “smart” textiles. The company offers customizable research-driven textile solutions for a diverse range of applications that include: wound care, compression garment systems, infant monitoring, athlete monitoring, remote monitoring of health and physiological symptoms for those in high-risk environments, such as first responders and defence personnel.

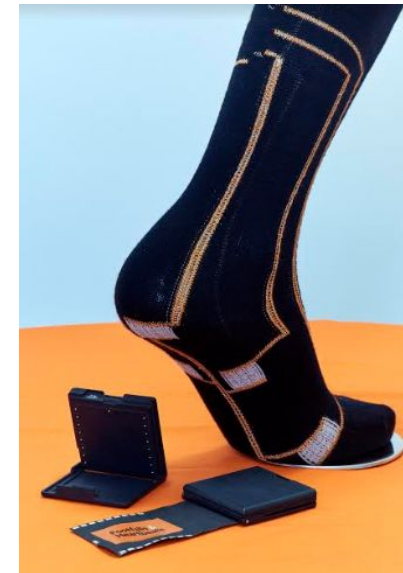


Figure: Footfalls “smart” sock. Source: [Footfalls & Heartbeats](https://www.footfallsandheartbeats.com/)

Technology

The company uses a proprietary process for manufacturing smart textiles where the textile itself is the sensor (therefore can be manufactured to support an electronics-free format). An early and likely application for the smart textile technology is its applicability for making compression bandages for use on chronic leg ulcers. This company is looking for partners for the early stages of developing a design for a bandage that can potentially measure its own tightness and convey information to medical staff by a color change, noise or another kinds of alerts.

The technology uses the three-dimensional complexity of a textile structure and leverages the interactions of fibres within the yarn itself as mechanisms to control the electrical resistance characteristics of the sensor structure. This involves using an electrically conductive yarn that is weaved into a mathematically determined textile structures to form a repeatable and sensitive sensor network. Conductive fibre technology, micro power sources, and computer aided design (CAD) are combined to produce textile structures that can detect external environmental stimuli in the form of electrical signals.

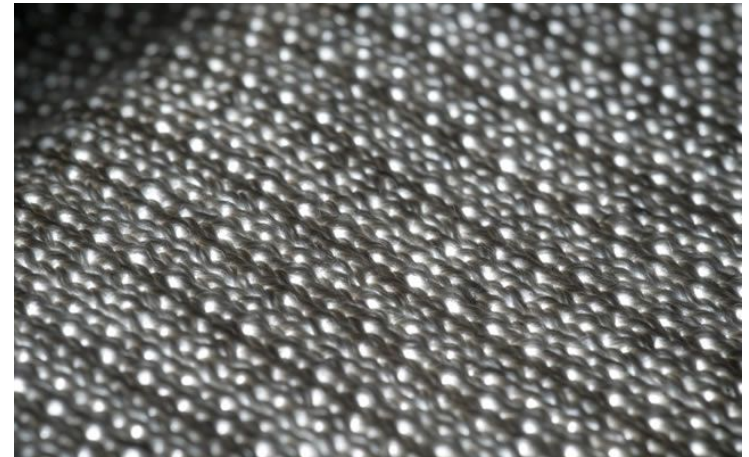


Figure: Footfalls & Heartbeats smart sensor fabric. Source: [Footfalls & Heartbeats](#).

Shreddies Flatulence Filtering Garments



Founded: n/a

Headquarters: Leicestershire, UK

Website: <https://www.myshreddies.com>

Type of business: Privately Owned, Clothing

Category: Accessories/Others

Company Overview: Excessive flatulence is an embarrassing scenario and can raise social anxiety issues and tank confidence. Shreddies are garments that solve such problems by improving the physical symptoms and reducing the anxiety associated with this condition. Shreddies' flatulence-filtering garments are manufactured with high grade materials to ensure the quality standards and perfect fit for all.

Key Strengths: Treats flatulence issues caused by IBS (irritable bowel syndrome), Gastritis, Crohn's disease, Dyspepsia and Colitis as well as food intolerances and many other bowel and digestive disorders.

Shreddies Flatulence Filtering Garments

THE ORIGINAL
Shreddies
FLATULENCE FILTERING
UNDERWEAR

Technology

Shreddies flatulence filtering garments house an activated carbon back panel that absorbs and traps flatulence odors. Owing to its highly porous nature, the odor vapors are neutralized by the cloth instantaneously and cannot escape the carbon panel. The activated carbon panel housed in the garment can be reactivated by regular washing. Studies published in [American Journal of Gastroenterology](#) show that carbon underwear is one of the most effective methods of removing flatulence odors.

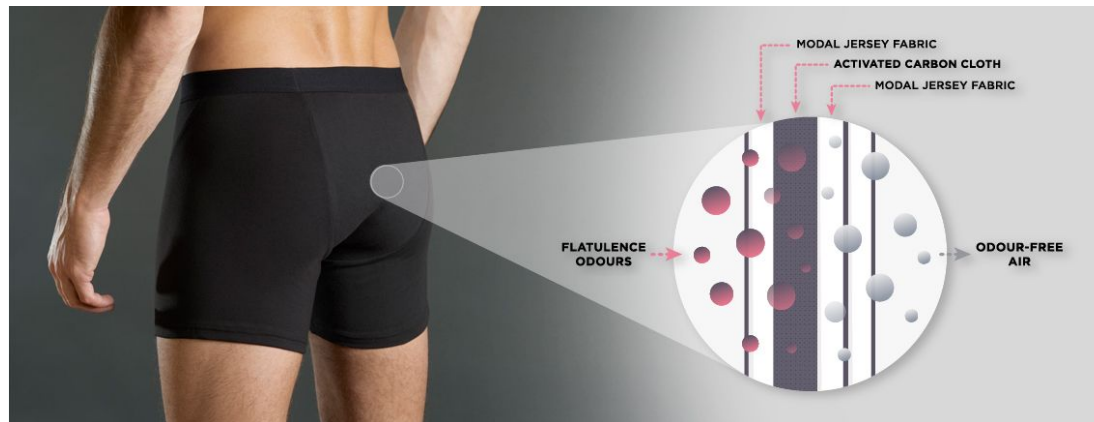


Figure: Shreddies undergarment. Source: [Shreddies](#)

Next Steps

Topic	Question	Report
<i>Key Players and Trends</i>	<i>What is current state of the adaptive clothing market and what is driving its growth?</i>	<i>Intelligence Brief 1</i>
<i>Innovations from Industry</i>	<i>What innovations are currently available from established companies and startups?</i>	<i>Intelligence Brief 2</i>
Innovations from Academia	What innovations from the academic sector may be leveraged in order to thrive in this space?	Intelligence Brief 3
Deep Dive into Key Tech	For the technologies of interest identified, what are the pros and cons relative to the desired point of market entry?	Intelligence Brief 4
Data Analysis and Final Recommendations for Summary Report		

About the Authors



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Senior Project Architect

Professional Summary:

Daniel is a Senior Project Architect who oversees the consumer goods vertical at PreScouter. He received his PhD in Chemical Engineering from North Carolina State University with a focus on developing stimuli-responsive polymer networks for micro-robotics applications. After his graduate studies, he completed post-doctoral work at the LPCNO Lab in INSA Toulouse, France where he focused on incorporating microfluidics with nanoparticle assembly techniques to develop multi-parametric sensors. In addition to his experience in polymer synthesis and characterization, Daniel has industrial experience in pharma manufacturing and polymer composites processing.

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Vinayak Khattar received his Ph.D. in Cancer Biology at the University of Alabama at Birmingham (UAB) and then completed his M.B.A from the Collat School of Business (UAB). He is passionate about marketing, developing, and communicating life sciences-related business ideas. He is a skilled Research Scientist and a Scientific Communicator with cross-functional experience in Molecular Biology, Cell Biology, Immunology, and Cancer Biology. He has successfully completed many life sciences projects leading to 7 peer-reviewed publications, 45+ citations, and 4 awards. He is also actively involved in Technology Consulting, Competitive Intelligence Analysis, and Medical Writing through his ongoing commitment to companies such as PreScouter, Medical News Bulletin, BioNews Services, iNDX.Ai, and SmartAnalyst. Vinayak likes to watch Netflix documentaries with his family during his free time.

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