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Trend Update: Human Movement Tracking and Sleeptech

Fitness and sleep-focused startups leverage human movement tracking technology and aim to enhance sleep quality in real time

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Introduction

After attending recent industry events, we wrote this analyst note to provide a summary of trends driving VC investments in human movement tracking and sleeptech. Key findings include:

- Increased use of AI to support human movement tracking devices primarily for fitness, but with several other potential use cases.
- Continued development of the sleeptech industry, with new products focused on active in-sleep intervention solutions rather than sleep preparation technology.

Human movement tracking

At-home fitness technology has primarily consisted of mobile applications and connected fitness equipment that can enable on-demand classes and integrate data from biometric devices to provide real-time activity monitoring. Early-stage startups are now seeking to use computer vision to track human movement and provide performance feedback in real time. In addition to fitness classes, we believe future health-related use cases could include posture tracking for physical rehabilitation and fitness training, as well as gesture tracking for controlling appliances and devices.

While some startups are building and training proprietary machine learning (ML) algorithms, others have relied on open-source code for specific use cases. We expect self-training startups may have an advantage in the market when it comes to developing alternative use cases, but they will likely require significantly higher product development costs to sustain model building and training activities.

Existing at-home fitness providers could be key buyers of ML-based motion detection technology. For example, Hydro could integrate cameras into its screen to train users on proper stroke technique; Echelon could integrate cameras into its bike to track if riders are matching instructor movement (for example, standing versus sitting) and use the data to calculate scores in the leadership board; Lite Boxer could implement human tracking into its connected device to track if users are returning their hands to the correct position (such as covering face) after delivering a punch.

We estimate the market for at-home connected fitness devices to be around $1.1 billion. However, this market appears to be under pressure in recent months as gyms reopen. Initial ML-based devices appear to be coming to market at similar price points to competitors, suggesting that the market for these products may develop slowly given the current headwinds. User hesitation could also stem from privacy fears related to using artificial intelligence (AI)-based cameras while exercising.

Notable AI-based human movement tracking companies

Company	Product	Description	VC raised to date ($M)
Wondercise	Fitness-themed social network with live motion matching	Live motion matching gives instant feedback and live scores displayed on leaderboards.	$1.5
Liteboxer	Boxing-themed workout game that uses AI to synchronize movements to music.	Offers a virtual reality (VR) boxing workout game and connected device. The company currently leverages computer vision on its VR version but not its connected fitness device. Its VR version utilizes Quest's hand and head tracking platform to track movement without the use of remotes.	$25.8
Altis	AI personal trainer powered through a computer vision neural network for sensorless body capture	Provides personal instruction based on individual capabilities, goals, limitations, and real-time performance .	N/A
Virdio	Fitness gamification application	Digital fitness using equipment-free augmented reality (AR) and movement tracking.	N/A
RowerUp	Rower-focused technique analysis	Computer vision analyzes rower form in real time to refine technique.	N/A

Source: PitchBook | **Geography:** Global
*As of January 27, 2022

*Company highlight: **Altis***

Altis's AI-based personal trainer provides personal instruction based on individual capabilities, goals, limitations, and real-time performance. Altis is powered by a patented computer vision neural network for sensorless body capture, which is continually developed through data collection and ML. While IPixel, Virdio, and RowerUp provide rudimentary computer vision through any camera, Altis delivers its AI personal trainer experience via a console that connects to any screen via HDMI. The console, which houses two time-of-flight cameras, retails for $1,499 in addition to a $39/monthly subscription. While Altis currently requires its console to accurately track body movement, it believes it will evolve to a device-agnostic solution within the next five years. While the company is starting with fitness—both direct-to-consumer in the home and business-to-business for health clubs, hotels, and even physical therapy chains—its mission is truly health-based, seeking to "democratize access to health by starting with its primary lever: what we do with our bodies."

Sleeptech

We have tracked over $2.4 billion in VC invested in sleep technologies since 2019. Sleeptech providers seek to improve behavioral-, environmental-, and genetic-based insomnia, as well as sleep apnea and other sleep disorders. With the increasing prevalence of sleep disorders and the growing focus on preventative health, coupled with technological advancements, we expect the market size for sleep aids to increase from $80.0 billion in 2020 to $150.0 billion in 2030. Within that market, we estimate the sleeptech market to be worth $12.0 billion, slightly under the current mattress market size of $17.0 billion.[1]

One notable trend in sleep devices is the development of products that actively intervene during sleep rather than focusing on preparing the user, during waking hours, for a good night's sleep. Technologies within this segment of sleeptech include light therapy, anti-snoring technology, and thermal regulation technology. Clinical research has shown that red light therapy can improve sleep quality and duration and help users produce more melatonin.[2] Thermal regulation devices regulate the user's external temperature at night; studies have shown that body temperature drops at night.[3] Technology that can track sleep cycles and optimize the external temperature to the user's current cycles will likely perform well.

Despite continued advances in sleep technology, we believe distribution remains a key challenge for sleeptech startups. Devices are often expensive, unproven, and not covered by insurance, so it remains difficult to generate widespread adoption. We have seen several sleeptech startups pursue partnerships with employers and engage in corporate wellness programs to increase distribution channels and potentially subsidize costs to users. However, we believe these approaches have been met with limited success as vendors struggle to demonstrate a clear link between better sleep (ostensibly gained from their products) and employee productivity.

1: "The Global Mattress Market Is Expected to Grow By $ 17.48 Billion During 2021-2025, Progressing at A CAGR Of Almost 8% During the Forecast Period," Report Linker, Infiniti Research Limited, July 5, 2021.
2: "Red Light and the Sleep Quality and Endurance Performance of Chinese Female Basketball Players," Jiexiu Zhao et al., Journal of Athletic Training, vol. 47 (6), November-December 2012.
3: "The Surprising Reason Why You Get Cold When You Sleep," Vox, Susannah Locke, November 5, 2014.

Notable AI-based human movement tracking companies

Company	Product	Description	VC raised to date ($M)	Post-money valuation/ enterprise value ($M)
Motion Pillow	Anti-snoring pillow	Motion Pillow senses when users begin to snore and gently turns their heads to mitigate snoring.	N/A	N/A
Sleepme	Sleepme sleep tracking device, Doc Pro temperature regulating sleep system	Sleepme+ monitors heart and respiratory rates and tracks body movements. Sleepme+ pairs with Doc Pro to adjust the bed's temperature in real time to optimize sleep quality.	$38.3	$117.00
Ergomotion	Adjustable bed base, integrated sound system, and sleep assist app	Ergomotion's smart system combines its adjustable base with an application to offer sleep monitoring and snoring intervention.	$0.7	N/A
Variowell and Tecciō.science	Variowell creates technology for mattress suppliers Tecciō.science creates a mattress firmness adjuster	Tecciō modules use software to change the bed's firmness during sleep. The software runs on an app that uses proprietary algorithms and real-time sensor data. The modules can be implemented into any mattress by the mattress manufacturer.	N/A	N/A
HAPBEE (TSX: HAPB)	Energy-emitting wearable to be used during sleep	The wearable emits ultra-low energy signals designed to mimic natural compounds such as caffeine. Users can select their energy program through mobile app.	N/A	$15.5

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