FROST & SULLIVAN

Healthcare Market Updates

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Wearables

Google wants to create earbuds that monitor users' health— July 26, 2018 (1/2)

Applicable Product Categories: Wearables

Technologies	Wearable/Hearable(Device)	**Therapeutic Areas**	Infectious Disease Epidemic (Ebola Chronic and swine flu); and Lifestyle drive diseases
Applications	Remote health monitoring	**Geographic Focus**	US / Global
Segment Focus	Consumer Grade	**Topics (News type)**	Tech Innovation/ Competitive Intelligence
Companies	Google	**Others**	NA

ANALYST TAKE:

- **Synopsis:** During July 10th, 2018, the U.S. Patent and Trademark Office awarded Google a patent for in-ear health monitoring technology which indicates the continuation of the tech giant's recent moves into the healthcare wearables space. The device is expected to compare each day's temperature against the wearer's baseline and, over time, will be able to identify any unexpected changes.

- **Industry Need:** With increasing commoditization in the consumer wearable and fitness band devices, industry experts view hearables as the next growth segment. Research suggests that in-ear hearable devices allow for more accurate measurements than wrist trackers, for body vitals such as heart rate, body temperature, blood pressure, pulse oximetry, ECG, and electro-encephalogram (EEG) signals among others. Hence, the consumer hearables segment and the hearing health market are expected to grow at 48% and 22% CAGR, respectively through 2022.

Google wants to create earbuds that monitor users' health— July 26, 2018 (2/2)

- **Value Proposition:** The company was granted a patent for an “In-Ear Health Monitoring” device which combines auditory experiences with health tracking. The idea is to use in-ear devices to collect data on users’ health as they consume audio content via their smartphones, tablets, or smart watches. While playing the content, the device would also capture users’ body temperatures, effectively creating a database of their temperature norms. Over time, the device would be able to compare a person’s daily reading against his or her baseline, and recognize unhealthy variations in temperature. In the patent description, Google claims that such a feature could lead to early detection of a contagious disease or other malady.
- Google suggests that in-ear health monitoring could have global health implications — distributing the devices during outbreaks of diseases such as Ebola and swine flu could increase early detection rates, decrease mortality, and limit the scope of the outbreak.
- **How the Earbud Diagnosticians will work?**
    - To complete the reading, a user would initiate a “temperature-equalization period” while she listens to a piece of audio content. That content will play long enough for a temperature sensor in the in-ear device to collect the relevant data.
    - If the user does this regularly, the sensor will compare each day’s temperature against the ones that came before, generating that day’s differential.
    - The patent also suggests that users could be compensated for their readings to incentivize them to record their daily temperatures. Potential rewards could include access to media content, financial compensation, or discounts.

- Frost & Sullivan believes, given Google’s technological might and complementing digital healthcare solutions (research watch, analytics, DeepMind, etc.), its new in-ear detection devices could alleviate the mental and physical overhead of disease detection, especially if the system includes reminder alerts or reward incentives. These would encourage people to check their temperatures, and that information could either be transmitted to a medical facility or be used by the individual. More importantly, beyond collecting and documenting temperatures, Google’s devices could transmit pre-recorded instructions can be processed through Google’s DeepMind AI population health analytics platforms to provide insights on spread of health epidemic and the necessary measures by health authorities to deliver timely care to infected people or appropriate next steps.

- **Target End-User:** Health Systems, Government, Healthcare Communities, Consumers

WEBLINK: https://bit.ly/2AhnrjS

LifeSignals Gets FDA Clearance For Wireless LP1100 Life Signal Patch — July 26, 2018 (1/2)

Applicable Product Categories: Wearables

Technologies	Wearable (Device + Platform)	**Therapeutic Areas**	Health Conditions; Ambulatory ECG Monitoring
Applications	Remote patient monitoring/ Ambulatory ECG	**Geographic Focus**	US
Segment Focus	Clinical Grade	**Topics (News type)**	Competitive Intelligence
Companies	LifeSignals Inc.	**Others**	3M; STMicroelectronics

ANALYST TAKE:

- **Synopsis:** LifeSignals Inc. (formerly HMicro Inc.) has received FDA clearance for its wireless LP1100 Life Signal Patch for enabling the next generation of wearable, healthcare monitoring devices. The company noted that the approval paves way for the next generation of Remote Patient Diagnostics.

- **Industry Need:** Based on industry estimates, Cardiovascular diseases (CVD) claim more lives than all forms of cancer combined. For example, heart disease has been the biggest killer in America since 1920 and involves spending of more than $110 billion/year. Research suggests that most CVD conditions can be prevented by continuous monitoring of modifiable behavioural and lifestyle risk factors – this in turn is driving the demand for digital remote patient monitoring solutions and accurate predicting tools.

LifeSignals Gets FDA Clearance For Wireless LP1100 Life Signal Patch — July 26, 2018 (2/2)

- **Value Proposition:** The company claims that the unique combination of its LC100 Life Signal Processor (LSP) Platform and a patented, integrated multi-electrode architecture would provide unprecedented attributes unachieved by other ECG patch product in the market. It opens the door for OEMS using the Life Signal Processor™ to develop ECG and other vital sign monitoring wearables with a wireless connection to the cloud. The approval also provides a needed biosensor patch for companies looking to deliver certain health applications in the low acuity patient monitoring space, consumer wellness, senior care and animal health.
- **Life Signals Processor Innovations:**
  - LP1100 LS Patch is a clinical-grade, two-lead ECG (extendable to three leads) and heart rate monitoring patch, providing three days of monitoring with continuous wireless data transmission using two zinc-air batteries.
  - The LS Patch has attributes previously unachieved by any other patch product – fully disposable, a small form factor, comfortable to wear under regular daily clothing, continuous data transmission on a Wi-Fi network, reliable coexistence of multiple patches while transmitting, and low cost.
  - LS Patch is intended to be a baseline reference design for OEMs addressing various markets such as healthcare, consumer wellness, senior care and animal health, accelerating time to market of their diagnostic and monitoring systems. It can also be adapted as-is by OEMs under their private label to create their own end-products based on LS Patch.
  - LS Patch is in high volume production at LifeSignals's contract manufacturing partner – Dreamtech of Korea.
- **Collaborations:** LifeSignals worked with 3M (NYSE: MMM) and STMicroelectronics (NYSE: STM) to develop and industrialize the Life Signal Processor product family, targeting high-volume markets.
- Frost & Sullivan's recent research reveals that among all the deaths caused by CVD, about two-thirds of them happen in out-of-hospital settings. Given this there is a strong growth opportunity for clinical-grade wearable devices that are empowering patients with seamless integration of remote monitoring solutions into daily life for early diagnosis and health promotion. However, given the growing competition in the clinical-grade remote ECG wearable solutions the real differentiation will be how these vendors move beyond the device play and augment caregivers/patients with data-driven actionable health insights to make informed decisions.
- **Target End-User:** Hospitals, Cardiac Rehab Centres, Home care

WEBLINK: https://bit.ly/2AgrQ6s

Myant and Butler Technologies Enter Wearable Technology Partnership— July 24, 2018 (1/2)

Applicable Product Categories: Wearables

Technologies	Wearable (Device)	**Therapeutic Areas**	Chronic and Lifestyle driven diseases
Applications	Remote health monitoring	**Geographic Focus**	US
Segment Focus	Consumer Grade	**Topics (News type)**	Tech Collaboration / Competitive Intelligence
Companies	Myant Inc; Butler Technologies Inc (BTI)	**Others**	NA

ANALYST TAKE:

- **Synopsis:** Toronto-based Myant Inc. and Butler Technologies Inc (BTI) have announced a licensing agreement of Myant's wearable electro-luminescent (EL) lamp technology and a partnership for the advancement of Textile Computing through Butler's participation in Myant's Digital Textile Factory initiative. Future collaboration between Myant and BTI will likely include the installation of a Myant Digital Textile Factory in the Pittsburgh area.

- **Industry Need:** Research suggests that 33% of US consumers stopped using wearables within 3–6 months of receiving them. As wearable technology blends with fashion, aesthetics and personalization – attributes such as ease of use and seamless usage will be key drivers for consumer adoption.

Myant and Butler Technologies Enter Wearable Technology Partnership— July 24, 2018 (2/2)

- **Value Proposition:** Myant's patented EL lamp technology emits light visible under any weather condition and from any angle. This technology builds on a naturally occurring phosphor powered by a small power source and is completely washable and flexible. In addition to the technology licensing agreement, BTI will join Myant's Digital Textile Factory initiative as a trusted expert on printed electronics.
- Future collaboration between Myant and BTI will likely include the installation of a Myant Digital Textile Factory in the Pittsburgh area. Doing so will provide the foundation for the development of an ecosystem for Textile Computing and printed electronics in Pennsylvania with significant opportunities for research collaboration with post-secondary institutions as well as opportunities for start-ups and other industry players to participate. This is one of a number of other Digital Textile Factories that will be built as part of a roll-out plan to democratize manufacturing while keeping it local. Textile Computing solutions apply to industries including military, aerospace, automotive, healthcare, health and safety, performance apparel, and more.

- Frost & Sullivan views this as Myant's continued commitment for innovation around its wearables devices - to make health wearables applications more seamless for average US consumer. In addition to the technology licensing agreement, BTI will join Myant's Digital Textile Factory initiative as a trusted expert on printed electronics. To achieve that BTI's participation will bring its demonstrated expertise in developing & manufacturing user-friendly printed electronic solutions for next-gen wearables to its Textile Computing network.
- The Digital Textile Factory concept can be viewed as a new revenue stream, where it can provide smart clothing tech entrepreneurs, innovators and established industry players access to a virtual factory for ideation, research & development, access to yarns and connectors, and design and manufacturing at scale. In doing so, this initiative will propagate and democratize advanced manufacturing techniques and access to the most advanced Textile Computing machinery in the world.

- **Target End-User:** Wearable OEMs, Consumers

WEBLINK: https://bit.ly/2LTlV8I

Edinburgh AI healthcare company secures $8m for US growth— July 26, 2018

Applicable Product Categories: Wearables

Technologies	Wearable (Device + App); AI	**Therapeutic Areas**	Chronic and Lifestyle drive diseases
Applications	Remote health monitoring	**Geographic Focus**	UK/US
Segment Focus	Consumer Grade	**Topics (News type)**	Tech Convergence
Companies	Snap40	**Others**	NA

ANALYST TAKE:

- **Synopsis:** Snap40 a company whose wearable device monitors the human body in real-time to identify health risks has secured $8 million (£6m) in seed financing, calling the investment the “largest seed financing round” for a digital healthcare company in the UK.
- **Industry Need:** Advent of digital solutions are manifesting a new era of healthcare consumerism empowering average individuals for self-health management. This Quantified-Self moment has been further propelled by an evolving ecosystem of connected health technologies such as wearables, telehealth, artificial intelligence, virtual reality, and others that support targeted health and well-being services.
- **Value Proposition:** The company intend to use the investment to accelerate its US expansion, where it has clinical trials and pilots with several hospitals and institutions. Snap40 said its wearable device is designed to monitor the body in real-time, using proprietary algorithms to identify health risks so appropriate proactive care can be applied. With a plethora of personalized data generated by health wearables Frost & Sullivan believes, convergence of AI and analytics capabilities will be instrumental to generate clinically actionable health outcomes for the much needed preventive care practice. For example, a majority of chronic health conditions are exacerbated by lifestyle choices and poor management, wearables technologies with AI-based intelligent solutions are uniquely geared to provide deeper insight into both for remote and hospital care settings.

WEBLINK: https://bit.ly/2OmiQj7

Mobile Phones/ mHealth

Healthy.io gets FDA nod for smartphone camera-based home urine test — July 25, 2018 (1/2)

Applicable Product Categories: Mobile Phones

Technologies	Artificial Intelligence, Image Recognition	**Therapeutic Areas**	Diabetes, Urology, Gynecology, CVD
Applications	AI enabled home based urinalysis	**Geographic Focus**	Global
Segment Focus	Clinical Grade	**Topics (News type)**	Care Delivery Innovation; Tech Innovation
Companies	Healthy.io	**Others**	NA

ANALYST TAKE:

- **Synopsis:** Tel-Aviv, Israel-based Healthy.io has secured FDA 510(k) clearance for Dip.io, a home-based urinalysis kit that turns a smartphone into a clinical-grade diagnostic device. It's touted as the first smartphone-based clinical urine test to secure clearance as a Class 2 device.
- **Industry Need:**
  - Home based POCT testing has increasingly made the diagnosis and care workflows more efficient and streamlined. While, portable kit based tests used to enable the user perform the diagnostic tasks at home, the analysis and final test results still used to be dependent on expert analytical skills of a trained clinician. Hence, the final test results used to be delayed, thereby delaying the final diagnosis and intervention
  - Additionally, conducting such tests in lab is highly cumbersome and time consuming, increasing pressure on the already stretched primary and secondary system and leading to wastage of healthcare dollars and resources

Healthy.io gets FDA nod for smartphone camera-based home urine test — July 25, 2018 (2/2)

- **Value Proposition:**
  - Dip.io is a home-based, smartphone-enabled urinalysis kit that lets patients conduct clinical grade urine tests from their home. It is the first time the FDA has ever granted Class II approval for smartphone urine testing.
  - The Dip.io kit used to detect protein, glucose, and blood in urine, consists of a cup, a bunch of dip sticks and a complimentary smartphone app. The patient needs to put urine in the cup, soak one end of the dip stick in the urine and place the dip stick onto a plastic plate with an bunch of colored spots on it. The dip stick has its own colored test areas, and the color of those will change depending on the presence of particular biomarkers. The smartphone app is then used to take a picture of the plastic plate and dip stick.
  - The app uses the colored spots on the plastic plate to calibrate for any differences in lighting and smartphone cameras being used. It then accurately assesses any color changes on the dip stick and sends its results to the patient's healthcare provider. The results can then be used as usual to lead to a diagnosis or to just be a part of the patient's clinical record.
  - Dip.io is already commercialized in Europe and Israel. In the UK, it's available through a "virtual renal clinic" launched in June by the Salford Royal NHS Foundation Trust. In the US, the company has done a study with National Kidney Foundation and Geisinger Health, demonstrating a feasible use of the platform to improve adherence to care for kidney patients.
- Frost & Sullivan believes that the Dip.io test kit will see high penetration among all types of patient population due to its simple, easy to use solution. Moreover, integration of such tests with the readily available products such as a smartphone, will further ease the workflows. The test is expected to increase patient engagement and empowerment amidst a global scenario of increased healthcare consumerism. This in turn also helps improve patient care coordination, adherence, outcomes and curbs healthcare expenditure. Furthermore, the ability of the solution to readily share the test results with the doctor, further improves the care outcomes through prompt diagnosis and intervention.
- **Target End-User:** Patients, clinicians

WEBLINK: https://bit.ly/2JZT8gU

Apple's applied-for sunscreen-detection patent could use Apple Watch or phone camera — July 23, 2018

Applicable Product Categories: Mobile Phones

Technologies	Spectrometry; Sensor; AR	**Therapeutic Areas**	Lifestyle diseases
Applications	Sensor enabled sunscreen detector	**Geographic Focus**	Global
Segment Focus	Consumer Grade	**Topics (News type)**	Tech Innovation; Tech Convergence
Companies	Apple	**Others**	NA

ANALYST TAKE:

- **Synopsis:** The United States Patent Office has published a patent from Apple, filed (not yet granted) in December 2017, for a "sunscreen detector" that could be incorporated into the Apple Watch or the iPhone and could even include augmented reality functionality.
- **Industry Need:** While sunscreens are discretionary items, they are proving to be of increasing utility across the globe due to added risks of harmful UV-IR rays from sun ultimately leading to highly morbid skin diseases and cancer. Having a smart solution to readily gauge effectiveness of sunscreen and impact on UV-IR rays on skin will be an added enabler of health through timely screening of any prevalent condition .which otherwise could have gone unnoticed.
- **Value Proposition:** The UV-IR spectrometer patent, filed by Apple, is aimed to be a sunscreen detector configured to identify the degree of sunscreen coverage in exposed areas of the skin of a user and may provide information about regions that may be at elevated UV exposure risk. The sunscreen detector also has capabilities to indicate areas of skin or entire body parts where sunscreen protection is missing or inadequate. Based upon the detected sunscreen coverage, the detector may provide notifications or instructions to the user about where to apply or re-apply sunscreen, and/or how much and how often to apply sunscreen. In the patent, Apple is proposing a sensor that could detect the UV rays being deflected by the skin, thus gauging the effectiveness of the sunscreen. The sensor would be built into an iPhone or Watch, allowing the user to scan different areas of their skin.

WEBLINK: https://bit.ly/2OmIG6T

Smart Home Devices & Appliances

Are Toilets The New Twitter? Using Smart City Data To Measure Interest – July 20, 2018

Applicable Product Categories: Smart Home Devices

Technologies	Sensors	**Therapeutic Areas**	Public Health
Applications	IoT	**Geographic Focus**	Japan / Global
Segment Focus	Consumer Grade	**Topics (News type)**	Technology Innovation
Companies	NA	**Others**	-

ANALYST TAKE:

- **Synopsis:** After the Football World Cup's Japan vs. Columbia match, Tokyo's waterworks bureau noted a 24% increase in water use across the city, as several people used the bathroom around the same time, during breaks.
- **Industry Need:** An increasing number of sensors around a city's public systems can be utilized for several use cases. For example, in this article's topic, the water department was prepared for the surge of water usage around specific times.
- **Value Proposition:** Frost & Sullivan has long argued that smart city initiatives can greatly benefit public health. The MIT Underworlds research project utilizes sensors in the sewage system to track the spread of infectious diseases, as an example.
- Frost & Sullivan also believes that smart homes can play a bigger role in public health and population health efforts. Smart homes' 'smart' toilets can help users track their health, but also provide anonymized data to be analyzed at a community or a city level for the hospitals or public health officials to track all kinds of disease conditions for better planning and outcomes.
- **Target End-User:** Public health, ACOs, health systems and insurance companies.

WEBLINK: https://bit.ly/2vaNKSS

Voice interfaces will lower the barrier to access technology – July 23, 2018

Applicable Product Categories: Smart Home Devices

Technologies	Sensors, Devices	**Therapeutic Areas**	NA
Applications	AI, IoT	**Geographic Focus**	Global
Segment Focus	Consumer Grade	**Topics (News type)**	Other Trends
Companies	NA	**Others**	-

ANALYST TAKE:

- **Synopsis:** Why voice is the best form of interface for accessing technology.
- **Industry Need:** As the article points out, we had to learn new features of smartphones such as pinch-to-zoom or swiping to answer calls; these didn't exist before. While the tech-savvy generations quickly pick up these skills, the elderly, and other generations find it difficult to catch up with new interfaces.
- **Value Proposition:** Because voice is a natural form of interaction, it lends itself to be a natural fit for almost anyone (except the mute, maybe) to easily access technology. Technology in the form of robots, devices or simply voice virtual assistants are easy to interact with voice. Seniors, those with physical disabilities, especially visual impairments benefit the most.
- Frost & Sullivan believes voice to be revolutionary for technology uptake, and the recent data on sales of smart speakers is evidence enough. Still early days maybe, because users need to be aware of the language semantics to interact efficiently with technology, and these are still completely dependent on an internet connection to function.
- **Target End-User:** All smart device users.

WEBLINK: https://bit.ly/2OkJpp5

Google is mulling a new market for Nest smart home products: seniors – July 23, 2018 (1/2)

Applicable Product Categories: Smart Home Devices

Technologies	Sensors, IoT	**Therapeutic Areas**	NA
Applications	Smart home devices	**Geographic Focus**	US / Global
Segment Focus	Consumer Grade	**Topics (News type)**	Competitive Intelligence
Companies	Google, Nest	**Others**	-

ANALYST TAKE:

- **Synopsis:** Google's Nest products are being pitched to senior living communities and facilities to support the aging-in-place trend, backed by technology.

- **Industry Need:** As outlined earlier, smart homes are the best fit for aging-in-place trend, i.e., seniors who wish to age independently. Given a growing elderly population (10,000 Americans turn 65 everyday; there are 67,824 centenarians in Japan), the need for such solutions will only increase, especially as they cater to the wishes of the seniors to live independently.

Google is mulling a new market for Nest smart home products: seniors – July 23, 2018 (2/2)

- **Value Proposition:** Nest smart home portfolio includes the popular thermostat, and also smart camera products, smart locks, etc. While these serve some elder care needs, Nest / Google is also thinking of additional ways to serve this segment, with motion sensors for example. However, these new products / concepts still need to be designed, are in discussion stages only. At the same time, Nest was under the parent company Alphabet, but recently has been rolled in to Google for better integration with Google Home assistant, and AI.

- Frost & Sullivan believes the integration of Nest products with Google Home and it's AI are crucial for success, especially as we discuss voice being the best interface for seniors. At the same time, Google will have to design new products that better serve the needs of senior living facilities, which it is currently targeting. Note, Google is actually up against senior living facility vendors such as Stanley Healthcare (a division of Staney, Black and Dekker), which not only have presence across the US and Europe and have several years of experience in serving the dedicated needs of these communities, but are also independently researching and developing their own versions of smart solutions, customized for aging-in-place! The competition is tough, with Google having the brand name, smarter AI and enough R&D budgets on their plus side.

- **Target End-User:** Senior living facilities, aging-in-place solution providers, builders and developers of senior living communities.

WEBLINK: https://cnb.cx/2A6LNN6

Kuri the cute home robot gets canned by Bosch – July 25, 2018

Applicable Product Categories: Smart Home Robots

Technologies	Robots	**Therapeutic Areas**	NA
Applications	AI, IoT	**Geographic Focus**	Global
Segment Focus	Consumer Grade	**Topics (News type)**	Other Trends
Companies	NA	**Others**	-

ANALYST TAKE:

- **Synopsis:** Bosch's subsidiary Mayfield Robotics announced that parent company Bosch has decided to cancel the home robot launch, as it was not a 'business fit'.
- **Frost & Sullivan:** "Kuri was designed to play with children, respond to voice commands and patrol properties while filming videos and taking photos." However, the number of robots being developed for specific tasks has continued to rise significantly. There is no doubt that robots are a requirement in the home – however, unlike smart home devices which can become part of an ecosystem (Amazon Alexa, Google Home, Samsung SmartThings), consumers cannot be expected to buy multiple robots – one for security and playing with children (Kuri), one for giving elderly folks company (ElliQ), etc.
- Bosch, with a suite of smart home products, considered robots not a business fit – and they may be right: interactive robots (not the robotic vacuum cleaners) such as Kuri won't necessarily be Bosch's forte. With news of Amazon trying to build robots, backed by the popular Alexa platform, Bosch may not be able to compete with such robots that can do much more, than just security patrol and entertaining children – the value proposition needs to be stronger than that.

WEBLINK: https://bbc.in/2LpxuZb