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APPLICATIONS OF IOT – CONNECTED CLOTHING

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ABSTRACT

Wearable technologies have so far been dominated by smart watches and fitness fans keen to exploit the tracking of speed, location and body monitoring to try and improve health. Yes fashion designers are also now exploring the potential of sensors and internet connectivity to create clothing and accessories that are often beautiful and intriguing as well as smart. It's not only clothing. While even the likes of Tag Heuer have announced plans to unveil an IoT wearable, there's more to connected accessories than smart watches. The research is still dancing between the two extremes. But the one thing that's certain is the world will be full of connected sensors. It's merely a matter of deciding how to use them – to count how many steps we've taken in a day, or to show off our emotional state to those around us with an interactive t-shirt.

Key Words: IoT wearable, digitally connected clothing, micro EMG sensors, pulse oximetry technology.

1. INTRODUCTION

Some 10 billion products in the apparel, accessories and footwear market are currently being individually digitally connected, and the ability to locate items is just one of the benefits that will surface from the deal. Over the next three years, it will see brands at both ends of the market introducing products with unique digital identities and data profiles in the cloud from the point of manufacturing.

Essentially our physical wares will come with digital applications accessible via our phones. We will indeed be able to find our shoes when we've lost them, but also do such things as figure out how to wash clothes properly, look for style tips on how to wear items, even search for how to buy a new version of the same piece. In fact, the limitations of what's possible lie entirely in the hands of the brands whose products will now have such digital identities, and not the partners facilitating it.

The outcome is the ability to make items of clothing (et al) more interactive, informative and personalised for consumers. They will also become increasingly smarter for businesses, able to use real-time data analytics to tackle problems like product authentication for better brand protection and increased efficiency in supply chains.

Fig 1.1 Connected footwear will provide all sorts of use cases

2. IOT- CHARECTERISTICS

IoT should have the following three characteristics:

Comprehensive Perception:

Using RFID, sensors, and two-dimensional barcode to obtain the object information at anytime and anywhere, it will be a new opportunity. Using it, information and communication systems can be invisibly embedded in the environment around us. Sensor network will enable people to interact with the real world remotely. Identification technologies

mentioned here include objects and location identifications. Identification and recognition of the physical world is the foundation of implementing overall perception.

***Reliable Transmission*:**

Through a variety of available radio networks, telecommunication networks, and Internet, objects information can be available in any time. Communication technology here includes a variety of wired and wireless transmission technologies, switching technologies, networking technologies, and gateway technologies. IoT further creates the interaction among the physical world, the virtual world, the digital world, and the society. Machine to machine (M2M), furthermore, is the key implementation technology of the Network of Things, which represents the connections and communications between M2M and Human to Machine including Mobile to Machine.

***Intelligent Processing*:**

By collecting IoT data into databases, various intelligent computing technologies including cloud computing will be able to support IoT data applications. The network service providers can process tens of millions or even billion pieces of messages instantly through cloud computing. Cloud computing technology will thus be the promoter of IoT.

3. APPLICATIONS –CONNECTED CLOTHING

From an IOT perspective it's a major milestone. We're talking about billions of apparel items having a digital capability, enabling a whole vertical industry to be able to act. We're taking the manufacturing complexity out of the challenge list by pre-solving it for brands. No longer is it about how we are going to get 500 million pairs of sneakers to have a digital capability, because it's already there. Now it's about what applications you're going to create, and a focus on real end value for the user. Much more than strapping gadgets to our wrists, faces, ears and feet, smart clothing can constantly track our heart rate, monitor our emotions and even pay for our Starbucks. All without grabbing a phone or even tapping a smart watch screen. The recent developments witnessed in digitally connected clothing are as below:

3.1. Lumo Run

From the makers of the Lumo Lift posture tracker, these smart running shorts and capris pack in a sensor that can monitor a host of metrics including cadence, ground contact time, pelvic rotation and stride length. The smart running gear supports real time coaching with feedback sent through to your headphones to help improve running form and reduce the chances of injury. There's no change on the battery front either, giving you an impressive one month off a single charge. If you don't want to buy the shorts, there's also the lumo run sensor that can smarten up your current running kit.

Fig 3.1 lumo run

3.3. Hexoskin Smart

The Montreal based smart clothing startup recently unveiled its latest connected shirt that's laced with sensors. Along with monitoring heart rate, breathing and movement, it's now fitted with a Bluetooth Smart sensor so you can pair your favourite fitness apps such as MapMyRun, RunKeeper and Strava, as well as a whole host of third-party accessories. Data is captured in real time and sends it all to the companion app, providing insights on a range of sporty metrics including intensity and recovery, calories burned, fatigue level and sleep quality.

Fig 3.2 hexoskin smart

3.3. Athos

Athos is based on expensive medical tech but designed for gym bunnies. Its range of training clothes is woven with micro-EMG sensors that detect which of your muscles are working and transfer this workout data to a smartphone via a Bluetooth core. Muscle effort, heart rate and breathing are all tracked and the app provides insights to help you to exercise correctly and avoid injury. This could be the personal trainer in your pocket you've been waiting for.

Fig 3.3. athos

3.4. Sensoria running socks

These connected socks aim to track your runs in detail, offering information on pace, distance and time as well as your running style. They can help users run with better form, which can lead to faster times and a reduced risk of injury. The socks feature three textile pressure sensors, which measure the pressure placed on the foot during running. All the number crunching is done by a unit that clips onto the top of the sock, and then the data is shown up in an app dashboard.

Fig 3.4 sensoria running socks

3.5. Owlet smart socks

Smart clothing isn't just about fitness anymore. Take the owlet smart sock a monitor for babies that uses the same pulse oximetry technology used in hospitals and can monitor heart rate to make sure the little one's breathing and sleep has been uninterrupted. The sock comes in three different sizes to ensure a snug fit and charges up via a small base station. It pairs with an iPhone companion app over Bluetooth with an Android version is expected in the coming months. This will keep you updated on your baby's status during the night to complete the ideal remote monitoring set-up.

3.6. Samsung NFC Suit

Samsung is going big on smart clothing and has already shown off its Body Compass workout shirt, which monitors biometric data, and a golf shirt in collaboration with Bean Pole Golf that includes weather and UV rating monitoring. The Korean giant also has an NFC smart suit, built in collaboration with Rogatis, that lets the wearer unlock their phone, swap business cards digitally and set gadgets to office and drive modes. It's already sale in Korea for roughly $500, with no news yet as to whether it's going to break out into other territories.

Fig 3.6. samsung NFC suit

3.7. Lyle & Scott Contactless Jacket

Barclaycard and Lyle & Scott recently teamed up to design a contactless payment jacket powered by bPay. The Contactless Jacket, which features the same contactless payment chip found in debit/credit cards discretely hidden in the cuff of the right sleeve, allows the wearer to pay for anything up to £30 across 300,000 shops, bars, restaurants and stations around the UK. The double-faced, hooded jacket is available from the heritage brand in Admiral Blue and True Black online, or if you happen to stumble across Lyle & Scott's Carnaby Street store.

Fig 3.7. lyle and scott contactless jacket

4. EXPECTED INNOVATIONS IN APPLICATIONS

A jersey that can monitor your blood pressure, heartbeat, running speed, distance covered etc,. will really be a cool idea as it is a widely preferred one by all ages and extra features like odour control, auto fitting, temperature control etc.,.

A contact lens that can clear our vision and also provide some features like zoom in and out for people with both short and long sight problems.

These are some ideas that we came up with. But, there are a wide range of applications when it comes to connected clothing with respect to which we can expect a revolution in the fashion industry.

5. ISSUES

The fact that the infrastructure that supports the Internet-connected devices is unreliable and can fail represents a disadvantage to the IoT as well. The infrastructure that supports the Internet works differently across diverse geographical areas. For example, in Mexico Telmex has the monopoly as the company that provides Internet to users and companies. It is expensive, unreliable and it fails frequently. Users can spend hours or days without Internet, and Telmex's support team is inefficient and fickle. Furthermore, since the Internet service is expensive, many individuals do not have this service, therefore the IoT could increase the damage caused by the digital divide. Furthermore, changes in the environment and weather conditions remain as an obstacle to objects connected to the Internet. What happens during a power electricity cut? What happens to these objects during a time of catastrophe or natural disaster?

6. CONCLUSION

The more sensors out there, the more dresses such as Intel's Spider will have to interact with. When we have a genuine sensor-led environment and our clothes can communicate with each other, with stores, with events, we will open up a world of possibilities that we have yet to explore or even understand what that could mean.

Fig 3.1 customising our look digitally

Connected clothing will allow us to communicate in a completely new way ... the possibilities are incredibly exciting. But what happens next for connected fashion depends on how tech evolves. The sensors and processing power could be crammed almost entirely on a phone, and interact with connected devices as a hub. Or, that power could be distributed across the body.

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