

E-Textiles in the real world

E-Textiles are the integration of electronics into textiles, to enhance a material, an item of clothing or a piece of art.

Electronics that are commonly integrated are:

- Sensors
- Actuators
- Power Supplies
- Smart Materials

Here are some examples of where E-Textiles are being used in research and development at the moment:

1. Sport: Safety helmet

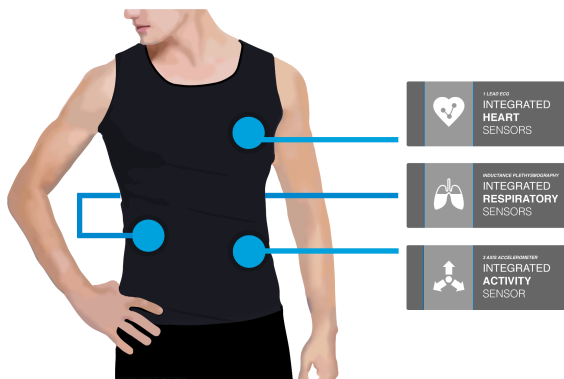


Here is an image of a new helmet that is being developed to inflate when a rider crashes.

There are multiple sensors integrated in the neck brace which monitor the acceleration of the wearer. These sensors can identify when the wearer experiences a severe shock which would indicate a crash or fall. When this takes place, a signal is sent to the actuator which causes the inflation of the helmet over the head.

By only inflating when the wearer encounters an accident, the helmet can fully protect all parts of the head, which may obscure vision in traditional designs. This allows the helmet to be more comfortable and less intrusive to wear yet provide additional protection.

2. Sport: Smart Undergarments



Using E-Textiles, smart wristbands that track fitness levels and activities, are now being developed into more wearable and less intrusive pieces of clothing. Smart undergarments are able to track a wearer's physical condition using various sensors. Common sensors include tracking one's heart rate, acceleration, breathing pattern and oxygen levels. These are items of clothing that can help athletes to improve their performance

by sending data to mobile devices, allowing them to track and monitor their progress.

3. Social Care: Smart home systems

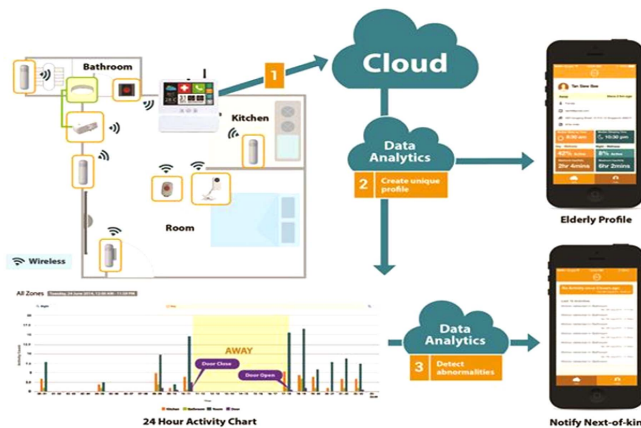


FIG. 9 The Smart Home Next System Uses the Information of the Inhabitant Home and Analyzes the Data to their needs (IEEE 2014)

Smart home systems are a developing technology to help support vulnerable people living at home. This may be if they are elderly and have a high risk of falling, or someone with a severe disability or long-term illness.

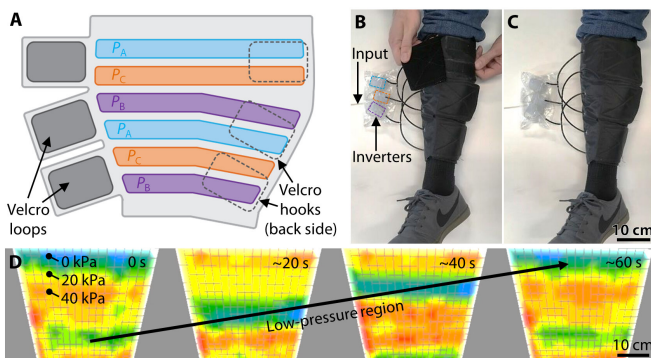
Within the home, multiple sensors are installed which can monitor the inhabitants health, activities and well-being.

Sensors can include light sensors, sensors to identify when appliances are used (such as

the oven, kettle or shower) as well as wearable sensors to track the inhabitants heart rate and acceleration. The idea is for all of this data to be compiled to be able to identify if the activity of the inhabitant is abnormal or indicates that they may need additional assistance with some tasks.

E-Textiles could be used in this context to help imbed sensors into the home, with them being less noticeable or intrusive to the inhabitant. They can also aid wearable technologies to be more comfortable for the wearer.

4. Medical Care: Stimulation for better blood circulation



An area of research being conducted at Harvard university is on using smart materials which can help improve blood circulation.

Smart materials are materials that change due to their environment. For example, a smart material may change shape or temperature, if electricity is run through them.

This example of Smart Materials is being used to aid elderly patients which have poor blood circulation in their lower legs. The compact design with the materials being integrated into a sling means that it is less intrusive for the wearer. The sensors throughout can then recognise where pressure is required. The material can react by increasing or decreasing in size to provide pressure to certain areas of the leg.