Development of an attachment method to a human body for a 3D motion tracker

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Factic is a product development company that develops a variety of products for her customers. Factic's product development services range from very early ideation up until product production. Factic has a multidisciplinary team where, next to software and electronics, industrial design is an important factor.

Factic is currently designing an "eSensor" for one of its customers. This is a wireless sensor that can determine its position and orientation. The eSensor is designed to be used for outdoor multiplayer virtual reality gaming, but it might as well be used for applications like: character animation, biomedical applications, eHealth, fitness, physiotherapy, robotics and kinetic art projects.

For outdoor multiplayer virtual reality gaming and for many of the other applications the eSensors must be attached to the human body amongst other things. This is where most sensors lack. Existing attachment methods are often hard to use or are not secure and robust enough. Complete suits have to be used, which take a long time to put on and usually require a specialist to help put them on correctly. That is why a better attachment method is needed. This attachment should be easy to attach to a human body. Without instruction and within two minutes a player has to be able to attach five sensors to him- or herself.

The main question of the assignment is: how can one attach and detach an eSensor multiple times to the own body in a way that the sensor will not move from its original spot?

The design process has been divided into five parts: requirements analysis, exploration, concept phase, design phase and testing

In the requirements analysis a target group had to be found. Since outdoor multiplayer virtual reality does not exist yet, a target group does not exist either. The found target group is interested in new technology, willing to take risks; the early adopters (1) of this group people aged 16 to 55 are the target group. In the end of this phase requirements were made, with important points like comfort and ability to stay in place and the fact that the sensors have to be attached to ankles, wrists and sternum.

In the exploration phase materials and techniques to attach a sensor, and design challenges were sought. The design challenges are problems that are not obvious but have to be solved to get to a good design. Through brainstorming many materials and techniques to attach a sensor were found, six of these could potentially be used and are explorated further.

In the concept phase the materials and techniques that were found in the exploration phase are used to make concepts. By making a morphological scheme six concepts could be created. Three of these concepts are chosen to be elaborated so one concept can be chosen. This concept is chosen to be even further elaborated in the design phase.

In the design phase a product is made that can be clicked around ankles, but slid over wrists and then tightened. A harness suitable for men as well as women is designed. (picture 1 and 2) The straps have a design on them that is exposed once the straps are tightened. The wrist and ankle attachments are made of stretchy Velcro. An attachment that

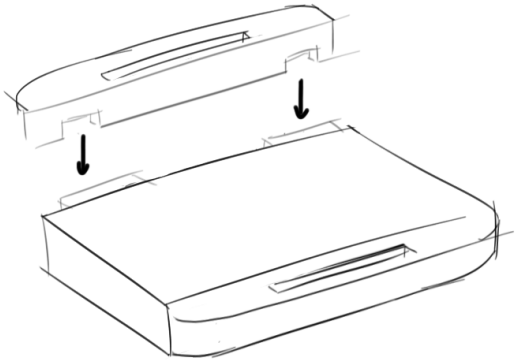
is a closed loop can be easily be slid over hands and be tightened by pulling on the Velcro strap and sticking it to itself. The sensor can be opened as well so it can be clicked open and close to attach to an ankle.

In the test phase the final design was tested. The attachments were tested by just trying to place them, by doing game-like movements and when swimming. The sensors do meet all requirements however.

The straps and harness can be made of different materials, for better performance. A packaging can be made in a way that the user knows where to place the sensors without having to receive written directions. The click mechanism should be changed by making the sides not slide off, but by making them click from the front side. (picture 3)

Picture 1, the redesigned sensor with the sides that can slide off

Picture 2, the sensors as they will be worn



Picture 3, the sensor with a new click mechanism as recommended

1. Rogers, E. M. (2002). Diffusion of preventive innovations. Diffusion of preventive innovations, 27, 989-993.