

US start-up Omius Tech has developed a waterproof jacket that uses artificial intelligence to regulate the wearer's body temperature.

The comfort zone

Silicon Valley, in the north of the US state of California, is a hotbed for innovation. As well as the headquarters of leading technology companies including Facebook, Google, Hewlett Packard and Tesla, it is also home to thousands of start-up companies, which feed on the area's rich supply of venture capital investment. One such start-up, Omius Tech, has created a "living" jacket that adjusts to the wearer's fluctuating body temperature during changeable weather conditions or varied physical activity.

The waterproof jacket features a ventilation system similar to stomata, the microscopic pores that plants use to allow gases in and out, an aspect of plant life that has been the basis of other sports textile developments. It consists of slitted vents which run up and down the chest and upper back of the garment; when open, they allow the hot air from near the body to escape, keeping the wearer cool. Gustavo Cadena, CEO and chief technical officer of Omius, tells *WSA* that the company came up with the idea of controllable vents and then realised the similarities with the natural system used by plants. He says this resemblance served as a sign that Omius was heading in the right direction as "nature usually arrives at very simple solutions".

The jacket was inspired by Mr Cadena's own experiences. Having lived in both very hot and very cold places, he believes he has experienced all the different levels of "thermal discomfort". "These experiences made me realise that clothing wasn't smart enough to regulate our temperature," he reveals. "I decided to build a garment that could change its properties depending on what you're doing and where you are to keep you always at the right temperature." It does so through an in-built processor that electronically opens and closes the vents as the wearer's body temperature rises or drops. The change is detected by a sensor that measures the temperature of the body, as well as that of the area outside the jacket.

The wearer can operate the vents manually, which helps the system to learn their individual temperature preferences. "Machine learning algorithms let us map out the comfort preferences of each user, allowing the jacket to automatically adapt its protection," Mr Cadena explains. The more it is worn, the more it will learn about the wearer. He believes that, over time, it will become an extension of the body's

natural functions, allowing the wearer to focus on whatever activity they are doing while the jacket takes care of temperature regulation.

The technology that powers the jacket has been developed in-house at Omius. It is integrated into the chest, back and armpits and adds approximately 3.5 oz (100g) of weight, according to the company, which is less than the weight of an average smartphone. It operates on a rechargeable lithium-polymer battery, which lasts for more than a day when fully charged. The vents only require power when opening or closing and there is no risk to the wearer as the voltages involved are very small. The mechanism is also so small that it won't be damaged by impacts, such as those experienced as the result of a fall. The company says the final product will be fully washable. Mr Cadena was unable to give *WSA* any details about the materials used in the jacket or the names of any material partners due to the project still being in the developmental stage.

Omius has carried out extensive testing, both in its laboratory and outdoors with the help of cyclists, runners and skiers, including Mexican Olympic cyclist Ingrid Drexel and members of running clubs from nearby universities. The company is trying to collect as much feedback as possible, with further tests in the pipeline. It considers the potential uses of the jacket to be wide-ranging. It could provide the solution to a problem suffered by many skiers; a warm jacket is needed when they are waiting for the ski lift to take them to the top of the mountain, but that same jacket would cause them to overheat when skiing back down. Away from a sports setting, Mr Cadena gives the example of a person using public transport in the winter when they are wearing lots of layers to combat the cold outside as another situation in which the jacket could prove to be useful.

Omius will likely follow the increasingly popular path of crowdfunding to take its idea forward. In the meantime, Mr Cadena is confident the final jacket will find a place in the high-performance apparel market. "People are very excited about this new experience of basically changing from one type of garment to another in just a second," he enthuses. "The feeling that your clothing is smart enough to adapt itself and help your body go beyond its limits is very powerful." 

