



SENSORS IN SPORTS

SENSORS ARE HELPING US BECOME FASTER, STRONGER, AND HEALTHIER. LEARN HOW TE CONNECTIVITY (TE) SENSORS ARE CHANGING SPORTS FROM TRAINING TO THE MAIN EVENT.

In the hyper-competitive world of sports, mere fractions of a second are all that lies between a champion and their competition. Every athlete wants to be at the peak of fitness and self-discipline. They train for years - some train most of their lives - for the chance to be named the best. How then, when the differences between athletes are so slight, do competitors focus their training to deliver the very best results?

SENSORS

By placing small, unobtrusive sensors into the clothing athletes wear while training, he or she can quantify not only heart rate and respiration but also muscle activity and exertion. With this information, athletes and coaches can identify areas for improvement. For example, changes in altitude can have a significant impact on aerobic capacity. Targeted training focused on increasing lung capacity can help mitigate the impact altitude will have. Soft, comfortable sensors embedded into the torso of a runner's singlet can gauge the VO₂ (volume of oxygen) max levels for the athlete and measure increases as a result of proper training. Accelerometers and conductive materials embedded into compression shirts and shorts can also measure posture and provide real-time feedback to athletes so they can perfect their form. It's one thing for a coach to provide verbal feedback to an athlete, it's something else entirely for the athlete to see themselves projected in real time against an ideal silhouette executing the same move. In these ways and more, adding sensors to sports environments will continue to revolutionize the way athletes train and compete.



SENSORS IN TAEKWONDO

TE Connectivity's contribution to wearable clothing in sports was publicly displayed during the 2012 Summer Olympics in London. Taekwondo athletes wore a chest protector containing several meters of piezo cable woven in a proprietary pattern. When a competitor was hit in the chest, the piezo cable emitted a voltage signal that was filtered and integrated into the scoring system, known as Truescore.

Weighing approximately 150 grams and extremely flexible, the presence of the cable in the chest protector had negligible impact on an athlete's performance. The success of the improved scoring system was due to the linearity of the output that the cable provided and the decision to process the output at the point of impact to remove any undesirable signals. Piezo Spiral Wrapped Coaxial Cable is a type of piezo polymer sensor that is designed as a coax cable. The piezo polymer is the "dielectric" between the center core and the outer braid. When the cable is compressed or stretched, a charge or voltage is generated proportional to the stress. Due to its coaxial design, the cable is self-shielding allowing its use in a high electromagnetic interference (EMI) environment. It is also extremely rugged and water/dirt resistant.



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> PIEZO SENSORS

WEARABLE SENSORS

Sensors continue to be developed and integrated into the latest wearable devices to allow for smarter decisions and healthier lives. TE Connectivity (TE) continues to support various applications with new product development and manufacturing of smaller, more accurate sensors



TE sensor platforms bring wearable technologies to life; users become safer, more productive and healthier.

> WEARABLE SENSORS

MEDICAL SENSORS

Piezoelectric polymer sensors from TE are used in pacemakers to monitor patient activity. They have a unique list of features, including:

- They require no power.
- They are well suited for vibration detection since they are small, reliable and durable.
- They are shaped like a tiny cantilever beam, with weight attached on one end that flops with body movement, so it generates a signal as the individual moves.

For example, the pacemaker receives this signal and makes the heart beat at the desired pace. And, they can differentiate between various activities such as walking, running or other physical activities.



Wearable sensors are not just about gadgets that you can put on your body; TE designs sensors for inside the body as well.

> MEDICAL SENSORS

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