fabric is a metallated fabric, carbon loaded fabric or other suitable fabric incorporating a flexible strain transducer element.

[0021] In some preferred embodiments, the feedback indication is an audio signal that can be heard by the user, however, in other forms the indication is a vibration or other mechanical input that is sensed by the user. The feedback indication may also be a change in colour of part of the sensor. In these embodiments, the sensor may include a transparent electrode coated with an inherently conductive polymer having a colour that is dependent on its oxidation state such that oxidation or reduction caused by current changes resulting from the mechanical input will produce a visible colour change. Preferably, the inherently conductive polymer is a polypyrrole, a polythiophene or a polyaniline. In a further preferred form, the transparent electrode is formed from indium tin oxide.

[0022] The feedback indication may also be in the form of a taste or smell.

[0023] In some forms, the sensor includes a transducer and separate feedback indicator. Still further embodiments of the sensor include a transmitter to allow the feedback indicator to be remotely positioned. Typically, the transmitter is configured to send signals in the microwave frequency range although any other frequency would be suitable. These embodiments allow the feedback indicator to be a remotely positioned computer screen or analogue/digital display.

[0024] Preferably, the sensor includes a wheatstone bridge circuit where the electrical current path provided by the conductive polymer material is the variable resistance segment of the circuit.

[0025] In one form, the electrical current path provided by the conductive polymer material is a strip coated on the elastic fabric such that the length of the strip aligns with the direction of extension of the elastic fabric caused by the mechanical input of interest. In other preferred forms, the conductive polymer material is coated on the elastic fabric in a U-shaped configuration such that the sides of the U align with the direction of extension of the elastic fabric caused by the mechanical input of interest. This allows electrodes at either end of the strip to be positioned relatively close together so that the overall design is relatively compact.

[0026] In a further preferred form, the conductive polymer material is coated on the elastic fabric in a multi-pronged fork configuration wherein the length of each prong aligns with the direction of extension in the elastic fabric caused by the mechanical input of interest. The multi-pronged configuration allows the prongs to have different inherent electrical resistance characteristics and/or different dynamic ranges. Hence, the electrodes can be attached to the ends of any selected pair of prongs for different response characteristics.

[0027] In some embodiments, the feedback indication is produced whenever a mechanical input is greater than a predetermined threshold. In the alternative, the indication could be produced whenever a mechanical input is less than a predetermined threshold. In a preferred embodiment, the device includes two or more current paths, such that the feedback indication from a first current path is produced by a mechanical input greater than a first threshold and the feedback indication from a second current path is produced by a mechanical input greater than a second threshold. This allows the device to track the location and movement of the mechanical input or inputs to the device.

[0028] In a still further preferred form, the first threshold is different to the second threshold. A multi-strip sensor enables simple direct bio-feedback on the rate of movement of a biological structure. For example, if a first strip triggers the feedback indication at a threshold of 20% extension and a second strip triggers the feedback indication at 40% extension, the time between triggers can be used to derive the appropriate rate.

[0029] In one form, the first and second current paths are closely adjacent. This configuration can record a localised movement rate and in other forms, the first and second current paths are on separate locations of the biological structure. With the strips on different parts of the body and with the use of telemetry, the device can provide a complex and accurate analysis of a body's motion.

[0030] In a particularly preferred form, the sensor has two or more current paths in a laminated structure. In this form, each of the current paths trigger a feedback indication at different thresholds. In one form, the laminated structure has layers including different polymer coatings, each coating forming one of the current paths, wherein each coating produces a feedback indication at different degrees of extension. Using the laminated structure, the sensor can have a greater operational. By including a fabric with appropriate mechanical recoil characteristics in the laminate (not necessarily the sensing fabric), the response times and fabric recoil are improved.

[0031] In another embodiment, the current path has non-uniform conductivity characteristics along its length whereby the sensor can detect the changes in impedance of predetermined sections of the current path such that each section triggers a feedback indication at different thresholds of mechanical input. The use of a graded resistance strip in the sensor can also increase the linear dynamic range of the device.

[0032] In some forms of the present invention, the mechanical input of interest is pressure applied to the current path. In a preferred form, the current path is provided by a laminated assembly including a fabric layer sandwiched between two polymer layers.

[0033] In some embodiments, the device is configured to monitor lower limb motion, and in particular, monitoring knee joint motion and/or ankle joint motion. In a particularly preferred embodiment, the device is used as a training aid during landing training programs for participants in sports with a high incidence of knee and ankle injuries such as football, netball, basketball or skiing. In other embodiments, the device is configured to monitor upper limb motion. In some forms of these embodiments the device is used as a training aid to improve the bowling technique of a cricketer, improve the basket shooting technique of a basketballer or netballer, improve the serving technique for a tennis player or improve the swing of a golfer. Preferably, the fabric is formed into a sleeve wherein the conductive polymer coating is positioned on the sleeve, such that in use, the feedback indicator provides an indication in the form of an audio signal to alert the participant when they are using inappropriate limb joint motion. Of course, the indicator couldjust as easily produce an indication in response to an appropriate limb joint motion.