Stitched Sensors for Detecting Joint Movement

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Sensor Types:

- Covestitch
- Overlock

Stitched sensors are fabricated using industrial sewing machines, with one thread replaced by a conductive thread.

Sensing Stretch:

- Insulation: Sensors are insulated using a fusible, stretchable polymer film

Garment applications:

- Breathing
- Spinal Posture
- Classification of Lifting Postures (disposable coverall)

User- and Sensor-independent Activity Classifier

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Focus: Developing an activity classifier that will work across a variety of users without tailoring to the individual (user-independent) and across a variety of sensor types without re-training to a specific sensor type (sensor-independent).

Pose-based activity classifier:
The activity classification algorithm is based upon sequences of poses: the position of the limbs relative to the torso. A pose is represented as a set of quaternions for the rotation of each segment relative to an adjacent segment.

Body model for activity classifier

The classifier has three major components:

1) Archetype generation (offline): For each known activity, generate a continuous representation of the archetype using pose sequences from several subjects.

2) Regular expression generation (offline): For each archetype, compute an alphabet and associated regular expression as a discrete representation of the activity archetype.

3) Matching (online): For each observed sequence of poses to be classified, use a string matching algorithm to find the cost of matching the observed sequence to each of the regular expressions for the archetypes to see if the observed sequence is a match to any of the archetypes.