

Modular Skin for Humanoid Robot Systems

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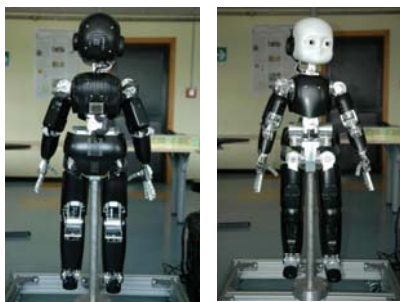
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MOTIVATIONS

- Robots are traditionally built as *stiff* and *accurate* (in terms of position control) machines.
- These specs. are not appropriate for implementing tasks involving direct/complex *human/robot* or *robot/environment* interaction
- Advanced robot interaction tasks require large scale touch/contact sensing for feedback control and high level cognitive perception.



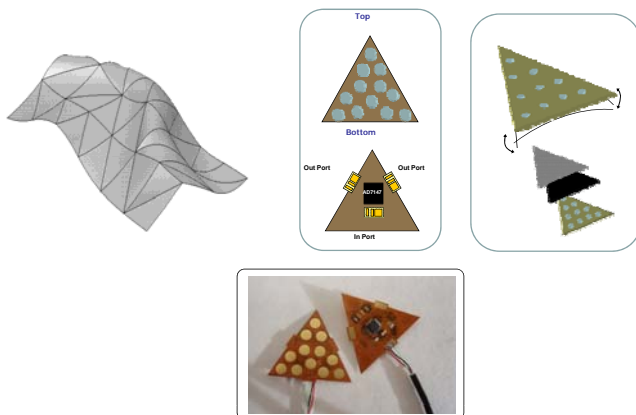
REQUIREMENTS

Robot skin should

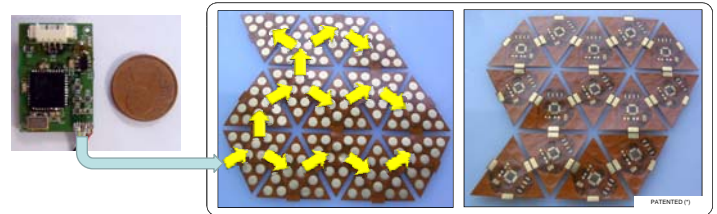
- cover large parts of robot (limbs, torso, hands ...)
- provide multimodal response
- have modular structure and be networked
- be implemented on different robots

THE SKIN SYSTEM

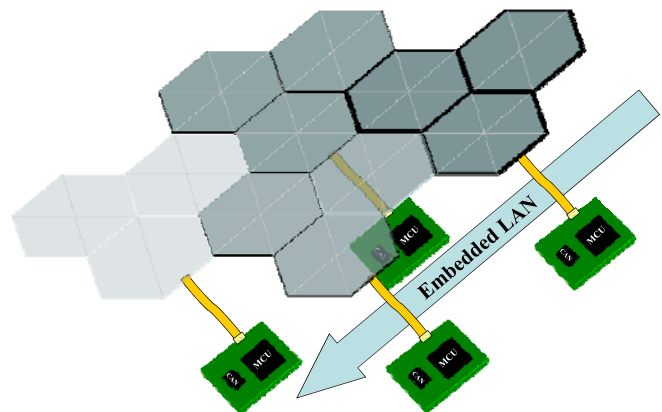
The main sensing mode is based on capacitive transducers. The skin is formed by a scalable mesh of flexible *triangular modules* with 12 *taxels* each capable of conforming to curved surfaces. A set of modules (up to 16) forms a *skin patch*. Modules are connected by an embedded communication network driven by a single microcontroller in order to limit wiring complexity.



PROTOTYPE ON A FLEXIBLE CIRCUIT



MODULAR SKIN ARCHITECTURE



CONFORMABILITY TESTS



CONCLUSIONS & FUTURE DEVELOPMENTS

A modular robot skin concept has been demonstrated.

Integration with two different robots is ongoing.

Further, development of the system combining capacitive and PVDF based transducers is currently in progress.

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