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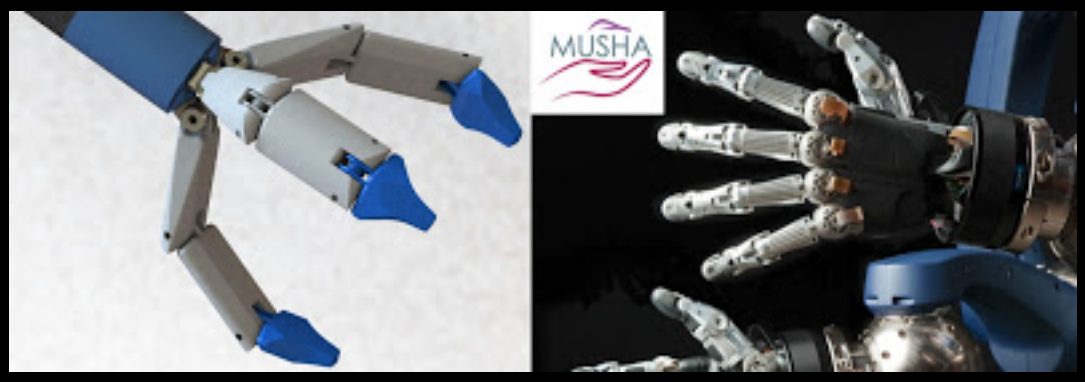
MUSHA: MULTIFUNCTIONAL SMART HANDS PROJECT



MUSHA – MUltifunctional Smart HAnds: new technological insight for mini-invasive surgical tools and artificial anthropomorphic hands is a new Italian project, aiming to extend the capabilities of surgical tools, building on the PRISMA HANDs.
"MUSHA aims at creating future generations of bio-inspired tools and advanced bio-aware manipulation paradigms toward breakthrough mini-invasive surgical instruments and android robotic hands.

Bio-inspired mechanical design will address the reduction of tools weight and dimension by limiting the number of actuators while preserving dexterity and manipulation capabilities. Fiber optic sensor will be suitably integrated to measure the contact forces exchanged with the environment and the temperature of the touched materials. Finally, an integrated framework merging vision and touch information in reasoning to carry out complex manipulation tasks will be developed. MUSHA arises from the need to replicate human manipulation capabilities in various fields where robotics can help to improve life. This includes unstructured environments in which a humanoid robot must replace the human being or parts of the body to address daily-life tasks, but also minimally invasive robotic surgery where the surgeon is unable to use hands to manipulate organs and tissues while feeling its anatomy, consistency and temperature. In both cases, the lack of knowledge on object or tissue textures, due to missing tactile and temperature information, entails a loss of performance
in task execution as well as wrong decisions. Moreover, the study of smart correlation patterns between perception and action, inspired by the observation of humans, will enhance the performance of planning and control strategies. MUSHA will integrate contributions from: surgeons, on tool requirements definition and on testing in mechanical simulators and surgical settings; electronic engineers, on the development, design and integration of fiber optic sensors; robotic engineers, on mechanical design, on vison-force control development from the observation of human sensory-motor coordination and on

testing on robotic manipulation. The synergy of the different competences is the key point to accomplish MUSHA objectives."

Source: MUSHA project site

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