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Sestosenso

Physical Cognition for Intelligent Control and Safe Human-Robot interaction

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What is Sestosenso?

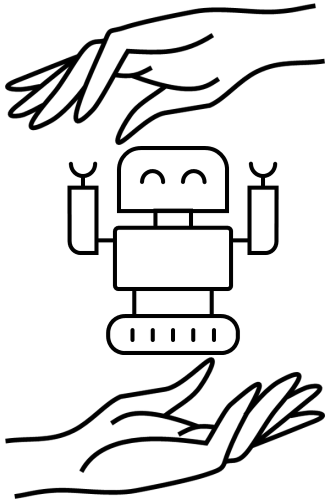
Sestosenso develops technologies for next generations of collaborative robots, capable of self-adapting to different time-varying operational conditions and capable of safe and smooth adaptation from autonomous to interactive when human intervention is required, either for collaboration or training/teaching.

The project proposes a new sensing technology from the hardware and up to the cognitive perception and control levels, based on networks of embedded proximity and tactile sensors on the robot body, providing a unified proxy-tactile perception of the environment, required to control the robot actions and interactions, safely and autonomously.

Sestosenso is motivated by the growing industrial need to integrate production line operators with robots, equipment, and site-specific factory information leading to robot systems that can operate and interact safely with a limited need of out-of-the-robot infrastructure. Also, Sestosenso is motivated by the need of adopting robots for medium-small production/service facilities and domestic applications with limited possibility of infrastructure as well as poorly structured and finally by the need of developing robot applications in poorly structured and rapidly changing environments or outdoor.

ProxySKIN

Sestosenso is grounded on the idea of integrating, over the robot body, networks of discrete miniaturized proximity sensors together with tactile sensors. This solution leads to ProxySKIN, a skin-like sensory system providing a complete and seamless proxy-tactile perception of the robot surroundings where proximity and tactile information can be intended as a new extended sensing mode.



Objective

The goal of Sestosenso is to develop and demonstrate (by 3 industrially relevant Use Cases) the capabilities of self-standing robot systems using proxy-tactile feedback provided by ProxySKIN sensors for safe human-robot interaction.

Use cases

Use case 1

COBOT-Worker cooperative assembly

Use case 1 involves vehicle assembly operations with workers often requiring exoskeletons and COBOTs. However, their concomitant use can cause collisions and limit workers' movements. Innovative AI and sensorization are necessary for safe and efficient cooperation between COBOTs, exoskeletons, and workers.

Use case 2

Dual arm handling of large objects

Use Case 2 involves robotic handling and manipulation of large objects in a warehouse, specifically for online grocery fulfillment. A bi-manual setup with a sensing skin is used to handle bulky and heavy objects. Sestosenso consortium will demonstrate their research outcomes towards the end of the project by manipulating and handling large objects with enhanced perception and control capabilities.

Use case 3

Agricultural harvesting via wearable devices and collaborative mobile manipulator

Musculoskeletal diseases are caused mainly by manual handling, heavy physical work, awkward postures, and repetitive movements. These situations are even more aggravated in a hilly/mountain environment. Automation and assistance systems can be a tool for supporting farmers in improving physical ergonomics. Use Case 3 involves a worker equipped with a sensorized exoskeleton, interacting with an autonomous manipulator as physical assistance system.