



Haptic Human-Machine Interface for Robotics Applications

Two Active Sticks + Hybrid Control scheme

Purpose

- Used in fully teleoperated robots and special automated tools whose control loop comprises the human operator
- Haptic HMIs enhances feedback and response of the human “shackle” who commands in real time the robotic system

HAPTIC topology

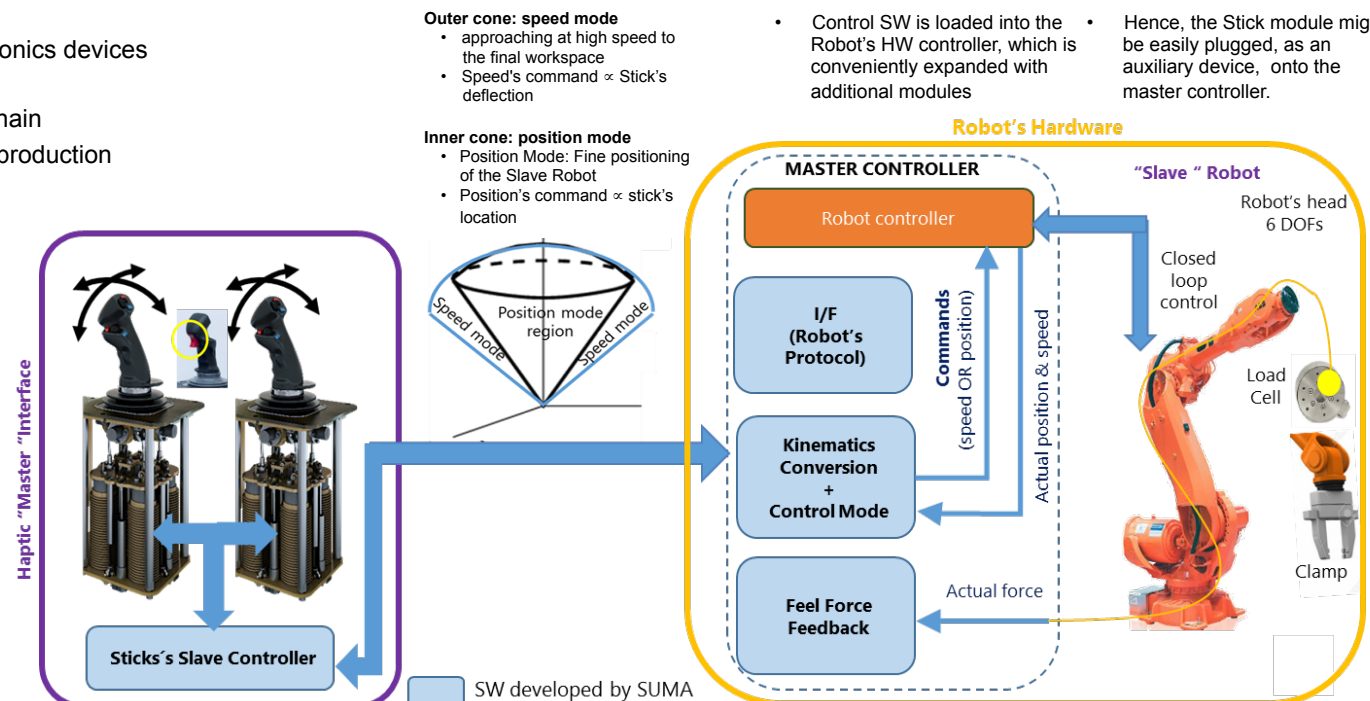
- console of two sticks (each one having two DoFs <-> angular deflections in two cross axes
- whose haptic feedback is exerted on the Grip by means of a mechatronic devices that generates a feel force – in real time –
- as function of the actual measurements from sensors (i.e., load Cells, distance sensors, ...) installed onto the robotic arm

SUMA's Value Added

- Effective Design to Cost.
- Deep Expertise in robust Mechatronics devices
- RAMS → High reliability
- Well-proven & Effective Supply Chain
- Lean Operation applied to series production

Product Specificity & Achievements

- Modular & Scalable Stick's mechanism to get different force ranges
- Fully flexible & configurable device, enabling a tailored feel force even suited to each operator's response
- Compact (High volume/force) equipment able to be fitted easily into.
- Innovative **HYBRID CONTROL**:
 - Concurrent Coupled Position & Speed modes on the Stick,
 - continuous transition, without manual switching,
 - without need of indexing the size of workspaces
- **ENHANCED HAPTIC RESPONSE** as result of Combining electrical Linear Motors (w/o gearheads) + Hybrid Control
 - Smooth Stick's motion without force ripple & discontinuities
 - High Dynamic response to get an optimum feedback in real time
 - Vibrations on the Stick to notice any mode change, exceeding limits or any other warning



(*) DoF = Degree of Freedom of the Slave Robot