

Title:

“ Development of the Huggable Social Robot Probo. On the Conceptual Design and Software Architecture.”

A new generation of robots is being created to live among humans and become a nearly ubiquitous part of our day-to-day lives. These robots will be better accepted if they measure up to a certain standard of social interaction and human-like communication, achieving the label of “social robot”. No robot today can fulfill the role of a fully social interactive robot, but new research domains such as HRI (human-robot interaction) are gaining vastly more interest. In this context there is a strong need for robotic platforms that support this HRI research.

This dissertation presents the design and software development of a huggable social robot named Probo. Probo embodies a stuffed imaginary animal, providing a soft touch and a huggable appearance. Probo's purpose is to serve as a multidisciplinary research platform for HRI focused on children. In terms of a social robot, Probo is classified as a social interface supporting non-verbal communication. Probo's social skills are thereby limited to a reactive level. To close the gap with higher levels of interaction, an innovative system for shared control with a human operator is introduced. The software architecture defines a modular structure to incorporate all systems into a single control center for the operator. The robot reacts on basic input stimuli that it perceives during interaction with children. These stimuli will influence the robot's attention and emotional state, which are communicated by its gaze and facial expressions. To facilitate interaction with children, Probo has an identity and corresponding history. Safety is ensured through Probo's soft embodiment and intrinsic safe actuation systems. Smooth life-like motions contribute to the huggable robotic companion that Probo has become.

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