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Implementation Architecture of a Home Robot Assistant

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This contribution deals with development of a home robot that incorporates two main ideas: first, envisioning such a robot as a part of a smart home which will provide resources for intelligent behavior; and second, employing a robot computing model that allows tailoring and customization of the system to areas of application that could significantly differ in both level of mechanical interaction and emotional roles performed by the robot.

The robot was initially foreseen to be a human-centric, social, care-robot for elderly people and persons with reduced ability. Accordingly, the mechanical structure of the robot was adopted to fit the needs of low mobile or immobile patients. Later, the possible application scenarios were widened to cover a broader range of everyday needs of home users. The robot itself (see Figure 1) is about 1,5m high wheeled mechanism consisting of a pear-shaped body, a turning head with a touch screen, and two articulated arms. It provides basic motion and material handling capabilities, it is equipped with a number of advanced sensors, and it has the ability to communicate with the user in natural language. Its intelligent behavior is additionally enhanced by the elements of emotional intelligence enabling better adaptability to different personality profiles.

The central architectural idea of the project is a view to the robot as basically mechanical and user interfacing part of the smart home, which provides immediate computing and ambient sensing resources. The overall system is based on the cloud computing model to leverage computing, data sensing and communication power of the robot. At the semantic level, it provides capabilities for improved perceiving and expressing the emotions based on analysis of collected and exchanged history data on emotional states and actions.

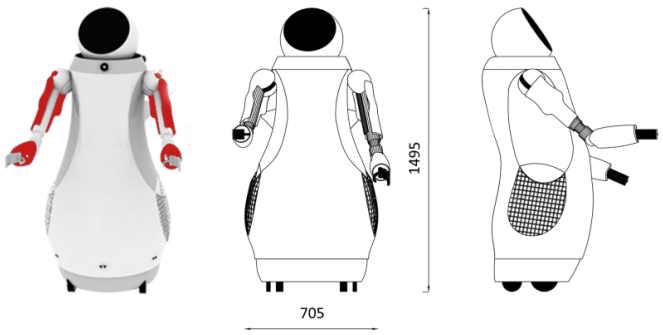

Figure 1. CAD model of the robot: (a) 3D model. (b) Front view. (c) Side view.

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