T. LINNER, C. GEORGOULAS, T. BOCK. ***Advanced building engineering: Deploying mechatronics and robotics in architecture.*** *Gerontechnology 2012;11(2):380;* doi:10.4017/gt.2012.11.02.158.00

Purpose As robots are not yet accepted in Europe as service providers in home environments, the authors intend to establish the possibility of distributing robotic elements in order to fuse them with various subsystems of buildings. Thus, robotic service systems could support activities of daily living (ADLs), and become an invisible part of the building. The proposed approach combines and applies strategies of performance-oriented architecture[1], ubiquitous computing[2], and service robotics[3]. **Method** Buildings and environments consist of a multitude of subsystems such as walls, ceilings, furniture, service cores and many others. In order to realize the proposed vision of seamless robotic assistance, the authors have since 2008 extensively studied various subsystems, exploring how these could be fused with mechatronic and robotic elements. Currently, the research team enters step 2 (*Table 1*). We describe and evaluate building subsystems that had been experimentally fused with mechatronic and robotic elements during step 1. For each category, we present our implemented system, embedded into a 1:1 scale prototype experimental flat, which was developed for the realization of the proposed robotic environment. Additionally, we outline: (i) how the systems can support ADLs; (ii) architectural aspects; (iii) deployed sensor-actuator systems; and (iv) the use of other basic technologies (vision system, robot operating system: ROS) during implementation. **Results & Discussion** The evaluations showed that the fusion of building subsystems with robotic technology, in each category (wall, ceiling, service core, cabinet, seat, in-house mobility; *Table 1*), has the potential to create assistive systems that are acceptable in the home environment, and that moreover are able to assist a multitude of ADLs. The evaluations also revealed that modularity and safety issues should be addressed intensively in future research. The authors' ultimate goal is to explore more building subsystems and finally integrate all systems explored during step 1 and step 2 to an integrated robotic environment in step 3.

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Table1: Roadmap for developing an integrated robotic environment

Subsystem	Robotic project	Step #: time period		
		1: 2008-2011	2: 2011-2012	3: 2012
Wall	Service wall (Research LISA)	x		
Ceiling	Modular ceiling robot	x		
Service core	Service core	x		
Cabinet	Cabinets	x		
Seat	Chair (Research GEWOS)	x		
In-house mobility	In-house transfer	x		
Bath	Automatic bath		x	
Combined in-/outdoor mobility	PASSAge research		x	
Integrated environment	AIR laboratory			x