

B. ABDULRAZAK, O. CHAKROUN, Y. MALIK. *LocSys: Localization framework for smart spaces. Gerontechnology 2010;9(2):346*; doi:10.4017/gt.2010.09.02.314.00

Purpose Location awareness is a key aspect to support smart environments. It facilitates various context dependant applications to access and utilize location data ubiquitously, and provide services that can improve daily living of people with special needs. Pervasive and multiple technologies deployment in smart environments are the key challenges in designing effective localization system. Efforts have been made in designing solutions that can provide location information continuity and ubiquity: (i) Solutions that are provided by telecom operators¹ are proprietary, one block designed depending on few technologies, expensive to deploy, and are not scalable², and (ii) Solutions that are developed for client devices experience limited computational and memory resources³⁻⁴.

Method In our efforts, we have designed an efficient and dynamic layered architecture (Figure 1) that separates the location information processing stages in a three layered architecture: (i) the detection layer provides functionalities to sense the real world and build location information, (ii) the decision and refinement layer contains modules to translate location information provided by detection layer to perform hand-off between indoor and outdoor environments. Inference engine has been developed and integrated in this layer to provide best location estimation to applications, and (iii) The presentation layer provides two presentation levels, one at zone level using our ontology⁵ and second at coordinate's level to fulfill requirements of various smart space applications.

Results & discussion The components of our architecture are implemented using Open Services Gateway initiative (OSGi). The solution is deployed and tested in different scenarios in DOMUS Lab which is a highly interfered environment due to multitude of sensors and heterogeneous technologies. It provides location estimation at the interval of five seconds up to 0.8 meters estimation error. Experiments results show the efficiency and dynamicity of architecture. LocSys framework enables quick development of assistive applications in various smart environments. It is infrastructure independent and supports various technologies. The components of our architecture are highly distributed to deal with limited computational and memory resources of client devices.

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Address: DOMUS lab, Université de Sherbrooke, Canada;
E: Bessam.Abdulrazak@Usherbrooke.ca

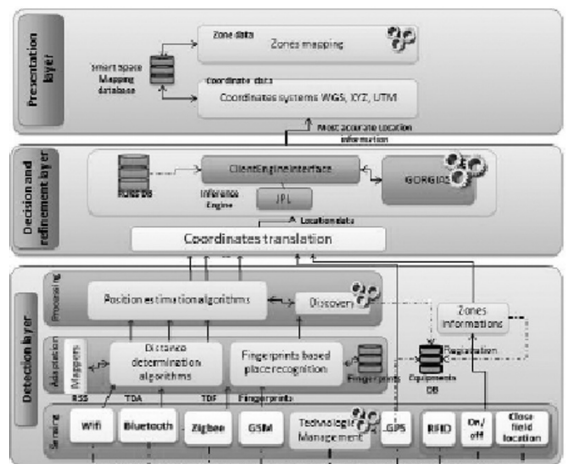


Figure 1. LocSys Architecture