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Verified Mobile Code Repository Simulator for the Intelligent Space*

Zoltán Istenes[a] , Máté Tejfel[a] , László A. Jeni[b]

[a]Eötvös Loránd University,
e-mail: {istenes,tejfel}@inf.elte.hu

[b]University of Tokyo,
e-mail:jedi@hlab.iis.u-tokyo.ac.jp

Abstract

This paper describes a method for formalisation and verification of properties of mobile code and presents a simulator for multiple mobile robots. Mobile robots can be controlled with the mobile code technology, by dynamically downloading on the robots the tasks needed to be executed by them. In our model, the mobile code — with its properties — is created, verified, stored and transmitted to the robot through the Certified Proved Properties Carrying Code (CPPCC) architecture. Explicit and formally expressed security requirements are attached to each of one of the robots (for example: each task has to be started from, and has to be stopped in a given state, the robot is prohibited to go to dangerous places, lift, stairway etc.). A correspondence analysis is executed using a formal verification system, in order to verify the mobile code properties correspondence against the robots requirements. This analysis may refuse to execute those mobile code tasks, that violate the robots requirements.

We integrated the above described method in the Intelligent Space, this iSpace contains mobile robots and several communicating Distributed Intelligent Network Devices (DINDs) which share their information about the human environment. The DINDs monitor the dynamic environment of the iSpace, process the captured information and communicate to provide the cooperation of different DINDs through a network. The mobile robots in the iSpace handle real objects and interact with humans to support them. Humans can give tasks to the robots — with the help of the correspondence analysis — the iSpace selects the most appropriate robots to execute the given task. A simulator was created to support both the simulation of the iSpace with several robots and the execution and transmission of the mobile code to the robots.

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