# Playing with Robots and Avatars.

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**Abstract.** We describe new features of a system designed to perform tasks including broad manipulation of robots and avatars. Basically, the robots have more autonomous behavior and can be encarnated by avatars.

## 1 Introduction

The original idea [1] is to let human users play with robots and avatars through the internet via a mixed reality system interface. We make a mixing between hardware and software platforms for control of multi-user agents in a mixed reality environment. We introduce several new issues (or behaviors) as "Remote Control", "Augmented Reality" for robots, making robots "Incarnating" avatars. Basically, a VRML based virtual interface was developed were users can control real robots that work in real spaces. Avatars are used for representing human users and robots in the Virtual Reality application. A human user can choose which role he/she wants to play. An application involving robots performing in a Museum is devised.

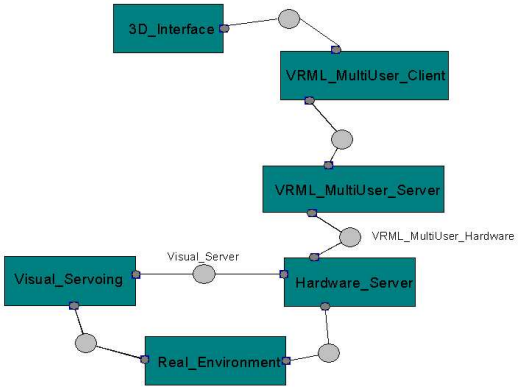


Figure 1: System Architecture.

## 2 The system

Figure 1 shows the several components and connectors. The 3D Interface represents the 3D virtual interface and the 3D objects. The 3D Interface component is resaponsible for real-time visualization of events in the real environment. The VRML Multi-User Client is the observer of events for the 3D Interface [2]. The VRML Multi-User Server [2] feeds each client with the corresponding information (position and orientation) from the Visual Server and Hardware Server components. The Hardware Server gets and sends information in real-time to the robots (real entities). The Visual Server acquires/determines position and orientation of the real entities and sends them to the other components. Each robot can have its own implementation code and this depends on the task goal to be achieved. Also, we can run different tasks for each robot, for example one robot can move and/or pick up a can.

## 3 Some experiments and demonstrations

Several experiments were run in order to validate. in a selected one, an autonomous robot can be in a real room interacting with the real environment and a syncronous version for this robot can be in the virtual side. Figure and 2 shows the robots running this experiment.

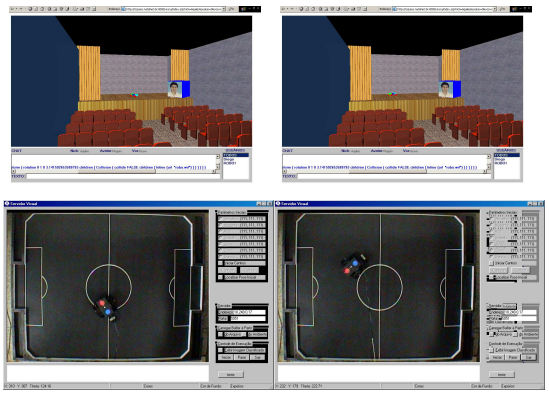

Figure 2: Virtual and real robots performing in the theater.

## 4 Conclusions and perspectives

The developed tools allow us to provide interactions with users, robots and avatars through the WWW in several ways. We will shortly run experiments involving robots performing as actors in the real Casa da Ribeira Theater. Besides the above applications, several other involving a mix between real and virtual parts could take place. As a future application example, we plan to use this system in order to transmit, through the internet robot contests. This will include robot soccer and other versions of games for robots.

## References

[1] Hiperpresence - An Application Environment for Control of Multi-User Agents in Mixed Reality Spaces. T. Tavares, L. Gonç alves, and others. Proceeding of 37th Simulation Symposium. IEEE CS Press, Los Alamitos, CA, April, 2003.

[2] A. Burlamarqui, T. Tavares, and G. L. S. Filho. Vixnu - Um Servidor Multi-usuário com Suporte a Comunicaç ão em Ambientes Virtuais Colaborativos. In Proc. of VIII SBMIDIA - Brazilian Symposium on Multimidia and Hipermidia Systems. Conf. held at Fortaleza, CE, Brasil, October, 2002.