Writing robot-agnostic controllers for real robots.

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In this talk, we present an overview of our humanoid control software stack, its history and key design decisions that have shaped its current state.

In order to try to reuse as much components as possible between different robots we need a decoupled design, where the controllers use a standard abstraction layer to interface with real robots as well as simulators.

In a humanoid robot determinism in the controllers must be guaranteed, to do that we use real time. There is always a critical layer, like walking or balance, that must be executed independently of whatever else is being executed or the computational load of the robot computers. Several of the real time tools that we use for developing, debugging, verifying determinism and our dual kernel configuration will be explained having as examples our walking and whole body control components.

Finally we will present our recent results in the implementation of a whole body control framework. Programming skills for the robot becomes a simple composition of prioritized objectives from an existing library of tasks. The framework has the ability to do its redundancy resolution at a kinematic and dynamic level. The framework architecture is modular and extensible and robot abstraction has been enforced in order to make it a useful tool for future development. We will show examples using the framework ranging from simple robots like a mobile base to complex humanoid robots. Using this framework we are trying to push the resource conflict resolution to a higher level.