Towards an improved framework for YaMoR

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The YaMoR project

1. Bluemove
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YaMoR is a modular robot composed of wireless modules. A module contains three boards: a Xilinx FPGA, a Zeevo Bluetooth chip and a power board.

During the winter semester, we developed a Java software called Bluemove to remotely control the modules from a computer.
The YaMoR project

Towards an improved framework for YaMoR
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- Improve Bluemove and add a real-time control system with scripting
- Design a simulator receiving orders from Bluemove
- Integrate the FPGA programming project of Jérôme Maye into Bluemove
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Real-time control in Bluemove

Our real-time control uses plugins which act like generators, filters, modifiers. It behaves like an interactive signal processing box.

Main features:

- Organized in a graph with connected nodes representing the different plugins
- Each plugin can be fully configured, new options can be added
- Each plugin has its own script (BeanShell language)
- Plugins can receive keys events in real-time
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The user adds new plugins on a panel and connects the nodes together. The values are transmitted along the links and finally sent to the modules.

Different types of plugins can be created:

- **Inputs**: generators, trajectories
- **Filters**: processors, modifiers, multiplexers, etc.
- **Outputs**: modules

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- Options are limited to a set of common types
- Internal variables for state machines
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- Function generator in the timelines manager
  For example: $sin(t \times 2) + exp(t)$
- Remote programming of the FPGA via Bluetooth (Jérome Maye project)

We also fixed bugs that we discovered during the inauguration and further tests.
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A simulator that could receive the positions sent by Bluemove would be useful to test and validate different configurations. Main features of our simulator ”Eve” :

- C++ code
- Physics and collisions (ODE)
- Polyvalent and portable 3D engine (Irrlicht)
- Interoperation with remote calls (XML-RPC)
- XML files for configuration
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- No more flat floors: Quake III levels
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- Bluemove uses remote calls to communicate with Eve.
- Used protocol: XML-RPC — XML files encoded and sent on HTTP
- Robot configuration: XML with modules and connections

Drawback: ping on network must be low and stable to ensure smooth motion.
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Simulator
Closing words

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- Modular robotics problem: weak velcro connectors
- Security problem: serial batteries
- Hardware problem: too many wires

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- Unreliable electronics: shortcuts, CRC errors, etc.

From the wireless point of view, YaMoR does a good job. However, we hope the 2nd generation will be more reliable than the first prototype.
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Questions?