

Modeling and Simulation in Robotics Workshop

Breakout Summary Slides

Team 4

Breakout 2

Slide 1: Consensus Thinking

- The toolchain you use is the toolchain you know.
- Steep learning curve, so people don't bother with it, and see real systems as easier to use.
- What would you pay for a model that does what you want?
- The level of fidelity of what you *can* simulate needs improvement.

Slide 2: “Somewhat contentious” Ideas

- What is the role of standardization? “What does it mean to be a physics engine?” Pull of different stakeholders on what level of investment is necessary
- Does better education (of what simulation can do) lead to better use of simulators? Or more of a tie to using the things you already know?
- Some of the most effective standards are *de facto* standards

Slide 3: Odds and ends, out there thoughts, fun stuff

- What we believe hinders M&S in robotics
- How people use simulation - how people use simulators in general. Steep learning curve, so people don't bother with it, and see real systems as easier to use.
- Teaching/training tutorials/doc, better APIs, connectivity to other software, fits into standard workflows.
- What are the barriers? Physics, software, what? Maybe a bit of both. Some MEs stick to the solidworks workflow (w/out simulation). Experimenting in simulation for sensor placement, reachability, etc. are important.
- Modelica cmnty has great graphical tools, assemble them graphically, and get pretty good simulations out of it. Even with that wide availability, folks don't always use them. Robotics world, Prototype->Trying it out->Tweak params-> ship it.
- Personnel are valuable to design simulation from scratch for a particular robot. "The toolchain you use is the toolchain you know."
- Educ/outreach, broadening exposure. No standardized curriculum.
- Lack of good system ID might reduce use of simulation--if you're going to have to fix it anyway, why ever start with simulation? You can't trust what the sim is going to do, so how much effort do you put in to make it work, when you can just work with the real world?
- Would you pay \$\$ for a good model? What marketplaces support the level of accuracy/fidelity that you need?
- What is the area for customizable vs. special purpose?
- How to enable distributed simulation? Model the behavior that you want, and then have the simulator live up to that behavior. Borrow from things from real-time systems: build the system to behave like the model, rather than have the simulator model the real system-- you get scalability.
- ARINC buses are deterministic (time-triggered), which gives you composability with guarantees of latency. The network delivers this behavior.
- Had a great simulator for motor control. However wanting to do learning algorithms for manipulation—do I work out myself how to do simulation with objects, how do I find a black-box that enables this? Combining simulators and plugins together is not easy.
- FMI - Functional Model Interfaces. There are families of simulation tools that support this kind of interface.
- The level of fidelity of what you can simulate needs improvement. Having this as a key level of your experience would be great.
- What does it mean to define a model? What level of standardization makes sense?

Cheat Sheet Slide

- Breakout Themes, “M&S in Robotics” workshop:
 - Breakout 1: Panoramic view of opportunities
[a time to dream]
 - Breakout 2: What’s stopping us from getting there
[the reality check]
 - Breakout 3: Pragmatic suggestions for moving forward
[what funding organizations, the robotics community,
or other vested parties can/should do]

- Breakout session, things to keep in mind
 - You have 25 mins to generate your three slides
 - Select a scribe to generate your three slides
 - Decide who will present your slides in plenary
 - Do not argue within team for more than 2 mins about an idea. Move it to “Slide 2” and proceed
 - Generate diverse/original/out-there ideas
- Plenary session, things to keep in mind
 - Each team has 5 mins to present its slides
 - We seek to collect as many original ideas/points of view/opinions as possible
 - Settling contentious issues not a priority
 - Use open-floor discussion to add to what the teams have presented
 - Limit your remarks to one to two minutes. Give others an opportunity to speak. Keep it fun, keep it friendly