
CPS

Open Source Tools and
Experimental Platforms for CPS

Birds of a Feather

Scribe: G. Karsai

BOF Guidelines

- “The BoF sessions are intended to be seeds for future special interest groups in the CPS Virtual Organization. Please help this community “self-organization” by stimulating discussions on
 - a. interesting and substantial challenge problems that can guide research,
 - b. shared testbeds and experimental platforms,
 - c. recommendations toward funding agencies,
 - d. key industry stakeholders”
-

Open Source Tools and Frameworks

Introduction - Motivation

- Serves as: Experimental and repeatable validation of research
 - Experimental testbed/s
 - Challenge problems (not necessarily Grand...)
 - Serves as: Means of publishing research results
 - Peer-reviewed open source tools
 - E.g. <http://www.escherinstitute.org/Plone/toolqualification>
 - Serves as: Vehicle for tech transfer
 - To industry, small business, etc.
-

Open Source Tools and Frameworks Discussion

- Researchers already do it in some areas...but
 - How to handle improvements?
 - CPS Sourceforge? (open collaborative environment for development)
 - Maintaining quality and longevity
 - Need: stable open architecture
 - Stable data interface in tools
 - Processor emulators, network emulators – stable platforms
 - QC needs: quality rating, degree of independent validation
-

Open Source Tools and Frameworks

Discussion

- Need: Data sets for experimentation
 - E.g.: Vehicle data, driver behavior data
 - E.g.: Challenge problems documented
 - Challenge problems: need to be quality controlled, vetted
 - Who pays for the experimental platform
 - Physical platform? – Some industrial solutions already
 - Small platforms already exists – but larger vehicles are different
 - Need something common -- a platform
-

Open Source Tools and Frameworks Discussion

- Support: From Office of Cyber Infrastructure?
 - Long-lifetime code
 - Community used code
 - Open source license is required in DOE-sponsored research
 - Problems:
 - Maintaining versioned community resource requires effort
 - Meta-data: Self-describing systems : meta-data comes with the component (e.g. to assist with tool integration)
-

Open Source Tools and Frameworks

Discussion

- Evaluating research – (Esp. young faculty)
 - Peer-reviewed/evaluated research code
 - Start from a working system in CPS, replace/improve domain-specific parts (controls, scheduling, software, etc.) and show improvement
 - Platform examples:
 - AirStar (NASA)
 - Starmac (C. Tomlin, UCB)
 - Robocup simulation
-

Open Source Tools and Frameworks

Discussion – To summarize

- **Goals:**
 - Scientific results, reproducibility
 - Productivity of (grad) researchers, accessibility of results
 - Common platform, architecture
 - **To stay honest: competition!**
 - **NSF should facilitate the process**
-