

Software modularity: OMG perspective

Introduction to the OMG standards for robotics Geoffrey Biggs AIST, Japan

Standardization Activity in OMG

Object Management Group

- Worldwide software consortium
 - Distributed object middleware (CORBA)
 - Channel-based communication middleware (DDS)
 - Modelling languages (UML, SysML, BPMN)
 - Model Driven Architecture (MDA)
- Application Fields Specific Standardization
 (Business Enterprise Integration, C4I, Finance, Healthcare, Life Science Research, Manufacture, Software-based Communication, Space, Robotics)

 > Domain Technology Committees



BJECT MANAGEMENT GROUP





http://www.omg.org/



Robotics DTF

(Formed Dec. 9, 2005)

- Robotics Domain Task Force (DTF)
 - One of nine task forces within the OMG addressing the needs of a particular problem domain
 - Defining software standards for integration and interoperability in robotics
 - Composed of industry, government and research organizations from countries in Asia, Europe and North America
 - Maintains active outreach to robotics community, *e.g.*, ISO TC184, KIRSF, JARA, ORiN, *etc.*



OBJECT MANAGEMENT GROUP







Specifications

Published

- RTC (Robotic Technology Component)
- RLS (Robotic Localization Service)
- RolS (Robot Interaction Service Framework)

In progress

- FSM4RTC (Finite State Machines for RTC)
- HAL4RT (Hardware Abstraction Layer for RT)
- Unified Component Model

PAIST

Robotic Technology Component (RTC)

- Issued as public specification (most recent version published in 2012) <u>http://www.omg.org/spec/RTC/1.1/</u>
- Component model for robotics
 - Basis for software modularization and integration at infrastructure/ middleware level in this domain
 - Builds on does not replace general-purpose component models







OMG RTC Family

Name	Vendor	Feature
OpenRTM-aist	AIST	C++, Python, Java
RTMSafety	SEC, AIST	IEC61508 (functional safety) certified RTM implementation
OpenRTM.NET	SEC	.NET(C#,VB,C++/CLI, F#, etc)
miniRTC, microRTC	SEC	RTC implementation for CAN and ZigBee based systems
RTC CANOpen	SIT, CiA	Standard for RTC mapping to CANOpen by CiA (Can in Automation) and implementation by SIT
PALRO	Fuji Soft	C++ implementation for small humanoid robots
OPRoS	ETRI	Korean national project
GostaiRTC	GOSTAI, THALES	C++ implementation for URBI
HRTM	Honda R&D	C++, Python. FSM Component.











FSM4RTC

- Finite State Machine Component for RTC
- Extends the RTC specification
- Adds better Finite State Machine support
 - Interfaces for managing state machines used inside components
 - Interfaces for online introspection of state machines
- Proposed by Honda R&D



HAL4RT

- Hardware Abstraction Layer for Robot
 Technology
- Common API for working with robot hardware

– OpenGL for robotics

- Proposed by Japan Embedded Systems Technology Association
- Good support from Japanese device makers



Unified Component Model

- New effort at the OMG by established component framework vendors
- Flexible component model with separation of concerns
 - Many features from the RTC specification
 - Lightweight and scalable
- Builds on long experience with the CORBA Component Model and the RTC
- Expected to meet many of the needs of modular robot software



Call for Participation

OMG Technical Meeting in Berlin

June 15-19, 2015

http://www.omg.org/news/meetings/tc/berlin-15/info.htm