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Category: **Industry**
Domain: Robotics.
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Shuichi Nishio is a senior researcher at ATR Intelligent Robotics and Communication Laboratories. His main interest lies in the field of android science, sensor networks and pattern recognition. He is also working on standardization of robotic technologies.

Q1. Please explain briefly what are your application domains and your role in the enterprise.

NISHIO Shuichi: My interest lies in two different areas related to robotics: One is the fundamental research on android science (www.irc.atr.jp/Geminoid), and another is on sensor network systems for supporting robotic services (www.irc.atr.jp/ptStructEnv/).

As part of the latter, I am working to establish an international standard for accessing and manipulating localization data.
The word 'localization' is a term specific in the field of robotics, and is used to identify the action of acquiring position and related information of entities such as people, robots or objects in the real world. We are now in the process of finalizing the standard document at a standardization consortium called OMG.

Q2. When the data models used to persistently store data (whether file systems or database management systems) and the data models used to write programs against the data (C++, Smalltalk, Visual Basic, Java, C#) are different, this is referred to as the "impedance mismatch" problem. Do you have an "impedance mismatch" problem?

NISHIO Shuichi*:* Yes and no. One of the features that is included in the current specification is the auto-negotiation feature between modules. This feature requires formal definition and exchange of what kind of data each module accepts and what functionality they can perform. Ideally, this description shall be tightly coupled with the

programmatic definition of the modules. However, as this reqires languages to be able to treat meta-level definitions, currently major programming languages are not able to handle this directly (Lisp or CLOS are examples that may be able to handle such structure). As such, we have gave up to handle everything in the framework of data model / interface description, and decided to define the semantics elsewhere. In other words, only the data structures are specified with UML, and the operations are defined by other means. Thus, we can say that no 'impedance mismatch' can be seen here, but this is anyway not a good situation.

Q3. What solution(s) do you use for storing and managing persistence objects? What experience do you have in using the various options available for persistence for new projects? What are the lessons learned in using such solution(s)?

NISHIO Shuichi*:* Currently we are using a XML database for storing meta data, and relational database for storing the actual localization data. One of the idea is that the semantics of the data shall be clearly defined. This is important to enhance connectability between heterogeneous systems, and at the same time, will increase productability. In our case, the localization data (in relation DB) are bound with semantics through links toward the definition in the XML DB.

Q4. Do you believe that Object Database systems are a suitable solution to the "object persistence" problem? If yes why? If not, why?

NISHIO Shuichi*:* Partially yes, for efficient storage and retrieval of the 'as-is' relationship. However, the current objective storage seems to lack a common framework for strong type system and persistence of operations. Just like in human beings, only knowledge is insufficient, but the skill to utilize it is necessary.

Q5. What would you wish as new research/development in the area of Object Persistence in the next 12-24 months?

NISHIO Shuichi*:* I don't think this is likely to happen, but two things that I gave in Q1 (meta-level information) and Q4 (keeping operation) may be helpful.