ICRA2009 Workshop on
Software Development and Integration in Robotics
(SDIR2009)

May 12, 2009. Kobe, Japan

Davide Brugali University of Bergamo, Italy

Christian Schlegel, University of Applied Sciences Ulm, Germany

Roberto Sannino STMicroelectronics, Italy

Open Discussion

16:00 – 17:30	Open Discussion

- This new edition of the SDIR workshop will focus on software engineering principles that specifically promote robotic software and system flexibility.

- Flexibility is the ease with which a system or component can be modified for use in applications or environments other than those for which it was specifically designed.

  The term environment refers to the complete range of elements in a robot installation that interact with the software system and components, i.e. the computer and network platform, the operating system, the software libraries, the sensing and actuating devices.

Open Discussion

Introductory Statements

- *Scope of the Workshop:*
  - *Software engineering principles that specifically promote robotic software and system flexibility*

- *First Topic:*
  - *What is robotic software and system flexibility ?*

  - *Are there examples of changes typical for the life span of a robotic system ?*
  - *Can different classes of changes be distinguished ?*
  - *Which of these classes of changes are related to a robotics software system ?*
  - *Which classes of changes are not at all / exceptionally well supported in a certain software structure, abstraction of execution environment or development process*

  => classes of changes ?

Open Discussion

Introductory Statements

- *Scope of the Workshop:*
    - *Software engineering principles that specifically promote robotic software and system flexibility*

- *Second Topic:*
    - *Where is flexibility located / required in a robotics system ?*

    - *Is flexibility related to systems, architectures, components or algorithms ?*
    - *Is flexibility a matter of run-time and life span adaptivity ?*
    - *Is flexibility the ease of adaptation from the application builder view ?*
    - *Is flexibility the ease of component parameterization, dynamic wiring of the data flow and orchestration ?*
    - *Can you summarize the scope of software and system flexibility in robotics ?*

    ⇒ *run-time vs. development / architecture vs. algorithms*
    ⇒ *flexibility equivalent to ease of reuse ?*
    ⇒ *flexibility = robustness during life-time / adaptivity / time-scale*
    ⇒ *granularity of subsystems for reuse ?*

Open Discussion

Introductory Statements

- *Statement in the Call for Papers*
    - *The key to achieving software flexibility is the possibility to predict the class of changes that are likely to occur over the lifespan of a robotic software system and to design software systems that are robust to those classes of changes*

- *Third Topic:*
    - *How much flexibility is finally needed ?*

    - *What impact has software and system flexibility ? Is it worth the effort ?*
    - *Where do we need flexibility ? Isn't it overly complex ?*
    - *Isn't that already covered by modern component based systems supporting run-time configuration and composability ?*
    - *Can you define the requirements on flexibility from the robotics perspective ?*
    - *Can you describe your impression of the current state-of-the art ?*

    - ⇒ *Requirements to match flexibility*

Open Discussion

Scope of the Workshop:

- *Software engineering principles that specifically promote robotic software and system flexibility*

- *Fourth Topic:*
  - *Can we identify major challenges and hurdles towards software and system flexibility ?*

  - *Is there a difference between software and system flexibility ?*
  - *Does learning and adaptation provide flexibility ?*
  - *Is flexibility just the ease of composing new applications out of building blocks ?*
  - *Can we identify the missing gap ?*
  - *Is the missing gap due to missing technology ?*
  - *Is it related to missing standards ?*
  - *Is it related to missing experience and examples ?*
  - *Do we know what is missing / why it is missing ?*

  - ⇒ *Enabling technologies for flexibility ?*
  - ⇒ *Are these technologies really missing ?*

Open Discussion

Scope of the Workshop:

- *Software engineering principles that specifically promote robotic software and system flexibility*

- *Fifth Topic:*

  - *If we know what is missing and what is needed:
    How can we measure progress towards our goal ?*

  - *How can we measure flexibility and ease of adaptation ?*
  - *Is it necessary to measure it ?*
  - *How can we evaluate whether progress has been made ?*
  - *What is a design for flexibility ?*

  - ⇒ *Measuring progress towards achieving flexibility ?*

Open Discussion

Scope of the Workshop:

- *Software engineering principles that specifically promote robotic software and system flexibility*

- Last Topic:

  - Extracting a roadmap / next activities from the panel discussion

  - *How could a roadmap to address software flexibility in robotics look like ?*
  - *What needs most urgent to be done until next SDIR workshop ?*
  - *What are good starting points to work on ?*
  - *On what issues should a PhD student work on next ?*

  - ⇒ *What needs to be done (most urgently) until next SDIR workshop ?*