

**1st IEEE International Workshop
on Services Integration in Pervasive Environments (SIPE'2006)**

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1. Foreword

In the last years, service-oriented computing and pervasive computing are emerging as the next computing paradigms. Service-oriented computing allows to easily develop, publish and use software functionalities. Pervasive computing rests on mobile and/or embedded devices, available anywhere and anytime, that can potentially provide services. Bringing these two trends together raises the new challenge of integrating/unintegrating, in an application, non-predefined services just discovered in the pervasive environment. The Services Integration in Pervasive Environments workshop aims at facilitating exchanges and discussions between researches, industrials and other contributors working on these topics.

Three main sub-areas of this topic are tackled in this workshop, in three complementary sessions: Semantic Service Discovery, Service Composition and Frameworks and Middlewares for Integration.

In highly changing environments, discovering relevant services is a challenge. In their work, Pravin Pawar and Andrew Tokmakoff introduce the concept of persistent service discovery. This mechanism simplifies the design of clients in pervasive environments as they need not actively search for the best services when their context changes but are dynamically notified of better service matches as they become available. In the article from Abdur-Rahman El-Sayed and James P. Black, a context-aware service-discovery mechanism is proposed to discover the most appropriate and relevant services for the requesting user/agent. The scheme relies on an ontology-based representation of services and contextual information to support knowledge sharing, common understanding, reasoning, capability-based search, and semantic matchmaking of services. To enhance the overall quality and save users time and effort, the scheme includes a dynamic service-selection mechanism that ranks and filters matching services according to their dynamic contextual-information.

Finding a specific service in every environment is not always possible, but composing existing services can often provide a similar functionality. André Bottaro, Anne Géroddolle and Philippe Lalanda propose an architecture that allows developers to focus on functional code and relieves application developers from the tedious and error-prone programming tasks related to distribution and dynamic service availability. Thanks to this architecture, peer-to-peer composition occurs at runtime. In their article, Caroline Funk, Jelena Mitic and Christoph Kuhmuench present the Dynamic Service Composition Language (DSCL) which provides a top-level building block for a pervasive service runtime environment. The language consists of a simple syntax and is thus the appropriate technology to define service

composition from a user's perspective. The language fulfils three key requirements: specification of relationships between pervasive services in order to achieve dynamic service composition; specification of conditions regarding the user's context; and the specification of personalization aspects, i.e. adaptation of the composition process to the user's preferences in a specific context. In their work, Koen Victor, Julien Pauty and Yolande Berbers propose the concept of Instantiable Service Compositions (ISC). An ISC is a high level description of a service composition that can be instantiated to the user's intentions and to the available services in the current environment. An ISC is not tied to one environment and can be adapted to the user's intentions. This means less or no configuration for the user, and a unified user interface for each composition.

Developing pertinent applications that include integration facilities is quite difficult. Factoring integration concerns in frameworks and middlewares is a huge improvement for applications developers. K. Kalapriya, S. K. Nandy and N. C. Narendra investigate the problem of automation of pervasive computing applications in response to user-specified requirements. By pushing the management of these tasks into the infrastructure, they have shown how pervasive computing applications can be automatically created and executed via the application of service-oriented computing principles. They allow for the specification and modelling of Quality of Services (QoS) requirements for the applications, and also provide provisions for composing services to execute a sequence of tasks that would meet the necessary QoS requirements. Rémi Emonet, Dominique Vaufreydaz, Patrick Reignier and Julien Letessier have developed O3MiSCID: an Object Oriented Open source Middleware for Service Connection, Introspection and Discovery. This middleware has a layered architecture specifically designed for pervasive environments and can maintain low latency and high bandwidth communications, allowing the creation of context-aware interactive applications featuring for instance audio stream and video stream processing. It relies on BIP, a performant, low-overhead protocol and DNS-SD (DNS Service Discovery) over mDNS (multicast DNS). Pierre Parrend, Yvan Royon, Noha Ibrahim propose an original application where users take control over their own residential gateway and can choose to cooperate with others users sharing a common interest. Service-Oriented communities are used to support data and process. Such an approach can therefore be considered as a powerful support for all kind of communities, from peer-to-peer and instant messaging to remote service execution or collaborative work.

2. Program Chairs

General co-Chairs

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- Andrew Tokmakoff, Telematica Instituut, The Netherlands

3. Workshop Schedule

- 08h45 - 09h00 : Opening -- *Frédéric Le Mouël, Stéphane Frénot (INRIA Ares / INSA Lyon, France)*

- 09h00 - 10h00 : Session 1 -- Semantic Service Discovery

"Ontology-Based Context-Aware Service Discovery for Pervasive Environments"
Pravin Pawar (University of Twente, The Netherlands), Andrew Tokmakoff (Telematica Instituut, The Netherlands)

"Semantic-Based Context-Aware Service Discovery in Pervasive-Computing Environments"
Abdur-Rahman El-Sayed, James P. Black (University of Waterloo, Ontario, Canada)

- 10h00 - 10h30 : Coffee break
- 10h30 - 12h00 : Session 2 -- Service Composition

"Pervasive spontaneous composition"
André Bottaro, Anne Gérodolle (France Telecom R&D, France), Philippe Lalanda (LSR-IMAG, France)

"DSCL: A Language to support Dynamic Service Composition"
Caroline Funk (Ludwig Maximilian University Munich, Germany), Jelena Mitic, Christoph Kuhmuench (Siemens AG, Germany)

"Instantiable composition of services in a home environment"
Koen Victor, Julien Pauty, Yolande Berbers (Katholieke Universiteit Leuven, Belgium)

- 12h00 - 13h30 : Lunch
- 13h30 - 15h00 : Session 3 -- Frameworks and Middlewares for Integration

"An Infrastructure-Based Approach For Seamless Execution Of Pervasive Computing Applications"
K. Kalapriya, S. K. Nandy (Indian Institute of Science, India), N. C. Narendra (IBM India Research Lab, India)

"O3MiSCID, a Middleware for Pervasive Environments"
Rémi Emonet, Dominique Vaufreydaz, Patrick Reignier, Julien Letessier (INRIA Prima, France)

"Service-Oriented Distributed Communities in Residential Environments"
Pierre Parrend, Yvan Royon, Noha Ibrahim (INRIA Ares / INSA Lyon, France)

- 15h00 - 15h30 : Coffee break

- 15h30 - 16h45 : Round table -- "Challenges and Guidelines for Pervasive Integration" -- *Frédéric Le Mouël, Stéphane Frénot (INRIA Ares / INSA Lyon, France)*
- 16h45 - 17h00 : Closing -- *Frédéric Le Mouël, Stéphane Frénot (INRIA Ares / INSA Lyon, France)*