

ERCIM “Alain Bensoussan” Fellowship Scientific Report

Fellow: Sattanathan Subramanian

Visited Location: NTNU, Norway

Duration of Visit: Oct 14th 2008 to July 13th 2009

I - Scientific activity

During this period, I have worked on four topics. Those are,

- (i) *Optimization of Web service calls in ActiveXML Workflows.* The problem and the initial solution are identified in the previous period, i.e., when I was in INRIA. In this period, I have shaped that solution with some algebraic formularizations to express the advantages of Service Calls Grouping (SCG) in ActiveXML workflows. This resulted in two international conference publication; details are given in [2] and [5].
- (ii) *Web Service Community.* It is a group of functionally similar Web services to facilitate and speed up the process of Web services discovery. The state-of-the-art development protocol of web service communities lacks ability to accommodate web services which do not completely satisfy the expectations of the community. So, I have provided a solution for attracting new Web services in the community even when the requirements or expectations of community or the new Web service does not completely match with each other. Some of the reasons for this solution are, to accommodate the new or varying requirements of the reputed users, to suit the immediate requirements after building or advertising the requirements of the community member, to try out the promising yet cost effective Web services, The result of this work is published in an international conference proceeding; the details are given in [1]. I have also provided a solution to keep the Web Service Community highly-available to the user or application. Here, the term highly-available refers that the Web Service Community can continue providing services even when master Web service (i.e., coordinator) fails operationally. Our solution customizes a distributed election algorithm called Fast Bully Algorithm to identify a temporary master Web service when there is any operational failure in existing master Web service of Community. This work also resulted in an international conference publication, given in [3].
- (iii) *Context-based Protocol for Vehicle's Safety in Highways.* Safety is evergreen vital criteria for road traffic. We have proposed an infrastructureless solution based on contexts to increase safety of vehicle. Contexts characterize and track the moving environment of a vehicle. Here, environment means the vehicle's own status like geographical position, break-control's functional status, driver's status etc., and the status of neighboring vehicles. Contexts make use of wireless sensors for getting the environmental data. Sensors feed their data continuously to contexts. Contexts keep them as system understandable information. The status of a vehicle is continuously broadcasted to other vehicles. Safety-decisions are derived based on contexts that are available in a vehicle. We have also provided an algorithm for our context-based solution. Finally, safety calculations are made for overtaking decisions through some linear equations. This work is published in an international conference proceeding, details are given in [4].
- (iv) *Web services for facilitating the project analysis of Collaborated Software Development.* The globalization of business has changed the nature of software development process into highly collaborated and distributed across the countries. This makes the task of project management as complex and tedious as possible, although the collaboration and distribution provide several advantages to the production. The

complexity is due to the lack of automated tools for analyzing the code base of collaborated and distributed software, to understand the efforts and contributions of the developers which are afforded during the development. We are providing a solution based on Web services to facilitate the automated project analysis of collaborated and distributed software development. This work is under preparation, and shortly will be submitted to an international conference for publication, details are given in [6].

II- Publication(s) during your fellowship

- [1] **S. Subramanian** and G. Sindre. Policy based Negotiation for Attracting New Web Services in a Community, International Conference on Software Technology and Engineering (ICSTE), July 2009, Chennai, India, published in World Scientific Press. (In-press)
- [2] **S. Subramanian** and G. Sindre. An Optimization Rule for ActiveXML Workflows, 9th International Conference on Web Engineering (ICWE), June 2009, San Sebastian, Spain, published in Springer LNCS.
- [3] **S. Subramanian**. Highly-Available Web Service Community, International Conference on Information Technology: New Generations (ITNG), April 2009, Las Vegas, USA, published in IEEE Computer Society.
- [4] **S. Subramanian**, D. Djenouri, G. Sindre, and I. Balasingham. CoP4V: Context-based Protocol for Vehicle's Safety in Highways Using Wireless Sensor Networks, International Conference on Information Technology: New Generations (ITNG), April 2009, Las Vegas, USA, published in IEEE Computer Society.
- [5] **S. Subramanian** and G. Sindre. Improving the Performance of ActiveXML Workflows: An Algebraic Model, International Conference on Services Computing (SCC), September 2009, Bangalore, India, published in IEEE Computer Society.
- [6] **S. Subramanian**, I. Omoronyia, and G. Sindre. Web Services for Facilitating the Project Analysis of Collaborated Software Development, 11th International Conference on Information Integration and Web-based Applications and Services (iiWAS), December 2009, Kuala Lumpur, Malaysia, published in ACM. (To be submitted)

III -Attended Seminars, Workshops, and Conferences

- (i) International Conference on Web Engineering, June 24-26, 2009, San Sebastian, Spain.
- (ii) IEEE Congress on Evolutionary Computing, May 19-21, 2009, Trondheim, Norway.