Collaborative Project

ASPIRE

Advanced Sensors and lightweight Programmable middleware for Innovative Rfid Enterprise applications

FP7 Contract: ICT-*215417*-CP

WP7 – Dissemination, Exploitation, Training

Public report - Deliverable

Training Material and Workshops

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Approvals

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Document history

Revision	Date	Modification	Authors
0.1	25 Feb 09	First draft, Introduction, Information, Conclusions	John Soldatos, Nikos Kefalakis
0.2	08 May 09	Added Abstract, Corrections	John Soldatos
0.3	11 May 09	Completed UJF training	Didier Donsez
	12 Jan 10	Reviewed and updates made according to the reviewers comments	Neeli Prasad
	15 Jan 10	RFID Course Evaluation Form added	John Soldatos
	19 Jan 10	Updated and corrections	Neeli Prasad

Content

http://moodle.fp7-aspire.eu/

Executive Summary

ASPIRE Deliverable D7.5 reports on the organization, support and conduction of trainings and workshops, targeted to researchers, students, engineers and other parties. This report gives details on ASPIRE training activities. Note that during this period training activities were confined to presenting early developments of the ASPIRE project. Training activities will intensify in the second and third year of the project, following also the release and gradual advancement of the AspireRfid Open Source Project (http://wiki.aspire.ow2.org/).

An electronic copy of all materials is available from http://www.fp7-aspire.eu/public/1/ and a full set of workshop materials, peer review analysis by participants and questionnaire form is available from the ASPIRE Project Manager on demand. This document will be updated annually in order to include future activities as well.

1. Introduction

ASPIRE Trainings in form of workshops and courses are available to the Research and Education communities and all scientific sectors without discrimination between users and sites. Trainings and workshops are taking place and have been done to train potential end-users of the project results. Training activities will include: (a) Annual training seminars, targeting students, researchers, and interested parties from the industry on the technologies supporting the project, as well as major outcomes. (b) Workshops targeting experts in the researched field, which need to gain insights into latest technical/technological developments of the project. (c) Frequent presentations emphasizing on how the ASPIRE middleware technologies can boost research and development in RFID systems and solutions.

This deliverable is a "living" document for the ASPIRE trainings. Updates will be made at the end of each year of the project. The deliverable includes reports of the organization details and results, along with pointers to related training material on RFID, RFID middleware and the AspireRFID middleware. Following recommendations from the ASPIRE reviewers this material is being uploaded in a specialized e-learning platform, http://moodle.fp7-aspire.eu.

2. Trainings and Workshops

2.1 Training Activities

2.1.1   AIT's Training workshop Profile Description, July 9th, 2008

Training Profile and Description	
Training Workshop Title	RFID Systems and Software
Place	Athens Information Technology Peania Campus 0,8 Km Markopoulou Ave.
Schedule – Time Table	10:30-11:45 Overview of RFID Technology and Applications (Prof. John Soldatos) 11:45-13:00 RFID Middleware (Prof. John Soldatos) 13:00-14:00 Lunch Break 14:00-15:00 RFID Case Study (Food Industry, Apparel) (Nektarios Leontiadis) 15:00-17:00 RFID Laboratory Demonstrations and Hands-On Training (Nikos Kefalakis MSc., Nektarios Leontiadis MSc., Philipos Tragas, MSc))
Training Methodology	• Lectures • Lab Visits • Hands-on Training
Training Material	• Slides (partly available at: http://wiki.aspire.ow2.org/xwiki/bin/view/Main/Services) • Sample Code (Exercises)

Curriculum	I. Overview of RFID Technology and Applications
	• Introduction to RFID Technology and RFID Systems
	• Physics of RFID
	• Anatomy of an RFID System
	• RFID Tags
	• RFID vs. BarCodes and other AutoID Technologies
	• Serialization
	• Benefits of RFID
	• Cost Issues and Concerns
	   o Item Level vs. Palette Level Tagging
	• Case Studies
	   o Galleria Kaufhof
	   o Lemmi Fashion
	• RFID in Apparel (in general)
	• Privacy Issues and Concerns
	• Introduction to EPC
	• Overview of the EPC Network Architecture
	II. RFID Middleware
	• Need and Rationale for RFID Middleware
	• RFID Middleware Functionality

	- RFID Middleware Layers according to EPC Network Architecture - Reader Protocol - Low-Level Reader Protocol - Application Level Events - Information Sharing – Business Events - RFID Middleware Vendors - Overview of Open Source RFID Middleware Platforms - The ASPIRE Project - The Open Source AspireRfid Project - Moving from the RFID to the Internet of Things (IoT) III. RFID Case Study - A case study in the Food Industry (Vivartia) - A case study in the Apparel Industry IV. RFID Laboratory Demonstrations and Hands-On Training - Demonstration of RFID Readers, Tags and Systems - UHF Systems (Conference Demo, Supply Chain Management Demo) - HF Systems (Library Demo) - Demonstration of RFID Middleware Capabilities and AspireRfid tools - Do it yourself: Simple hands-on exercises - Conclusions
Number of Participants	15
Profile of Participants	MSc. Students from Computer Science and Computer Engineering

2.1.2 AAU-CTIF PhD trainings and couses:

AAU's Training Profile Description, November 2009

Training Profile and Description	
Training Workshop Title	Internet of Things (IoT)
Place	Aalborg Univeristy
Schedule – Time Table	09:00 – 09:15 Introduction: What is IoT? By Neeli Prasad 09:15 – 11:00 IoT Applications by Albena Mihovska 11:15 – 13:45 Information Shadow (from physical to virtual worlds) by Zheng-Hua Tan 12:00 – 13:00 Lunch Break 13:45 – 5:45 Enabling Technologies, Challenges and Concerns by Neeli Prasad 15:45 – 16:30 Group work to be delivered on Monday Nov. 30, 2009 in IEEE conference paper format max. 5 pages
Training Methodology	- Lectures - Lab Visits - Hands-on Training

Curriculum	- What is IoT? - Applications and Scenarios - Retail and logistics - Product management - Surveillance - Smart buildings and green buildings - Telematics - Telehealth - Introduction to RFID Technology and RFID Systems - information shadow - Barcode - Computer vision for IoT - Physical mobile interaction - Data processing - Do it yourself: Simple hands-on exercises - Enabling Technologies, Challenges and Concerns - Physics of RFID - Anatomy of an RFID System - RFID Tags - RFID vs. BarCodes and other AutoID Technologies - EPC - Serialization - Benefits of RFID - Security and Privacy Issues and Concerns - Standardization - Conclusions
Number of Participants	20
Profile of Participants	PhD students and Researchers

AAU Training Profile Description, Fall 2010

Training Profile and Description	
Training Workshop Title	SENSORS AND RFID NETWORKS
Instructor	Neeli R. Prasad
Place	Aalborg Univeristy
Schedule – Time Table	4 full days of lectures (8 half-days) in Fall 2010
Training Methodology	- Lectures - Lab Visits - Hands-on Training
Curriculum	**Description:** The consumers of today's networked world are swamped with information coming from a myriad of applications and services available on their devices, communication infrastructures and internet. By 2020, the information overload will be magnified when Internet of Things (IoT) becomes a reality, i.e. objects, smart devices, services, sensors, etc., interacting with the user and themselves to provide

	services or information. This course will discuss different scenarios and applications which include Wireless Sensor, Sensor Networking and Protocols, RFID, etc.
	The topics covered will be:
	Networks including mobile ad-hoc networks and sensor networks routing in wireless multi-hop Software and hardware design and implementation of wireless sensing technologies Sensor data collection, assimilation and manipulation RFID operations and software development Wireless sensor network architecture design Sensor Networking and Protocols Security and Privacy Legal and Ethical issues
	Course Outline:
	Establishing the Sensor Network and RFID Introduction – Sensor Applications Sensor Hardware Platforms and Architectures Sensor Networking and RFID Sensor Networking and Protocols Security and privacy issues in RFID and Sensor Networks The need for security Sensor networks vs. Ad hoc networks Protocols for key establishment Vulnerability of routing protocols and various attacks Other issues in security and Privacy Future Directions and Conclusions Legal and Ethical issues
Number of Participants	-
Profile of Participants	Prerequisites: Basic knowledge of mobile and wireless communications, e.g. as obtained through the M.Sc. engineering studies at Aalborg University, is expected

2.1.3 UJF ASPIRE RFID Training, from January to March 2009

UJF's Training Profile Description, January to March 2009

Training Profile and Description	
Training Workshop Title	Teaching material (in French) for RFID and M2M applications development and deployment based on Aspire RFID
Place	UJF, UFR IMAG, Master Professional track in Informatics, 2nd Year
Schedule – Time Table	60 hours with teacher + 30 hours homework (6 ECTS) Outline: Part 1: Embedded Linux Configuration • Overview of Embedded Operating Systems • Overview of Linux Embedded Distributions • Configuring of Embedded Linux distribution step by step • Installation of embedded Java Virtual Machine Part 2:

	• Introduction to Machine-to-Machine services. • RFID technologies, standards (EPC Global, NFC Forum) and middlewares. • OSGi application development • Adhoc services (UPnP, DPWS, JINI, SLP, DNS-SD) • Data mediation with JavaEE (JMS, Web Services, RESTFul) • Management and monitoring (JMX, LDAP, WBEM). Part 3: practice • Team development of a M2M service including RFID readers (Tikitag, Mir:ror), sensors (IP video camera, USB webcam, temperature, GPS, weather stations, Wiimotes, Sunspots …) and actuators (iBuddys, Nabaztag). The developed service uses and extends SW modules of the OW2 Aspire middleware. It is deployed on industrial low-cost PCs.
Training Methodology	• Lectures(http://membres-liglab.imag.fr/donsez/ujf/m2pgi/pm2m/) • Practices • Oral presentation, reports and demonstrations for the final exam. Industrials are invited to the defensis.
Training Material	• Slides (http://membres-liglab.imag.fr/donsez/ujf/m2pgi/pm2m/)
Curriculum	http://membres-liglab.imag.fr/donsez/ujf/m2pgi/pm2m/
Number of Participants	13 (between 10 and 15 students par year since 2005)
Profile of Participants	10 aster students and 3 PhD students

Preparation and Presentation of a RFID middleware tutorial and of the OW2 Aspire Project at ICAR 2008, August 2008

Training Profile and Description	
Training Workshop Title	Preparation and Presentation of a RFID middleware tutorial and of the OW2 Aspire Project at ICAR 2008 Summer School (organized by Univ of Nice).
Place	Nice
Schedule – Time Table	3 hours Part 1: • Context: Internet of Things, Machine-to-Machine • Overview of RFID technologies (passive, active, WSN) • RFID vs 1D/2D barcodes • Emergence of NFC • Application Domains • Social aspects (Privacy Issues and Concerns) • Architectural design patterns • Software standardization efforts (EPCGlobal, NFCForum, JCP) • Examples of RFID middlewares • OW2 AspireRFID in detail

	• Q&A
	Part 2: Live demonstrations
	from http://wiki.aspire.ow2.org/xwiki/bin/view/Main/Demos
	• Supply chain (lego train)
	• Tangible HMI
	• NFC phone Midlet
Training Methodology	Presentation
	Demonstration
Training Material	http://rainbow.essi.fr/icar08/Documents/RFID/seminaire-intergiciels-rfid.pdf
	http://wiki.aspire.ow2.org/xwiki/bin/view/Main/Demos
Curriculum	http://rainbow.essi.fr/icar08
Number of Participants	80
Profile of Participants	PhD students, Teachers, Researchers, R&D Engineers

2.1.4   RFID Presentations

A number of presentations to students and engineers have been also conducted by AIT, AAU and UJF, in particular:

- May 21st, 2008: Presentation of the ASPIRE Project in the scope of the Greek RFID Information Day, including an illustration of RFID demonstrations.
- December 6th, 2008: Presentation of RFID and ASPIRE to more than 100 undergraduate students, in the scope of a Student Festival in Athens.
- AAU presented ASPIRE project and RFID implementation in the CTIF Easy Life lab throughout 2009 to companies, students, research centers, doctors, etc.
- Presentation of RFID middleware and Aspire at ESISAR engineering school, November 4th 2008

UJF's 1st Training Profile Description, November 4th 2008

Training Profile and Description	
Training Workshop Title	Presentation of RFID middleware and Aspire at ESISAR engineering school
Place	Valence, France (ESISAR + Pole Tracabilité)
Schedule – Time Table	4 hours
	Part 1:
	• Context: Internet of Things, Machine-to-Machine
	• Overview of RFID technologies (passive, active, WSN)
	• Emergence of NFC
	• RFID vs 1D/2D barcodes
	• Application Domains (Privacy Issues and Concerns)
	• Social aspects
	• Architectural design patterns
	• Software standardization efforts (EPCGlobal, NFCForum, JCP)
	• Examples of RFID middleware
	• Aspire in detail
	• Q&A

	Part 2: Live demonstrations from http://wiki.aspire.ow2.org/xwiki/bin/view/Main/Demos - Supply chain (lego train) - NFC phone Midlet Part 3: Presentation of the Supply Chain at the Pole Tracabilité de Valence' show room
Training Methodology	Presentation Demonstration Visit
Training Material	http://membres-liglab.imag.fr/donsez/cours/intergicielsrfid.pdf
Curriculum	ESISAR IR track http://esisar.grenoble-inp.fr/
Number of Participants	21
Profile of Participants	1 professor and 20 students (5th year)

3. Peer Review Evaluation

Peer review was conducted in the form of feedback and evaluation forms distributed during the workshop. Generally the feedback was very positive with most respondents giving a very positive rating of the workshop overall. A full set of feedback and evaluation data is available in the separate peer review report. An example of the evaluation form from one of the courses is given below:

Training Course on RFID in the scope of EC co-funded ASPIRE Project (FP7-215417)

EVALUATION FORM

We would appreciate your honest evaluation of the seminar to help us plan future programs.

Personal Information (filling the fields of this section is optional)

1. **Name:**
   _____
   _____

2. **Company/University:**
   _____
   _____

3. **Position:**
   _____
   _____

4. **What is your degree of awareness regarding RFID technology? (please circle)**
   a. **I've never heard about this technology**
   b. **General information (press / internet)**
   c. **Specific information coming from my own business area (customer / competitor / exhibition / professional organization)**
   d. **I plan to use RFID technology**
   e. **I already use RFID technology**

5. **Define the purpose you are interested in RFID**
   _____
   _____
   _____

Seminar Evaluation

1. **How do you rate this seminar compared to your expectations? (please circle)**

	Significantly below my expectations	Met my expectations			Exceeded my expectations a lot
Personal interest and learning	1	2	3	4	5
Professional relevance	1	2	3	4	5

2. **What are the major Strengths and Weaknesses of the seminar?**

Strengths:

_____
_____
_____
_____
_____

Weaknesses:_____
_____
_____
_____
____

3. How useful did you find:

	Totally useless				Very useful
The topic	1	2	3	4	5
The material	1	2	3	4	5
The quality	1	2	3	4	5
Discussion/presentation	1	2	3	4	5

4. How helpful did you find the seminar for:

	No helpful at all				Very helpful
Professional development	1	2	3	4	5
Practical application	1	2	3	4	5

5. Please give your comments on the overall organization and logistics of the seminar.

Poor				Excellent
1	2	3	4	5

6. Please assess Professor's:

Name of the Instructor	Totally useless			Very useful	
methodology	1	2	3	4	5
communication skill	1	2	3	4	5
effectiveness	1	2	3	4	5
overall	1	2	3	4	5

7. **Please assess the presented Topics:**

Presented Topics	Totally useless		Very useful		
Overview of RFID Technology & Applications and the Internet of Things	1	2	3	4	5
The RFID EPC Network Architecture	1	2	3	4	5
Open Source RFID Middleware Solutions and the AspireRfid FOSS middleware	1	2	3	4	5
Programming RFID Systems with the AspireRfid Middleware	1	2	3	4	5
RFID Laboratory Demonstrations	1	2	3	4	5

7. **Testimonial- please make a statement of max 20 words about the course you have just completed.**

Please note that we might use your testimonial in our next brochure/site update, please check accordingly the box in case you do not want your ☐name, ☐title, or ☐company/University name to be referred in this testimonial. THANK YOU

_____
_____
_____
_____
_____
_____

Thank you for your time….

4. Conclusions

The ASPIRE project has commenced its training activities early on, even though the ASPIRE developments (in terms of RFID middleware and tools) in the first year were at its infancy. The ASPIRE partners organized workshops and presentations that included introductions to RFID technologies, introduction to RFID middleware technologies, platforms and tools, as well as a comprehensive presentation of early developments of the ASPIRE project. The ASPIRE training activities will intensify as the project progresses, where partners will endeavor to train researchers on how to take most advantage out of the AspireRfid open source project (http://wiki.aspire.ow2.org/). Also, through elearning trainings are organized for ASPIRE work and other RFID related topics.