VAASAN AMMATTIKORKEAKOULU
VASA YRKESHÖGSKOLA
VAASA POLYTECHNIC

International Workshop in Embedded Systems, Internet Applications and Industrial IT
From the 19th to the 21st of August 2002
Place: Vaasa Polytechnic, Wolffintie 30, 65200 Vaasa, Finland

Aim and for whom it is intended

The Workshop aims to share the knowledge gained trough many years of experience in the field of IT with its partner institutions from academia and from industry and it is intended for **students**, **faculty members** and **people from industry**

Invited Speakers

- Prof. **Helmut Dispert**, Faculty of Computer Science, Kiel, Germany
- Prof. **Karsten Morisse,** University of Applied Sciences, Osnabrück, Germany
- Prof. **Bettayeb Maamar,** University of Sharjah, UAE,
- Prof. **George Papadourakis,** Technological Educational Institute of Crete, Greece
- Lic. **Rombout Meijer,** Hogeschool van Utrecht, Netherland
- Dr. **Pasi Tuominen,** Vaasa University of Applied Sciences, Finland
- Dr. **Smail Menani,** Vaasa University of Applied Sciences, Finland

- **Pentti Ruotsala**, Vaasa University of Applied Sciences, Finland
- Dr. **Kimmo Salmenjoki,** Vaasa University, Finland
- Lic. **Timo Kankaanpää,** Vaasa University of Applied Sciences, Finland
- **Raimo Sillanpää,** ABB Control OY, Vaasa, Finland
- **Peter Cork,** Nokia Mobile Phones, Tampere, Finland
- **Akbar Jawid,** Nokia Mobile Phones, Turku, Finland
- **Bertil Jauren,** Mitsubishi Electric Europe, SWEDEN
- **Raimund Stampa,** Mitsubishi Electric Europe, SWEDEN
- **Eric Matley,** Stonesoft, Finland

Abstracts

Workshop Title: **Introduction to 16-bit and 32-bit Microcontrollers and tools**
Speaker: **Jauren Bertil,** Mitsubishi Electric Europe, SWEDEN
Abstract: Microcontrollers offers modern embedded system design a powerful new approach in the design process. There are, moreover, a dozen or more manufacturers of microcontrollers, each with different architecture and performance, so choosing the right device for any particular application is a critical part not only of the design process but also of the company strategy. The Workshop will first start by giving a general understanding of Microcontroller platform family concepts, then shows to a designer how to choose the appropriate microcontroller for any application. Emphasis will be on the M16C and M32C families followed by a comprehensive technical explanation, features and benefits. It also gives hints and tips, based on the speaker's intensive experience on the field to allow designers to optimise performance of any particular family of devices. At the end of the presentation, the speaker will present a variety of development and debugging tools with a clear explanation of their use and benefit.

Workshop Title: **Applications of M16C and M32C in Embedded systems, Embedded Internet and Industry**
Speaker: **Raimund Stampa,** Mitsubishi Electric Europe, SWEDEN
Abstract: The Workshop will discuss about Embedded software development using microcontrollers. Issues on the many possibilities in writing programs when using the M16C and M32C microcontrollers families will be discussed. Finally Implementation examples will be explained and demonstrated.
The following examples will be covered: -BlueTooth stack, TCP/IP, Embedded homepage, DTMF Decoder, Software modem, GSM codec, FAT-file system, Motor Control, Graphic Library and RTOS.

Workshop Title: **Audio / Video Coding Technology for IP-based Applications**
Speaker: **Prof. Dr. Karsten Morisse,** Osnabrück, University of Applied Sciences, Germany
Abstract: Within the Workshop open standards for audio and video coding technology are considered. Special consideration is given to MPEG (MPEG-1, MPEG-2, and MPEG-4) and its usability within IP-based applications, like streaming media scenarios in IP-based networks (Internet or even Intranet)

Workshop Title: **Wireless control of industrial process**
Speaker: **Lic. Timo Kankaanpää,** Vaasa University of Applied Sciences, Finland
Abstract: The Workshop will introduce how to develop a wireless application with Java language to monitor a process device with a mobile phone. The application uses mobile phone that supports WAP (Wireless Application Protocol). Short demonstration on how to create an application and what layers there should be will be given. The usability and availability of the services will be discussed during the lesson.

Workshop Title: E-Automation and its application in Process Control
Speaker: Dr. Smail Menani, Vaasa University of Applied Science, Vaasa, Finland
Abstract: The Workshop will first give an overview of automation engineering then discuss methods and techniques used to integrate IT with process control and automation. Results of an ongoing research about the topic will be displayed. Possibilities to give a demonstration on the subject are also considered.

Workshop Title: **Embedded Internet Server Technology**
Speaker: **Prof. Dr. Helmut Dispert,** University of Applied Sciences, Kiel, Germany
Abstract: Early Internet applications have used the CGI (Common Gateway Interface) to develop dynamic Web-based presentations and in a later stage to access general purpose server-side applications. Recently dedicated server technology and the Java programming language have extended applications into the area of internet-based metrology and embedded control. In this Workshop two newer approaches will be discussed:

a) Dedicated server technology implemented with the "SitePlayer^{TM} Embedded Ethernet Web Server Coprocessor Module" will be presented. This modular approach makes it possible to transform any microprocessor-based system into a web-enabled device useful for embedded applications. Software development is facilitated through so called SiteObjects that form an object based system used for communication between the embedded server side and the client side web page. A typical sample implementation shows multi-input/output systems used in virtual lab applications for educational purposes. b) The development of embedded systems has been strongly influenced by the availability of new Java language environments. Approaches like Sun Microsystems' Java Embedded Server technology offer frameworks to use Java Servlets, Java Server Pages (JSP), and Servlet-like objects to implement embedded architectures. The Java Embedded Server Technology will be introduced followed by a detailed discussion of typical samples applications for Servlets and JSP in industrial systems.

Workshop Title: **Using PDAs in distributed education**
Speaker: **Prof. Dr. Kimmo Salmenjoki,** Vaasa University, Finland
Abstract: In this Workshop we will consider how mobile devices can be used in distributing information and extending educational systems into personalized information systems. The Virtual University project in Finland has advocated the usage of online learning systems for providing education in various fields of science. The project was started in 18th of January, 2001, for more details see http://www.virtuaaliyliopisto.fi/. In that project the idea is to use PCs and web based learning applications or information systems. In this paper we will see how modern mobile and PDA end devices can further enhance online learning. During the academic year 2001-2002 we are introducing the usage of PDA (Personal Digital Assistant) devices both in organizing departmental information and in teaching of certain courses in the transformation education from Bachelor of Engineering into Master of Engineering in the University of Vaasa. The courses that were used were Basics of knowledge engineering and Java programming.

Workshop Title: **Embedded Internet Implementation and Programming**
Speaker: **Dr. Pasi Tuominen,** Vaasa University of Applied Science, Vaasa, Finland
Abstract:
The Workshop will introduce how embedded internet can be implemented and how different kind of security aspects can be taken into account. Different methods and component possibilities to use microcontrollers in order to implement embedded Internet system are also covered. Shortly the Workshop will give an overview of TCP/IP - stack operation and about some upper level protocols over it. Discuss about current trends in this area are also covered. IPv6 and wireless application will be presented. Possibilities of using XML with embedded Internet systems will also be covered. The meaning of GPRS-protocol will be discussed from the process control point of view. Generally different manners to connect process control systems to Internet are discussed. Possibilities to connect OPC-server to internet are presented.

Workshop Title: **Realistic SW Project Management.**
Speaker: **Peter Cork,** Nokia Mobile phones, Tampere, Finland
Abstract: This Workshop will first describe the typical steps in the lifecycle of a SW project. It will discuss the realistic side of day to day running the SW project. Finally, possible SW processes will be discussed and how they can be used to improve the successful delivery of the project.

Workshop Title: **SoC process Design Flow**
Speaker: **Jawid Akbar,** Design Engineer, Digital ASIC, Nokia Mobile phones, Turku, Finland
Abstract: The Workshop will explain the important steps that are required for the development of an ASIC. The presentation will give a brief idea of each and every phase starting from Pre study & ending at mass production of the chip. Tools and techniques used in different steps will be introduced as well.

Workshop Title: **Artificial Neural Networks**
Speaker: **Prof. George M. Papadourakis, Ph.D.** Department of Applied Informatics, Crete, Greece
Abstract: This Workshop is an introduction to Artificial Neural Networks. Initially the motivation for using neural computing, and a comparison with traditional computers will be presented. Then, the areas where Neural Networks can be applied, what they can be used for and how people from various fields are interested on them will be provided. The biological neuron as well as the key elements of neural networks and the training methods will be introduced. The various types of neural networks such as Perceptron, feedforward using backpropagation and other architectures will be explained and demonstrated. Finally, in the first part, the self organizing maps (Kohonen) will be investigated and explained. The second part of the Workshop will be devoted to applications. Initially, the characteristics on neural networks will be introduced and why neural network projects are different will be explained. The project life cycle and how neural networks are applied in real problems will be presented. The actual applications such as fibre optics image transmission, TV picture quality control, adaptive inverse control, chemical manufacture, stock market prediction, oil exploration and automated industrial inspection.

Workshop Title: **Wavelet-based Compression for Multimedia Processing:**
Speaker: **Prof. Maamar Bettayeb,** University of Sharjah, Sharjah, UAE
Abstract: Efficient use of bandwidth in multimedia and information highway applications is critical as trillions of bits of data are transmitted daily over the internet and other media. These include videophone, video conferencing, video on-demand, digital audio broadcasting, high fidelity TV, graphics, animation, virtual environment and storage devices. Compression is the key challenge for effective access to speech, audio, image and video information. This challenge is overwhelming as one needs to achieve high quality audio and video for transmission over limited bandwidth, requiring high compression ratios.
In this tutorial, the wavelet transform is presented as a powerful technique for multimedia processing, transmission, access and storage. Important features of wavelet transform for compression are first detailed. Some successful applications to speech, audio, image and video compression are reported. The adoption of wavelet to the new JPEG 2000 standard is highlighted. Its performance with respect to the discrete cosine transform is discussed. Future research directions are outlined.

Workshop Title: **ABB's goal is Industrial IT**
Speaker: **Raimo Sillanpää,** ABB Ltd. Low Voltage Systems, Vaasa, Finland
Abstract: Industrial IT is ABB's name for a powerful commitment to solutions for Real-Time Automation and Information. Far more than a marketing concept, Industrial IT will guide virtually every step ABB takes going forward -- in marketing, technology, business processes, and more. The basic goal of Industrial IT is to enable our many products to work together in truly seamless fashion -- creating a total solution that is far greater than the sum of its parts -- much the way the various programs on your PC work together to make the job easier. ABB's goal is to deliver advanced products that are truly pre-engineered, ready-to-use -- and reusable across many tasks. These products will be easier to configure, install, and move around within the business enterprise, and they will provide their owners with real-time information that makes them easier to operate and maintain. More will be described during the Workshop week at Vaasa Polytechnic.

Workshop Title: **The crossing point of Artificial intelligence, Robotics and Planning systems.**
Speaker: **Rombout Meijer,** Hogeschool van Utrecht, Netherland
Abstract: Planning can be seen as a case of State space search. This includes the definition of a Current state, a Goal state, the possible Transitions, and a Plan to define a way to proceed from the Current state to the Goal state. The usual search procedures from Artificial intelligence can be applied. Embedded in robots, it will become possible to let the robot find its own way in inventories, logistic environments, etc. The "least commitment strategy" will be discussed and illustrated. A classical planning system (STRIPS, from Stanford) will be shown, using the so called "Blocks world". Also a simple planner's program (in Prolog) will be presented.

Workshop Title: **IT Security for the fixed and mobile IP Network.**
Speaker: **Erik Motelay,** Marketing Director EMEA , Stonesoft Corporation, Finalnd
Abstract: As companies share business critical information and conduct commerce over the public Internet identifying the security threats and risk areas has become a necessity. The Workshop will describe the challenges and critical components needed when building highly available and secure Internet connections and Virtual Private Networks across both fixed and mobile IP infrastructures. The focus shall be on related business benefits (Cost of Ownership, case studies...) rather than an in-depth overview of the technologies involved. The current and upcoming security solutions linked to offering secure services and applications in the different wireless environments (WLAN, GPRS, WAP...) will also be specifically discussed.

Schedule

Day	Time	Activity
Sunday 18/08/2002		Arrival of participants to Vaasa
Monday 19/08/2002	08:00 to 08:15 08:15 to 10:00	Welcoming by Rector **Pentti Ruotsala** *Workshop 1*: **Embedded Internet Implementation and Programming** By Dr. **Pasi Tuominen**, Vaasa University of Applied Sciences, Finland
	10:00 to 11:00	*Workshop 2:* **Wireless control of industrial process** By **Lic. Timo Kankaanpää**, Vaasa University of Applied Sciences, Finland
	11:00 to 12:00	Lunch break
	12:00 to 13:00	**Workshop 3: Realistic SW Project Management.** By **Peter Cork,** Nokia Mobile Phones.
	13:00 to 14:00	*Workshop 4*: **Using PDAs in distributed education** By **Prof. Kimmo Salmenjoki**, Vaasa University, Finland
	14:00 to 18:00	*Workshop 5*: **Introduction to 16-bit and 32-bit Micro-controllers and tools** By **Jauren Bertil,** Mitsubishi Electric Europe, SWEDEN
Tuesday 20/08/2002	8: 15 to 10:00	*Workshop 6*: **ABB's goal is Industrial IT** By **Raimo Sillanpää**, ABB Ltd, Finland
	10:00 to 12:00	*Workshop 7*: **IT Security for the fixed and mobile IP Network** By **Erik Motelay,** Stonesoft Corporation, Finland
	12:00 to 13:00	Lunch Break
	13:00 to 14:00	*Workshop 8:* **SoC Process Design Flow** By **Jawid Akbar,** Digital ASIC, Nokia Mobile phones, Finland
	14:00 to 18:00	*Workshop 9*: **Applications of M16C and M32C in Embedded systems, Embedded Internet and Industry** By **Raimund Stampa,** Mitsubishi Electric Europe, SWEDEN
Wednesday 21/08/2002	08:15 to 09:00	*Workshop 10*: **E-Automation and its application in Process Control** By **Dr. Smail Menani**, Vaasa University of Applied Science, Finland
	09:00 to 11:00	*Workshop 11*: **Wavelet-based Compression for Multimedia Processing.** By **Prof. Maamar Bettayeb,** University of Sharjah, UAE
	11:00 to 12:00	Lunch Break
	12:00 to 13:00	*Workshop 12*: **Artificial Neural Networks** By **Prof. G. M. Papadourakis**, Technological Educational Institute of Crete
	13:00 to 14:00	*Workshop 13*: **Audio / Video Coding Technology for IP-based Applications** By **Prof. Karsten Morisse**, Osnabrück University of Applied Sciences , Germany
	14:00 to 17:00	*Workshop 14*: **Embedded Internet Server Technology** By **Prof. Dr. Helmut Dispert,** Kiel University of Applied Sciences, Germany
	17:00 to 18:00	*Workshop 15*: **The crossing point of Artificial intelligence, Robotics and Planning systems.** By **Rombout Meijer**, Hogeschool van Utrecht, Netherlands

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