



French – Japanese Workshop
in the field of
Information and Communication Science
and Technologies

French National Research Agency (ANR)

And

Japan Science and Technology Agency (JST)

19 & 20 of November

**« Marriott Rive gauche »
17, Boulevard Saint Jacques
75014 Paris**

Agenda

Thursday, November 19th 2009

13:30 pm welcome coffee

14:00 Opening

J. LECOURTIER, General Director, ANR

14:20 Presentation of JST – ANR joint call

Nakita VODJDANI, Head of International Cooperation ANR and ICT program manager

14:40 Bio MEMS for ICT

Beomjoon KIM, Associate Professor, Univ. of Tokyo.

15:00 ICT Technologies for next car generation

Christian LAUGIER, Research Director, INRIA.

15:20 Vision-based 3D Media Synthesis and Display

Hideo SAITO, Professor, Keio University.

15:40 Reconfigurable architectures for Wireless Sensor Network

Daniela DRAGOMIRESCU, LAAS-CNRS.

16:00 Coffee break

16:20 Meme Media and Knowledge Federation Architectures

Yuzuru TANAKA, Professor, Hokkaido Univ.

16:40 High performance simulation based on new processor architecture for seismology and geophysics

Fabrice DUPROS and Hideo AOCHI, BRGM.

17:00 XcalableMP: A performance-aware scalable parallel programming language and "e-science" project for Japanese Petascale supercomputer

Mitsuhsa SATO, Professor, Univ. of Tsukuba.

17:20 Evolution of mobile networks, mobility management

Jean-Marie BONNIN, Telecom Institute.

17:40 Micro sensors for robots

Jean-Philippe POLIZZI, CEA-LETI.

18:00 Hardware and Software Architectures for Embedded High Performance Computing

Thierry COLETTE, CEA LIST.

Friday, November 20th 2009

9:00 Micro Electro Mechanical Systems

Yoshio MITA, Associate Professor, Tokyo Univ.

9:20 Digital simulation libraries for high performance computing

Sylvestre LEDRU, Consortium Scilab, INRIA.

9:40 Inference-based Hypothesis-finding for Systems Biology

Katsumi INOUE, Professor, National Institute of Informatics.

10:00 Network coding in wireless and ad hoc networks

Khaldoun AL ALGHA, Saclay, HIPERCOM.

10:20 Coffee break

10:40 Unifying framework and tool for the high-performance modeling and verification of hybrid concurrent systems

Kazunori UEDA, Professor, Waseda Univ.

11:00 Sharing knowledge while keeping secret secret

Philippe DAGUE, INRIA and Université Paris-Sud.

11:20 Performance-aware networking

Yutaka TAKAHASHI, Professor, Kyoto Univ.

11:40 Trusted Computing Platform

Jean-Luc DANGER, Telecom Institute.

Naofumi HOMMA, Professor, Tohoku Univ.

12:00 Adaptative Multimedia Streaming for the Future Internet

Hitoshi ASAEDA, Associate professor, Keio Univ.

12:30 Lunch

14:00 Ubiquitous multimedia services

Françoise PRETEUX, Telecom Institute.

14:20 cognitive radio activities at CEA-LETI

Dominique NOGUET, CEA-LETI.

14:40 Understanding Internet Dynamics from a Global View: Measurement Research in the WIDE Project

Kenjiro CHO, Professor, Internet Initiative Japan Inc.

15:00 Algorithms, Programming and Software for multi Petascale Computing

Serge PETITON, Professor, INRIA.

15:20 Research topics at the Japanese-French laboratory for Informatics (Tokyo)

Philippe CODOGNET, Visiting Professor, Tokyo Univ./Paris 6. Univ.

15:40 Coffee break

16:00 Nanophotonics for telecom applications

Abderraim RAMDANE, CNRS.

16:20 Action recognition for humanoid robots and archaeology

Jean PONCE, INRIA.

16:40 Microfluidic and cell biochips for *in vitro* toxicity analysis

Eric LECLERC, CNRS.

17:00 Closing

Akinori YONEZAWA, Program Officer, JST

17:30 End of the Workshop

List of Participants

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Summary / Keywords

K. Al Agha: Network coding is a new topic in routing and consists in combining packets together before forwarding. The optimization comes from the fact that information packets could be decoded at destination or intermediate nodes and so the number of transmissions could be decreased in a significant way. My presentation will present shortly the work done at LRI and Kyoto University on network coding based flooding in ad hoc networks and perspectives for new ideas to enhance the quality of service by using the network coding tool. The application area could be home networking and femtocell routing in 4G networks.

H. Asaeda: multimedia communication, streaming, multicast, wireless

J.-M. Bonnin: Heterogenous mobility management: Taking advantages from technology diversity. The recent boom in wireless network technologies and the diversification of the network-enabled devices opened the way to a lot of network-based services. In a very near future, users will expect to be permanently connected to the Internet no matter where they are, and especially in cars and public transportation. Multihomed devices are now able to take advantage of the media access abundance (technology diversity) to improve the user experience. However, in such a versatile world, traditional management techniques and network stacks are not able to tackle multiple interfaces management nor to deal with the complex decisions that have to be taken. Therefore, novel connectivity management frameworks has to be designed to accompany this evolution. This framework could be used in terminal equipment or rely on an intermediate equipment (Mobile Router) responsible for managing the ubiquitous access issues on behalf of the devices and provide them with a stable and easy-to-use access network. In this presentation we present the rationales for working on such a framework. Then we describe a policy-aware mobility management framework we designed in several collaborative projects.
Keywords: Mobility, Mobility management, Multi-homing, Multi-interfaces, NEMO, MIPv6, Policy aware.

T. Bourouina: MEMS, microtechnology, nanotechnology, bottom-up, photonic, captors.

Jumana Boussey: assesment of nanoimprint lithography for metamaterials-based devices. Nanoimprint lithography for large surface nanoelectronics and nanophotonics applications.

H.-P. Charles: computer architecture, code optimisation, compilation, dynamic compilation, applications HPC, applications multimedia.

D. Chiaroni: Optical Networks

K. Cho: Internet, WIDE project, traffic measurement, network visualization, data sharing

P. Codognet: Next Generation Networks, Grid Computing, High-Performance Computing, Computer Security, Images and Multimedia, Quantum Computing

T. Collette: Hardware and Software Architectures for Embedded High Performance Computing. In the embedded domain, applications as image processing and image/video understanding need embedded resources for computing and memorisation. The design of an embedded computer must be done taking into account a compromise on different criteria, as the performance, the silicon area, the power consumption, the reliability, the programmability and the flexibility. In this presentation a discussion around these criteria will be proposed and several MPSoC architectures will be briefly presented. Architectures, programming languages and tools will be presented. Proposition of projects around this topic will be done, as well as propositions on Model-Based Architecture and on Non Destructive Testing for industrial applications.

V. Cros: Researcher Physical departement CNRS/Thales, Spintronique and Nanomagnetisme.

P. Dague: Sharing knowledge while keeping secret secret. More and more applications deal with entities or agents, more or less autonomous, that have to share knowledge to achieve a task (composite services distributed databases querying peer to peer systems, social networks, systems,biology, etc.). Very often too, these entities do not want, or are not allowed, to disclose some information. A challenge is then to design reasoning processes among

these entities allowing a goal to be fulfilled while keeping secret to other entities some knowledge private to one entity. We will present some clues for this general problem, in the context of knowledge formalized in propositional logic. We will focus more particularly on distributed reasoning in a P2P setting, where each peer owns a private local theory and shares some knowledge with some other fixed neighbouring peers by the way of mappings. Two main categories of reasoning will be addressed: consequence finding and hypothesis finding respectively illustrated by distributed knowledge bases querying and distributed diagnosis, and technically belonging to prime implicates and prime implicants distributed computation respectively. This addresses also the problem of reasoning in a possibly globally inconsistent system. Several lines of future research, perspectives of extension and potential applications will be sketched, as well as a draft of project proposal.

J.-L. Danger and N.Homma: Trusted Computing Platform. Even if the cryptographic algorithms are mathematically robust, their implementation leaks secret information when the ciphering function is executed. For instance, the key can be recovered by observing the device activity via the "side channels" which can be the power dissipation, the execution time or the electromagnetic field. Another type of "attack" is to inject faults inside the device. The trusted computing platform project consists in studying countermeasures to thwart any kind of attacks. In the ANR-JST framework it will concentrate mainly on the electromagnetic analysis and the simulation modelling.

M. Dias de Amorim: mobile and wireless network.

D. Dragomirescu: We present here our work on reconfigurable architectures for Wireless Sensor Networks. We study low power radio interface using impulse radio UWB systems in the 3-10 GHz band and at 60GHz. We propose new design solution for digital circuits to implement the impulse radio UWB and low power RF front end circuits functioning at 60GHz. Our goal is to obtain a RadioSoC system completely integrated. We are also working on RF MEMS for phase shifter for smart antenna. To achieve the RadioSoC system we need predictive modeling, that's way we propose new VHDL-AMS models for each bloc (base band, Rf front end and RF MEMS). Different MAC layers are proposed taking into account the specificity of the application. A new software tool is

developed to allow the simulation of WSN using UWB impulse radio physical layer. Cross-layering is done to obtain optimal routing.

Keywords: Impulse radio UWB, 60GHz circuits and architectures, VHDL-AMS modeling, Radio SoC, MEMS RF, Mac layer, Cross-layering, Simulation tool using UWB-IR, Wireless Sensor Network architectures.

F. Dupros and H. Aochi: One major goal of strong motion seismology is the estimation of damage in future earthquake scenarios. The French geological survey is involved in seismic risk assessment and a joint workshop has been recently organised to enhance collaboration between French and Japanese teams on these topics (<http://www-solid.eps.s.u-tokyo.ac.jp/~ide/FJWS/>). One bottleneck in seismic simulations is the important computing requirements for the realistic three-dimensional problem. The NUMASIS project (<http://numasis.gforge.inria.fr/>), funded by ANR, has introduced several tools to tackle multicore and NUMA architectures (thread libraries, linear solvers, memory affinity support). These contributions have been validated on seismic applications. The next step is to extend these approaches for very large scale simulations on emerging platforms.

Mohand-Said Hacid: Services Web, Web Semantic, data management

K. Inoue: Artificial Intelligence, Automated Reasoning, Knowledge Representation, Hypothesis Finding, Machine Learning, (Inductive) Logic Programming, Systems Biology, Modeling, Pathways

B. Kim: NEMS/MEMS devices, Single molecule handling, Bio-sensor, Point of care diagnostics, and LIMMS(French-Japan Network)

E. Leclerc: Microfluidic and cell biochips for *in vitro* toxicity analysis. In the framework of the REACH directive and the "3R" recommendations, an important issue in toxicity studies is the development of new pertinent *in vitro* tests that could provide an alternative to *in vivo* testing methods. Current developments in tissue engineering and microtechnology fields are allowing the proposal of microfluidic biochip as microtools for *in vitro* investigations.

C. Laugier: ICT Technologies for next car generation. It is now more and more clear that ICT technologies will play an increasing role in the development of the next car generation. Research laboratories and R&D departments of car constructors and of car suppliers are involved since

at least 15 years into large National and European programs for the development of Advanced Driving Assistance Systems (ADAS technologies). Thanks to the recent technological progress in sensor technologies, robotics technologies, miniaturized mechatronic systems, embedded systems, and more generally ICT technologies, this new concept aimed at increasing driving safety and comfort is gradually becoming a reality. This talk will address this issue located on the cutting edge of the state of art. Both current results and open research issues will be presented in the context of some past and current France-Asia collaborations on Intelligent Transportation Systems. **Keywords:** Car safety & Eco driving

S. Ledru: Digital Simulation Libraries for High Performance Computing Today, for simulation and optimization of large complex systems (environment, sustainable development, aeronautics, automotive,...) it is necessary to have more and more powerful modeling and numerical computation. With the coming of future exaflop machines together with personal computers including very effective multicores and GPU's, the numerical computation libraries are one important element for performance. For instance, it is the case for matrix computation, differential equations solving, signal processing (fft) etc. In order to adapt them, many research works are needed, in particular the parallelization of algorithms. We propose to use the free software for numerical computation Scilab, already used a lot in Japan, for the implementation, the tests and the diffusion of these algorithms.

D. Migault: Naming System : DNS/DNSSEC. On our side for now more focused on cache servers, homegateway and end user devices than authoritative servers. Our topics include architecture design of DNS cache platform, traffic analyses, development of cache monitoring tools, anti-phishing detection, DNSSEC resolution for end user, DNSSEC deployment in ISP networks...
IPsec: IPsec in a mobile and multihoming environment, design of an IPsec API.

Y. Mita: Human Friendly Computer Interface, Micro/Nano Electro Mechanical Systems, 3D capturing circuits, Microoptics, Very Large Scale Integration (VLSI)

P. Nguyen: Cryptology, Security, Algorithmic number theory.

D. Noguét: Cognitive Radio (CR) has been a very active research area for several years in the field of wireless communication. The classical cognition cycle breaks down into 4 main functions a CR has to perform: sense, analyse, decide, adapt. CEA-LETI has worked in this field concentrating on algorithms and hardware for sensing and adaptation. These technologies include spectrum sensing, system identification, flexible antennas using MEMs and advanced materials, flexible RF and baseband. The talk concentrates on identifying key opportunities and the associated breakthroughs needed to foster the use of CR into actual systems.

Vincent Nozick: computer vision, virtual reality, real-time rendering.

S. G. Petiton: Algorithms, Programming and Software for High Petascale Computing. Our goal is to propose algorithms, software and a global programming paradigm for future 10 Petaflop Platforms, as a step toward the future Exascale barrier. We rely on the expertise acquired through our previous researches on supercomputers, cluster of clusters and grids with heterogeneous multicore nodes using accelerator programming. We optimize algorithms for dense and sparse linear algebra and FFT, and we introduce software to bridge the gap between parallel languages and clusters of multicore machines. We address subjects ranging from new high level languages for the end-users to low-level multi-core programming methodologies, including task scheduling, runtime systems, resilience for HPC applications, distributed storage and green computing strategies.

J.-P. Polizzi: Microsensors for macro-robots. In order to address the needs raised by an ageing population, Japan has taken the lead, among industrialized countries, in the field of robotics. To be autonomous, these robots require a large number of sensors. On the other hand, in the last 25 years, CEA Leti has developed a large number of MEM sensors and actuators. Several of them were successfully transferred to industry for aerospace, automotive or consumer applications. Some examples of past realizations will be presented. A focus on devices of interest for robotic applications will be given as potential development in the frame of the French-Japanese collaborative call.

F. Prêteux: Institut Telecom presents its advanced research activities on emerging technologies for user-centric ubiquitous networked media. First we shall discuss the related scientific challenges referring to:

- 1- *Media to network convergence* for defining networkable, context-aware, and dynamically reconfigurable media,
- 2- *Media to communication convergence* for establishing unitary modelling and management for user-generated content,
- 3- *Sensory software interfaces* for providing ubiquitous, mobile, and immersive experience, and
- 4- *Digital knowledge of the cognitive human* for bridging the semantic gap.

Then we shall present a brief overview of the open innovation actions with emphasis on the:

- Alcatel Lucent Bell Labs / Institut Telecom joint laboratory on media ubiquity offering a seamless science-technology- business ecosystem,
 - cutting-edge standardized technologies promoted by Institut Telecom
 - inter-networked SMEs constituting a portfolio covering from business models & social networks to content representation and protection.
- Some achievements through advanced research projects as Terranumerica, HD3D-IIO and Medi@tic will illustrate the Institut Telecom's expertise. Finally, we shall identify possible tracks for a research proposal relevant for the joint ANR-JST call in ICT.

A. Ramdane: This talk will summarize recent advances in semiconductor quantum dot (QD) based devices grown either on GaAs or InP for telecom applications. Novel optical sources will in particular be discussed that are suited for access networks. The potential of QD devices for high bit rate all-optical signal processing will also be addressed.

L. Saini: robotique.

H. Saito: Visual Media Computing, 3D Display, Virtual Reality, Computer Vision

M. Sato: High performance computing, Parallel programming language, Supercomputer, Distributed memory systems, Parallel computing, e-science project, Petascale computing, Exascale computing

N. Spyrtatos: databases, conceptual models, information integration (data entrepose, mediators), Visualisation of information, numerical libraries.

Y. Takahashi: networking, performance analysis, QoS, content delivery, traffic, network tomography, routing, ad hoc networks, wireless communication

Y. Tanaka: Knowledge Media, Knowledge Federation over the Web, SOA, Proximity-based Federation, Interoperability, Web Resources

K. Ueda: nondeterministic systems, hybrid systems, concurrency, constraint programming, model checking, model understanding, reliable computing, high-performance verification, modelling languages, language implementation

E. Yoshida: Robotics, Humanoid, Robot Autonomy, Human-Robot Interaction, International Mixed Unit