



9th Annual Symposium on Future Trends in Service-oriented Computing

Hasso Plattner Institute
Potsdam | June 26 - 27, 2014

Design IT. Create Knowledge.

Hasso Plattner Institute for IT-Systems Engineering

The Hasso Plattner Institute for IT-Systems Engineering (HPI) at the University of Potsdam is unique in Germany for two key reasons: It was the first university institute in Germany financed entirely by private funds, and second, it is a prime example of a successful public-private partnership. The Hasso Plattner Institute offers the Bachelor's and Master's degree in "IT-Systems Engineering" that emphasizes the ability to design, develop, and control large, complex, and distributed IT systems. A particular specialty of the HPI is the strong engineering orientation that intensively incorporates industrial projects in its curriculum.

10 Research Groups shape the profile of the HPI in IT-Systems Engineering. At the HPI, 470 undergraduate and graduate students are currently enrolled and about 100 research assistants and Ph.D. students are researching in their respective field. Since October 2005, the HPI runs the Research School on "Service-Oriented Systems Engineering", an international Ph.D. school with 55 students in four different countries: Potsdam in Germany, Cape Town in South Africa, Haifa in Israel, and Nanjing in China.

The Hasso Plattner Institute tightly cooperates with scientific partners, both nationally and internationally. Among the partners - apart from renowned European universities - are the Stanford University, the Massachusetts Institute of Technology (MIT) in the US, as well as Technical University of Beijing in China. Furthermore, the HPI cooperates with renowned major IT companies, such as EMC, Fujitsu, HP, IBM, Microsoft, SAP, Siemens, and T-Mobile.

Agenda

Thursday, June 26, 2014

Room: HS 1, HS Foyer (Lecture Building)

- 13:00-13:15 **Opening of the FutureSOC Symposium**
- Prof. Dr. Christoph Meinel, HPI Potsdam page 6
 - Prof. Dr. Andreas Polze, HPI Potsdam page 7
 - HPI Research School
 - Ph.D. Students Introduce Their Work - Elevator Pitch
- 13:15-14:00 **Keynote**
- Dr. Manuel Serrano, INDES, INRIA page 8
 - From PCs to Tablets: Programming the Diffuse Web
- 14:00-14:15 Coffee Break
- 14:15-15:45 **Session 1**
- Dr. Thore Graepel, Microsoft Research page 9
 - The Human Manifold: On the Predictability of Human Online Behaviour and its Consequences
 - Prof. Dr.-Ing. Jörg Nolte, BTU Cottbus page 10
 - Multi- and Many-Core Architectures - A Trip over a Bumpy Road
 - Dr. Douglas Santry, Advanced Technology Group, NetApp page 11
 - Technology Trends: A Storage Vendor's Perspective
- 15:45-16:00 Coffee Break
- 16:00-16:45 **Keynote**
- William L. Franklin, Hewlett Packard page 12
 - Hybrid Cloud Computing - An OpenStack Based Approach
- 16:45-17:00 Coffee Break
- 17:00-18:30 **Session 2**
- Carl-Friedrich Bolz, King's College London page 13
 - Low Effort Just-In-Time Compilers with RPython for More Efficient Service Execution
 - Dr. Matthias Weidlich, Imperial College London page 14
 - Constraint-based Optimisation of Complex Event Processing
 - Marcel Taeumel, HPI Research School Potsdam page 15
 - Interleaving of Modification and Use in Data-driven Tool Development
- 19:00 **Social Event** Dinner at Caputh Palace page 24

Friday, June 27, 2014

Room: HS 1, HS Foyer (Lecture Building)

09:00-09:45 **Keynote**

Martin Heisig, SAP page 16
Building the Enterprise Cloud - Innovation at Work

09:45-10:00 Coffee Break

10:00-11:30 **Session 3**

Prof. Dr. Stefan Katzenbeisser, TU Darmstadt page 17
Privacy by Design - Protecting Sensitive Data on Untrusted Machines

Josiah Chavula, PhD Student, HPI Research School Cape Town page 18
Peering for the Pan-African Research and Education Networks: Challenges and Possibilities

Ofir Shwartz, PhD Student, HPI Research School Haifa page 19
A Trust-Nothing Architecture for Secure Computing

11:30-11:45 Coffee Break

11:45-13:15 **Session 4**

Prof. Dr. Yitzhak Birk, Technion page 20
On the Multiple Dimensions of Performance and Implications to System Architectures

Aderonke Busayo Sakpere, HPI Research School Cape Town page 21
Dynamic Buffer Resizing for Efficient and Secure Streaming Data Anonymization

Xiangyang Xu, HPI Research School Nanjing page 22
Object-based Stereo Image Retrieval

Pedro Lopes, HPI Research School Potsdam page 23
Pose-IO: A Wearable Device that Allows for Eyes-Free Input and Output Through the User's Muscles

Speakers



Introduction: Hasso Plattner Institute

Prof. Dr. Christoph Meinel

Director of the
Hasso Plattner Institute

Christoph Meinel is full professor (C4) for computer sciences at HPI and University of Potsdam, holding a chair on „Internet Technologies and Systems“. His research focuses on Future Internet Technologies, in particular Internet and Information Security, Web 3.0: Semantic, Social and Service Web, as well as innovative Internet Applications, especially in the domains of e-Learning and Telemedicine. Apart from teaching in the HPI Bachelor and Master courses on IT-Systems Engineering he also teaches at the HPI School of Design Thinking. He is a visiting professor at the College for Computer Science at Beijing University of Technology in China and is a senior research fellow at the Interdisciplinary Center for Security, Reliability and Trust (SnT) at the University of Luxembourg (formerly LIASIT - Luxembourg International Advanced Studies in Information Technology). Since 2008, he is program director of the HPI-Stanford Design Thinking Research Program together with Prof. Larry Leifer from Stanford University.

Introduction: Future SOC Symposium



Prof. Dr. Andreas Polze

Speaker of the
HPI Research School

Prof. Dr. Andreas Polze is the Operating Systems and Middleware Professor at the Hasso Plattner Institute for Software Engineering at University Potsdam, Germany. He is also the speaker of the Ph.D. school on "Service-Oriented Systems Engineering" at HPI and member of the steering committee of HPI's Future SOC Lab. Andreas received a doctoral degree from Freie University Berlin, Germany, in 1994 and a habilitation degree from Humboldt University Berlin in 2001, both in Computer Science.

At HPI, his research focuses on architectures of operating systems, on component-based middleware, as well as on predictable distributed and cloud computing. Andreas Polze was visiting scientist with the Dynamic Systems Unit at Software Engineering Institute, at Carnegie Mellon University, Pittsburgh, USA, where he worked on real-time computing on standard middleware (CORBA) and with the Real-Time Systems Laboratory at University of Illinois, Urbana-Champaign.

Current research interests include Predictable Service Computing, Adaptive System Configuration, and End-to-End Service Availability for standard middleware platforms. He is member of the GI and the IEEE. He has been CoChair of ISORC 2011 and 2012 (Intl. Symp. On Object-Oriented Real-Time Computing). Andreas Polze has (co-) authored more than 90 papers in scientific journals and conference proceedings. He has contributed to five books.

Together with Mark Russinovich and David Solomon, Andreas Polze is one of the co-authors of the Windows Curriculum Resource Kit (CRK), the top-download at the Microsoft faculty resource center. Andreas Polze has been funded through the Rotor-I and Rotor -II projects. He received a Phoenix Direct Funding award in 2007 for research on Phoenix for Real-time Robotics and Process Control. Together with Charité, Getemed, and Deutsche Telekom, he has run the Fontane telemedicine project. Joint research with SAP has investigated porting HANA to new processor architectures.



Dr. Manuel Serrano

Senior Scientist, INDES
(Informatique Diffuse et
Sécurisée), INRIA

From PCs to Tablets: Programming the Diffuse Web

Personal computing has been radically changed by smartphones and tablets. Within a few years, these new devices have become as numerous as personal computers. They have also almost bridged the performance gap. A modern smartphone is equipped with a hardware that can compete the traditional laptop on many aspects.

Since we permanently carry our phones with us. Since they are always connected to a network and since they are equipped with a vast set of sensors, they allow us to implement new applications that were inconceivable a few years back in the past: the diffuse applications.

However, programming diffuse applications is difficult because it combines all the hardest points of the traditional programming to which it brings new problems of its own. In this course, we will present a new programming language called Hop, specially designed for addressing these problems. We will present the language, its constructs, its semantics, and how to program realistic diffuse applications.

Manuel Serrano is a Senior Scientist at INRIA, leading the INDES (Informatique Diffuse et Sécurisée) team in Sophia-Antipolis. After completing his PhD (Paris VI, 1994), on the compilation of functional languages, he moved to Nice and created the Bigloo development environment for Scheme. He joined INRIA in 2001, and has focussed on development environments for the diffuse web since 2005.

The Human Manifold: On the Predictability of Human Online Behaviour and its Consequences



Dr. Thore Graepel

Online Services, Advertising
and Applied Games,
Microsoft Research

A growing proportion of human activities, such as social interactions, entertainment, shopping, gathering information, and learning, are now mediated by digital services and devices. Such digitally mediated behaviours can easily be recorded and analysed, fuelling the emergence of computational social science together with new services such as personalized search engines, recommender systems, and targeted online marketing. In this talk, I will discuss to what degree human behaviour is predictable from online records, and I will demonstrate that, by using basic machine learning methods, it is possible to predict a wide range of personal attributes including sexual orientation, ethnicity, religious and political views, personality traits, intelligence, and happiness to a surprising degree of accuracy. I give examples of associations between attributes and Likes and discuss implications for online personalization and privacy. This is joint work with Michal Kosinski and David Stillwell at the University of Cambridge and is based on the PNAS paper "Private traits and attributes are predictable from digital records of human behavior".

Thore Graepel is a Principal Researcher at Microsoft Research Cambridge and Professor of Machine Learning at University College London (UCL). Thore's research is rooted in machine learning and probabilistic reasoning with applications to large-scale online services, games people play, visual pattern recognition, automatic data analysis, and social network data. More recently, he has been working in probabilistic programming - co-inventing the Tabular programming language - and has rediscovered his passion for behaviour and reinforcement learning. Thore's work in machine learning continues to have a strong influence on Microsoft products and services with millions of users, including the TrueSkill ranking and matchmaking system in Xbox Live, the Ad-Predictor click-through rate estimation system in Bing, and the Matchbox recommendation system for the Xbox Live Marketplace.



Prof. Dr.-Ing. Jörg Nolte

Verteilte Systeme/
Betriebssysteme,
BTU Cottbus

Multi- and Many-Core Architectures - A Trip over a Bumpy Road

General purpose CPUs with dozens of computing cores are currently reaching the market. Some researchers even expect chips with thousands of computing cores to be available in the foreseeable future. In this talk we will discuss the architectures of some current multi- and many-core CPUs with an emphasis on understanding the hardware foundation of today's parallel computing systems. In particular we will concentrate on the memory hierarchy of these CPUs and the inherent cost of sharing in cache-coherent multi-core systems. Additionally, we will examine typical problems that system designers and application programmers have to solve when they try to utilize such hardware architectures effectively.

Jörg Nolte is professor for computer science at the Brandenburg University of Technology (BTU) in Cottbus (Germany) where he holds the chair for distributed systems and operating systems. Prior to that position he was a senior researcher at the Fraunhofer Gesellschaft, Institute for Computer Architecture and Software Technology (FIRST), Berlin. He received his M.S. (Dipl.Inform.) in computer science in 1988 and his Ph.D. (Dr.-Ing.) in 1994, both from the Technical University of Berlin. He was a principal member and finally the deputy head of the PEACE group that developed the operating system for Germany's first massively parallel supercomputer. In the 90s he was a post doc fellow and senior researcher in the Tsukuba Research Center (TRC) of the Real World Computing Partnership (RWCP) in Tsukuba Science City, Japan. Since that time his research concentrated on scalable, low-latency middleware and operating system platforms for clusters and other parallel architectures, including rather strange ones such as wireless sensor networks. He was Subject Area Editor for Parallel and Distributed Systems for Elsevier's "Journal of Systems Architecture" and his group recently participated in the Intel MARC program (Many-core Applications Research Community). Currently he is the speaker of the special interest group for operating systems of the German GI and the dean of the Faculty 1 (Mathematics, Natural Sciences and Computer Science) of the BTU Cottbus. His major research interests are operating systems, middleware and programming languages for parallel, distributed and embedded systems.

Technology Trends: A Storage Vendor's Perspective

The storage industry has changed substantially since 1956. The entire landscape, with its attendant assumptions, is shifting underneath the feet of storage vendors. There are many opportunities - and pitfalls - in the near future. This talk will briefly survey some of the driving trends keeping company strategists up at night.



Dr. Douglas Santry

Advanced Technology Group
NetApp

Doug Santry earned his PhD from the University of Cambridge. He is best known for the Elephant file system. He is also an original member of the Xen hypervisor team at Cambridge. Taking a break from systems he worked as a quant for a leading investment bank where he formed strong opinions on the fitness for purpose of modern storage systems. His research interests at NetApp focus on making modern storage systems more useful for mathematical computation (analytics, scientific, financial) by leveraging non-volatile memories; he believes that in the very near future the relationship between applications and the storage stack will change forever.



William L. Franklin

Vice President,
OpenStack and Technology
Enablement,
HP

Hybrid Cloud Computing - An OpenStack Based Approach

Touching on the origins of the need for a horizontal, elastic infrastructure we examine how OpenStack is being used by HP Helion as a platform for hybrid - private, managed and public - cloud computing. The OpenStack community, one of the most rapidly growing open source projects in years, is developing the fundamental components for cloud computing. HP, as one of the major contributors and platinum members of OpenStack, is basing its cloud products and strategy on OpenStack. We conclude by comparing the evolution of the client-server architecture as at the 2nd revolution of infrastructure computing, to the elastic cloud model - the 3rd revolution of infrastructure. This talk will include multiple real-world use case examples.

William L. Franklin's experience spans more than 25 years, leading successful teams of software development technologists in a variety of cross-functional environments. These teams delivered enterprise products that include operating systems, database engines, migration tools, and e-commerce. Bill joined HP in 2012, focusing on the use of OpenStack across HP's Converged Cloud portfolio.

His experience serving as an executive advisor to several startups gives Bill a valuable perspective on the business implications of engineering decisions. This experience has been refined during a career that included Vice President of Engineering roles at Sun Microsystems, Cloudscaling, Clustra Systems, Unikala Software, and Alibris. He also served in product development, product management, and marketing roles prior to focusing his career on engineering leadership.

While at Sun Microsystems Bill was responsible for the core engineering of Solaris, and Sun's distribution of OpenSolaris. He served as the executive liaison to opensolaris.org, ran the hosting of opensolaris.org and oversaw the contribution of a number of projects to Apache.org. Additionally, Bill has worked closely with a number of open source communities, including projects within Apache, MySQL, postgresql, OpenSolaris, OpenStack and others.

Bill earned Bachelor's Degrees in Computer Science and Economics from the University of California, Berkeley, and a M.Sc. by Research in Electronic Systems Engineering from the University of Essex, Colchester, England.

Low Effort Just-In-Time Compilers with RPython for More Efficient Service Execution

One of the advantages of service-oriented computing is that it makes it feasible for programmers to choose the language that is most suited to the job, since services communicate through a language-independent interface. This allows the programming language landscape to become a lot more heterogeneous. These different languages all need to be implemented efficiently, typically using a good just-in-time (JIT) compiler. In this talk I will discuss approaches to radically lowering the implementation effort of JIT systems using the meta-tracing JIT construction approach and the RPython programming language.



Dr. Carl Friedrich Bolz

Research Associate,
Software Development Team
King's College London

Carl Friedrich Bolz is a postdoc at King's College London who is broadly interested in runtime compilation techniques for dynamic languages and other systems that can benefit from a JIT compiler. He did his PhD at the Heinrich-Heine-Universität Düsseldorf and was a postdoc at the Hasso-Plattner-Institut Potsdam.



Dr. Matthias Weidlich

Research Associate,
Large-Scale Distributed
Systems Group,
Imperial College London

Constraint-based Optimisation of Complex Event Processing

The enactment of processes in a service-oriented environment often creates streams of events that can be exploited for execution monitoring. Complex event processing (CEP) systems collect, analyse, and react to events, thereby providing an infrastructure to realise such monitoring. Yet, matching of complex event patterns is a common performance bottleneck. We argue that the processes creating events can be leveraged for optimising detection of event patterns. In particular, we show how constraints extracted from process models can be used for event pattern rewriting, execution plan selection, and execution plan rewriting.

Matthias is a post-doctoral research associate in the Department of Computing at Imperial College London, United Kingdom. Before joining Imperial in 2013, he was a research fellow and adjunct lecturer at the Technion - The Israel Institute of Technology, Israel. He received his PhD in Computer Science from the Hasso Plattner Institute (HPI), University of Potsdam, Germany, in 2011. His research focuses on process modelling and analysis, event-based systems, data interoperability, and uncertainty management. His results appeared in journals, such as IEEE Transactions on Software Engineering, IEEE Transactions on Knowledge and Data Engineering, Information Systems, The Computer Journal, and Acta Informatica. For his work, he received the Grand Challenge Audience Award at DEBS 2013 and the Best Paper Award at ICSOC 2010.

Interleaving of Modification and Use in Data-driven Tool Development

There is a need for supporting the process of creating and adapting visual programming tools such as code browsers or run-time explorers because of the following observation: Programmers who are working in a Unix shell environment have little difficulties when building customized tools around utilities such as “grep” by creating, adapting, or composing scripts. This leads to the perception of good programmers being able to address any given task efficiently by employing their own programming capabilities. However, programmers who are working in a graphical, integrated programming environment such as Eclipse or Visual Studio do arguably not share this perception. There, the available set of tools seems to be complex and extension points not easy to exploit programmatically. Instead, programmers are concerned with mastering the graphical user interface, keyboard shortcuts, and plugins. They rarely build their own plugins/tools; the overhead is just too high. In that spirit, we want to bring the flexibility and power of the Unix shell to state-of-the-art programming environments. For this, we map a data-driven perspective on programming tools and describe a framework in that perspective to ease tool creation and modification. We address software artifacts that are not only source code, but also more general information such as traces, bugs, features, emails, or stocks. With that, our proposal is not limited to the programming domain but can be applied to other application domains concerned with information.

Marcel is PhD student at the Hasso Plattner Institute at the University of Potsdam. He is part of the Software-Architecture group led by Prof. Dr. Robert Hirschfeld. Since getting his Master’s degree at HPI in October 2011, Marcel has been part of the HPI Research School. His research activities include the area of integrated tools for programmers, especially code-centric program comprehension. For this, direct manipulation concepts, dynamic analysis, and cooperation of distributed teams in agile processes play an important role. Additionally, he investigates modularity concepts with respect to critical software quality metrics such as extensibility and maintainability while reasoning about interdependencies between programming languages and tools.



Marcel Taeumel

PhD Student,
HPI Research School,
Potsdam, HPI



Martin Heisig

Senior Vice President
SAP HANA Enterprise Cloud,
SAP

Building the Enterprise Cloud - Innovation at work

In the new networked economy, organizations need to accelerate their innovation agenda across all business units. IT organizations need to support this change with a technology agenda that includes brokering innovative solutions and services to the business. Cloud solutions can dramatically help global enterprises to react quickly to new business requirements and new market trends. SAP has introduced the HANA Enterprise Cloud to run mission critical applications in a cloud environment. Martin Heisig provides insights on SAP Cloud Technology stack and how organizations can leverage SAP's cloud services to maximize their innovation agenda.

Martin Heisig is the head of SAP's Infrastructure Services Organization. In this role he is responsible for SAP's global IT infrastructure including the operation of SAP's external cloud offerings. The SAP Cloud offering includes SaaS solutions as well as comprehensive cloud infrastructure combined with managed services for global enterprise customers. Martin Heisig holds a Degree in Electronics and Communications Engineering from Fachhochschule Munster Germany and has more than 20 years experience in the professional IT business."

Privacy by Design - Protecting Sensitive Data on Untrusted Machines

The increasing use of networked IT systems brings new challenges regarding the protection of sensitive data. While in the past privacy was mainly assured through regulatory approaches, access control and audits, these mechanisms tend to be inappropriate for largely distributed systems. New technical protection mechanisms come to rescue: they allow to make sensitive data available for various applications, while protecting them from misuse.

The talk will focus on the problem of securely outsourcing data and computations to untrusted cloud environments. I review the feasibility of using modern cryptography for the protection of sensitive data: by directly computing on encrypted data, leaks by insiders can be prevented. Based on own work, I will review the basic constructions for secure computations and show their applicability to practical problems. Finally I discuss how the complex design process of the underlying cryptographic protocols can be automatized by the use of special compilers.



Prof. Dr.
Stefan Katzenbeisser

Security Engineering Group,
TU Darmstadt

Photo:Katrin Binner/CASED

Stefan Katzenbeisser is a professor for security engineering at Technische Universität Darmstadt and principal investigator at the Center for Advanced Security Research Darmstadt (CASED). After studying computer science at the Vienna University of Technology, he worked as a senior scientist at Philips Research in Eindhoven. His research focuses on applied cryptography, privacy, secure embedded systems and critical infrastructures.



Josiah Chavula

PhD Student,
HPI Research School
Cape Town, UCT

Peering for the Pan-African Research and Education Networks: Challenges and Possibilities

Despite an increase in the number of Internet eXchange Points (IXPs) in Africa, as well as proliferation of submarine and terrestrial fibre optic cable systems, the level of peering among Africa's Internet service providers remains low. Using active network measurements, this work characterizes the level of interconnectivity and peering among Africa's National Research and Education Networks (NRENs), and examines the performance of traffic exchange in terms of latencies. Results show that African inter-university traffic is characterized by high latencies due to circuitous inter-continental routes used for the exchange of traffic. The resulting poor performance limits the ability of African universities to use the Internet as a tool for collaboration and e-resource sharing. This work evaluates the possibility for improving peering and reducing latencies through the use of software defined internet exchange points.

Josiah is a PhD student in the HPI Research School in ICT4D at the University of Cape Town. His research focuses on Internet performance and traffic engineering in Africa, especially among the National Research and Education Networks (NRENs). Josiah is interested in approaches to achieve flexible Internet peering, such as through software defined Internet eXchange Points (IXPs). He is also interested in dynamic and collaborative traffic engineering techniques using map-and-encapsulate routing protocols. His goal is to achieve improved performance for African inter-NREN traffic exchange and enhanced cross-border collaboration and e-resource sharing among universities.

Josiah has a Master of Science degree in Networking and Internet Systems from Lancaster University, England, as well as a Bachelor of Science degree in Computer Science from the University of Malawi. For the past five years, he has been teaching undergraduate courses in Information and Communications Technology at Mzuzu University in Malawi. Prior to joining Mzuzu University, Josiah worked as a network engineer for a mobile network operator Airtel.

A Trust-Nothing Architecture for Secure Computing

Security and privacy are main concerns of future computer systems. The problem has gained increasing importance in a world with vast amount of devices connected to each other over the internet, where common software bugs allow compromising systems even if their owner is trustworthy. One wishes to have trust in computing resources either against their owner which might be untrusted, or against external attacker which can compromise the system. In our research we focus on hardware based architectures that enable complete protection from software attacks, including a hostile operating system or even hypervisor, and from most of the hardware attacks. We aim to provide complete secrecy and tamper awareness of a program and its data while correctly executing it, or declaring failure due to a tamper attempt. We consider a single local computer running multiple applications with an untrusted OS, and show that our architecture delivers complete privacy and tamper awareness, where the protection mechanisms barely hurt the system's performance. We see first signs that our approach can be expanded to multi-core multi-computer systems such as cloud systems.



Ofir Shwartz

PhD Student,
HPI Research School
Haifa, Technion

Ofir Shwartz is currently a PhD student at the Technion Israel Institute of Technology, where he also acquired his Master degree and BSc degree. Shwartz was a member of the design and architecture team at EZchip Technologies developing performance critical systems, and before worked at companies such as Intel Corporation and Zoran Microelectronics. His main interests are computer architecture, performance oriented systems, and system security.



**Prof. Dr.
Yitzhak Birk**

Center for Communication
and Information
Technologies
Electrical Engineering Dept.,
Technion, Israel

On the Multiple Dimensions of Performance and Implications to System Architectures

High performance is a common goal for system designers. However, performance is actually multi-faceted, with different notions of performance often being mutually contradictory. For example, the desire of a user for quick response, and thus no queuing, is at odds with the provider's desire to fully utilize its resources. Unfortunately, designers often proceed to propose solutions without first determining the true requirements and relevant performance measures; this is akin to attempting to provide the optimal solution to an unspecified problem...

In this talk, we will discuss various performance measures, some well known and others less so, as well as the interplay among them. Examples from a variety of areas will be used to show this, as well as for illustrating how precise articulation of the relevant measures and removal of unnecessary requirements can enable dramatically better solutions. The talk is relevant to a very broad audience, and will be self contained. While most people will find parts of the talk obvious, most are likely to gain important new insights.

Yitzhak (Tsahi) Birk has been on the faculty of the Technion's Electrical Engineering department since 1991, and presently heads its Center for Communication and Information Technologies (CCIT) and the Parallel Systems Laboratory. He is also involved with Israeli industry in various ways. Prof. Birk received his B.Sc. and M.Sc. degrees from the Technion, and the PhD from Stanford University, all in Electrical Engineering. He was subsequently a research staff member at IBM's Almaden Research Center before joining the Technion. His research interests include computer and communication systems, parallel architectures, with focus on storage and information-dissemination systems. The judicious exploitation of redundancy for performance enhancement is a recurring theme in his work, as are cross-layer approaches and techniques. Most recently, these have been applied to non-volatile memory and to data centers. Presently, he is also engaged in an attempt to architect secure systems that do not trust the software infrastructure.

Dynamic Buffer Resizing for Efficient and Secure Streaming Data Anonymization

The emergence of electronic crime reporting systems in the developing world has raised the need to design effective privacy enforcing mechanisms for streaming crime data. Due to the lack of expertise, it makes sense to transfer real-time crime report data in these countries to third party data mining service providers for pattern analysis aimed at reducing future crime occurrences. Proposed approaches to protecting streaming data from “curious-but-honest” service providers include various k-anonymity privacy algorithms. However, these algorithms rely on buffering mechanisms to temporarily store the data records during the anonymization process. Buffering mechanisms incur high information loss, in terms of records exceeding their time-delay constraints, particularly in cases of intermittent streaming data flows. Furthermore, since previous schemes/algorithms trigger anonymization on the basis of the number of records in the buffer instead of the time-sensitivity of the data, time-sensitive records can get neglected. In crime reporting scenarios time-sensitivity of records is a strong constraint because the third party service providers need to be provided with accurate anonymized streaming data to generate useful results in a timely manner. We discuss extensively on challenges of adapting existing data stream anonymization algorithms to electronic crime reporting scenario. We also discuss possible solutions to address these challenges.



**Aderonke Busayo
Sakpere**

PhD Student,
HPI Research School
Cape Town, UCT

Aderonke Busayo Sakpere is a second year doctoral candidate at the Hasso Plattner Institute in ICT for Development, University of Cape Town under the supervision of Dr. Anne V.D.M. Kayem and Prof Stephen Wolthusen. She holds BSc (Hons) and MSc degrees in Computer Science from University of Ilorin, Nigeria. Her research interest lies primarily in anonymization of streaming and static data. She is also interested in Data Mining, ICT for Development and Information Security. She has taught various Computer Science subjects at secondary school level, diploma-awarding college and university level.



Xiangyang Xu

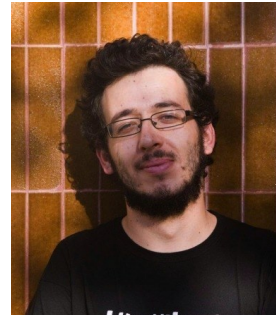
PhD Student,
HPI Research School Nanjing

Object-based Stereo Image Retrieval

Recent years, the stereo image has become an emerging media in the field of 3D technology, which leads to an urgent demand of stereo image retrieval. In this presentation, we will introduce a framework for object-based stereo image retrieval (OBSIR), which retrieves images containing the similar objects to the one captured in the query image by the user. The proposed approach consists of both online and offline procedures. In the offline procedure, we propose a salient object segmentation method making use of both color and depth to extract objects from each image. The extracted objects are then represented by multiple visual feature descriptors. In order to improve the large scale search efficiently, we construct an approximate nearest neighbor (ANN) index using cluster-based locality sensitive hashing (LSH). In the online stage, the user may supply the query object by selecting a region of interest (ROI) in the query image, or clicking one of the objects recommended by the salient object detector.

Xiangyang Xu currently is a first year Ph.D. student of Department of Computer Science and Technology, Nanjing University. He received his B.Sc. degree in computer science from Nanjing University in June 2011. After that, he was admitted to study for a M.Sc. degree in Nanjing University without entrance examination. In July 2013, he became a Ph.D. candidate in Multimedia Computing Group (MCG), Nanjing University, under the supervision of Prof. Gangshan Wu. Xiangyang's research interest lies in the field in multimedia content analysis including image retrieval, high-dimensional indexing, and computer vision and so on. Since 2013, he has published several papers on the international conferences in the related topics served as main-author or co-author, such as ICME, PCM, ICIMCS.

Pose-IO: A Wearable Device that Allows for Eyes-Free Input and Output Through the User's Muscles



Pedro Lopes

PhD Student,
HPI Research School
Potsdam, HPI

We present Pose-IO, a wearable device that offers input and output. Users wear Pose-IO on their forearms. They communicate with Pose-IO through the pose of their wrists. Users enter information by performing an input gesture by flexing their wrist, which the device senses using a 3-axis accelerometer. Users receive output from Pose-IO by finding their wrist posed in an output gesture, which Pose-IO actuates using electrical muscle stimulation. This mechanism allows users to interact with Pose-IO without visual or auditory senses, but through the proprioceptive sense.

We demonstrate three simple applications that demonstrate eyes-free use, real-time interaction, and spatial interaction. In a first user study, participants re-entered posed received from Pose-IO with an average accuracy of 5.8° despite the minimal bandwidth offered by the device. In a second exploratory study, we explored participants' emotional response to Pose-IO and the concept of the user's hand itself serving as the interface.

Pedro is a PhD student of Prof. Patrick Baudisch's Human Computer Interaction lab in Hasso Plattner Institute. Pedro engineers and investigates future interfaces that read & write directly to the user's body, through the muscles. Pedro's devices enable realistic immersive experiences, such as force-feedback, with a small hardware footprint. This is achieved by directly actuating the human body with electrical stimulation instead of using motors and moving parts. Outside research, Pedro enjoys writing about music [in jazz.pt magazine] and technology [as digital content editor at ACM XRDS magazine].

Social Event

Dinner at Schloss Caputh (Caputh Palace)



"Schloss Caputh (Caputh Palace)" by Colin Smith (via Geograph Deutschland), CC BY-SA 2.0

The small royal, electoral country estate, Caputh Palace, is the only surviving palace building in the Potsdam cultural landscape, which represents the era of the Great Elector, Friedrich Wilhelm of Brandenburg. Caputh Palace (built after 1662) belonged to Frederick William's second wife, Dorothea

We will start with a boat tour (departing Thursday June 26 at 19.00 at the pier near hotel *Avendi* at lake *Griebnitzsee*) to *Caputh Palace*. After that, dinner will start at 20.30 in *Kavalierhaus Caputh*.

There will be shuttle buses to the *Hasso Plattner Institute/Griebnitzsee* available departing approx. 22.45 at *Kavalierhaus* (via *Potsdam Central Station*).

The HPI Research School

In October 2005, the HPI started its Research School on “Service-Oriented Systems Engineering”, a graduate school based on the model of the DFG (German Research Foundation) “Graduiertenkolleg”.

The Vision of the Research School

Design and implementation of service-oriented architectures impose numerous research questions from the fields of software engineering, system analysis and modeling, adaptability, and application integration. Service-Oriented Systems Engineering represents a symbiosis of best practices in object orientation, component-based development, distributed computing, and business process management. It provides integration of business and IT concerns. Service-Oriented Systems Engineering denotes a current research topic in the field of IT-Systems Engineering with high potential in academic research as well as in industrial application. Supported by an internationally renowned grant, PhD students at our college participate in joint activities such as lectures, seminars, winter schools and workshops.

The Members of the Research School

The professors of the HPI with their research groups are supporting pillars for our PhD school. With its interdisciplinary structure, the research college on Service-Oriented Systems Engineering interconnects the HPI research groups and fosters close and fruitful collaborations.

In context of the research college, the different groups at HPI work on the following topics: Human Computer Interaction and Computer Vision as Service (Prof. Dr. Patrick Baudisch), Service-Oriented Geovisualization Systems (Prof. Dr. Jürgen Döllner), Modeling and Verification of Self-Adaptive Service-Oriented Systems (Prof. Dr. Holger Giese), Tools and Methods for Software Engineering in Service-Oriented Systems (Prof. Dr. Robert Hirschfeld), Security Engineering of Service-Based IT-Systems (Prof. Dr. Christoph Meinel), Service-Oriented Information Integration (Prof. Dr. Felix Naumann), Evolutionary Transition of Enterprise Applications to Service-Oriented Computing (Prof. Dr. h.c. Hasso Plattner), Operating System Abstractions for Service-Oriented Computing (Prof. Dr. Andreas Polze); and Services Specification, Composition, and Enactment (Prof. Dr. Mathias Weske).

On the website of the Research School, please find latest information about the Ph.D. students, their research interests, joint projects, and events:

http://www.hpi.uni-potsdam.de/research_school

International Branches

International cooperations enable the HPI to extend its research scope and to provide international partners with an opportunity for close exchange and with access to the HPI's international research contacts. Junior researchers work at their home universities, but receive their scholarships from the HPI in Germany. While being mentored jointly by their home university professors, they will be integrated into the Potsdam HPI Research School's research activities and participate in joint conferences and symposia.

Nanjing, China

In November 2011 the "HPI Research School at Nanjing University" was opened.

Haifa, Israel

Since April 2010 there is a HPI Research School at Haifa in cooperation with Technion - Israel Institute of Technology too. The Ph.D. students are working at the "HPI Research School at Technion, Haifa" within the HPI Research School team.

Cape Town, South Africa

In April 2009, the HPI Research School launched a "branch" in South Africa. The "HPI Research School at University of Cape Town" is mainly researching information and communication technologies that are relevant for developing and emerging countries.

Expansion of the Research School

Annually, the Institute's Research School seeks talented junior researchers and accordingly offers

8 Ph.D. Scholarships and 2 Postdoc Scholarships

The HPI Research School focuses on the foundation and application of large-scale, highly complex and interconnected IT systems. With its interdisciplinary and international structure, the Research School interconnects the HPI research groups as well as its international branches at Cape Town University, Technion - Israel Institute of Technology and Nanjing University. The HPI Future SOC Lab, a state-of-the-art computer center, enriches the academic work at the HPI Research School.

The HPI professors and their research groups ensure high quality research and will supervise Ph.D. students in the following topic areas: Human Computer Interaction, Prof. Dr. Patrick Baudisch; Computer Graphics Systems, Prof. Dr. Jürgen Döllner; System Engineering and Modeling, Prof. Dr. Holger Giese; Software Architecture, Prof. Dr. Robert Hirschfeld; Internet Technologies and Systems, Prof. Dr. Christoph Meinel; Information Systems, Prof. Dr. Felix Naumann; Enterprise Platform and Integration Concepts, Prof. Dr. h.c. Hasso Plattner; Operating Systems and Middleware, Prof. Dr. Andreas Polze; Business Process Technology, Prof. Dr. Mathias Weske

If you have prior experience in any of these areas, you are invited to submit a full application with the following documents: curriculum vitae and copies of certificates/transcripts, brief research proposal, work samples/copies of relevant scientific work (e.g. master's thesis), and a letter of recommendation.

Applications must be submitted by August 15th of the respective year. Positions are usually available at the beginning of October. Please send your applications to:

research-school-application@hpi.uni-potsdam.de

For more information on HPI and its HPI Research School see:

http://www.hpi.uni-potsdam.de/research_school

Contact

**Hasso-Plattner-Institut
für Softwaresystemtechnik**

Campus Griebnitzsee
Prof.-Dr.-Helmert-Straße 2-3
D-14482 Potsdam, Germany

Phone +49 331 5509-0
E-Mail hpi-info@hpi.de
Web www.hpi.de

Photo: HPI/Kay Herschelmann