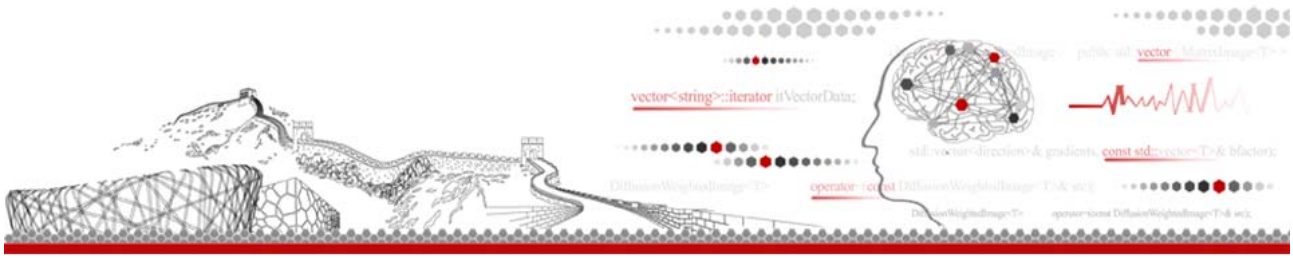

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MIAR 2010

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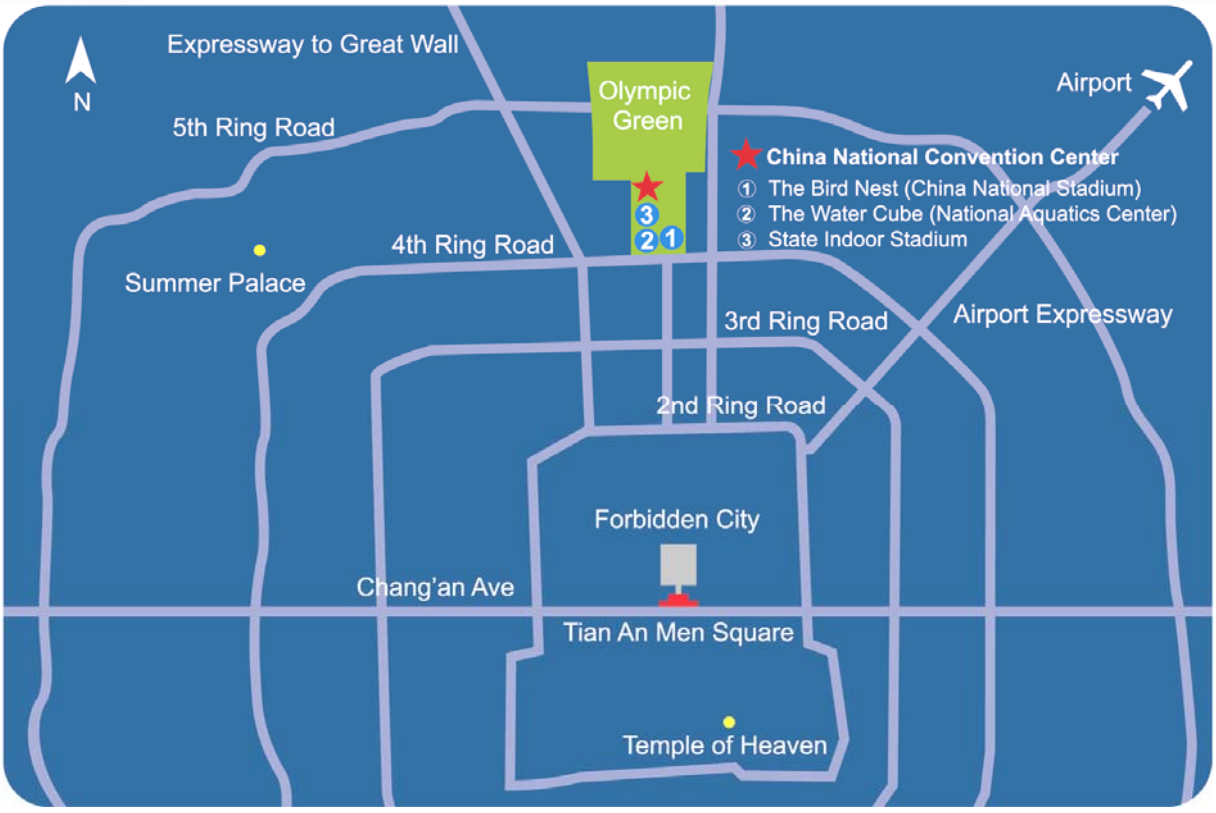

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PROGRAM

Sunday, September 19	(Room E232A)
Opening remarks	
(8:45-9:00)	(Hongen Liao, PJ "Eddie" Edwards, Xiaochuan Pan, Yong Fan)
Oral session 1 (9:00-10:30)	**Image Segmentation** Chairs: Dinggang Shen and Guoyang Zheng
1.1 9:00-9:15	Automatic Segmentation of Neonatal Images Using Convex Optimization and Coupled Level Set Method *Li Wang, Feng Shi, John Gilmore, Weili Lin, Dinggang Shen*
1.2 9:15-9:30	A Unified Minimal Path Tracking and Topology Characterization Approach for Vascular Analysis *Hasan Cetingul, Mehmet Gulsun, Huseyin Tek*
1.3 9:30-9:45	Subject Specific Shape Modelling with Incremental Mixture Models *Lichao Wang, Karim Lekadir, Ismail EI-Hamamsy, Magdi Yacoub, Guang-Zhong Yang*
1.4 9:45-10:00	Segmentation of the infarct and peri-infarct zones in cardiac MR images *Aditya Gupta, Mubarak Shah*
1.5 10:00-10:15	Spatial-Temporal Constraint for Segmentation of Serial Infant Brain MR Images *Feng Shi, Pew-Thian Yap, John Gilmore, Weili Lin, Dinggang Shen*
1.6 10:15-10:30	Multi-parametric Classification of Traumatic Brain Injury Patients Using Automatic Analysis of Quantitative MRI Scans *Benjamin Aribisala, Christopher J.A. Cowie, Jiabao He, Joshua Wood, David A. Mendelow, Patrick Mitchell, Andrew Blamire*
Oral session 2 (10:45-12:00)	**Image Registration** Chairs: Chung-Ming Chen and Bo Zheng
2.1 10:45-11:00	Deformable Vessel-based Registration using Landmark-guided Coherent Point Drift *Yipeng Hu, Erik-Jan Rijkhorst, Richard Manber, David Hawkes, Dean Barratt*
2.2 11:00-11:15	Registration of CT Segmented Surfaces and 3-D Cardiac Electroanatomical Maps *Jingjing Gong, Yiyong Sun, Zhaohua Chang*
2.3 11:15-11:30	Coronary Motion Estimation from CTA Using Probability Atlas and Diffeomorphic Registration *Dong Ping Zhang, Laurent Risser, Francois-Xavier Vialard, Phillip Edwards, Coert Metz, Lisan Neefjes, Nico Mollet, Wiro Niessen, Daniel Rueckert*
2.4 11:30-11:45	A Continuity Equation Based Optical Flow Method for Cardiac Motion Correction in 3D PET Data *Mohammad Dawood, Christoph Brune, Xiaoyi Jiang, Florian Buther, Martin Burger, Otmar Schober, Michael Schafers, Klaus Schafers*
2.5 11:45-12:00	Simultaneous reconstruction of 4-D myocardial motion from both tagged and untagged MR images Using Nonrigid Image Registration *Wenzhe Shi, Maria Murgasova, Philip Edwards, Daniel Rueckert*
Invited session	Chair: Philip Edwards
Invited Lecture 13:30-14:00	***Dr. Stephane Nicolau****, IRCAD , TAIWAN* Augmented and Virtual Reality for Surgery Guidance: The IRCAD Point of View
Oral session 3 (14:00-15:30)	**Shape Modeling and Morphometry** Chairs: Li Shen and Su-Lin Lee
3.1 14:00-14:15	Cortical Sulcal Bank Segmentation via Geometric Similarity based Graph Partition *Gang Li, Lei Guo, Tuo Zhang, Jingxin Nie, Tianming Liu*
3.2 14:15-14:30	Evaluation of multiple voxel-based morphometry approaches and applications in the analysis of white matter changes in temporal lobe epilepsy *Wenjing Li, Huiguang He, Jingjing Lu, Bin Lv, Meng Li, Zhengyu Jin* (This paper was not included in the proceeding due to technical issues. The PDF file are available at MIAR 2010 website http://www.miar.org/2010/program.html)
3.3 14:30-14:45	A framework for 3D analysis of facial morphology in fetal alcohol syndrome *Jing Wan, Li Shen, Shiaofen Fang, Jason McLaughlin, Ilona Autti-Ramo, Ase Fagerlund,*

	Edward Riley, H. Eugene Hoyme, Elizabeth S. Moore, Tatiana Foroud
3.4 14:45-15:00	Feature Driven Rule based Framework for Automatic Modeling of Organic Shapes in the Design of Personalized Medical Prosthetics *Sajjad Baloch, Konrad Sickel, Vojtech Bubnik, Rupen Melkisetoglu, Sergei Azernikov, Artem Boltyenkov, Andreas Reh, Tong Fang*
3.5 15:00-15:15	Manifold Learning for Image-Based Gating of Intravascular Ultrasound(IVUS) Pullback Sequences *Gozde Gul Isguder, Gozde Unal, Martin Groher, Nassir Navab, Ali Kemal Kalkan, Muzaffer Degertekin, Holger Hetterich, Johannes Rieber*
3.6 15:15-15:30	Automatic Computation of Electrodes Trajectory for Deep Brain Stimulation *Caroline Essert, Claire Haegelen, Pierre Jannin*
Oral session 4 (16:00-17:00)	**Image Analysis** Chairs: Guido Gerig and Yaoqin Xie
4.1 16:00-16:15	FEM Based 3D Tumor Growth Prediction for Kidney Tumor *Xinjian Chen, Ronald Summers, Jianhua Yao*
4.2 16:15-16:30	Adaptive GPU Ray Casting Based on Spectral Analysis *Stefan Suwelack, Eric Heitz, Roland Unterhinninghofen, R?Eiger Dillmann*
4.3 16:30-16:45	Metrics for Uncertainty Analysis and Visualization of Diffusion Tensor Images *Fangxiang Jiao, Jeff M. Phillips , Jeroen Stinstra, Jens Krueger , Raj Varma, Edward Hsu, Julie Korenberg , Chris R. Johnson*
4.4 16:45-17:00	Robust 3D Reconstruction and Mean-Shift Clustering of Motoneurons from Serial Histological Images *Nicolas Guizard, Pierrick Coupe, Nicolas Stifani, Stefano Stifani, D. Louis Collins*
Oral session 5 (17:00-18:00)	**Diffusion Tensor Image** Chairs: Stephen Wong and Yong Fan
5.1 17:00-17:15	DTI Connectivity by Segmentation *Marc Niethammer, Alexis Boucharin, Christopher Zach, Eric Matlbie, Yundi Shi, Mar Sanchez, Martin Styner*
5.2 17:15-17:30	Locally Weighted Regression for Estimating and Smoothing ODF Field Simultaneously *XiaoZheng Liu, Guang Yang, Peterson Bradley S, DongRong Xu*
5.3 17:30-17:45	Distinguishing Left or Right Temporal Lobe Epilepsy from Controls Using Fractional Anisotropy Asymmetry Analysis *Hai Li, Zhong Xue, Mario F. Dulay, Amit Verma, Solomon Wong, Christof Karmonik, Robert Grossman, Stephen Wong*
5.4 17:45-18:00	Hierachical Spherical Harmonics Based Deformable HARDI Registration *Pew-Thian Yap, Yasheng Chen, Hongyu An, John Gilmore, Weili Lin, Dinggang Shen*

Monday, September 20	(Room 209A-B)
Invited session	Chair: Xiaochuan Pan
Invited Lecture (8:30-9:30)	***Prof. Zhi-Pei Liang***, *University of Illinois at Urbana-Champaign, USA* Fast Imaging with Sparsity and Rank Constraints
Oral session 6 (9:30-11:00)	**Computer Assisted Intervention** Chairs: Kensaku Mori and Guangzhi Wang
6.1 9:30-9:45	Marker-free Registration for Electromagnetic Navigation Bronchoscopy under Respiratory Motion *Marco Feuerstein, Takamasa Sugiura, Daisuke Deguchi, Tobias Reichl, Takayuki Kitasaka, Kensaku Mori*
6.2 9:45-10:00	Computational Decision Support for Percutaneous Aortic Valve Implantation *Ingmar Voigt, Razvan Ioan Ionasec, Bogdan Georgescu, Jan Boese, Gernot Brockmann, Joachim Hornegger, Dorin Comaniciu*
6.3 10:00-10:15	Relative Error: an approach for in vivo Characterization of Electromagnetic Tracking Errors and Confidence Intervals *Mohammad Matinfar, Vijay Parthasarathy, Raymond Chan, Ameet Jain*
6.4 10:15-10:30	A Motion Correction Algorithm for Microendoscope Video Computing in Image-Guided

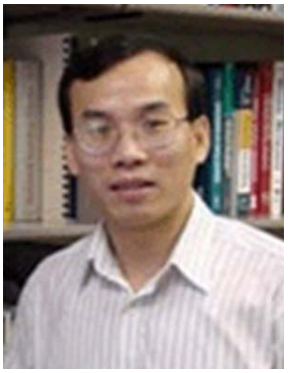
	Intervention *Tiancheng He, Zhong Xue, Weixin Xie, Solomon Wong, Kelvin Wong, Miguel Valdivia y Alvarado, Stephen Wong*
6.5 10:30-10:45	Least-Incision Transformable End-effector mechanism for forceps for endoscopic surgery *Hiroaki Nakaji, Ryoichi Nakamura*
6.6 10:45-11:00	Real-time organ tracking in ultrasound imaging using active contours and conditional density *Xiaohui Zhang, Matthias Guenther, Andre Bongers*
Poster teaser (11:20-12:00)	Chairs: Ryoichi Nakamura and Zhong Xue
	Medical Image Computing
1	A Malignant Breast Carcinoma Size Assessment Using Multiple Orientation Axial, Lateral, and Shear Elastographies: The Second Stage of a Pilot Study *Ying Chi, Michael J. Brady, Ruth E. English, Junbo Li, J Alison Noble*
2	Level Set Diffusion for MRE Image Enhancement *Bing Nan Li, Chee Kong Chui, Sim Heng Ong, Stephen Chang, Etsuko Kobayashi*
3	Content-Based Surgical Workflow Representation Using Probabilistic Motion Modeling *Stamatia Giannarou, Guang-Zhong Yang*
4	Improved Precision in the Measurement of Longitudinal Global and Regional Volumetric Changes via a Novel MRI Gradient Distortion Characterization and Correction Technique *Vladimir Fonov, Andrew Janke, Zografos Caramanos, Douglas L. Arnold, Sridar Narayanan, G. Bruce Pike, D. Louis Collins*
	Visualization and Application
5	DVV: Towards a Taxonomy for Mixed Reality Visualization in Image Guided Surgery *Marta Kersten, Pierre Jannin, D. Louis Collins*
6	Three-Dimensional Ultrasound Probe Pose Estimation from Single-Perspective X-rays for Image-Guided Interventions *Pencilla Lang, Petar Seslija, Damiaan F. Habets, Michael W.A. Chu, David W. Holdsworth, Terry M. Peters*
7	Automated Nomenclature of Upper Abdominal Arteries for Displaying Anatomical Names on Virtual Laparoscopic Images *Kensaku Mori, Masahiro Oda, Tomohiko Egusa, Zhengang Jiang, Takayuki Kitasaka, Michitaka Fujiwara, Kazunari Misawa*
8	Hidden Markov Model for Quantifying Clinician Expertise in Flexible Instrument Manipulation *Jagadeesan Jayender, Raul San Jose Estepar, Keith Obstein, Vaibhav Patil, Christopher Thompson, Kirby Vosburgh*
9	A robust mosaicing method with super-resolution for optical medical images *Mingxing HU, Graeme Penney, Daniel Rueckert, Philip Edwards, Fernando Bello, Roberto Casula, Michael Figl, Yigang Cen, Jie Liu, Zhenjiang Miao, David Hawkes*
	Segmentation and Classification
10	Spectral Aggregation Based on Iterative Graph Cut for Sonographic Breast Image Segmentation *Chi-Hsuan Tsou, Jyh-Horng Chen, Jie-Zhi Cheng, Chung-Ming Chen*
11	Organ Pose Distribution Model and an MAP Framework for Automated Abdominal Multi-Organ Localization *Xiaofeng Liu, Marius George Linguraru, Jianhua Yao, Ronald M. Summers*
12	Probabilistic Refinement of Model-based Segmentation: Application to Radiation Therapy Planning of the Head and Neck *Arish A. Qazi, John J. Kim, David A. Jaffray, Vladimir Pekar*
13	Skin Lesions Classification with Optical Spectroscopy *Asad Safi, Victor Castaneda, Tobias Lasser, Nassir Navab*
14	Segmentation of vertebral bodies in MR images based on geometrical models in 3D *Darko Štern, Boštjan Likar, Franjo Pernuš, Tomaž Vrtovec*

	Medical Image Understanding
15	A Learning-based Approach to Evaluate Registration Success *Christoph Vetter, Ali Kamen, Parmeshwar Khurd, Rudiger Westermann*
16	Automatic Cortical Gyral Parcellation using Probabilistic Atlas and Graph Cuts *Gang Li, Lei Guo, Tuo Zhang, Jingxin Nie, Tianming Liu*
17	Hierarchical Fiber Clustering Based on Multi-Scale Neuroanatomical Features *Qian Wang, Pew-Thian Yap, Hongjun Jia, Guorong Wu, Dinggang Shen*
18	Neural Mass Model Driven Nonlinear EEG Analysis *Xin Fang, Zhenghui Hu, Pengcheng Shi*
19	Modeling the Dermoscopic Structure Pigment Network Using a Clinically Inspired Feature Set *Maryam Sadeghi, Majid Razmara, Paul Wighton, Tim K. Lee, Stella Atkins*
Poster session (13:00-14:30)	**Poster session** Chairs: Ryoichi Nakamura and Zhong Xue
Oral Session 7 (14:30-15:45)	**Image-Guided Surgery** Chairs: Russell Taylor and Lixu Gu
7.1 14:30-14:45	An Application Driven Comparison of Several Feature Extraction Algorithms in Bronchoscope Tracking During Navigated Bronchoscopy *Xiongbiao Luo, Marco Feuerstein, Tobias Reichl, Takayuki Kitasaka, Kensaku Mori*
7.2 14:45-15:00	Modeling Kinematics of Mobile C-arm and Operating Table as an Integrated Six Degrees of Freedom Imaging System *Lejing Wang, Rui Zou, Simon Weidert, Juergen Landes, Darius Burschka, Ekkehard Euler, Nassir Navab*
7.3 15:00-15:15	Peripheral Lung Cancer Detection by Vascular Tumor Labeling Using In-Vivo Microendoscopy under Real Time 3D CT Image Guided Intervention *Miguel Valdivia y Alvarado, Tiang Chen He, Zhong Xue, Stephen T. Wong, Kelvin Wong*
7.4 15:15-15:30	Particle-based Deformable Modeling with Pre-computed Surface Data in Real-time Surgical Simulation *Bo Zhu, Lixu Gu, Zhe Zhou*
7.5 15:30-15:45	Direct Co-Calibration of Endobronchial Ultrasound and Video *Philipp Dressel, Marco Feuerstein, Tobias Reichl, Takayuki Kitasaka, Nassir Navab, Kensaku Mori*
Oral session 8 (16:15-17:30)	**Augumented Reality** Chairs: Terry Peters and Mirna Lerotic
8.1 16:15-16:30	Real-time Epicardial Excitation Time Map Overlay *Paul de Lange, Yuhei Takata, Hongho Kim, Hongen Liao, Etsuko Kobayashi, Minoru Ono, Shunei Kyo, Shinichi Takamoto, Ichiro Sakuma*
8.2 16:30-16:45	Knowledge-based Situation Modeling and Interpretation for Context-aware Augmented Reality in Dental Implant Surgery *Darko Katic, Gunther Sudra, Stefanie Speidel, Gregor Castrillon-Oberndorfer, Georg Eggers, R?Eiger Dillmann*
8.3 16:45-17:00	Scorpion shaped Endoscopic Surgical robot for NOTES and SPS with augmented reality functions *Naoki Suzuki, Asaki Hattori, Kazuo Tanoue, Satoshi Ieiri, Kozo Konishi, Morimasa Tomikawa, Hajime Kenmotsu, Makoto Hashizume*
8.4 17:00-17:15	Optimisation of Focal Length using a Stereoscopic Operating Microscope for Augmented Reality Surgical Guidance *Gerardo Gonzalez-Garcia, Rudy Lapeer*
8.5 17:15-17:30	An Efficient Graph-based Deformable 2D/3D Registration Algorithm with Applications for Abdominal Aortic Aneurysm Interventions *Rui Liao, Yunhao Tan, Hari Sundar, Marcus Pfister, Ali Kamen*
Closing remarks	
(17:30-17:45)	

Invited Lecture 1

Fast Imaging with Sparsity and Rank Constraints

Professor Zhi-Pei Liang
University of Illinois at Urbana-Champaign, USA



Abstract

Conventional imaging methods are based on Shannon sampling theory. As such, the number of Nyquist samples (or measurements) grows exponentially as the physical dimension of the underlying imaging problem increases (the so-called curse of dimensionality), rendering it difficult to achieve high resolution for high-dimensional imaging. Sub-Nyquist sampling is possible for sparse and/or partially seperable signals and is providing a powerful way to speed up various imaging experiments. This talk will provide an overview of recent sparse sampling methods based on compressed sensing theory and partial seperable function theory. An emphasis will be placed on discussing the issues of image reconstruction from sub-Nyquist data with sparsity and rank constraints and demonstrating their potential applications.

Biography

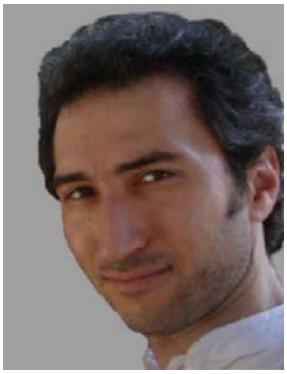
Professor Zhi-Pei Liang received his Ph.D. degree in Biomedical Engineering from Case Western Reserve University in 1989. He subsequently joined the University of Illinois at Urbana-Champaign (UIUC), first as a postdoctoral fellow (advisor: Paul C. Lauterbur), and then as a faculty member in the Electrical and Computer Engineering Department. He is currently Professor of Electrical and Computer Engineering and Co-chair of the Integrative Imaging Theme of the Beckman Institute for Advanced Science and Technology. He also has joint appointments in the Coordinated Science Laboratory, the Computational Biophysics Program, and the Department of Bioengineering, all at UIUC.

Dr. Liang's research interests include magnetic resonance imaging, superresolution image reconstruction using a priori constraints, statistical and learning-based methods for biomedical image analysis, and their application to functional brain mapping, cancer imaging, and cardiac imaging.

Dr. Liang is a recipient of the Sylvia Sorkin Greenfield Best Paper Award of the Medical Physics Journal (1990), an NSF Research Initiation Award (1994) and CAREER Award (1995), and an IEEE-EMBS Early Career Achievement Award (1999). He was named Fellow of the UIUC Center for Advanced Study (1997), Henry Magnuski Scholar (1999-2001), and University Scholar (2001-2004). He has appeared several times in the Daily Illini List of Excellent Teachers (1998-2000; 2005; 2007, 2008), was selected as a Distinguished Lecturer of IEEE-EMBS (2002-2005), and received the Ronald W. Pratt Faculty Outstanding Teaching Award (2005), and the Engineering Council Award for Excellence in Advising (2006, 2007, 2008). Dr. Liang was elected as Vice President (2006-2009), President-elect (2010), and President (2011-2012) of IEEE-EMBS. Dr. Liang is a Fellow of American Institute for Medical and Biological Engineering (2005), a Fellow of IEEE (2006), and a Fellow of International Society of Magnetic Resonance in Medicine (2010).

Invited Lecture 2

Augmented and Virtual Reality for Surgery Guidance: The IRCAD Point of View



Dr. Stephane Nicolau
IRCAD, TAIWAN

Abstract
In this presentation, we will present in a first part the activity of the IRCAD France center (Research Center against Abdominal and Digestive Cancer) along the last 12 years. In a second part, we will focus on the recent development of a new IRCAD center in Taiwan.

We will firstly review the main research works performed in the field of Virtual and Augmented Reality, then we will detail the problems we have encountered whilst trying to apply prototype technologies in the operating room. We will mainly share our experience on deformation issues. These experiments led us to revise our approach and think differently about the help that Augmented Reality can bring intra-operatively.

The second part of the presentation will be devoted to the new IRCAD center that has been builtin Taiwan 2 years ago, and which has set up a medical imaging research team last year. I will firstly explain the purpose of this center in Taiwan and how the collaboration with the French center is performed thanks to efficient collaborative tools. Secondly, I will describe the works that has been performed during the first year on Ultrasound Simulation and marker tracking accuracy. Finally, I will quickly present the future projects we plan to work on.

Biography
Stephane Nicolau was born on 25th January 1978. In 2000, he obtained his engineer diploma of the Ecole Nationale Superieure de Physique de Strasbourg (ENSPS). He then furthered his academic studies and made a PhD at INRIA Sophia-Antipolis under the supervision of Nicholas Ayache, head of the ASCLEPIOS team (former EPIDAURE). He obtained his PhD in 2004 and joined the Virtual Reality team of the Institut de Recherche contre les Cancers de l'Appareil Digestif in Strasbourg (IRCAD) as a researcher. In 2009, he becomes in IRCAD TAIWAN the leader of the new research team in medical imaging. His main fields of interest include medical augmented reality, medical image processing, 3D modelling of anatomical deformations, calibration of vision systems and validation of medical guidance systems.

Ultrasonix is a leading developer and manufacturer of high quality diagnostic ultrasound imaging systems. The company's OpenSONIX ultrasound technology provides superior image quality, ease of use and clinical flexibility to adapt to the needs of a variety of specialties. Ultrasonix is a privately held, profitable company headquartered in Richmond, British Columbia with affiliate dealers in 65 countries.

Established 28 years ago, NDI is trusted by international leaders in medical research and medical device manufacturing for the accuracy and reliability of its measurement technology. NDI provides both optical and electromagnetic based tracking solutions. Polaris and Aurora systems are the core technology inside the world's leading computer-assisted surgery and therapy systems in the applications such as neurosurgery, orthopedics surgery, intervention, robotics surgery, and radiotherapy. Today, the company has over 15,000 installations in more than 30 countries around the world.

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