Computer Assisted Orthopaedic Surgery

11th Annual Meeting of CAOS-International
Final Program
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Continuing Medical Education

Please check the meeting’s web page at http://www.caos-international.org/2011 for latest information about Credits for Continuing Medical Education (CME).

For Information and Registration Please Contact

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Email CAOS2011@CAOS-International.org
## Meeting of CAOS-UK

The UK chapter of Computer Assisted Orthopaedic Surgery will have their gathering in **Clifford Room** at 9 to 11 am.

## Pre-Congress Educational Workshops

After the great success during the last year, we will again offer a number of pre-congress educational workshops. A faculty of renowned experts will comprehensively introduce workshop participants to selected topics related to computer assisted orthopaedic surgery.

Two basic workshops will run in parallel and take place at 11:00-14:00 followed by seven parallel advanced workshops (14:00-18:15).

### Basic Workshop I – Introduction to CAOS for Clinicians New to the Activity

**Wright Room**

**Organizers:** Leo Joskowicz & Séphane Lavallée

The goal of this workshop is to present to clinicians in simple terms the basic technical concepts of CAOS and their current use in clinical orthopaedic procedures. Technical concepts include visualization, segmentation, and modeling of anatomical structures from preoperative CT images, computer-based preoperative planning, real-time tracking, imaging, and registration for intraoperative navigation, and robot-assisted intraoperative execution. Computer-based procedures include total hip and total knee replacement, spinal procedures, ACL reconstruction, and fracture reduction and fixation, among others.

### Basic Workshop II – Introduction to CAOS for Technologists New to the Activity

**Bailey Room**

**Organizers:** Eric Stindel

Computer assisted surgery, including new technologies of intraoperative 3D imaging, is indispensable in orthopaedic and trauma surgery since many years. This workshop is aiming at students and young engineers, providing an overview on the actual status of CAOS in clinical use.

For future developments, an intense dialogue between developers, researchers and physicians is essential. Efficient research must be orientated on clinical problems and needs. For that purpose an understanding of special conditions in the operation room and of limitations of existing technology is very important. The common goal of engineers and clinicians is the development of more precise, more reliable, simpler and – last but not at least – more cost efficient systems for relevant and demanding problems.

This workshop is conducted by physicians with many years of personal experience in computer assisted orthopaedic surgery. It will provide its participants with the unique opportunity of getting personal contact for questions and for discussion.

### Advanced Workshop I – Custom-made Surgical Guides

**Wright Room**

**Organizers:** Klaus Radermacher & Mahmoud Hafez

The individual template (or customized surgical guides) approach has been originally developed and evaluated in different clinical applications in orthopaedic surgery in the early 1990s. Meanwhile, applications in other disciplines such as cranio-facial surgery as well as dental implantology have been established. Due to its intraoperative simplicity and intuitive handling together with a proven effectiveness and efficiency for selected applications, the individual template approach today is adopted by many clinicians and companies world wide. The workshop will provide a critical review of the benefits and bottlenecks of the template technique - from a historical review to its actual techniques and applications.

The workshop will include topics such as:

- Information acquisition and preprocessing (CT, MR, initial approaches, current techniques and future trends...)
- Planning systems for different applications
- Manufacturing approaches and techniques
- Surgical techniques and applications
- Clinical outcomes review
- Usability and workflow considerations

### Advanced Workshop II – Morphology and Kinematics of the Arthritic Hip
Bailey Room

**Organizers:** Randy E. Ellis

Recent research suggests that the adult human hip joint is not always spherical in shape and may not have the motion of an ideal ball-and-socket mechanism. This workshop will consider the basic science and clinical applications of: population variability of pelvic shape; the shape and kinematics of osteo-arthritic joints; clinical implications of using population averages and/or individual variability in arthroplasty alignment; and current disputes in hip morphology.

The workshop is designed to be of interest to both technical and clinical participants.

### Advanced Workshop III – TKR & Uni-compartmental Knee Surgery
Boardroom

**Organizers:** Kamal Deep

The theme of the advanced workshop will be understanding the role of kinematics and standardising the goals of the procedure objectively in quantitative language.

The participants will come out with a better understanding of why and what should be the aims of the procedure of TKR, including the bony and soft tissue elements, which can be achieved objectively during the surgical procedure using CAOS technology.

### Advanced Workshop IV – Robotics & Navigation Systems
Clifford Room

**Organizers:** Brian L. Davies

Robotics and navigation systems for orthopaedic surgery have come a long way in the last 15 years. Systems have become smaller, easier to use, and more accurate. This workshop will consider a number of technological issues given by leading groups as well as presentations on a range of applications from clinicians using all the major robotic systems. One of the largest sources of error has been "registration" between the pre-operative model and the intra-operative system of patient and the CAOS device, and so this has been given a separate session.

The workshop will be presented by a number of internationally renowned speakers who are active in the technology and clinical application of navigation and robotics.

### Advanced Workshop V – Novel Technologies
Studio

**Organizers:** Branislav Jaramaz

Several novel technologies have been introduced in CAOS in recent years. Some are based on new generations of sensors and devices, and some on synergistic approaches that combine CAOS with new advances in biological sciences. Apart from progress in surgical guidance techniques, novel technologies lead to progress in surgery planning and evaluation. This workshop will address the following topics:

- Advances in position tracking
- Sensors and CAOS
- Small robots and intelligent devices for CAOS
- CAOS and tissue engineering

The workshop will present a broader overview of the state of the art of each topic as well as the authors' own experience in the respective field. It will address the novel approaches in research and the applications in clinical practice.

### Advanced Workshop VI – Statistical Shape Modelling and its Applications in CAOS
Miles Room

**Organizers:** Mauricio Reyes and Guoyan Zheng

Statistical shape analysis enjoys a remarkable popularity within the medical image analysis community, and has been widely used to study human anatomy. These techniques hold potential for novel approaches in image guided surgery.
planning, simulation and execution. Among possible applications, the need for pre- and/or intraoperative CT data sets to gather bone surface information may be removed, pathologies could be detected automatically or structural biomechanical behaviour of human structures incorporated during planning.

The aim of the workshop is to introduce and present statistical shape modelling to researchers working in Orthopaedics and related topics. The workshop introduces a varied list of international renowned speakers working actively on the topic of statistical shape and intensity modelling. The workshop aims at emphasizing not only on the methodologies but also on the practical aspects of statistical shape modelling.

**Advanced Workshop VII – Biomechanics in Orthopaedic Surgery**

**Organizers:** Jonathan Jeffers

Jules Pean implanted the first joint replacement in 1893, and orthopaedic surgery has never looked back. Greater understanding of human joint biomechanics has led to hip, knee and shoulder replacements becoming amongst the most successful and popular procedures in contemporary surgery. The success of these procedures has widened the patient selection criteria to include younger, more active patients who take implant survival as a given and will not tolerate any reduced function that may compromise their lifestyle.

In this workshop, we will investigate the role of biomechanics in developing treatment for the arthritic hip, knee and shoulder, and discuss the challenges that remain to the orthopaedic surgeons and engineers. The invited speakers are from a surgical and engineering background, and the workshop should be of interest to both disciplines.

**Welcome Reception at the Industrial Exhibition**

18:30 **REGISTRATION AND CAOS-INTERNATIONAL WELCOME RECEPTION**

Participants of the above workshops are invited to join participants of the main conference in celebrating our Anniversary, the 11th Annual Meeting of CAOS-International. This reception takes place in the industrial exhibition of the meeting.

21:00 **END OF THE DAY**
Thursday, June 16, 2011

7:00  REGISTRATION

7:45  Introduction to the 11th Annual Meeting
      Cobb JP, Deep K

Session I – Total Hip Arthroplasty, Part 1: Planning and Registration

Chairmen:  André Bauer & Russell H. Taylor

8:00  Ultrasound based APP determination for computer-assisted THAs operated in lateral approach
      Schumann S, Nolte LP, Zheng G

8:10  Validation of a new 2D/3D reconstruction-based program for determination of cup orientation after THA
      Zheng G, Von Recum J, Nolte LP, Grützer PA, Franke J

8:20  Reliability of mental 2D/3D matching for 3D cup positioning based on pre-operative 2D planning in defect hips

8:30  Computer-assisted navigation with spatial table-patient registration versus mechanical instrumentation
      K Hanna G, Cinque M, Walker R

8:40  An automated 3D cup planning in total hip arthroplasty from a standard X-ray radiograph using atlas-based
      2D-3D pelvis shape reconstruction

8:50  Total hip arthroplasty in supine position using a conventional cup alignment guide cannot always provide an
      optimum position for acetabular cups
      Kunihiko T, Kenji W

Session II – Osteotomy

Chairmen:  Andrew Pearl & Randy E. Ellis

9:00  Virtual 3D planning and patient specific surgical guides for osteotomies around the knee
      Victor J, Deprez P, Premanathan A, Kepper L

9:10  Registration-based examination of joint remodeling after periacetabular osteotomy: a preliminary study
      Rasquinha B, Sayani J, Dickinson AWL, Rudan JF, Wood GCA, Ellis RE

9:20  Custom-made template for corrective femoral osteotomy was useful during total hip arthroplasty in a patient
      with a previous Schanz osteotomy: a case report
      Nakamura N, Murase T, Tsuda K, Sugano N, Iwana D, Kitada M, Kawakami H

9:30  Posterior tibial slope in medial opening-wedge high tibial osteotomy with navigation: 3D vs. 2D
      Song EK, Seon JK, Jeong MS, Khan MS, Kang KD, Park CH, Yim JH

9:40  Results of 37 computer-assisted double level osteotomies for severe genu varum deformity: a 1 to 9 years follow-up
      Saragaglia D, Blaysat M, Mercier N, Grimaldi M

9:50  An evaluation of current options in pelvic acetabular osteotomy, issues of 3D measurements in hip dysplasia
      and a prospective of the use of computer-assisted surgery, virtual planning, rapid prototyping, and image-guided navigation in PAO
      Anaya AA, Vigneron LM, Diab M, Burch S

Tea Break and Poster Session – Part 1

10:00  POSTERS S1-S5 WERE RATED “SPECIAL POSTERS” INDICATING AN EXCEPTIONAL QUALITY OF THIS WORK.
       POSTERS WILL BE PRESENTED IN FIVE SESSIONS, DURING WHICH THE AUTHORS OF THE RESPECTIVE SESSION’S
       POSTERS WILL BE PRESENT AT THE POSTER BOOTHS. HOWEVER, ALL POSTERS AND SPECIAL POSTERS OF ALL
       SESSIONS WILL BE ON DISPLAY DURING THE ENTIRE TIME OF THE MEETING.
S1) Three-dimensional assessment of acetabular coverage in femoroacetabular impingement
Klingenstein GG, Murphy SB

S2) Accuracy of imageless navigation system in total hip arthroplasty
Taki N, Mitsugi N, Mochida Y, Akamatsu Y, Ota H, Kobayashi H, Saito T

S3) Hip joint center localization with an extended Kalman filter
Beretta E, Valenti M, De Momi E, Ferrigno G

S4) The early results of robot-assisted uni-knee arthroplasty (fixed bearing versus mobile bearing)
Lee CT, Yoon SH, Hur JH, Kwon OM, Trabish M, Lee HJ, Park J, Kim JY

S5) A novel method in assessing tunnel positions in ACL reconstruction
Kang X, Yau WP, Taylor RH, Otake Y

S6) A clinical trial comparing two navigated ACL single bundle reconstruction: conventional vs. anatomical
Sasaki SU, Albuquerque RFM, Daher SS, Hernandez AJ, Rezvoz RD, Moscovisch H

S7) Measuring leg length discrepancy using pelvic radiographs
Heaver C, St. Martin JP, Nightingale P, Sinha A, Davis ET

S8) Accuracy of a CT-based hip navigation system with fluoroscopic registration

S9) The accuracy of CT-based fluoroscopy-matching navigation system in THA: a comparison of the anterolateral and posteolateral approaches
Kaneko HK, Yokoyama KY, Morisawa YM, Kataoka TK, Yoshida AY, Yanagimoto SY

S10) Ultrasound navigation in lateral position: sagittal plane defines virtual anterior pelvic plane
Südhoff I, Reising K, Mollard B, Helwig P

S11) This poster was withdrawn

S12) Intra-operative stress testing to optimise tibiofemoral and patellofemoral dynamics during computer assisted surgical navigation
Strachan R, Konala P, Iranpour F, Prime M, Amirthanayagam T, Amis A

S13) Rotational accuracy of implant placement using pre-operative surgical planning and patient-specific surgical guides in total knee arthroplasty
Deboer DK, Blaha JD, Langston GD, Obert RM, Carroll ME, Stenniski PM, Lancianese SL

S14) Comparison of the tibia-first with the femur-first technique in the navigation-assisted implantation of a Columbus bicondylar surface replacement
Malzdorf M

S15) Optimizing the calculation algorithm of elbow rotation axis for assessment of elbow deformity
Hung SS, Yen PL, Lee MY, Tseng GF

S16) Image fusion for computer assisted tumor surgery (CATS)
Wong KC, Kumta SM, Tse LF, Ng EWK, Lee KS

S17) Experimental validation of a stability model for surgical guides
Van den Broeck J, Wirix-Speeijens R, Vander Sloten J

S18) Image based navigation increases accuracy for K-wire placement
Kraus M, Riepl C, Jones A, Gebhard F, Schoell H

S19) Assessment of accuracy of robotically assisted unicompartmental knee arthroplasty
Mofidi A, Lu B, Goddard MS, Condit MA, Poehling GG, Jinnah RH

Session III – Total Knee Arthroplasty, Part 1: Outcomes

*Chairmen: Rolf Miehlke & Carolyn Anglin*

11:00 Comparison of robot-assisted total knee arthroplasty using conventional robot system and improved tissue sparing robot system
Lee CT, Yoon SH, Kim JY, Kwon OM, Trabish M, Park JS, Lee HJ, Choi SW
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>11:10</td>
<td>Comparative study of flexion stability between navigational and robotic total knee arthroplasty</td>
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<tr>
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<td>Song EK, Seon JK, Jeong MS, Khan MS, Kang KD, Park HW, Yim JH</td>
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<tr>
<td>11:20</td>
<td>Navigated, mobile bearing total knee prosthesis: a 5-year multicentric follow-up study</td>
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<td>Jenny JY, Mielike RK, Saragaglia D</td>
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<td>11:30</td>
<td>Navigated versus conventional total knee arthroplasty – are there improved gait kinematics or clinical benefits?</td>
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<td>Smith JR, Rowe PJ, Blyth M, Jones B</td>
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<tr>
<td>11:40</td>
<td>Effects of joint line changes on clinical outcomes in computer navigated total knee arthroplasty</td>
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<td></td>
<td>Ee G, Pang HN, Yeo SJ</td>
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<tr>
<td>11:50</td>
<td>Functional outcome computer assisted primary mobile bearing uncemented cruciate retaining total knee arthroplasty between measured resection and gap balancing techniques: a randomised control study</td>
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<td>Singh VK, Trehan R, Kamat Y, Varkey R, Raghavan R, Adhikari A</td>
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<tr>
<td>12:00</td>
<td>How many TKA patients could be treated with early intervention procedures?</td>
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<td></td>
<td>Kreuzer S, Lonner JL, Leffers K, Conditt MA</td>
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<tr>
<td>12:10</td>
<td>Computer assisted primary total knee arthroplasty between obese and non obese patients: is navigation the answer to knee arthroplasty in obesity?</td>
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<td>Singh VK, Trehan R, Kamat Y, Varkey R, Raghavan R, Adhikari A</td>
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<td>12:20</td>
<td>Educational benefits of computer-assisted surgery simulations and directed practice for the trainee</td>
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<td>Myden C, Anglin C, Kopp G, Hutchison C</td>
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**Keynote Lecture I**

12:30 The technology and economics of computer aided Orthopaedic guiding: the Materialise perspective  
*Fried Vancraen, founder and CEO of Materialise*

**Lunch Break**

13:00 **LUNCH BREAK AT THE INDUSTRIAL EXHIBITION**

**Industrial Workshops**

14:00 **THE FOLLOWING INDUSTRIAL WORKSHOPS WILL BE PRESENTED:**

- **Surgical Planning Associates, Inc.:** The HipSextant Patient-Specific Cup Navigation  
  *Speakers: Stephen B. Murphy, MD, Greg Klingenstei, William S. Murphy*  
  *Room: Lecture Hall*

- **Stanmore Implants:** Patient specific unicompartmental knee surgery using a Sculptor robot  
  *Speaker: Justin Cobb, MD*  
  *Room: Clifford Room*

**Tea Break and Poster Session – Part 2**

15:00 **POSTERS S6-S10 WERE RATED “SPECIAL POSTERS” INDICATING AN EXCEPTIONAL QUALITY OF THIS WORK. POSTERS WILL BE PRESENTED IN FIVE SESSIONS, DURING WHICH THE AUTHORS OF THE RESPECTIVE SESSION’S POSTERS WILL BE PRESENT AT THE POSTER BOOTHS. HOWEVER, ALL POSTERS AND SPECIAL POSTERS OF ALL SESSIONS WILL BE ON DISPLAY DURING THE ENTIRE TIME OF THE MEETING.**

- **S6)** Comparison of isolated AM bundle and PL bundle augmentation in ACL reconstruction  
  *Song EK, Seon JK, Park JK, Jung WB, Kang KD*

- **S7)** Dynamic measurements of hip movement in deep bending activities after total hip arthroplasty using a patient-specific four-dimensional motion analysis system  
  *Tsuda K, Miki H, Tamura S, Kitada M, Nakamura N, Sugano N*

- **S8)** Can the surgeon’s eye replace the optical camera for acetabular component alignment?  
  *Murphy WS, Steppacher SD, Kowal JH, Murphy SB*
S9) Results of an early experience with custom-fit total knee replacement: intra-operative events, long leg alignment, and prosthetic placement
Song EK, Seon JK, Park JK, Kang KD

S10) Accuracy evaluation of CT-3D-fluoroscopy matching navigation system
Takao M, Yabuta K, Nishii T, Sakai T, Sugano N

16) Computer navigation helps to predict potential graft impingement in anterior cruciate ligament reconstruction
Yau WP, Fok WM

17) Quantitative assessment of acetabular overcoverage in pincer deformity using CT data
Murphy RJ, Subhawong TK, Chhabra A, Carrino JA, Armand M, Hungerford M

18) Acetabular center axis registration is more relevant to impingement in navigated hip replacement
Hakki S

19) Technical validation of the accuracy of measurement of pelvic planes and angles with a navigation system
Arachchi SMA, Augustine A, Deakin A, Picard F, Rowe P

20) Comparison of the orientation of the resultant force of different biomechanical hip models

21) X-ray stitching for intra-operative mechanical axis determination of the lower extremity

22) In vivo three-dimensional determination of normal knee kinematics from dynamic flat-panel detector images
Yamazaki T, Watanabe T, Tomita T, Sato Y, Yoshikawa H, Tamura S, Sugamoto K

23) Measurement and identification of fixed flexion deformities of the knee using non-invasive tracking
Spencer SJ, Deakin AH, Clarke JV

24) Three-dimensional TTTG distance: a new reference frame for patellofemoral disease investigation
Harris SJ, Fornaciari P, Cobb JP

25) Intraoperative 3D computer-assisted navigation in foot and ankle surgery with the O-arm surgical imaging system: a cohort study
Dubois-Ferriere V, Hoffmeyer P, Assal M

26) Direct application of MR images to computer-assisted bone tumor surgery: a technique for computer-assisted bone tumor surgery
Yoon SH, Park IH, Yoon SH, Cheon SH, Cho HS

27) Kinematics-based position control of the 6-DOF surgical robot epizactor
Wagner A, Nordheimer E, Berscher M, Heute S, Weiser HP, Pott PP, Badreddin E, Schwarz MLR

28) Novel 3S image registration integrated into conventional orthopedic robot system
Lee CT, Yoon SH, Kwon OM, Lee HJ, Trabish M, Kim M, Kim SH, Park SH

29) Evaluation of the effect of X-ray projection on the measurement of clavicular fracture displacement
Lubovsky O, Safran O, Axekrod D, Peleg E, Whyne C

30) A novel technique for simplified distal interlocking of intra medullar nails to reduce radiation exposure
Schroeder JE, Fliri L, Liebergall M, Richards G, Windolf M

31) The position of components in uni-compartmental knee replacement: comparison of per-operative, computer assisted planning and post-operative X-ray attainments
Pink M, Skladal M, Lisy M, Valousek T

Session IV – Trauma

Chairmen: Meir Liebergall & Antony Hodgson

16:00 Evaluation of a new computer-assisted surgery system (Surgix™) in scaphoid bone fractures – an experimental study
Schoell H, Mentzel M, Gebhard F, Kraus MD

16:10 Comparison of 3D volume rendering to volumetric slicing of cone-beam computed tomography for navigation of percutaneous scaphoid fixation
Smith EJ, Al-Sanawi H, Gammon B, St. John P, Pichora DR, Ellis RE
16:20 A new ultrasound method for determining bone geometry and fracture reposition
Keppler P, Vüllers H, Mayer S, Gebhard F

16:30 Evaluation of a 2D-fluoroscopy-based navigation system enabling a virtual radiation-free preview of X-ray images for insertion of a proximal femoral nail (PFNA®): an experimental study

16:40 An automated, cone-beam CT, atlas-based approach for the alignment of femoral shaft fractures in six degrees of freedom
Crookshank MC, Schemitsch EH, Beek M, Hardisty M, Whyne CM

16:50 Accuracy and precision of the piriformis and trochanteric entry point for IM nailing in femoral shaft fractures using image-guided navigation and conventional fluoroscopy
Crookshank MC, Edwards M, Sellan M, Whyne CM, Schemitsch EH

**Session V – Hip Resurfacing**

**Chairmen:** Stephen B. Murphy & Ferdinando Rodriguez y Baena

17:00 The accuracy of CT based navigation versus freehand hip resurfacing: an analysis of acetabular component orientation

17:10 Orientation of the femoral component in resurfacing arthroplasty of the hip: in-vitro comparison of accuracy of computer navigation and mechanical jigs
Bansal R, Verma R, Gambhir AK, Murphy P

17:20 Investigating the contribution of soft tissues to impingements at the hip joint: a preliminary study
Smith EJ, Anstey J, Kunz M, Rasquinha B, Rudan J, St John P, Wood GCA, Ellis RE

17:30 A comparison between 2D and 3D digital templating for resurfacing hip arthroplasty
Nakasone S, Takao M, Nishii T, Sakai T, Nakamura N, Sugano N

17:40 The short term results of hip resurfacing arthroplasty using personalized instrumentation – 40 cases follow-up reports
Lee CT, Yoon SH, Hur JH, Trabish M, Kang MR, Kwon OM, Park JS, Lee HJ

17:50 END OF THE DAY
Friday, June 17, 2011

8:00 Registration

Session VI – Total Knee Arthroplasty, Part 2: Biomechanics

**Chairmen:** Eun Kyoo Song & Jonathan Jeffers

8:30 Standardising the assessment of coronal knee laxity
Wilson WT, Deakin AH, Picard F, Riches PE, Clarke JV

8:40 Recalibrating CAS to improve accuracy
Lionberger DR, Crocker CL, Rahbar MH

8:50 Intra-operative analysis of the kinematic behavior of a total knee replacement by a navigation system: initial experience and first results
Jenny JY, Wasser L, Firmbach FP

9:00 Measurements of tibial rotational alignment by two reference axes in the 3D-coordinate system
Enomoto H, Nakamura T, Shimosawa H, Niki Y, Toyama Y, Suda Y

9:10 The effect of elevation of the joint line on mid-flexion stability in navigated cruciate retaining TKA
Seon JK, Song EK, Kang KD, Yim JH

9:20 Patellar tracking assessment in surgical navigation for total knee replacement: initial experience in patients
Belvedere C, Ensini A, Moctezuma De La Barrera JL, Feliciangeli A, Leardini A, Catani F

9:30 Effect of tibial slope on dynamic stability of the posterior cruciate ligament and posterolateral corner deficient knee
Petrigliano FA, Suero EM, Lane CG, Voos JE, Citak M, Allen AA, Wickiewicz TJ, Pearle AD

Session VII – New Tools and Techniques

**Chairmen:** Eric Stindel & Mauricio Reyes

9:40 Model-based bone shape estimation from sparse, heterogeneous data
Blanc R, Székely G

9:50 Automated bone contour detection in 3D B-mode ultrasound images using optimized phase symmetry features – a clinical evaluation for pelvic fractures

10:00 Hybrid optical-inertial tracking system for a servo-controlled handheld tool
Claasen GC, Martin P, Picard F

10:10 Miniaturized navigation system for computer aided surgery

10:20 iPod based navigation in TKR and THR – first experience and results of the pilot study
Bäthis H, Shafizadeh S, Banerjee M, Tjardes T, Bracke B, Neubauer T, Bouillon B

Tea Break and Poster Session – Part 3

10:30 **POSTERS S11-S15 WERE RATED “SPECIAL POSTERS” INDICATING AN EXCEPTIONAL QUALITY OF THIS WORK. POSTERS WILL BE PRESENTED IN FIVE SESSIONS, DURING WHICH THE AUTHORS OF THE RESPECTIVE SESSION’S POSTERS WILL BE PRESENT AT THE POSTER BOOTHs. HOWEVER, ALL POSTERS AND SPECIAL POSTERS OF ALL SESSIONS WILL BE ON DISPLAY DURING THE ENTIRE TIME OF THE MEETING.**

S11) Comparison of the measurement of the anterior laxity by anterior cruciate ligament deficiency with the GNRB system and with a navigation system: a preliminary validation study
Jenny JY, Arndt J

S12) Patient-specific prediction of the three-dimensional structure of the human pelvis based on plain radiographic images: implications for navigation of acetabular component implantation
Murphy WS, Steppacher SD, Kowal JH, Murphy SB
S13) Improving cup positioning using a mechanical navigation instrument
   Steppacher SD, Kowal JH, Murphy SB

S14) Development of a dynamic knee-simulator to evaluate the influence of ligament instabilities to 3D patella-tracking and retroperitellar pressure distribution using an industrial robot and an optical tracking system
   Hofbauer VR, Bittrich T, Schulze M, Burger M, Zantop T, Rosenbaum D, Rueberdt A, Raschke MJ

S15) Minimization of intra-operative shaping of bone fixation plates using population-based analysis
   Bou Sleiman H, Nolte LP, Reyes M

32) Effect of posteromedial corner injuries on tibiofemoral translation in the ACL deficient knee
   Hammoud S, Suero EM, Maak TG, Rozell JC, Inra ML, Jones K, Pearlea AD

33) A method for visualisation and correction of cam impingement
   Harris SJ, Masjedi M, Cobb JP

34) Accuracy of X-ray based leg length and offset measurements in total hip arthroplasties

35) Development of a pelvic phantom to assess accuracy of anterior pelvic plane definition and acetabular angle calculation in hip navigation systems
   Augustine A, Deakin AH, Rowe P, Picard F

36) 3D accuracy of rendering hip joints for patient-specific templates
   Anstey JB, Smith EJ, Lee W, Ellis RE

37) Fitting a quadratic surface to bones in order to resect/shape bones using an active constraint robot
   Masjedi M, Harris SJ, Cobb JP

38) Computer navigation at the knee joint arthroplasty
   Kaminski AV, Gorbunov EV

39) The effect of weight-bearing on tibiofemoral alignment in asymptomatic, osteoarthritic and prosthetic knees
   Clarke JV, Deakin AH, Picard F, Riches PE

40) The axial plane rotational kinematics of arthritic knee before and after total knee replacement
   Deep K, Picard F, Deakin A, Menna C

41) A new concept of a multiple-use screw-based shape-fitting plate in TKA
   Haselbacher M, Sekyra K, Mayer E, Thaler M, Nogler M

42) Radiographic comparison of two different ankle registration techniques
   Suero EM, Charles C, Citak M, Pearle AD, Plaskos C

43) Tumor surgery: bone cuttings using saw guides
   Paul L, Docquier PL, Cartiaux O, Delloye C, Banse X

44) Reliability of a computer assisted sphericity assessment technique for the reamed acetabulum

45) Acoustic emission as a means of detecting damage within a bone and providing warning of fracture during hip replacement
   Pechon PHM, Evans S, Jones S, Pullin R, Eaton M

46) Improved visualization of anterior and posterior acetabular columns
   Nakhla AI, Richards R, Cobb JP

47) Cadaveric evaluation of robotically assisted multi compartmental knee kinematics
   Yildirim G, Walker PS, Conditt MA, Horowitz S, Jones J, Madrid I

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**Session VIII – Total Hip Arthroplasty, Part 2: Pelvic Tilt and Cup Orientation**

**Chairmen:** Nobuhiko Sugano & Angela H. Deakin

11:30 The natural orientation of the acetabulum in arthritic hips
   Goudie ST, Deep K, Picard F, Baines J

11:40 The functional pelvic plane for cup orientation in patients with a large difference in pelvic sagittal inclination between supine and standing positions – 4D motion analysis
   Tamura S, Miki H, Tsuda K, Takao M, Nakamura N, Hattori A, Suzuki N, Sugano N
Femoral tilt and the concept of combined anteversion for total hip arthroplasty
Haimerl M, Dohmen L, Gneiting S, Sendtner E, Woerner M, Springorum HR, Griñka J, Renkawitz T

Cup orientation guided by the transverse acetabular ligament
Abe H, Yamanashi W, Takao M, Sakai T, Nishii T, Nakamura N, Sugano N

Validating a new reference plane for image-free navigation of acetabular cup placement
Xie W, Franke J, Grützner PA, Nolte LP, Zheng G

Clinical and radiological comparison of classic versus mini invasive anterolateral navigated primary total hip replacement
Hakki S, Bilotta, V, Bui H, Pedersen K, Webster W, Osman M

The robots have landed: how to grow a $1 billion company from CAOS in 7 years
Maurice Ferre, founder and CEO of Mako Surgical Corp.

Combined anatomic intraarticular ACL reconstruction and lateral extraarticular sling: a cadaveric study using computer navigation
Sherman SL, Suero EM, Rozell JC, Delos D, Jones K, Sherman MF, Pearle AD

A comparison among analogue, 2D digital and CT-based templating in cementless THA
Yabuta KY, Takao MT, Sakai TS, Nishi TN, Sugano NS

Pelvic incidence: analysis in three-dimensions
Vrtovec T, Janssen MMA, Pernuš F, Castelein RM, Viergever MA

Interest of intra-articular ultrasound probe to analyze knee cartilage

Anterior cruciate ligament reconstruction using fluoroscopic-based navigation system
Hiranaka T, Kawakami Y, Hida Y, Uemoto H, Doita M, Tsuji M

The innovative EOS imaging system for the evaluation of THA patients: a study of pelvic and acetabular parameters about 150 cases
Lazennec JY, Rousseau MA, Brusson A, Catonne Y

Comparison of 2D and 3D measurements of femoral neck-shaft angles
Girardi B, Kunz M, Rudan JF, Wood GCA

An effect of magnitude of muscle force for artificial-hip-joint dislocation
Kiguchi K, Hayashi Y, Horie T, Ueno M, Kobayashi T, Mawatari M, Hotokebuchi T

2D vs. 3D landmark localization for cup positioning in THR based on biomechanical hip models

Improving PST (patient-specific template) enables the post-operative femoral component angle of resurfacing THA more accurate

The use of navigation to obtain rectangular flexion and extension gaps during primary total knee arthroplasty and midterm clinical results
Song EK, Seon JK, Park JK, Jung WB, Kang KD
55) Navigation of the tibial plateau alone is sufficient in computer-assisted uni knee arthroplasty: results of 23 cases  
*Saragaglia D, Grimaldi M, Rubens-Duval B, Plaweski S*

56) Comparison between intra- and post-operative measurements of three-dimensional motion analysis of the replaced human knee joint  
*Belvedere C, Ensini A, Notarangelo DP, Tamarri S, Feliciangeli A, Leardini A*

57) Comparison of radiographic results of total knee arthroplasty using robot-assisted and conventional manual method in severe varus deformity  
*Lee CT, Yoon SH, Kim JY, Kim MK, Hur JH, Yang SC, Jung CY, Choi SW*

58) Preoperative prediction of gap balance based on the radiographic flexion and extension laxities in robotic TKA  
*Song EK, Seon JK, Park JK, Jung WB, Kang KD*

59) CAS in adamantinoma resection and computer assisted reconstruction  
*Gerbers JG, Jutte PC*

60) Spinal osteotomy planning using estimation of post-operative balance  
*Steffen JS, Skalli W, Vital JM, Hauger O, Dubouset J, Obeid I*

61) Auto-detection of bone cutting through in robot-assisted surgery  
*Yen PL, Hung SS, Chu YJ*

62) A novel approach for surgical guiding in closed intramedullary nailing of femur using robotic laser pointing system  
*Suthakorn J, Nakdhamabhorn S, Mahaisavariya B*

63) Robotic arm guidance to improve lateral UKA accuracy  
*Roche MW, Velyvis JH, Horowitz S, Conditt MA*

Round Table I – Is it time to require CAS in training residents?  
15:30 Chairman: Frédéric Picard  
Participants: David Stulberg, Carolyn Anglin, Alberto Gregori, Jon Clarke, Justin Cobb

Session IX – Uni- and Bi-Compartmental Knee Arthroplasty  
Chairmen: Kamal Deep & Brian L. Davies

16:20 Accuracy of pre-operative planning in robot-assisted unicompartmental knee arthroplasty  
*Goddard MS, Lang JE, Poehling GG, Conditt MA, Jinnah RH*

16:30 Robot-assisted unicompartmental knee arthroplasty: outcomes of 500 consecutive procedures  
*Goddard MS, Lang JE, Bircher JS, Lu B, Poehling GG, Jinnah RH*

16:40 Deep flexion kinematics with robotic modular knee arthroplasty  
*Watanabe T, Banks SA, Kreuzer S, Leffers KJ, Muneta T, Jones J, Conditt MA*

16:50 Tactile-guided unicompartmental knee arthroplasty: clinical accuracy  
*Danbar N, Roche MW, Park B, Horowitz S, Conditt MA, Banks SA*

17:00 Customizable correction in unicompartmental knee replacement  
*Suero EM, Rozell JC, Inra ML, Cross MB, Ranawat AS, Pearle AD*

17:10 Navigated unicompartmental vs. total knee replacement – with correct patient selection, does bone conserving surgery give superior results?  
*Windley J, Nathwani D*

17:20 Bicompartmental arthritis of a knee: UKR+PFA vs. TKR computer assisted – a prospective matched short term study  
*Confalonieri N, Manzotti A, Cerveri P*
CAOS-International Banquet

20:00 CAOS-INTERNATIONAL BANQUET

The Banquet will feature the following highlights:
- Presentation of the Maurice E. Müller Award for Excellence in Computer Assisted Surgery
- Introduction of the new CAOS-International President
- Invitation to the 12th Annual Meeting of CAOS-International in Seoul in 2012
Saturday, June 18, 2011

8:00 REGISTRATION

Session X – Total Hip Arthroplasty, Part 3: Outcomes

Chairmen: William L. Bargar & Branislav Jaramaz

8:20 Pelvic tilt before and after total hip arthroplasty
Murphy WS, Murphy SB, Zheng G

8:30 Comparison study of conventional and CT-based individualized instrument guided acetabular component placement
Vasarhelyi EM, Kunz M, Rudan JF, Ellis RE

8:40 Computer navigated acetabular component orientation – a comparison of navigated vs. non-navigated acetabulum reaming
Chaudary MI, Davis ET

8:50 Evaluation of the advantage in CT-based navigation system for THA – comparison the advantage between two different matching methods: land-mark matching and fluoroscopy matching
Yanagimoto S, Tezuka M, Kameyama M, Nakayama S, Hotta H, Kaneko H, Fujita Y, Funayama A

9:00 Assessment of postoperative range-of-motion in total hip arthroplasties by means of image-free navigation

9:10 Heels-down squatting after total hip arthroplasty
Sakai T, Koyanagi J, Yamazaki T, Watanabe T, Sugano N, Yoshikawa H, Sugamoto K

Tea Break and Poster Session – Part 5

9:20 POSTERS S20-S23 WERE RATED “SPECIAL POSTERS” INDICATING AN EXCEPTIONAL QUALITY OF THIS WORK. POSTERS WILL BE PRESENTED IN FIVE SESSIONS, DURING WHICH THE AUTHORS OF THE RESPECTIVE SESSION’S POSTERS WILL BE PRESENT AT THE POSTER BOOTHS. HOWEVER, ALL POSTERS AND SPECIAL POSTERS OF ALL SESSIONS WILL BE ON DISPLAY DURING THE ENTIRE TIME OF THE MEETING.

S20) Comparison of two regression techniques for statistical shape model based reconstruction – application to the proximal femur and the pelvis
Schumann S, Nolte LP, Zheng G

S21) Physical and psychological outcomes of hip resurfacing using individualized templates
Bow J, Kunz M, Rudan JF, Wood GCA, Ellis RE

S22) Validation of ultrasound-CT registration across multiple porcine vertebrae
Yan CXB, Goulet B, Chen SJS, Tampieri D, Collins DL

S23) Can computer navigation improve NJR statistics? Early functional and radiological outcomes of one hundred consecutive navigated unicompartmental knee replacements
Windley J, Ball S, Nathwani D

64) Effect of tibial slope on the stability of the anterior cruciate ligament deficient knee
Voos JE, Suero EM, Citak M, Petrigliano FP, Bosscher MRF, Wickiewicz TL, Pearle AD

65) Virtual surgery and range of motion of total hip arthroplasty, hip resurfacing, and dual mobility THA
Klingenstein GG, Lipman JD, Westrich GH

66) Femoral neck anteversion: implications for acetabular component positioning and femoral component design
Murphy AC, Murphy SB

67) Impact of implant alignment on joint load in total knee arthroplasty – a simulation study
Schmidt F, Asseln M, Eschweiler J, Belei P, Radermacher K

68) Surgical accuracy and efficiency of computer-automated total knee arthroplasty – a report on the first 80 cases
Koenig JA, Plaskos C
11th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery

69) Intra-operative laxity of knee with cruciate retaining TKA using a balanced gap technique with navigation system
   Seon JK, Song EK, Kang KD, Yim JH

70) Preoperative planning of bone tumor, merging navigation system and RP models for surgical training – experimental model

71) 3D fluoroscopy-based navigation system in spine and sacro-iliac percutaneous surgery: a prospective study
   Ruatti S, Merloz PH, Bodin A, Tonetti J, Eid A, Troccaz J

72) Extracting material stiffness from the vibration signal of an arthroscopic hooked probe
   Phoolchund N, Tenzer Y, Davies BL, Rodriguez y Baena F

73) Pediatric supra-condylar humerus fractures – computer assisted finite element analysis of fixation configuration

Session XI – Spine

Chairmen: Philippe Merloz & Wafa Skalli

10:00 Zero-dose-C-arm-navigation (ZDCAN) as a tool for education: radiation dose reduction in lumbar interventional techniques
   Ladenburger A, Nebelung S, Buschmann C, Strake M, Ohnsorge JAK, Radernacher K, De La Fuente M

10:10 Accuracy of percutaneous thoracic pedicle screw placement with isocentric C-arm fluoroscopic navigation
   Kishida S, Sato K, Ando T, Katayama Y

10:20 Designing individual templates for safe pedicle screw placement
   Takemoto M, Neo M, Fujibayashi S, Okamoto T, Ota E, Sakamoto T, Nakamura T

10:30 Optimal design of patient specific templates for pedicle spine screw placement

Session XII – Other Joints

Chairmen: Philippe Merloz & Wafa Skalli

10:40 Flat-detector computed tomography (FD-CT) guided infiltration of foot joints
   Wiewiorski M, Takes MTL, Jacob AL, Valderrabano V

10:50 Effects of tibial component malpositioning on joint kinematics during passive flexion in an original three-component total ankle replacement
   D'Angeli V, Visentini A, Belvedere C, Leardini A, Romagnoli M, Giannini S

11:00 Shoulder augmented surgery
   Chaoui J, Moineau G, Stindel E, Hamitouche C, Boileau P

Session XIII – Total Knee Arthroplasty, Part 3: Custom Guides & Intervention

Chairmen: Lombardi & Klaus Radermacher

11:10 Determining the accuracy of patient-matched instrumentation in total knee arthroplasty
   McCoy BW, Yaffe MA, Ghate R, Stulberg SD

11:20 A detailed analysis of the accuracy of PSI using CAS tools
   Yaffe MA, McCoy BW, Greene SJ, Luo M, Cayo MA, Stulberg SD

11:30 Pre-operative navigation in performance of TKA: assessment of patient-specific (MyKnee®) cutting blocks in performance of TKA
   Goldberg TD, Bush JW, Currey WT, Qin Q

11:40 Adjustable cutting blocks improve alignment and surgical time in computer assisted total knee replacement
   Suero EM, Plaskos C, Dixon P, Pearle AD

11:50 Custom cutting jigs improve or efficiency over CAS, but may sacrifice accuracy
   Lionberger DR, Crocker CL, Fung L, Bawkher SH, Chen CH
Round Table II – Will custom guides eliminate active navigation and robotics?

12:00  Chairman: Klaus Radermacher and Brian L. Davies
       Participants: Mahmoud Hafez, David Stulberg, Kirsten Schmieder, Jean-Yves Jenny

Scientific Awards Ceremony

12:40  Best clinical podium and best clinical poster presentation awards
       Sponsored by B. Braun Aesculap

       Best technical podium and best clinical poster presentation awards
       Sponsored by NDI Europe GmbH and CAOS-International

Closing

12:55  Closing remarks
       Justin P. Cobb

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Venue  The Mermaid Conference & Events Centre
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       Great Britain
       http://www.the-mermaid.co.uk/

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