



**INTERNATIONAL
SHOULDER GROUP 2022**

**PROGRAMME &
INFORMATION**

ISG Conference
18 & 19 August 2022

Table of contents

Welcome	3
Programme at a glance	4
Practical Information	5
Meeting keynotes	6
Detailed programme	8
Session A: Ultrasound, fluoroscopy, and diffusion tensor imaging	8
Session B: Rehabilitation	8
Session C: Virtual/augmented reality and sports	9
Session D: Wearables and exoskeletons	9
Session E: Rotator Cuff injuries	10
Session F: Muscle contributions and new methods	10
Sponsors	12
Organisation ISG Conference 2022	13
The International Shoulder Group	14
Pictures	15

Welcome

Welcome to the 2022 ISG meeting in Delft, the Netherlands. It is almost exactly 25 years ago that the first official ISG meeting was held in the very same university (26-27 August 1997)! Since that first meeting we have had meetings every two years, apart from the 2020 session of which we all know why it had to be canceled.... maybe it had to do that this is the XIIIth meeting ;-).

The International Shoulder Group was started in 1989, when at the ISB congress in Los Angeles, a group of shoulder researchers decided to start focused meetings, dedicated to shoulder research, with the intention to combine modeling-, experimental- and more clinically-oriented research related to the shoulder. This activity was based on the experience that shoulder research was too scattered in larger meetings like the ISB bi-annual congress and that there was a lot to gain in reducing the distance between research and clinic. It is difficult to judge whether we succeeded or whether the ISG has had a positive impact, but I like to believe that it did!

ISG meetings are traditionally smaller meetings and are especially meant to stimulate new contacts and collaboration between researchers. Ideally the outcome of the meeting is expansion of each attendant's network with (literally and figuratively) new and older faces. This probably applies to all of us, so please use the opportunities to interact!

On behalf of the organizing committee Marit van Dijk, Ton Leenen, Lisa Noteboom and Bart van Trigt,

DirkJan Veeger

Programme at a glance

Thursday August 18th

8.30- 9:00	Walk-in with coffee/tea
9.00-10:00	Keynote Gretchen Oliver
10:00-11.20	Session A: Ultrasound, fluoroscopy, and diffusion tensor imaging
11.20-11.40	Coffee break
11.40-13:00	Session B: Rehabilitation
13:00-13:50	Lunch break
13.50-15.10	Session C: Virtual/augmented reality and sports
15.10-15:30	Coffee break
15.30-16.30	Keynote Ajay Seth
16:30-17:00	Lab visit (optional) (tentative)
19:00-22:00	Dinner (Redjeki, Choorstraat 50-56, Delft)
22:00-	PhD night out

Friday August 19th

8.30- 9:00	Walk-in with coffee/tea
9.00-10.00	Keynote Tjarco Alta
10.00-11.20	Session D: Wearables and exoskeletons
11.20-11.40	Coffee break
11.40-13:00	Session E: Rotator Cuff injuries
13.00-13.50	Lunch break
13.50-14.20	ISG general meeting
14.20-15.20	Session F: Muscle contributions and new methods
15.20-15.40	Coffee break
15.40-16.40	Keynote Michael Davidson
16:40-17:10	Closing ceremony
17:10-18:00	Closing drinks

Practical Information

Meeting venue

“De Oude Bibliotheek”
Raam 180
2611 WP Delft

De Oude Bibliotheek is an inspiring historic building dating from 1915, which used to serve as the library of the TU-Delft. Now it has been transformed into an event location and serves as a center for knowledge exchange and meetings. The building is located in the center of Delft, at 15 minutes walking distance of the railway station. Parking in Delft center is virtually impossible: the closest parking garages are “Paardenmarkt” (relatively small) or parkeergarage “Marktgarage”.

Internet access

Wificode “de Oude Bibliotheek”: deOudebiblioth33k

Conference Dinner

[Redjeki](#)

Choorstraat 50-56
2611 JH Delft

(This is a five-minute walk from the conference venue)

Redjeki is an “Indisch” restaurant (06-41763525), which implies it serves Indonesian kitchen, but in a Dutch style. You will be served “Rijsttafel” (direct, but meaningless translation is Rice table), in buffet style.

“The ‘Rijsttafel’ originated in the Dutch colonial era, when the need was felt to create a festive and official type of banquet that would represent the multi-ethnic nature of the Indonesian archipelago. Dishes were assembled from many of the far-flung regions of Indonesia, where many different cuisines exist, often determined by the religion of the particular island or island group. Brought back to the Netherlands by former colonials and exiled Indonesians after Indonesia gained its independence in 1945, the rijsttafel was predominantly popular with Dutch families with colonial roots.”

Conference WhatsApp group

To keep in touch and up to date during this meeting we have created the WhatsApp group ‘ISG 2022’. Join our WhatsApp group by scanning the QR-code. You will then receive the latest info on activities, locations, or other important details.



Meeting keynotes

Thursday 9:00 - 10:00

**Gretchen Oliver: The Biomechanics of Pitching:
Translating Theory to Application**



Dr. Oliver is a full professor in the School of Kinesiology at Auburn University. She is a Fellow of the American College of Sports Medicine, a Certified Athletic Trainer, and a Corrective Exercise Specialist. Her primary research focus is on injury prevention and performance enhancement in youth baseball and softball athletes. She has a vast publication record regarding baseball and softball pitching and injury prevention. Among her peers, both nationally and internationally, she is known as the expert in the biomechanics of pitching.

Thursday 15:30 - 16:30

**Ajay Seth: Applying musculoskeletal modeling to
improve the design and technology for shoulder
injury therapy and prevention.**



Ajay Seth is an assistant professor of Biomechanical Engineering at Delft University of Technology where he directs the Computational Biomechanics Lab. His research is centered on neuromuscular and musculoskeletal modeling and computer simulation to understand, monitor, and affect human movement. He was the principal architect of the biomechanical modeling and simulation software, OpenSim—the most widely used musculoskeletal simulator, which he now directs its development at TU Delft. Ajay's background is in biomechanical modeling, controls (Ph.D.), multibody dynamics, computer simulation, and software design. He has a decade of industrial software engineering experience and over a dozen years of scientific research and development. Dr. Seth is devoted to applying physics-based modeling and simulations to accurately measure and classify human performance outside of the laboratory and to design devices and clinical interventions to improve human mobility.

Friday 9:00 - 10:00

Tjarco Alta: Long head biceps biomechanics, pathology and current treatments



Dr. Tjarco Alta is an orthopedic surgeon currently working at the Spaarne Gasthuis at both locations Hoofddorp and Haarlem. Since recently, Dr. Tjarco Alta also offers his experience and skills in relation to the shoulder for patients at FlexClinics. In addition to his work as an orthopedic surgeon, Tjarco is also a member of the ExCom of European Society of Shoulder and Elbow Surgery (SECEC) where he fulfills the role of chair of the Health Care Delivery Committee and since March 2022, he is also president-elect of the Dutch Shoulder and Elbow Society (WSE) of which he will become president in March 2023.

Friday 15:40 - 16:40

Michael Davidson: Identification of shoulder complaints in clinical practice



Michael Davidson was born on January 14, 1956 and graduated in physiotherapy in 1979. He obtained his manual therapy diploma on April 22, 1991. Since 1980 he has been established as an independent physiotherapist and owner of his physiotherapy practice in Amsterdam, named Milé Fysiotherapie. Literally over a hundred diagnostic tests exist for the identification of shoulder complaints. Almost none of these tests by themselves are proven valid. The use of test combinations, based on systematic combinations of tests related to scapular kinematics, pain and reduced mobility, can help the therapist to zoom in on the type and region of the problem and the accompanying treatment. Michael Davidson has 40+ years of experience as a shoulder physical therapist. In this presentation he will demonstrate his approach and explain his rationale behind the followed procedures.

Detailed programme

Session A: Ultrasound, fluoroscopy, and diffusion tensor imaging

- 10:00 - 10:20 **Assessment of glenohumeral translation: motion capture vs. fluoroscopy**
Eleonora Croci, Fabian Warmuth, Marina Künzler¹, Jeremy Genter, Franziska Eckers, Corina Nüesch, Daniel Baumgartner, Andreas Marc Müller and Annegret Mündermann
- 10:20 - 10:40 **Fully automatic landmark detection algorithm for assessing glenohumeral translation on fluoroscopy images**
Hanspeter Hess, Eleonora Croci, Daniel Baumgartner, Andreas Marc Müller, Kate Gerber and Annegret Mündermann
- 10:40 - 11:00 **Evaluation of an ultrasound scapula tracking method.**
Julien Leboucher, Firooz Salami and Sebastian I Wolf
- 11:00 - 11:20 **Three-dimensional architecture of the human subscapularis muscle in vivo**
Yilan Zhang, Robert D Herbert and Bart Bolsterlee

Session B: Rehabilitation

- 11:40 - 12:00 **HHT predictions using forward dynamics vs force-dependent kinematics: an application to TSA mismatch. (Virtual)**
Ehsan Sarshari, Luis Jimenez, and Alexander Wolfe
- 12:00 - 12:20 **Adductor co-contraction during abduction in patients with Subacromial Pain Syndrome: A Friend or Foe**
Celeste L. Overbeek, Arjen Kolk, Jochem Nagels, Rob G.H.H. Nelissen, Jurriaan H. de Groot

12:20 - 12:40 **Shoulder pain in persons with tetraplegia and the association with force application during manual wheelchair propulsion**
Ursina Arnet, Fransiska M Bossuyt, Benjamin JH Beirens and Wiebe de Vries

12:40 - 13:00 **Distance to dislocation concept does not seem to predispose recurrence following an arthroscopic labral repair in a military population**
Lukas P.E. Verweij, Theodore P. van Iersel, Derek F.P. van Deurzen, Michel P.J. van den Bekerom, Sebastiaan Floor

Session C: Virtual/augmented reality and sports

13:50 - 14:10 **An Immersive Virtual Reality Environment for Controlling Shoulder Kinematics**
Erin CS Lee, Michael P Pearce, Kayla Lee, Gibson Hegan, and Michael J Rainbow

14:10 - 14:30 **Holoreach - Augmented Reality in Rehabilitation for upper extremity therapy**
Daniel Baumgartner, Michael Redburn, Fabian Müller, Patrick Bischof, Gabriel Dobler

14:30 - 14:50 **A comparison of trunk energy flow, shoulder distraction force, and pitch speed between youth and collegiate softball pitchers**
Yuki Yanagita, Anthony Fava, Nicole Bordelon, Katherine Everhart, Billy Lozowski and Gretchen Oliver

14:50 - 15:10 **Quantifying Within-Individual Elbow and Shoulder Load Variability in Youth Elite Baseball Pitchers and Its Role in Overuse Injuries**
Bart van Trigt, Foskien Bouman, Ton Leenen, Marco Hoozemans, Frans van der Helm and Dirkjan Veeger

Session D: Wearables and exoskeletons

10:00 - 10:20 **Prediction of shoulder load from wearable sensors for wheelchair related activities: a machine learning approach**
Sabrina Amrein, Charlotte Werner and Wiebe de Vries

- 10:20 - 10:40 **Classification of shoulder loading activities of daily life from wearable sensors: Verification and validation**
 Laura Mayrhuber, Inge Eriks-Hoogland, Christina Ehrman,
 Wiebe de Vries
- 10:40 - 11:00 **Effects of inertial measurement unit placement on scapular kinematics**
 Kenzie B. Friesen and Angelica E. Lang
- 11:00 - 11:20 **A novel shoulder exosuit with adaptive passive extendon attachment**
 Sagar Joshi, Cosimo Della Santina and Ajay Seth

Session E: Rotator Cuff injuries

- 11:40 - 12:00 **Biomechanical modelling estimated tendon strains reveal a large range-of-motion for shoulder rehabilitation exercises with low rotator cuff strain risk**
 Irene Beck, J. Micah Prendergast and Ajay Seth
- 12:00 - 12:20 **Glenohumeral instability in rotator cuff tears: an ex-vivo study**
 Jeremy Genter, Elenora Croci, Franziska Eckers, Birgit Oberreiter, Andreas M. Müller, Annegret Mündermann and Daniel Baumgartner
- 12:20 - 12:40 **Musculoskeletal Analysis of Rotator Cuff Repair after Tendon Retraction and Fixation Medialization**
 Johanna Menze, Hanspeter Hess, Tomas Rojas, Stephen J. Ferguson, Matthias A. Zumstein and Kate Gerber
- 12:40 - 13:00 **The puzzle of Rotator Cuff Tendinopathy and Exercise: analysis of two pieces that fit together**
 Oscar Vila Dieguez and Lori A. Michener

Session F: Muscle contributions and new methods

- 14:20 - 14:40 **Level of muscle activation in contribution to shoulder maximal isokinetic and isometric torque**
 C. Royal Cole, Micah Thatcher, Traci A. Bush and Vassilios G. Vardaxis

- 14:40 - 15:00 **Validation of a work-related and functional task protocol to assess scapular motion**
Kenzie B. Friesen and Angelica E. Lang
- 15:00 - 15:20 **Scaling and Validation of a Shoulder Model with External Hand Forces in Submaximal Exertions**
Italo Belli, Kimberly Meszaros, Sagar Joshi, J. Micah Prendergast, Luka Peternel, Clark Dickerson and Ajay Seth

Sponsors



The MotionMonitor offers a real-time, customized 3D motion analysis system for quantifying human motion for various applications including facilitating shoulder studies using the ISB recommendations for joint center locations, segment axes and analysis. Supported kinematic technologies

include marker-based optical systems, electromagnetic trackers, IMUs and markerless. Motion data is synchronized with peripheral technologies including VR, EEG, Eye-tracking, EMG, Force plates and more. Real-time capabilities allow for Biofeedback studies to modify movement behavior using audio and visual cues. The leaflet in your goodybag will provide more information about us.

For more information: <https://www.innsport.com/>

BioMechanical Engineering is a Research Department at the Delft University of Technology, located in the Faculty of Mechanical Engineering (3-ME). The Department of BioMechanical Engineering coordinates the Education and Research activities in the field of Mechanical

Engineering techniques, like modeling and design, to analyze the interaction between biological and technical systems.

For more information: <https://www.tudelft.nl/3me/over/afdelingen/biomechanical-engineering>



**BioMechanical
Engineering**



The International Society promotes and supports international contacts amongst scientists, the

dissemination of knowledge, and the activities of national organizations in the field of biomechanics. One of the major activities of the Society is the organization and conduct of its biennial [International Congress on Biomechanics](#). The ISB supports other scientific meetings concerned with biomechanics by serving as an official sponsor, or organising and sponsoring thematic sessions. In this capacity, the Society helps with dissemination of information and promotion of the meetings, encourages members to participate and assists with the planning and organization upon request. The ISB also sponsors and organizes various activities in Economically Developing Countries, including lecture tours and training.

Organisation ISG Conference 2022



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The International Shoulder Group

The International Shoulder Group (ISG) is one of the technical groups of the International Society of Biomechanics (ISB). Technical groups aim at advancing research in, and dissemination of knowledge on specific areas of research. The ISG is a collaboration of mostly biomechanically oriented research groups, whose main interest is in the shoulder. The ISG has been a Technical Group of the International Society of Biomechanics since 1999. The ISG aims to enhance shoulder research by creating a platform for discussion and the exchange of information, software and data. As such, the ISG has been responsible for the organization of bi-annual meetings since 1997 (which was before the ISG received the official status as technical group), special sessions at ISB meetings and by occasion also at other meetings, sometimes in the form of tutorials (f.i. at ESMAC-2003). We have worked on the sharing of software and data, as well as on standardization of research protocols and definitions.

Currently, the board consists of:

[Clark Dickerson](#) (Chair)

University of Waterloo, Canada.

[Gretchen Oliver](#)

Auburn University, Alabama, USA.

[Katherine Saul](#)

North Carolina State University, North Carolina, USA.

[Stefan van Drongelen](#)

Orthopaedic University Hospital Friedrichsheim, Frankfurt am Main, Germany.

[Meghan Vidt](#)

Pennsylvania State University, Pennsylvania, USA.

[Martin Warner](#)

University of Southampton, UK.

Membership of the ISG is free, although it is strongly advised to also become a member of the International Society of Biomechanics. See the ISB website (<https://isbweb.org>) for more information on membership and registration.

Call for pictures

While we were in the process of organizing this meeting, we realized that there is no ISG archive. We do have copies of the older shoulder group abstract books and our older members probably have quite some info in their personal archives. It would probably be nice to try and combine this info.

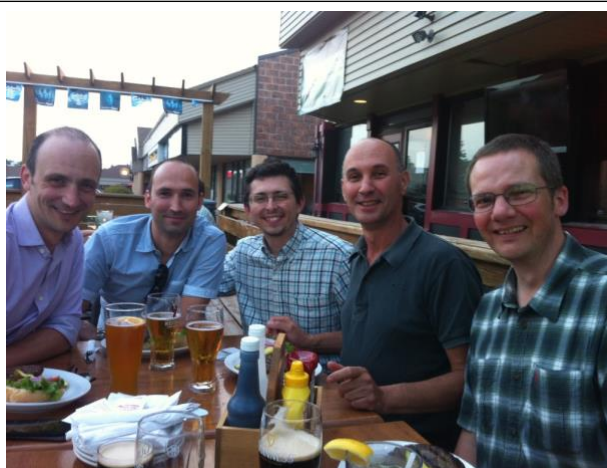
Here is a starter for some social pictures. If you have more, please send these to one of the organizers, preferably with names!



Bologna 2008



Winterthur 2016



Waterloo 2014