LAURANNE SINS

Education & Skills

(514) 242-1527
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Education

École de technologie supérieure / CR-CHUM — *Montréal (QC), CANADA*
- PhD in Biomechanical Engineering with highest honors for thesis and defense. 2011 — 2014
- Internal Auditor certificate for quality system standard ISO 13485:2003 2011
- M.Eng in Biomechanical Engineering. 2009 — 2011

Institut National des Sciences Appliquées — *Strasbourg, France*
Mechanical and plastics Engineering Diploma (300 ECTS credits; Obtained in June 2009). 2004 — 2009

Institut National des Sciences Appliquées — *Strasbourg, France*
Caisse Régionale d'Assurance Maladie — *Région Alsace, France*
Certificate in occupational health and safety. Subject : musculoskeletal disorders. 2007 — 2009

Skills and Qualifications

PROJECT

Project Management
- Product Requirements
- Agile Methods
- Project Manager: JIRA, Confluence, Redmine
- Planing / Gantt: Office Project, Omniplan

Software Development & Follow-up
- Software Specifications
- Code Repositories: Bitbucket, GitHub, SourceTree, GitKraken

Quality and Regulatory Services
- Verification & Validation
- Quality: ISO 13485-2003
- Regulatory (IEC60601, FDA 510(k))

NUMERICAL

Programming Languages
- C/C++
- Javascript
- Matlab
- LateX
- SQL
- HTML5

Web Development
- Back End: Php, NodeJS
- FrontEnd: Html, Jade, Pug
- Style: CSS, SCSS, Bootstrap

Simulation
- Finite Elements: Ansys, Moldflow
- Musculoskeletal Inverse/Forward dynamics

Computer Aided Design
- PTC ProE, Creo
- SolidWorks
- Catia

Segmentation / Reconstruction
- SliceOMatic (Tomovision)
- Mimics (Materialise)
- Density vs ROI Segmentation

System Administration & Office Softwares
- Windows Server
- Microsoft Office
- Active Directory
- Apple iWork
- Network: DNS, VP, etc.

Artwork
- Lightroom
- Photoshop
- Gimp

SYSTEM

Windows, Mac OS, Command Line, SSH

LANGUAGES

French: Mother tongue, written and spoken
English: Advanced, TOEIC Certification: 840
German: Conversational.

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Experience - Projects

PRODUCT DEVELOPMENT DIRECTOR || TECHNICAL PRODUCT MANAGER — *OSSimTech — Montréal (QC), Canada*

2017 — Present

Project — Development of open surgery simulators with haptic feedback dedicated to residents in orthopaedic.

OBJECTIVES

- Design and validate a haptic feedback simulator for orthopaedic basic skills and open surgery practice.
- Elaborate a simulation based orthopaedic residency curriculum integrating both psycho-motor and cognitive skills.

ROLES

- Director of Product Development [Software developers & Artists teams]
  - Coordinate and manage software developers and 3D artists teams
  - Ensure appropriate communication between all teams: product management and development, R&D, production
  - Plan and follow-up tasks to respect expected deliverables and long term objectives
  - Evaluate detailed requirements and act as technical resource
  - Write and verify technical documentation
- Product Owner & Project Manager
  - Gather targeted-users needs (orthopaedic residents and experts) to analyze, synthesize and organize medical knowledge into integrable content such as pre-operative cases, surgical procedures steps, metrics, etc.
  - Assist and follow-up artists and software development teams to ensure proper integration.
  - Set-up and manage validation studies with subject matter experts to assess content, construct, and face validities.
- Scrum Master
  - Implement tools, maintain backlog and administrate scrum board
  - Schedule and animate agile meetings: Stand-ups, Sprint reviews, Retrospectives, 1 on 1's, etc.

PARTNERS & RELATIONS

- AO Foundation
- **Private companies** — Zimmer-Biomet, Stryker
- **Hospital** — Shriner Hospital, Maisonneuve-Rosemont Hospital
- **Engineering Schools** : Polytechnique, Ecole de Technologie Supérieure

POST-DOCTORAL FELLOW — *Dassault Systems — Montréal (QC), Canada*

2017

Project — Perform research tasks to develop and validate a smart 3D human manikin posture engine

OBJECTIVE

- Improve the existing posture engine proposed by the company to evaluate working stations ergonomy during their design steps.

ROLES

- Project Manager:
  - Implement efficient methods to track and plan project livrables
  - Summarize and organise existing and missing information to ensure efficient development
  - Play a role of coordination between all teams worldwide (France, UK, USA, and Canada)
- Researcher/Developer:
  - Write source code to improve accuracy and reliability of the posture engine
  - Perform Validation and Verification tasks, including in-vivo studies
  - Ensure proper transfer and deployment of the posture engine.

R&D MANAGER AND DEVELOPER FOR MEDICAL FIELD — *Useful Progress Canada R&D Inc. / Vizua 3D — Montréal (QC), Canada*

2015 — 2017

Project 1 — Development of a Web-based 3D printing platform for 2D medical images.

OBJECTIVES

- Develop an automated conversion tool: from 2D medical images to 3D volume and surface models in in-house 3D viewing platform.
- Develop a web based platform for advanced custom segmentation and 3D printing services.

ROLES

- **System Designer** — Requirements, specifications, deliverables, roadmap, verification and validation, release doc.
- **Developer** — Adaptation of in-house 3D rendering engine, building PACS web based platform to manage the 3D models and order services to external companies (professional segmentation, 3D printing, …)

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Project 2 — Implementation of Virtual/Mixed Reality solution for radiology and surgery.

OBJECTIVES
- Develop a complete mixed reality solution dedicated to radiologists and surgeons using Hololens glasses.
- Extend in-house 3D rendering engine and streaming solution to the mixed reality context,
- Integrate tools to view, manipulate, and modify both 2D images and 3D volume models in the mixed reality interface
- Develop dedicated functions and options to support both surgery planing and assisted surgery that includes registration and tool tracking. Developing a web based platform for advanced custom segmentation and 3D printing services.

ROLES
- **System Designer** — Requirements, specifications, deliverables, roadmap, verification and validation, release doc.
- **Developer** — 3D registration methods, UI/UX, 3D Mixed Reality rendering, surgery tools tracking.

PARTNERS & RELATIONS
- **Foundation**: MOVEO (Paris, France)
- **Hospital**: CHUM, CR-CHUM, Interventional Radiology service - Hospital Henri-Mondor (Créteil, France)
- **Companies**:
  - Radiology: TeraRecon
  - 3D Printing: WhiteClouds, 3DR

SYSTEM DESIGNER AND TESTER — *Zimmer CAS / ZimmerBiomet — Montréal (QC), Canada* — 2015–2016

Project — Development of computer assisted surgery systems

OBJECTIVES
- Design and validate a haptic feedback simulator for orthopaedic basic skills and open surgery practice.
- Elaborate a simulation based orthopaedic residency curriculum integrating both psycho-motor and cognitive skills.

ROLES
- **System Designer** — Requirements, specifications, risks analysis, etc.
- **Tester** — Coordinate proper development and test to comply with regulatory standards (ISO, FDA, IEC).

POST-DOC FELLOW / PHD / MASTER (BIOMEDICAL ENGINEERING) — *Laboratoire de recherche en imagerie et orthopédie, CR-CHUM, École de Technologie Supérieure — Montréal (QC), Canada* — 2009–2015

Post Doctoral Project — Development of numerical methods to study musculoskeletal behaviors and disease

OBJECTIVE 1
- **Development of shoulder musculoskeletal model — Model improvements and user interface creation**
  - Improve muscular algorithms and scaling methods for musculoskeletal shoulder model (cf. PhD).
  - Develop a user-friendly software to deploy shoulder model as a clinical tool to evaluate arthroplasty complications.
  - Develop & conduct tests to verify and validate the developed software according the ISO9241-210 recommendations.

OBJECTIVE 2
- **Development of shoulder musculoskeletal model for wheelchair propulsion study**
  - Develop a musculoskeletal model to simulate experimental setup of haptic manual wheelchair simulator and evaluate shoulder stress
  - Work with experimental data: kinematics (Vicon), forces (SmartWheels), muscles activations (EMG).

PhD Project — Experimental and numerical evaluation of shoulder arthroplasty

OBJECTIVES
- Develop a musculoskeletal inverse dynamics model to quantify parameters (kinematics, kinetics, forces) related to arthroplasty complications.
- Develop and validate an experimental device to measure cadaver shoulder kinematics during abduction.
- Develop and design 3D prosthetics components to evaluate parameters design consequences.

ENGINEERING DEVELOPMENT - PLASTICS — *Bosch Techniques d'Emballage — Reichstett, France* — 2008–2009

Project — Rheology characterization and flow modeling of confectionery food.

OBJECTIVES
- Develop finite element analysis to study the confectionery food flow (PTC ProEngineer, ANSYS Polyflow).
- Characterize rheological properties of the confectionery food.
- Design and manufacture a system to measure confectionery food viscosity during the flow process.

LAURANNE SINS

Extracurricular Activities & Hobbies

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Extracurricular Activities

CO-SUPERVISOR
École de technologie supérieure (ÉTS) / CR-CHUM— Montréal (QC), Canada
Role: Supervision of Bachelor, Master and PhD students.
2015 — Present

MEMBER OF EDITORIAL BOARD
World Journal of Orthopaedic (WJO) — Pleasanton (CA), USA
Frontiers in Neurorobotics — Lausanne, Switzerland
Role: Paper review and publication decision
2015 — Present

MEMBER OF ADVISORY COMMITTEE
Strategic cluster « Ingénierie de technologies interactives en réadaptation (INTER) », funded by the Fonds de recherche sur la nature et les technologies (FRQ-NT) of Québec — Sherbrooke (Canada)
Role: Review and Decision for funding submission
2011 — 2014

LECTURER
École de technologie supérieure (ÉTS) — Montréal (QC), Canada:
- GTS503 - «Health technologies, standards and certification»
- GTS504 - «Introduction to health technologies»

2010 — 2015

FACILITATOR
École de technologie supérieure (ÉTS) / CR-CHUM— Montréal (QC), Canada.
Role: Facilitator: Organizing bi-monthly meetings at the research lab.
2009 — 2014

FUNDER OF A HUMANITARIAN ASSOCIATION
Association DCA4L, Institut National des Sciences Appliquées — Strasbourg, France.
Role: Funder and secretary; Participation to 4L (Renault cars) rallye-raid in Morocco
2007 — 2008

MEMBER OF BOARD OF STUDIES
Institut National des Sciences Appliquées — Strasbourg, France.
Role: Participation to decisions related to university administration (courses, programs, etc.)
2006 — 2009

Hobbies

SPORT
Ski : competition level.
Paragliding: autonomous pilot level.
Biking.

MUSIC
Piano: End-of-study diploma, with high honours.

PHOTO
1st prize jury and 3d prize audience. « Destination LAN », during ÉTS LAN in Montréal (2014).
1st prize. « Multicultural Montréal » exhibition, during the Montreal Design Festival. (2014).

MECHANICS
Restoration of old cars and participation to Rally Raid.

LAURANNE SINS | Honours

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Honours and Awards

École de Technologie Supérieure — *Montréal (QC), CANADA*

35,000 $/yr	Post-doctoral scholarship award	2015 - 2016
1,000 $	Student award - participation at the 7th World Congress of Biomechanics (Boston, US)	2014
1,000 $	First Prize, Scientific popularization contest	2014
5,000 $	PhD Excellence Award	2012
1,000 $	Master Excellence Award	2010, 2011

Fonds de recherche du Québec - Nature et technologies (FRQ-NT) — *Montréal (QC), CANADA*

20,000 **$/yr** Research Award for foreign PhD students — 2012 - 2014

Réseau Provincial de Recherche en Adaptation - Réadaptation (REPAR) — *Montréal (QC), CANADA*

500 $ Student award towards participation at:

- 7th World Congress of Biomechanics (WCB) (July 6th-11th, 2014, Boston, MA, USA) — 2014
- 18th congress of the European Society of Biomechanics (Lisbon, Portugal) — 2012

Research Center of CHUM, Notre Dame Hospital (CRCHUM) — *Montréal (QC), CANADA*

700 $ Student award towards participation at international congresses and courses:

- 12th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering (Amsterdam, The Netherlands) — 2012
- PhD course about the AnyBody Modeling System software (Anybody™ Technologies) (Aalborg, Denmark) — 2013
- 9th Congress of the International Shoulder Group (ISG) (Aberystwyth, Wales) — 2014

CHUM, Notre Dame Hospital — *Montréal (QC), CANADA*

500 $ Student award towards participation at international congresses and courses:

- 9th Congress of the International Shoulder Group (ISG) (Aberystwyth, Wales) — 2014
- 23th Congress of the European Society for Surgery of the Shoulder and Elbow (Lyon, France) — 2011

Canadian society of biomechanics (CSB/SCB) — *Vancouver (BC), CANADA*

300 $ Student travel award for the 17th meeting of the Canadian Society of Biomechanics (Burnaby, Canada) — 2012

Caisse Régionale d'Assurance Maladie — *Strasbourg, FRANCE*

700 € Award for the certificate in occupational health and safety, with honours — 2009

Région Alsace — *Strasbourg, FRANCE*

320 € Award for mobility internship in a foreign country — 2007

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Publications

Articles in peer-reviewed journal

(1) **Sins L.,** Tétreault P., Nuño N, and Hagemeister N. (2019, Under Review) A new representation of deltoid muscle for the AnyBody™ musculoskeletal shoulder model. *Journal of Biomechanics.*

(2) **Sins L.,** Tétreault P., Nuño N, and Hagemeister N. (2015, Accepted) Effect of prosthetic mismatch and subscapularis tear on glenohumeral contact mechanics of a non-conforming total shoulder arthroplasty: a musculoskeletal numerical analysis. *Clinical Biomechanics.*

(3) **Sins L.,** Tétreault P., Nuño N, and Hagemeister N. (2015, Accepted) Adaptation of the AnyBody™ musculoskeletal shoulder model to the non-Conforming Total Shoulder Arthroplasty context. *Journal of Biomechanical Engineering*.

(4) **Sins L.,** Tétreault P., Petit Y., Nuño N, Billuart F., and Hagemeister N. (2012) Effect of glenoid implant design on glenohumeral stability: An experimental study. *Clinical biomechanics*. 27(8):782–788.

(5) **Sins L.**, Tétreault P., Petit Y., Nuño N, Billuart F., and Hagemeister N. (2012) Effect of glenoid implant design on glenohumeral stability: an experimental study. *Journal of Biomechanics*. 45(Supplement 1):S552.

Invited speaker

(1) **Sins, L.** (2017). De la salle d'attente au bloc opératoire. TEDxHEC Montréal. Online. https://youtu.be/yCy7CZVlajw.

(2) **Sins, L.,** Tétreault, P., Nuño, N., and Hagemeister, N. (2014). A musculoskeletal shoulder model using force dependent kinematics to evaluate non-conforming total shoulder arthroplasty. In AnyBody Webcasts. December 4th 2014. Online. http://www.anybodytech.com/index.php?id=webcasts_index.

International peer-reviewed conferences

(1) Strzelczak, M., **Sins**, L., Begon, M., Hagemeister N., "New more physiologically faithful deltoid model integrated in the musculoskeletal model of non-conforming total shoulder arthroplasty", ORS 2018 Annual Meeting, March 10-13, 2018, New Orleans, Louisiana; Poster

(2) **Sins, L.,** Cresson, T., Tétreault, P., Nuño, N., and Hagemeister, N. (2014). A user-friendly interface of shoulder musculoskeletal model for clinical studies. In *12th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering (CMBBE).* October 13d - 15th 2014. Amsterdam (The Netherlands).

(3) **Sins, L.**, Tétreault, P., Nuño, N., and Hagemeister, N. (2014). Introducing Force Dependant Kinematics in the Anybody Shoulder Model. In *7th World Congress of Biomechanics (WCB)*. July 6th - 11th 2014. Boston (MA, USA).

(4) **Sins L.,** Lemieux, PO, Tétreault P., Nuño N., Billuart F., and Hagemeister N. (2014). A Numerical Model of Total Shoulder Arthroplasty for Implant Reaction Forces Estimation. In *9th conference of the International Shoulder Group (ISG)*. August 22nd - 24th 2012. Aberystwyth University, Wales (UK).

(5) **Sins L.,** Tétreault P., Petit Y., Nuño N., Billuart F., and Hagemeister N. (2012). Effect of glenoid implant design on glenohumeral stability: an experimental study. *18th congress of the European Society of Biomechanics (ESB).* July 01st to 04th 2012. Lisbon (Portugal).

(6) **Sins L**., Tétreault P., Petit Y., Nuño N., Billuart F., and Hagemeister N. (2012). An experimental study of the effect of glenoid implant design on glenohumeral stability. *17th Biennial Meeting of the Canadian Society of Biomechanics/Societe Canadienne de Biomécanique (CSB/SBC).* June 06th to 09th 2012. Burnaby (Canada).

(7) **Sins L**., Tétreault P., Petit Y., and Hagemeister N. (2011). Validation of a device to simulate shoulder abduction by kinematics and deltoid forces evaluation. *23nd congress of the European Society for Surgery of the Shoulder and Elbow (SECEC*-ESSSE). September 04th to 07th 2011. Lyon (France).

Local peer-reviewed conferences

(1) Strzelczak, M., Lund, M., **Sins, L**., Begon, M., Hagemeister N., "A new wrapping approach for the deltoid muscle modelling", the 2018 meeting of the Canadian Society for Biomechanics, August 14-17, 2018, Halifax (Canada).

(2) **Sins, L.**, Tétreault, P., Nuño, N., and Hagemeister, N. (2014). A musculoskeletal shoulder model simulating glenohumeral translations to evaluate prosthetic designs. In *1ère Conférence sur la recherche en biomécanique au Québec / 1st Biomechanics Research in Quebec Conference (CRBQ-BRQC)*. May 30th 2014. Montréal (Canada).

(3) **Sins L.**, Tétreault P., Petit Y. and Hagemeister N. (2012). Prescribed mismatch for non-conforming total shoulder arthroplasty using a force-dependent kinematics model. In *Programme d'orthopédie d'Edouard Samson (POES)*. May 16th 2014. Montréal (Canada).

(4) **Sins L.**, Tétreault P., Petit Y., Nuño N., Billuart F., and Hagemeister N. (2012). Effet d'un nouvel implant glénoïdien sur la stabilité glénohumérale.

- *Programme d'orthopédie d'Edouard Samson (POES). May 11st 2012. Montréal (Canada).*
- *80è congrès de l'Acfas. May 07th to 09th 2012. Montréal (Canada).*

(5) **Sins L.**, Tétreault P., Petit Y., and Hagemeister N. (2012). Validation d'un montage de simulation d'abduction de l'épaule par l'évaluation de la cinématique et des forces du deltoïde.

- *Programme d'orthopédie d'Edouard Samson (POES). May 06th 2011. Montréal (Canada).*
- *79è congrès de l'Acfas. May 09th to 13th 2011. Montréal (Canada).*
- *13è congrès annuel du CRCHUM. December 13th 2010. Montréal (Canada)*