Noura **HAMZE**

PHD IN COMPUTER SCIENCES

Computer Graphics and Geometry group • ICube laboratory •
University of Strasbourg, France

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Bio: I am researcher and teaching fellow at the University of Strasbourg, France. Recently, I fulfilled my PhD in computer sciences in the Computer Graphics and Geometry group IGG, at the ICube laboratory under the supervision of Dr. Caroline Essert. I am generally interested in most areas of computer graphics for surgical purposes. My primary area of research involves the path planning of surgical tools in image-guided surgery. In particular, I focus on geometric constraints solving, physical simulation, and optimization techniques. The main domains on which I worked on are neurosurgery and percutaneous procedures.

Occupations

Teaching (50%) and research (50%) fellow (ATER) — Oct. 2015 – Aug. 2016
Mathematics and computer science faculty / ICube laboratory
University of Strasbourg, France.

PhD. candidate — Oct. 2012 – Jun. 2016
Computer graphics and geometry group, ICube laboratory
University of Strasbourg, France.

MSc. Candidate — Sep. 2010 – May. 2012
Computer graphics and geometry group, ICube laboratory
University of Strasbourg, France.

Intensive language courses — Jan. 2010 – Aug. 2010
Higher institute of languages, University of Aleppo, Syria
360 hours of French & 256 hours of German.

R&D engineer — Nov. 2007 – Dec. 2009
Higher institute of languages, University of Aleppo, Syria
Charged in: solutions for e-learning, installation of language labs, local network administration, staff training.

Freelancer and software developer — Sep.2006 – Oct.2007
Startup for informatics solutions (web, databases, training courses)
Aleppo, Syria.

Education

University of Strasbourg — Strasbourg, France
PhD in computer science — 2012 - 2016

- Thesis title: Preoperative path planning and optimization in static and deformable conditions for image-guided minimally invasive surgery
- Supervisor: Dr. Caroline Essert
- Defended in public on June 21th, 2016. Jury composed of:
  - Prof. Leo Joskowics, Hebrew University of Jerusalem
  - Dr. Emmanuel Promayon, Université Joseph Fourier
  - Prof. Gabor Fichtinger, Queen's University
  - Dr. Caroline Essert, Université de Strasbourg
- PhD marked as follows:
  - Scientific quality: excellent
  - Manuscript: very good
  - Presentation: excellent
  - Questions and answers: excellent

University of Strasbourg — Strasbourg, France
MSc. in computer graphics and geometry — 2010-2012

- Thesis title: Perspective geometry textures
- Supervisor: Dr. Rémi Allègre
- Ranked 2/11

University of Aleppo — Aleppo, Syria
License in computer sciences — 2001-2006

- Option: artificial intelligence and natural language processing
- Ranked 6/27

Professional Training

2014 Evolutionary Stochastic Optimization
Massive Open Online Course "Optimisation Stochastique Évolutionnaire"
15 Sep. – 3 Nov. 2014, Université de Strasbourg, France.
Animated by: Prof. Pierre Collet

2014 Surgical simulators Design
Summer school "Chirurgical simulators conception"
30 Jun. – 4 Jul. 2014, INSA de Lyon, France.

2010 Guidance in open e-learning courses
Formation "Le tutorat dans une formation ouverte et à distance"
27 Jun. – 1 Jul. 2010, AUF (Francophone University Agency), Aleppo, Syria.

2008 Basic use of Internet for group animation using e-groupware
Formation "Usage de base de l'internet pour l'animation de groupe"
24 – 28 Aug. 2008, AUF (Francophone University Agency), Aleppo, Syria.

2007 Network administration under GNU/Linux
Formation "Administration d'un réseau sous GNU/Linux"
09 – 13 December 2007, AUF (Francophone University Agency), Aleppo, Syria.

Research Experience

ACouStiC — Computer Assisted Surgical Planning in Deep Brain Stimulation

In this multi-task project, we addressed the problem of deformation resulting of the "Brain Shift" phenomenon to calculate safe tools trajectories subjected to surgical rules. Furthermore, we proposed a novel approach for multi-objective optimization in neurosurgery path planning. Research director: Dr. Pierre Jannin Project webpage

Haystack — Needle Insertion Planning in Percutaneous Procedures

In this project, we addressed the problem of adjusting tools trajectories be- cause of soft tissue deformation and flexible needle deflection while needles are inserted inside the body. To this end, we proposed a preoperative path planning algorithm that couples a geometric solver with FEM physics simulations.
Research director: Dr. Stéphane Cotin

Teaching

Faculty of Mathematics and Informatics, University of Strasbourg, France
Total hour's volume: 64 h. in 2012/2013 and 210 h. en 2015/2016

- Algorithms and Programming 1
  - Level: first semester, first year, mathematics and informatics departments
  - Charged in labs: 22h. & lectures: 38h.
- Methodology of academic work
  - Level: first semester, first year, mathematics and informatics departments
  - Charged in labs: 4h. & lectures: 5h.
- Database 1
  - Level: first semester, second year, informatics department & second year, master of chemo-informatics
  - Charged in labs: 10h.
- Database 2 and web programming
  - Level: first semester, third year, informatics department
  - Charged in labs: 24h.
- Human-machine interfaces
  - Level: first semester, third year, informatics department
  - Charged in labs: 20h.
- Software development techniques
  - Level: first semester, third year, informatics department
  - Charged in labs: 16h. & lectures: 14h.

Faculty of Engineering, Ebla Private University, Ebla, Syria
Total hour's volume: 90 hours. during 2008/2009

- Programming 1
  - Level: first semester, first year, informatics and architecture departments
  - Charged in labs: 30h.

- Object Oriented Programming
  - Level: first semester, second year, informatics department
  - Charged in labs: 30h.

Publications

Publications in international journals with review committee:

- Noura Hamzé, Igor Peterlik, Stéphane Cotin, and Caroline Essert. Pre-operative Trajectory Planning for Percutaneous Procedures in Deformable Environments, Computerized Medical Imaging and Graphics, Elsevier, page 16-28, Volume 47, January 2016. doi : 10.1016/j.compmedimag.2015.10.002

Publications in international conferences with review committee with proceedings:

- Noura Hamzé, Jimmy Voirin, Pierre Collet, Pierre Jannin, Claire Haegelen, and Caroline Essert. Pareto front vs. weighted sum for automatic trajectory planning of Deep Brain Stimulation. The 19th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), Athens, Greece, October 2016.

- Noura Hamzé, Pierre Collet, and Caroline Essert. Introducing Pareto-based MOEA to Neurosurgery Preoperative path planning, Genetic and Evolutionary Computation Conference (GECCO'16), Denver, United States, July 2016. Short paper / poster. doi : 10.1145/2908961.2909028

- Noura Hamzé, Alexandre Bilger, Christian Duriez, Stéphane Cotin, and Caroline Essert. Anticipation of brain shift in Deep Brain Stimulation automatic planning, 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'15), Milano, Italy, pages 3635 - 3638, August 2015. doi : 10.1109/EMBC.2015.7319180

Manuscripts:

- Preoperative path planning and optimization in static and deformable conditions for image-guided minimally invasive surgery
  Doctorate thesis of Noura Hamzé, 2016

- Perspective geometry textures
  Master's thesis of Noura Hamzé, 2012

Oral communications/posters without proceedings:

- Invited talk: on « trajectory planning in deformable conditions », Altair Robotics lab, Verona, Italy.

- Poster MITK: Presented with a Demo at the German Cancer Research Center DKFZ at MITK user's meeting 2015. The event took place in Heidelberg, Germany.

- Poster doctoral school: Presented at the doctoral school of mathematics and informatics follow up day after the first year of the thesis. The event took place in Strasbourg, France.

Administrative Responsibilities

Jan. 2013 – Aug. 2015 Member of the doctoral committee of ICube laboratory
A committee of 16 member representing around 150 PhD. students at ICube lab.

Research Memberships

Since 2013 AFIG Association Française d'Informatique Graphique student member

Since 2014 IEEE Institute of Electrical and Electronics Engineers student member

Voluntary Experience

2015 Student volunteer at Computer Graphics International CGI 2015

2016 Student volunteer at Eurographics

Attended Conferences

International conferences:

2016 Computer Assisted Radiology and Surgery (CARS)
June 21 – 25, 2016, Heidelberg, Germany

2016 Information Processing in Computer-Assisted Interventions (IPCAI)
June, 21 – 22, 2016, Heidelberg, Germany

2015 IEEE Engineering in Medicine and Biology Society (EMBC)
August 25 – 29, 2015, Milano, Italy

2015 Computer Graphics International (CGI)
June 24 – 26, Strasbourg, France

2014 Eurographics
April, 7 – 11, 2014, Strasbourg, France

2013 CIPA Symposium Recording, Documentation and Cooperation for Cultural Heritage. September, 2-6, 2016, Strasbourg, France

Workshops and national conferences:

2015 MITK Users Meeting
April 27-28, 2015, Heidelberg, Germany

2015 3rd Workshop Francophone M-DBS
« Modèles en Stimulation Cérébrale Profonde (Planning, Implantation et Evaluation Post-opératoire): Problèmes Méthodologiques »
January 22, 2015, Rennes, France

2013 2nd Workshop Francophone M-DBS
« Modèles en Stimulation Cérébrale Profonde (Planning, Implantation et Evaluation Post-opératoire): Problèmes Méthodologiques »
January 24, 2013, Rennes, France

2012 7èmes journées de l'Association Française d'Informatique Graphique (AFIG)
October 29-31, 2012, Strasbourg, France

Skills

- Technical skills:
  - Operating systems: Linux • Windows
  - Programming languages: C++ • Php •Prolog
  - IDEs: QtCreater • Microsoft Visual studio
  - Computer graphics: CGAL • ITK • VTK • Paraview • Meshlab
  - Platforms: MITK (Medical Interaction Tool Kit) medical platform
    SOFA (Open source medical simulation platform)
  - Database: SQL • Oracle
  - Miscellaneous: svn • git • latex
- Recent ongoing self-learning:
  - Python
  - GPU programming
- Soft skills:
  Patience • self-motivated
- Hobbies & Interests:
  Cuneiform scripts • writing • and Oud

Languages

- Arabic mother tongue
- English fluent working proficiency
- French speaking, reading, writing
- German basic oral knowledge (256 hours, August 2010)

References

Mme. Caroline Essert
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M. Rémi Allègre
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Master internship director
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Mme. Dominique Bechmann
Professor in Computer Science
Head of Computer Graphics and Geometry group
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- Last updated on August 2016.
- Please refer to my webpage for further materials, or just e-mail me.