Dr. Houda CHAABOUNI-CHOUAYAKH

Date and place of birth	02/07/1980 in Sfax, Tunisia
Marital Status	Married, 3 children
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PROFESSIONAL EXPERIENCE

Since 11/2022: Senior researcher at the Digital Research Center of Sfax (CRNS), Sfax-Tunisia.

Research fields of interest: remote sensing, computer vision, artificial intelligence, deep learning, 3D modeling

04/2020- 10/2022: R&D Manager at Udini, Sfax-Tunisia.

Research fields of interest: computer vision, artificial intelligence, image processing

07/2018- 04/2020: Post doc at the Digital Research Center of Sfax (CRNS) , Sfax-Tunisia.

Research fields of interest: computer vision, deep learning, endoscopic image matching

12/2012-06/2018: Advanced consultant at AED Engineering, Munich-Germany.

Conception and development of different modules for Advanced Driver Assistance Systems (ADAS) applications within the R&D departments of Audi Electronics Venture (AEV) and the BMW group.

10/2009- 12/2011: DAAD Research fellow in the Remote Sensing Technology Institute (IMF) at the German Aerospace Center (DLR), Munich-Germany.

Research topic: *3D change detection using Multi-spectral and Digital Elevation Models (DEMs) Information Fusion Techniques*.

Participation in the rapid acquisition, processing and analysis of satellite data activities of the Center for Satellite Based Crisis Information (ZKI), a service of DLR's German Remote Sensing Data Center (DFD).

02/2006- 07/2009: Scientific researcher in IMF at DLR.

EDUCATION

Since 04/2015: Project Management Professional (PMP) certification

2006-2009: Ph.D. degree completed with the first class of honor in the frame of the CNES/DLR/Télécom ParisTech center of competence on information extraction and image understanding for earth observation.

Ph.D. topic: *Multi-layer interpretation of high resolution SAR images: Application to urban area mapping by means of information fusion*.

2004-2005: Master degree in Signal Processing and Automatic Control Theory with the first class of honor from Université Paris-Sud (Supelec), Paris-France.

> **February-June 2005:** Master's thesis within the satellite image processing work group at the Image & Signal processing department-Télécom ParisTech (TSI), Paris-France.
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> Topic*: Satellite image indexation using region-based attributes.*

2001-2004: Engineering degree from Tunisia Polytechnic School**,** Tunis-Tunisia.
Branch of study: Signals and Systems (SISY).

> **February-June 2004:** Diploma thesis at the video coding work group in TSI-ENST, Paris-France.
> Topic**:** *Study of the spectral characteristics of sequences obtained after a temporal wavelet decomposition*.
>
> **July 2003:** Engineering training at the National Center for Remote Sensing, Tunis-Tunisia.
> Topic: *Geometrical corrections of AVHRR Level 1b Data*.

1998-2001: Preparatory Classes at the Institute for Scientific and Engineering Studies (IPEST)**,** Tunis-Tunisia.
Among the 20th/1500 best ranked in the national competition.

June 1998: Baccalaureate with the first class of honor in Sfax-Tunisia.

KEY SKILLS AND COMPETENCES

Technical attributes
- Development of new ADAS utilities for different automotive customers (BMW, AEV): Ego-localization inside parkings, Car2x communication (MQTT, HTTP), augmented guidance techniques and visualization, automatic emergency braking for pedestrian protection.
- Physical layer design and implementation for multi-channel IEEE 802.16.4 Software Defined Radio (SDR)
- Machine learning and deep learning
- Feature extraction and object recognition
- 3D modeling
- Remote sensing data processing (radar, stereo, aerial, video, etc).
- Excellent research skills

Personal attributes
- Excellent pedagogical ability in oral presentations and written publications: 5 journal papers and more than 10 conference and symposium papers as first author.
- Extreme flexibility and vivid team interaction.
- High Enthusiasm and commitment to learn/analyze/resolve challenging topics.
- Strong customer facing and communication skills

TEACHING AND SUPERVISION EXPERIENCE

2018-2020: Teaching several modules (Digital image processing, Image synthesis and virtual reality, Digital video processing, sound processing, …) in Institut supérieur d'informatique et de multimédia de Sfax (ISMIS).

2015-2017: 3D Image processing using embedded systems course at Ecole Nationale d'Ingénieurs de Sfax (ENIS).

2011-2016: Single guest lectures at the institute of photogrammetry and cartography in the Technical University of München (TUM).
01/ 2011: Matlab training about image processing and change detection in the Institute for Geoinformatics and Remote Sensing at the University of Osnabrück.
04-07/2010: Image processing course in the frame of the Earth oriented space science and technology (ESPACE) master program at TUM.
2009- 2022: Supervision of several internships and master thesis.

LIST OF PUBLICATIONS

Journal papers:

1. Farhat M., **Chaabouni-Chouayakh, H.**, and Ben-Hamadou, A. *Self-Supervised Endoscopic Images Matching.* Systems with Applications Expert Systems with Applications 2022, Vol. 213, doi : https ://doi.org/10.1016/j.eswa.2022.118696.
2. Ben-Hamadou A., Smaoui O., **Chaabouni-Chouayakh H.**, Rekik A., Pujades S., Boyer E., Strippoli J., Thollot A., Setbon H., Trosset C., Ladroit E.: *Teeth3DS: a benchmark for teeth segmentation and labeling from intra-oral 3D scans.* CoRR abs/2210.06094 (2022)
3. **Chaabouni-Chouayakh, H.**, Rodes-Arnau, I. and Reinartz, P. (2013): *Automatic 3D Change Detection through Multi-spectral and Digital Elevation Model Information Fusion*, International Journal of Image and Data Fusion. Vol.4. doi : 10.1080/19479832.2012.739577,
4. **Chaabouni-Chouayakh, H.** & Reinartz, P. (2011): *Towards Automatic 3D Change Detection inside Urban Areas by Combining Height and Shape Information.* Photogrammetrie Fernerkundung Geoinformation, 2011 (4), pp. 205-218. Schweizerbart Science Publishers. DOI: 10.1127/1423-8364/2011/0083. ISSN 1432-8364.
5. **Chaabouni-Chouayakh, H.** & Datcu, M. (2010): *Backscattering and Statistical Information Fusion for Urban Area Mapping Using TerraSAR-X Data.* IEEE Journal of Selected Topics in Earth Observations and Remote Sensing (JSTARS), Vol. 3(4), pp. 718-730.
6. **Chaabouni-Chouayakh, H.** & Datcu, M. (2010): *Coarse-to-fine Approach for Urban Area Interpretation Using TerraSAR-X Data.* IEEE Geoscience and Remote Sensing Letters, Vol. 7(1), pp. 78-82.
7. **Chaabouni-Chouayakh, H.** & Datcu, M. (2009): *High Resolution SAR Image Analysis by Combining the PCA and the Azimuth Sub-band Decompositions.* Transactions of Systems, Signals and Devices, Vol. 4(3).

Conference papers as first author:

1. **Chaabouni-Chouayakh, H.**, Farhat, M. and Ben-Hamadou, A. *Deep Features Extraction for Endoscopic Image Matching.* in the 17th International Joint Conference on Computer Vision, Theory and Applications VISAPP 2022, February, 2022
2. **Chaabouni-Chouayakh, H.**, Rodes-Arnau, I. and Reinartz, P. (2011): *Multi-spectral and Digital Elevation Model information fusion for automatic 3D change detection.* CDSM, Hong Kong.
3. Tian, J., **Chaabouni-Chouayakh, H.** and Reinartz, P. *3D Building Change Detection from High Resolution Spaceborne Stereo Imagery.* in International Workshop on Multi-Platform/Multi-Sensor Remote Sensing and Mapping DOI :10.1109/M2RSM.2011.5697371, Xiamen, China, 2011.
4. **Chaabouni-Chouayakh, H.**, d'Angelo, P., Krauss, T. and Reinartz, P. (2011): *Automatic urban area monitoring using digital surface models and shape features.* JURSE, Munich, Germany.
5. Reinartz, P., Angelo, P., Krauß, T. and **Chaabouni-Chouayakh, H**. *DSM Generation and Filtering from High Resolution Optical Stereo Satellite Data.* in Remote Sensing for Science, Education, and Natural and Cultural Heritage, Proceedings 30th European Association Remote Sensing Laboratories (EARSeL) Symposium, pp. 527-53, Paris, France, 2010
6. **Chaabouni-Chouayakh, H.**, Krauss, T., d'Angelo,P., and Reinartz, P. (2010): *3D Change Detection inside Urban Areas using different Digital Surface Models.* PCV 2010 - ISPRS

Technical Commission III Symposium on Photogrammetry Computer Vision and Image Analysis , Paris, France.

7. Tian, J., **Chaabouni-Chouayakh, H.**, Reinartz, P., Krauss, T. and d'Angelo, P. *Automatic 3d Change Detection Based On Optical Satellite Stereo Imagery.* in International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - IAPRS Archives. 38. 586-591 IAPRS 2010, 2010.

8. Datcu, M., Cerra, D., **Chaabouni-Chouayakh, H.**, de Miguel, A., Molina-Espinoza, D., Schwarz, G. and Soccorsi, M. *Design and Use of Earth Observation Image Content Tools.* in PV 2009, Madrid, Spain, 2009

9. **Chaabouni-Chouayakh, H.** & Datcu, M. (2008): *Optimal Processing for Geometric and Topological Features Extraction from TerraSAR-X Data.* IGARSS'08, Boston, U.S.A.

10. Datcu, M., Cerra, D., **Chaabouni-Chouayakh, H.**, de Miguel, A., Molina-Espinoza, D., Schwarz, G. and Soccorsi, M. *Automated Information Extraction from TerraSAR-X Data : The Content Map.* in IGARSS 2008, Boston, U.S.A, 2008

11. **Chaabouni-Chouayakh, H.**, de la Mata-Moya, D. & Datcu, M. (2008): *TerraSAR-X Image Analysis Using PCA, ICA and SVM.* EUSAR, Friedrichshafen, Germany.

12. **Chaabouni-Chouayakh, H.** & Datcu, M. (2008): *Optimized PCA Based Feature Extraction from Multi-look/Multi-resolution TerraSAR-X Data.* ESA-EUSC, Frascati, Italy.

13. **Chaabouni-Chouayakh, H.** & Datcu, M. (2007): *PCA vs. ICA Decomposition of HR SAR Images: Application to Urban Structures Recognition.* Proceedings of the SPIE Remote Sensing Symposium 2007, Florence, Italy, Vol. 6746.

14. **Chaabouni-Chouayakh, H.** & Datcu, M. (2007): *Linear Versus Non-Linear Analysis of Relevant Scatterers in High Resolution SAR Images.* IGARSS, Barcelona, Spain.

15. **Chaabouni-Chouayakh, H.** & Datcu, M. (2007): *Azimuth Sub-band and Eigenspace Decomposition for High Resolution SAR Image Analysi.,* the 4th IEEE International Multi-conference on Systems, Signals and Devices (SSD'07), Hammamet, Tunisia.

16. **Chaabouni-Chouayakh, H.** & Datcu, M. (2006): *Covariance Based Analysis of Relevant Scatterers in High Resolution SAR Images.* ESA-EUSC, Madrid, Spain.

17. **Chaabouni-Chouayakh, H.** & Datcu, M. (2006): *Relevant Scatterers Characterization in SAR Images.* MaxEnt, Paris, France, pp. 375–382.

COMPUTER SKILLS

- VHDL and FPGA programming (Xilinx)
- C/C++, C#, Python
- ADTF, IDL/ENVI, Matlab/Simulink/dSpace,
- ArcGis, Definiens, ERDAS

LANGUAGES

Arabic: mother tongue.
French: fluent written, read, spoken.
English: fluent written, read, spoken.
German: good.
Spanish: beginner.

OTHER INTERESTS

Piano, Cinema, Music, Traveling, Swimming, Reading …