Farah Deeba

Graduate Research Assistant, Robotics and Control Group,
The University of British Columbia, Vancouver, Canada.

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Education

- **The University of British Columbia (UBC)** — Vancouver, Canada
  Ph.D., Electrical and Computer Engineering — *2016 – April 2022 (Expected)*
  - Supervisor: Dr. Robert Rohling
  - Thesis Title: A Multimodal Approach for Placenta Characterization: Towards an Objective and Effective Pregnancy Screening System.
- **University of Saskatchewan (U of S)** — Saskatoon, Canada
  M.Sc., Electrical and Computer Engineering — *2016*
  - Supervisor: Dr. Khan Wahid & Dr. Francis Bui
  - Thesis Title: A Computer-aided Decision Support System for Gastrointestinal Cancer Precursor Detection in Endoscopic Images.
- **Bangladesh University of Engineering and Technology (BUET)** — Dhaka, Bangladesh
  B.Sc., Electrical and Electronic Engineering — *2013*
  - Supervisor: Dr. Shofiqul Islam
  - Thesis Title: A complete analytical model for square diaphragm capacitive sensor with clamped edge.

Research Interest

Placenta, Quantitative Ultrasound, Medical Imaging, Machine Learning, Deep learning, Signal and Image processing.

Awards

vGHC (Grace Hopper Celebration) Student Scholarship, AnitaB.org	2021
NIH New Investigator Award, International Federation of Placenta Associations (IFPA) Meeting	2021
Berkeley EECS Rising Stars, University of California, Berkeley	2020
Microsoft Research Dissertation Grant	2020
Schlumberger Foundation Faculty for the Future Fellowship	2019-2020
Finalist, Microsoft Research PhD Fellowship	2019
Faculty of Applied Science Graduate Award, UBC	2016-2019
Student Travel Grant, IEEE International Ultrasonics Symposium (IUS)	2019
5th IVADO/Mila Deep Learning School Scholarship, Vancouver	2019
CGSR Devolved Scholarship, U of S	2015-2016
Travel Award, U of S	2016
2nd Position, Three Minute Thesis Competition, U of S	2016
BUET Merit Scholarship and Dean's List Award, BUET	2009-2012

Research Experience

- **The University of British Columbia and BC Women's Hospital** — Vancouver, Canada
  Project Lead, SWAVE 2.0 — *May 2018 – Jan 2021*
  - Conducted a collaborative project for multimodal data acquisition from ex-vivo placentas (n = 47).
  - Co-ordinated the SWAVE team comprising pathologists, radiologists, sonographers, and M.Sc. students.
  - Designed the data acquisition protocol, proposed and implemented techniques for alignment among different modalities, including ultrasound, MRI, and histopathology, and performed the experiments and the subsequent data analysis.

- **Robotics and Control Laboratory, UBC** Vancouver, Canada
  Graduate Research Assistant *2016 – Present*
  - Investigated Quantitative Ultrasound (QUS) techniques for placental tissue characterization.
  - Modified and optimized ultrasound data acquisition using different ultrasound research platforms (Vantage Research Ultrasound System and Ultrasonix research interface).
  - Proposed deep learning and signal processing methods for attenuation coefficient estimation with applications of placental tissue characterization and liver steatosis detection.
- **Multimedia Processing Laboratory, University of Saskatchewan** Saskatoon, Canada
  Graduate Research Assistant *2014 –2016*
  - Developed machine learning based computer-aided methods to detect bleeding and polyps in capsule endoscopic images.
  - Proposed the first computer-aided detection method specified for angiectasia detection.
  - Proposed a saliency-aided visual enhancement (SAVE) method for superficial neoplastic lesion detection.

Publications: Journal Publications from PhD Research

- **F. Deeba**, C. Schneider, S. Mohammed, M. Honarvar, J. Lobo, E. Tam, S. Salcudean, and R. Rohling, "A Multiparametric Volumetric Quantitative Ultrasound Imaging Technique for Soft Tissue Characterization," *Medical Image Analysis*, vol 74, 102245, 2021.
- **F. Deeba**, M. Ma, M. Pesteie, J. Terry, D. Pugash, J. Hutcheon, C. Mayer, S. Salcudean, R. Rohling, "Attenuation Coefficient Estimation of Normal Placentas," *Ultrasound in Medicine and Biology*, 2019.
- (Under Review) **F. Deeba**, J. Terry, D. Pugash, J. Hutcheon, C. Mayer, S. Salcudean, R. Rohling, "SWAVE Imaging of Placental Elasticity and Viscosity Part II (SWAVE 2.0): Potential Biomarkers for Placenta-mediated Disease Detection," *Ultrasound in Medicine and Biology.*
- (Under Review) **F. Deeba**, J. Terry, D. Pugash, J. Hutcheon, C. Mayer, S. Salcudean, R. Rohling, "Project SWAVE 2.0: An overview of the study design for multimodal placental image acquisition and alignment," *Placenta*, 2021.
- (Under Preparation) **F. Deeba**, J. Terry, D. Pugash, J. Hutcheon, C. Mayer, S. Salcudean, R. Rohling, "Placenta QUS: A peephole into the underlying pathophysiology".

Publications: Peer-reviewed Conference Papers from PhD Research

- **F. Deeba**, J. Terry, D. Pugash, J. Hutcheon, C. Mayer, R. Rohling,"Project SWAVE 2.0: A Multimodal Placental Imaging Study," *International Federation of Placenta Associations (IFPA) 2021 symposium*, 2021.
- **F. Deeba**, C. Schneider, J. Terry, D. Pugash, J. Hutcheon, C. Mayer, R. Rohling,"A Quantitative Ultrasound Approach for Detecting Placenta-Mediated Diseases," *2021 IEEE International Ultrasonics Symposium (IUS)*, IEEE, 2021.
- **F. Deeba**, J. Terry, D. Pugash, J. Hutcheon, C. Mayer, R. Rohling,"Ultrasonic Attenuation Coefficient Estimate of Placenta Is Correlated to MRI Proton-Density-Fat Fraction: A Preliminary Ex-Vivo Study," *2021 IEEE International Ultrasonics Symposium (IUS)*, IEEE, 2021.
- **F. Deeba**, R. Rohling, "Repeatability and Reproducibility of Quantitative Ultrasound Parameter Estimation Using Spatially Weighted Total Variation (SWTV) Regularization," *2020 IEEE International Ultrasonics Symposium (IUS)*, IEEE, 2020.

- **F. Deeba**, R. Rohling, "PredictUS: A Method to Extend the Resolution-Precision Trade-off in Quantitative Ultrasound Image Reconstruction," *International Workshop on Machine Learning for Medical Image Reconstruction (MLMIR)*, 255–264, Springer, Cham, 2019.

- **F. Deeba**, C. Schneider, S. Mohammed, M. Honarvar, E. Tam, S. Salcudean, R. Rohling. "SWTV-ACE: Spatially Weighted Regularization based Attenuation Coefficient Estimation Method for Hepatic Steatosis Detection," *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, 610–618. Springer, Cham, 2019.

- **F. Deeba**, R. Hu, J. Terry, D. Pugash, J. Hutcheon, C. Mayer, S. Salcudean, R. Rohling, "A Spatially Weighted Regularization Method for Attenuation Coefficient Estimation," *IEEE International Ultrasonics Symposium (IUS)*, 2019.

- **F. Deeba**, M. Ma, M. Pesteie, J. Terry, D. Pugash, J. Hutcheon, C. Mayer, S. Salcudean, R. Rohling, "Multiparametric QUS Analysis for Placental Tissue Characterization," *2018 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, IEEE, 2018.

- **F. Deeba**, M. Ma, M. Pesteie, J. Terry, D. Pugash, J. Hutcheon, C. Mayer, S. Salcudean, R. Rohling, "SWAVE Imaging of Local Variations in Placental Elasticity: A Feasibility Study," *International Federation of Placenta Associations (IFPA) conference*, 2017.

Publications: Selected Journal Publications from Research during M.Sc.

- **F. Deeba**, F. M. Bui, and K. A. Wahid, "Computer-aided Polyp Detection based on Image Enhancement and Saliency-based Selection," *Biomedical Signal Processing and Control*, vol. 55, pp. 101530, 2020.

- **F. Deeba**, S. K. Mohammed, F. M. Bui, and K. A. Wahid, "Performance assessment of a bleeding detection algorithm for endoscopic video based on classifier fusion method and exhaustive feature selection," *Biomedical Signal Processing and Control*, vol 40, pp. 415-424, 2018.

- **F. Deeba**, S. K. Mohammed, F. M. Bui, and K. A. Wahid, "A Saliency-based Unsupervised Method for Angiectasia Detection in Endoscopic Video Frames," *Journal of Medical and Biological Engineering*, vol. 38.2, pp.325-335, 2018.

- **F. Deeba**, S. K. Mohammed, F. M. Bui, and K. A. Wahid, "Efficacy Evaluation of SAVE for the Diagnosis of Superficial Neoplastic Lesion," *IEEE Journal of Translational Engineering in Health and Medicine*, vol 5, pp. 1-12, 2017.

Publications: Selected Peer-reviewed Conference Papers from Research during M.Sc.

- **F. Deeba**, S. K. Mohammed, F. M. Bui, and K. A. Wahid, "Unsupervised Abnormality Detection Using Saliency and Retinex based Color Enhancement," in *38th Annual International Conference on IEEE Engineering and Medicine and Biology Society*, Orlando, FL. 3871-3874, 2016.

- **F. Deeba**, S. K. Mohammed, F. M. Bui, and K. A. Wahid, "An Empirical Study on the Effect of Imbalanced Data on Bleeding Detection in Endoscopic Video," in *the 38th Annual International Conference on IEEE Engineering and Medicine and Biology Society*, Orlando, FL. 2598-2601, 2016

- **F. Deeba**, F. M. Bui, and K. A. Wahid, "Automated GrowCut for Segmentation of Endoscopic Images," *2016 International Joint Conference on Neural Networks, (IJCNN 2016)*, Vancouver, Canada. 4650-4657, 2016.

Selected Talks

Invited University Talks:

Understanding the Placenta: Towards an Objective Pregnancy Screening, The Robotic Institute, Carnegie Mellon University. March, 2021

Understanding the Placenta: Towards an Objective Pregnancy Screening, School of Biomedical Engineering, The University of British Columbia. June, 2020

Conference Talks

Project SWAVE 2.0: A Multimodal Placental Imaging Study,
International Federation of Placenta Associations (IFPA) 2021 symposium. September, 2021

A Quantitative Ultrasound Approach for Detecting Placenta-Mediated Diseases,
2021 IEEE International Ultrasonics Symposium (IUS), IEEE, 2021. September, 2021

Ultrasonic Attenuation Coefficient Estimate of Placenta Is Correlated to MRI Proton-Density-Fat Fraction: A Preliminary Ex-Vivo Study,
2021 IEEE International Ultrasonics Symposium (IUS), IEEE, 2021. September, 2021

Repeatability and Reproducibility of Quantitative Ultrasound Parameter Estimation Using Spatially Weighted Total Variation (SWTV) Regularization,
2020 IEEE International Ultrasonics Symposium (IUS), IEEE, 2020. September, 2020

PredictUS: A Method to Extend the Resolution-Precision Trade-off in Quantitative Ultrasound Image Reconstruction,
International Workshop on Machine Learning for Medical Image Reconstruction (MLMIR) October, 2019

A Spatially Weighted Regularization Method for Attenuation Coefficient Estimation
IEEE International Ultrasonics Symposium (IUS), 2019. October, 2019

Multiparametric QUS Analysis for Placental Tissue Characterization,
2018 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), IEEE, 2018. July, 2018

SWAVE Imaging of Local Variations in Placental Elasticity: A Feasibility Study,
International Federation of Placenta Associations (IFPA) conference, 2017. July, 2017

Teaching Experience

- **The University of British Columbia** Vancouver, Canada
  Teaching Assistant, Department of ECE *September 2016 – April 2017*
  - ELEC341 (Systems and Control)
  - ELEC 211 (Engineering Electromagnetics)

- **University of Saskatchewan** Saskatoon, Canada
  Teaching Assistant, Department of ECE *January 2015 – December 2015*
  - EE 216 (Probability Statistics and Numerical Methods)
  - EE 840 (Mathematical Methods in Engineering)

- **United International University** Dhaka, Bangladesh
  Lecturer, Department of EEE *December 2013 – August 2014*
  - Electrical Circuits I
  - Electrical Circuits II
  - Properties of Material

Leadership Activities

Secretary, ECE Graduate Student Association, UBC 2019-2020
Councilor, Graduate Student Society, UBC 2018-2020
Member, Women in Engineering, UBC 2018-2019

Professional Service

- Reviewer: IEEE TMI, MICCAI 2018, MICCAI 2019, Elsevier CBM, Elsevier BSPC, Elsevier Neurocomputing
- Session Co-chair: *40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, Honolulu, Hawaii, July 17-21, 2018.
- Committee Member: Machine Learning for Medical Image Reconstruction (MLMIR 2020) Workshop.

References

Dr. Robert Rohling
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Dr. Septimiu Salcudean
Professor, Department of Electrical and Computer Engineering,
Canada Research Chair in Intelligent Computer Interface Design,
The University of British Columbia.
Email: tims@ece.ubc.ca

Dr. Jefferson Terry
Division Head, Anatomical Pathology, BC Children's Hospital,
Pediatric and Perinatal Pathologist, Children's & Women's Health Centre of BC.
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Dr. Francis Bui
Associate Professor, Electrical and Computer Engineering,
University of Saskatchewan.
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Dr. Purang Abolmaesumi
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Dr. Jennifer Hutcheon
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Associate Professor, Department of Obstetrics and Gynaecology, Faculty of Medicine,
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