TAJWAR ABRAR ALEEF

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RESEARCH INTERESTS

My research interest includes mainly medical image analysis, computer vision, image processing, deep learning, and machine learning. Much of my research is centered around cancer detection/localization, solving optimization problems for radiotherapy using adversarial learning, and ultrasound elastography.

EDUCATION

PhD, Biomedical Engineering (in-progress) *Sep 2018 – Present*
University of British Columbia (UBC), Vancouver, Canada
Dissertation: Ultrasound guided prostate cancer diagnosis and treatment.
Supervisors: Dr. Septimiu E. Salcudean & Dr. S. Sara Mahdavi

MSc, ERASMUS+ Joint Master Degree in Medical Imaging and Applications *Sep 2016 – Sep 2018*
University of Burgundy-France, University of Cassino and Southern Lazio-Italy,
University of Girona-Spain, & Radboud University Medical Center-Netherlands
Dissertation: Malignancy estimation of pulmonary nodules using multi-view multi-time point convolutional neural networks.
Supervisors: Dr. Bram van Ginneken & Dr. Colin Jacobs | **CGPA:** 8.9/10 (*thesis ranked top* 2^{nd})

BSc, Electrical & Electronic Engineering (EEE) *Aug 2012 – Feb 2016*
American International University-Bangladesh (AIUB), Bangladesh
Dissertation: Design and performance measurement of an in-body implantable miniaturized slot dipole rectangular patch antenna for biomedical applications.
Supervisor: Dr. Rashedul Hoque | **CGPA:** 3.96/4.00 (*highest academic honor*)

RESEARCH & TEACHING EXPERIENCE

Research Assistant, Robotics and Control Laboratory, UBC, Canada *Sep 2018 – Present*
Supervisors: Dr. Septimiu E. Salcudean & Dr. S. Sara Mahdavi
– Developing multi-parametric Transrectal Ultrasound imaging framework to non-invasively detect prostate cancer & Developing automatic treatment planning system for low-dose-rate prostate brachytherapy.

Teaching Assistant, Dept. of Electrical and Computer Engineering & *Jan 2019 – Present*
School of Biomedical Engineering, UBC, Canada
– EECE 570: Fundamentals of Visual Computing, 2018W2 & 2019W2: Developed & graded assignments, helped students with assignments and course project.
– ELEC 421: Digital Signal and Image Processing, 2019W1: Took tutorials and lab sessions, prepared & graded lab assignments, helped students with debugging codes.
– CPEN 491, ELEC 491, ELEC 494: Capstone Design Project, 2020W1, 2020W2, 2021W1 & 2021W2: Mentored three engineering project teams, helped with documentation of projects, graded assignments.
– BMEG 321: Biomedical Instrumentation, 2021S–2021W1: sourcing all medical equipment and setting up the lab that will be used to teach this course in 2021W2.

Graduate Research Student, Diagnostic Image Analysis Group, *Jan 2018 – Sep 2018*
Radboud University Medical Center, Netherlands
Supervisors: Dr. Bram van Ginneken & Dr. Colin Jacobs
– Completed research and development of an automated algorithm for early diagnosis of malignant lung nodules using multi-timepoint low-dose lung CT scans.

Graduate Research Intern, Division of Image Processing, *Jun 2017 - Sep 2017*
Leiden University Medical Center, Netherlands & Delft University of Technology, Netherlands
Supervisors: Dr. Marius Staring & Dr. Jan van Gemert
- Completed research on developing an algorithm for automatic localization of brachytherapy applicator used during radiation therapy for cervical cancer.

PUBLICATIONS [*click here for full list*]

Selected Conferences:

[1] **Tajwar Abrar Aleef**, Ingrid T Spadinger, Michael D Peacock, Septimiu E Salcudean, and S Sara Mahdavi. Rapid treatment planning for low-dose-rate prostate brachytherapy with tp-gan. *International Conference on Medical Image Computing and Computer-Assisted Intervention*, 2021. [***Accepted for MICCAI 2021***; arXiv link].

[2] Megha Kalia†, **Tajwar Abrar Aleef**†, Nassir Navab, Septimiu E Salcudean, and Peter Black. Co-generation and segmentation for generalized surgical instrument segmentation on unlabelled data. *International Conference on Medical Image Computing and Computer-Assisted Intervention*, 2021. [***Accepted for MICCAI 2021; received MICCAI Travel Award**, arXiv link*].

[3] Md Kamrul Hasan, **Tajwar Abrar Aleef**, and Shidhartho Roy. Automatic mass classification in breast using transfer learning of deep convolutional neural network and support vector machine. In *2020 IEEE Region 10 Symposium (TENSYMP)*, pages 110–113. IEEE, 2020. [*link*].

[4] **Tajwar Abrar Aleef** and Akash Biswas. Design and measurement of a flexible implantable stripline-fed slot antenna for biomedical applications. In *Electrical Engineering and Information Communication Technology (ICEEICT), 2016 3rd International Conference on*, pages 1–5. IEEE, 2016. [*link*].

[5] Nasim Al Islam, **Tajwar Abrar Aleef**, Ussash Arafat, and Akib Jayed Islam. Design improvement and performance comparison of an existing slot dipole bendable antenna for biomedical applications. In *Informatics, Electronics and Vision (ICIEV), 2016 5th International Conference on*, pages 508–512. IEEE, 2016. [*link*].

[6] Nasim Al Islam, **Tajwar Aleef Aleef**, Ussash Arafat, Akib Jayed Islam, and Rashedul Hoque. Design and performance measurement of an in-body implantable miniaturized slot dipole rectangular patch antenna for biomedical applications. In *Advances in Electrical Engineering (ICAEE), 2015 International Conference on*, pages 59–63. IEEE, 2015. [*link*].

† Joint first author

Selected Journals:

[1] **Tajwar Abrar Aleef**, Ingrid T Spadinger, Michael D Peacock, Septimiu E Salcudean, and S Sara Mahdavi. Centre-specific autonomous treatment plans for prostate brachytherapy using cgans. *International Journal of Computer Assisted Radiology and Surgery*, pages 1–10, 2021. [***received Honorary Award for Best Oral Presentation**, link*].

[2] Yeman Brhane Hagos, Vu Hoang Minh, Saed Khawaldeh, Usama Pervaiz, and **Tajwar Abrar Aleef**. Fast pet scan tumor segmentation using superpixels, principal component analysis and k-means clustering. *Methods and Protocols*, 1(1):7, 2018. [*link*].

[3] **Tajwar Abrar Aleef**, Yeman Brhane Hagos, Vu Hoang Minh, Saed Khawaldeh, and Usama Pervaiz. Design and simulation-based performance evaluation of a miniaturised implantable antenna for biomedical applications. *Micro & Nano Letters*, 12(10):821–826, 2017. [*link*].

Conference Abstract Poster Presentations:

[1] **Tajwar Abrar Aleef**, Ingrid T Spadinger, Michael D Peacock, Septimiu E Salcudean, and S Sara Mahdavi. Stepping towards intra-operative treatment planning for low-dose-rate prostate brachytherapy with rapid automatic ai-based planner. *SBME 2021 Symposium*, 2021.

[2] **Tajwar Abrar Aleef**, Ingrid T Spadinger, Michael D Peacock, Septimiu E Salcudean, and S Sara Mahdavi. Further evaluation of an automatic treatment planning technique for prostate brachytherapy. *SBME Research Day*, 2021.

[3] **Tajwar Abrar Aleef**, Ingrid T Spadinger, Michael D Peacock, Septimiu E Salcudean, and S Sara Mahdavi. Ai-assisted automatic centre-specific treatment plans for prostate brachytherapy. *Emerging Technologies: BC's AI Showcase*, 2020.

SCHOLARSHIPS & AWARDS

- **Affiliated Doctoral Scholarship, 2020–2021 (16,000 CAD)** – offered to only a handful of highly meritorious students after university-wide competition (based on academic excellence) by the Faculty of Graduate and Postdoctoral Studies at UBC.
- **Faculty of Applied Science Graduate Award, International Tuition Award, & President's Academic Excellence Initiative PhD Award, 2018–2021 (14,943 CAD)** – in recognition of academic achievements provided by UBC.
- **Erasmus Mundus Joint Master (EMJMD) scholarship, 2016–2018 (65,184 CAD)** – highly competitive & prestigious scholarship offered to top-ranked applicants covering full MSc tuition fees with a monthly stipend for 24 months provided by the European Union.
- **Academic Scholarship, 2012–2016 (7,866 CAD)** – consistent merit based academic scholarship for exceptional academic performance throughout BSc from AIUB.
- **Full tuition waiver, 2014 (39,385 CAD)** – ranked as top applicant and was offered 100% tuition waiver for BSc in Electrical and Electronics Engineering from Middle East Technical University, Turkey (***declined***).
- **Summa Cum Laude Distinction, 2016** – highest academic honor from AIUB for completing BSc with a CGPA of 3.96/4.00 under full course load.
- **Edexcel's High achievers' Award, 2012** – from Pearson Edexcel & British Council (United Kingdom) for obtaining world's highest mark (600/600) in GCE Advanced level Accounting.
- **Daily Star Award, 2012** – awarded for obtaining highest possible grades in GCE Advanced level courses with one world's highest mark.
- **Daily Star Award, 2010** – awarded for obtaining highest possible grades in GCE Ordinary level courses.

SELECTED VOLUNTEERING ACTIVITIES

- **Treasurer, Electrical and Computer Engineering Graduate Student Association (ECEGSA), UBC:** worked as a treasurer for the association. ECEGSA organizes social, academic and professional development events tailored to building a stronger community of students within the department.
- **Executive Member and Treasurer, Biomedical Engineering Graduate Association (BMEGA), UBC:** worked as a treasurer and executive member for the association. BMEGA strives in improving the quality of life of biomedical engineering graduate students at UBC by organizing academic, social and industrial events.
- **Content Developer and Volunteer, IEEE AIUB Student Branch, AIUB:** developed video content for promotional events of the club, mentored in departmental workshops, and volunteered in organizing several events.
- **Video content developer, Light of Hope Bangladesh:** developed educational video materials to be used with their product Sputnique: A solar-powered digital school in a backpack. This project aims to make high-quality education easily accessible to all corners of Bangladesh by fitting everything needed to run a classroom in a single backpack.

- **Volunteer, Jaago Foundation (non-profit organization):** volunteered to raise funds used for building schools and providing free education for poverty-stricken children in Bangladesh.
- **Founder, Robot Maniacs Club, AIUB:** a student-run club with the main motive of inspiring members into learning robotics through practical problem-solving challenges. We also held regular events for showcasing projects and hosted robot building contests to encourage iterative improvement in design and promote healthy competitions.
- **Academic Reviewer:** reviewed several journal articles from Artificial Intelligence In Medicine (IF: 5.3), Physica Medica: European Journal of Medical Physics (IF: 2.7), and World Journal of Surgical Oncology (1.9).

TECHNICAL SKILLS

Programming languages: Python*, MATLAB*, C++, Java
Machine learning libraries: Keras*, TensorFlow*, PyTorch, fast.ai, SciPy*, Scikit-Learn*, NumPy*, Pandas*, Matplotlib*, OpenCV*, Seaborn

* *proficient*

REFERENCES

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Dr. Robert Marti
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