Megha Kalia

Robotics and Control Lab, The University of British Columbia
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EDUCATION

The University of British Columbia (UBC) **Vancouver, Canada**
Ph.D. Candidate, Electrical and Computer Engineering 2017 - current
Thesis: "Real-Time, Perceptually Coherent Augmented/Mixed Reality Applications for Surgical Interventions"
Advisors: Prof. S. E. Salcudean, UBC & Nassir Navab, Technical University of Munich (TUM)

Indian Institute of Technology (IIT) Kharagpur **Kharagpur, India**
M.Tech., Medical Imaging and Informatics, (Grade - 8.67/10) 2014 - 2016
Thesis: "Methods to Improve Depth Perception in Medical Augmented Reality"
(Carried out at TUM with support from DAAD Scholarship)
Advisors: Prof. Chandan Chakraborty & Nassir Navab

Guru Gobind Singh Indraprastha University (GGSIPU) **New Delhi, India**
B.Tech., Biotechnology, (Grade - 71.9/100) 2010 - 2014

RESEARCH INTERESTS

Medical Augmented/Mixed Reality, Human Computer Interaction, Context-Aware Interface Design, Perception, Computer Vision

AWARDS AND SCHOLARSHIPS

- Public Scholars Initiative Award, UBC — Aug 2020 - Apr 2021
- Teaching as Research, Graduate Student Award, UBC — May 2020
- **Outstanding Paper Award**, Computer Aided Intervention Workshop, Medical Image Computing and Computer Assisted Intervention, Shenzhen, China — Oct 2019
- Graduate Student Initiative Award, UBC — Sep 2019
- International Tuition Award, UBC — 2017, 2018, 2019, 2020
- Graduate Travel Award, UBC — Mar 2018
- Travel Award, Hamlyn Winter School, Imperial College London, UK — Dec 2017
- DAAD (German Academic Exchange Service) Scholarship (for completion of master's thesis at TUM, Germany) — Sep 2015 - Mar 2016
- BOSCH India Women Inventor of the Year (for filing two patents) — 2015
- AICTE–GATE Post Graduate Scholarship, Government of India (for master's degree) — 2014 - 2016

PATENTS

- A microscope imaging system — India 4592/CHE/2015
- Meibomian gland diagnostic device — India 5742/CHE/2015

PEER-REVIEWED JOURNALS

1. **Kalia, M.**, Avinash, A., Navab, N., & Salcudean, S. E. (2021). Preclinical Evaluation of a Marker-less, Real-time, Augmented Reality Guidance System for Robot Assisted Radical Prostatectomy. *International Journal of Computer Assisted Radiology and Surgery* (Accepted).

2. **Kalia, M.**, Mathur, P., Tsang, K., Black, P., Navab, N., & Salcudean, S. E. (2020). Evaluation of a marker-less, intra-operative, augmented reality guidance system for robot-assisted laparoscopic radical prostatectomy. *International Journal of Computer Assisted Radiology and Surgery*, 15, 1225-1233.

3. **Kalia, M.**, Mathur, P., Navab, N., & Salcudean, S. E. (2019). Marker-less real-time intra-operative camera and hand-eye calibration procedure for surgical augmented reality. *Healthcare technology letters*, 6(6), 255-260. (Outstanding Paper Award)

4. Abdelaal, A. E., Avinash, A., **Kalia, M.**, Hager, G. D., & Salcudean, S. E. (2020). A multi-camera, multi-view system for training and skill assessment for robot-assisted surgery. *International journal of computer assisted radiology and surgery*, 15, 1369-1377.

PEER-REVIEWED CONFERENCES

1. **Kalia, M.**, Avinash, A., Navab N., & Salcudean S. E. (2021) "Real-Time, Intra-Operative, Camera Projection Matrix Estimation for Augmented Reality in Surgical Robotics". (Submitted)

2. **Kalia, M.,** Aleef, T., Navab, N., & Salcudean, S. E. (2021). Co-Generation and Segmentation for Generalized Surgical Instrument Segmentation on Unlabelled Data. (Submitted)

3. **Kalia, M.**, Navab, N., & Salcudean, S. E. (2019, May). A real-time interactive augmented reality depth estimation technique for surgical robotics. In 2019 *International Conference on Robotics and Automation (ICRA)* (pp. 8291-8297). IEEE.

4. **Kalia, M.**, Navab, N., Fels, S., & Salcudean, S. E. (2019, March). A Method to Introduce & Evaluate Motion Parallax with Stereo for Medical AR/MR. In 2019 *IEEE Conference on Virtual Reality and 3D User Interfaces (VR)* (pp. 1755-1759). IEEE.

5. **Kalia, M.**, zu Berge, C. S., Roodaki, H., Chakraborty, C., & Navab, N. (2016, August). Interactive depth of focus for improved depth perception. *In International Conference on Medical Imaging and Augmented Reality* (pp. 221-232). Springer, Cham.

LEADERSHIP & SERVICE

Reviewer: International Conference on Intelligent Robots and Systems (IROS), 2021. IJCARS, 2020. IJCARS, 2019. Medical Imaging and Augmented Reality, Augmented Environments for Computer Assisted Interventions (AE-CAI), MICCAI, 2019.

Steering Committee Member, Biomedical Imaging and Artificial Intelligence Research Cluster, UBC 2018 - current
Planning and organizing events to promote AI related research and outreach

Member, Academic Policy Sub-committee, Graduate Council Student Caucus, UBC 2018 - 2020

Grant Writer, Kaleidoscope, UBC mental health awareness club 2018 - 2019

Executive Committee Member, Women in Engineering, UBC 2017
Organized biweekly networking event to discuss gender and diversity issues at workplace

Co-founder, Ambar, LGBTQ support group, IIT Kharagpur 2015
Organized events to spread awareness about gender-identity related issues among students

ACHIEVEMENTS

- 2^{nd} **Place**, 3 Minute Thesis Competition, ECE, UBC Feb 2021
- 3^{rd} **Place**, Reboot Startup Competition, UBC Jan 2019
  Idea: Semi-Automatic Segmentation of Multi-modal Medical Data
- **Hult Prize Business Competition**, represented UBC in Canada Region, Toronto Mar 2018
  Idea: Cluster farming for small farmers for maximizing profits by economies of scale.

RESEARCH EXPERIENCE

Research Assistant, Electrical and Computer Engineering, UBC, Canada May 2017 - Current
Project: Augmented Reality for Robot Assisted Surgery
Advisor: Prof. S. E. Salcudean

- Coordinating with Urologists, Nurses for data recording and collection of human robotic prostate surgeries at Vancouver General Hospital (VGH)
- Building real-time, intra-operative AR visual guidance solutions for minimally invasive surgical procedures. Evaluating new methods (user studies and mathematical modelling).

Research Assistant, Computer Aided Medical Procedures & Augmented Reality, TUM, Germany
Aug 2016 - Mar 2017
Project: Multi-Modal Medical Visualizations
Advisors: Prof. Nassir Navab

- Software development for visualizing and evaluating AR methods using 3D data such as MRI/CT

INDUSTRIAL EXPERIENCE

Summer Intern, BOSCH Engineering and Business Solutions, Bengaluru, India Jun 2015 - Jul 2015

- Proposed a metric for quantification of the medical condition, Meibomian Gland Dysfunction, using wavelet based features and image processing techniques. The algorithm is in a clinical product.
- Filed two patents

ADDITIONAL TRAINING

Medical Augmented Reality Summer School, University of Balgrist, Zurich Aug 2019
Two weeks of lectures and hands-on AR project on Magic Leap head mounted display

Hamlyn Winter School on Surgical Imaging and Vision,
Imperial College London, United Kingdom Dec 2017
One week of lectures and a hand-on project on surgical robotics

Suicide Prevention Training (QPR-Question, Persuade, Refer), UBC Dec 2019
Strategies to identify and handle peers in distress

TEACHING AND MENTORSHIP

Teaching Assistant, UBC Jan 2018 - Apr 2018
Human Computer Interaction, CPEN 441 (Undergraduate course)

Instructional Skills Workshop, Center for Teaching, Learning and Technology, UBC Jan 2020

Supervisor, School of Biomedical Engineering (SBME), UBC Summer 2020
Abdulrahman Shinnawy (3^{rd} year undergraduate intern)
Student received SBME scholarship for my proposed project

Mentor, Undergraduate Research Experience Program, UBC Fall 2020
Mentored 5 undergraduate students

Poster Presentation, CTLT Winter Institute Poster Fall 2020
Title: Comparing the effect of individual and group code review activities on student engagement in an online classroom