MUHAMMAD TWAHA IBRAHIM
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Education:

UC IRVINE   *School of Information and Computer Science,* Irvine, CA   **Sept 2017 - Present**
Doctorate in Computer Science   GPA: 3.95   *Expected Graduation: Spring 2024*
THESIS: Spatially Augmented Reality on Dynamic, Deformable Surfaces and its Applications
Relevant courses: Image Understanding, Visual Computing, Computer Vision, Machine Learning,
Algorithm Analysis, Computer Networks, Embedded Systems,
- Research Focus: I am researching on creating seamless multi-projector displays on deformable surfaces.
  I am exploring various applications of this system, e.g. providing pre-operative surgical guidance.

CORNELL UNIVERSITY   *College of Engineering,* Ithaca, NY   **May 2014**
Master of Electrical and Computer Engineering   GPA: 3.79
Relevant courses: Computer Vision, Computer Architecture, Artificial Intelligence, Parallel Computing,
Large-Scale Information Systems, Evolutionary Algorithms, Technical Management
- MEng Project: Quadcopter control using Computer Vision techniques
- Computer Vision Projects: Intelligent Scissors, Image Feature Extraction, Panorama Stitching,
  Single-View Modelling, Automatic Person Detection
- Computer Architecture Project: Design and Analysis of Single & Quad-core Processor with
  Instruction & Data caches connected via Ring Networks
- Other projects: Server scalability & fault tolerance on AWS, Parallel smooth particle hydrodynamics
  simulation

NATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY (NUST), Pakistan   **Sept. 2011**
Bachelor of Computer Systems Engineering   GPA: 3.68
Relevant courses: Image Processing, Operating Systems, Software Engineering, Data Structures,
Database Systems, Algorithms
- Recipient of NUST High Academic Achievers Scholarship in every semester
- Awarded Commandant's Plaque of Excellence for Outstanding Students from 150 students
- Final Year Project: Digital Drawing Board; Appointed team lead; Runner-up in Microsoft Pakistan
  Imagine Cup 2011
- Other Projects: Optical disk extraction from retinal images, OpenGL-based Origami simulation
  software, Pharmaceutical database management software

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Work Experience:

SUMMIT TECHNOLOGY LABORATORY., Irvine, CA   **Sep 2020 – Present**
Research Engineer & GPU Programmer
- Researched and developed algorithms for creating high-resolution, seamless multi-projector display systems
- Improved system runtime efficiency by 60% through exploiting GPU and multi-threading paradigms
- Presented results to the team; advised on new methods to further improve system efficiency
- Responsible for managing team of engineers and interns to develop new algorithms and modules

GOOGLE LLC., Venice, CA   **Jun 2018 – Sep 2018**
Software Developer Intern
- Designed, developed, and evaluated a face recognition system using deep learning and
  convolutional neural networks
- Presented results to the team; recommended potential ways to further improve recognition

EPIC SYSTEMS INC., Verona, WI   **Apr 2015 – May 2017**
Software Developer
- Responsible for designing, developing, and maintaining Epic's surgery management software suite
- Visited customer sites to provide support and gather requirements for designing new functionality

Work Experience (contd.):
FUTUREWEI (HUAWEI) TECHNOLOGIES INC., Bridgewater, NJ   **Jul 2014 – Jan 2015**
Research Intern
■ Researched on panoramic video and super resolution cameras using Raspberry Pi boards
■ Designed a rig for mounting cameras to capture timelapse of panoramic video

VISION IMAGING AND SIGNAL PROCESSING RESEARCH GROUP, Pakistan   **Aug 2011 – Aug 2013**
Research Assistant and Teacher Assistant
■ Researched in computer vision and image stitching algorithms; responsible for developing image stitching software in a joint project with ETRI (South Korea)
■ Published one conference paper, one journal paper and filed one patent
■ Co-developed and managed Verilog labs for 75 students at graduate and undergraduate levels

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Publications:
■ **Ibrahim, M. T.**, Sayadi, L. R., Vyas, R., Gopi, M. and Majumder A., "*Illuminating Precise Surgical Stencils using Projection-based Augmented Reality*", accepted in IEEE/ACM Connected Health: Applications, Systems and Engineering Technologies (CHASE), June 2024.
■ **Ibrahim, M. T.**, Gopi, M. and Majumder A., "*Real-time Seamless Multi-Projector Displays on Deformable Surfaces*", accepted to IEEE Conference on Virtual Reality and 3D User Interfaces (VR & 3DUI) March, 2024.
■ **Ibrahim, M. T.**, Gopi, M. and Majumder A., "*Self-Calibrating Dynamic Projection Mapping System for Dynamic, Deformable Surfaces with Jitter Correction and Occlusion Handling*", in IEEE International Symposium on Mixed and Augmented Reality, October 2023
■ Byun S., **Ibrahim, M.T.**, Gopi, M., Majumder, A., M., Vyas and Sayadi, L. R., "*Automated Landmark Detection for AR Based Craniofacial Surgical Assistance System*", in AIVR 2023, July 2023
■ Tehrani, M. A., **Ibrahim, M. T.**, Majumder, A. and Gopi, M., "*3D Gamut Morphing for Non-Rectangular Multi-Projector Displays,*" in IEEE Transactions on Visualization and Computer Graphics, May 2023
■ **Ibrahim, M.T.**, Gopi, M., and Majumder, A. "*Projector-Camera Calibration on Dynamic, Deformable Surfaces*". In IEEE Conference on Virtual Reality and 3D User Interfaces, March 2023.
■ **Ibrahim, M.T.**, Gopi, M., Vyas, R., Sayadi, L. R., and Majumder, A. "*Projector Illuminated Precise Stencils on Surgical Sites*". In IEEE Conference on Virtual Reality and 3D User Interfaces, March 2023.
■ Figueira, I., **Ibrahim, M. T.**, Majumder, A., & Gopi, M. *Augmented Reality Patient-Specific Registration for Medical Visualization.* In Proceedings of 28th ACM Symposium on Virtual Reality Software and Technology (Nov 2022).
■ Thakur, S., Urs, M., **Ibrahim, M.T.**, Sidenko, A. and Majumder, A. "*Ambient Light Tolerant Laser-Pen Based Interaction with Curved Multi-Projector Displays*". In 24th HCI International Conference, HCII 2022, June 2022.
■ **Ibrahim, M. T.**, Majumder A and Gopi, M. "*Dynamic projection mapping on deformable stretchable materials using boundary tracking*". Computers & Graphics. Online publication date: 1-Jan-2022.
■ **Ibrahim, M. T.**, Gopi, M., Majumder, A., "*Dynamic Projection Mapping of Deformable Stretchable Materials*", VRST '20: 26th ACM Symposium on Virtual Reality Software and Technology, November 2020, Article No.: 35, Pages 1–5.
■ **Ibrahim, M. T.**, Hafiz, R., Khan, M. M., Cho, Y., "*Automatic Selection of Colour Reference Image for Panoramic Stitching*", Springer Multimedia Systems Journal (MMSJ) 2016, Vol. 22, pp 379-392.
■ **Ibrahim, M. T.**, Hafiz, R., Khan, M. M., Cho, Y., Cha, J., "*Automatic Reference Selection for Parametric Colour Correction Schemes for Panoramic Video Stitching*", Int. Symposium on Visual Computing, 2012, Part 1, LNCS 7431, pp. 492-501.

Presentations:
■ **Ibrahim, M.T.**, "*Dynamic Spatially Augmented Reality on Deformable Surfaces*", in the Doctoral Consortium at the IEEE Conference on Virtual Reality and 3D User Interfaces 2024
■ **Ibrahim, M.T.** and Majumder, A., "Multi-Projector *Dynamic Spatially Augmented Reality on Deformable Surfaces*", in Research Demos at the IEEE Conference on Virtual Reality and 3D User Interfaces 2024
■ Vyas R., Sayadi, L. R., **Ibrahim, M.T.**, Gopi, M. and Majumder, A., "*Spatial AR with 3D Surface Projection for Remote Intra-Operative Guidance*", in International Symposium on Craniofacial Surgery, September 2023
■ Majumder, A. and **Ibrahim, M.T.**, "*Towards Building Automated Non-Rigid Spatially Augmented Reality*", tutorial in IEEE Conference on Virtual Reality and 3D User Interface, March 2023
■ **Ibrahim, M.T.** and Majumder, A., "*Spatially Augmented Reality on Non-rigid Dynamic Surfaces*", in Research Demos at the IEEE Conference on Virtual Reality and 3D User Interfaces 2024

Presentations (contd.):
- Vyas, R. M., **Ibrahim, M. T.**, Sayadi, L. R., Chahine, E., Annan, B., Hamdan, U., Majumder, A. *Combining AI and AR for Knowledge and Skill Transfer in Cleft Surgery*. 4th International Comprehensive Cleft Care Workshop. Istanbul, Turkey. October 2021.

Patents:
- Application No. US20210295466A1: *Shape conforming projections of medical information.*
- Application No. US10003740B2: *Increasing spatial resolution of panoramic video captured by a camera array*
- Application No. US20140071228A1: *A method for Color correction apparatus for panorama video stitching and method for selecting reference image using the same.*

Awards, Fellowships and Recognitions:

PLASTIC SURGERY INNOVATION CHALLENGE 2023, Austin, TX   **Oct 2023**
- Research work selected as one of three finalists from a total of forty submissions
- Won the People's Choice Award by receiving more than $2/3^{rd}$ of the audience vote

LINK MS&T FELLOW 2023-2024   **May 2023**
- Awarded $34,000 from the Link Foundation to support my research.
- The Link Fellowship is awarded annually to 6-7 PhD students across the entire United States.

GRADUATE STUDENT ENTREPRENEUR AWARD IN COMPUTER SCIENCE, UC Irvine   **May 2023**
- Awarded The Beall Family Foundation Graduate Student Entrepreneur Award in Computer Science

RESEARCH DEMO HONORABLE MENTION   **Mar 2023**
- Received honorable mention at the IEEE Conference on Virtual Reality and 3D User Interfaces 2023 for my research demo "*Spatially Augmented Reality on Non-rigid Dynamic Surfaces*".

UC IRVINE GRAD SLAM CHAMPION, UC Irvine   **Mar 2023**
- Won the UC Irvine Grad Slam Competition.
- One of ten participants selected from the entire graduate student body at UC Irvine.
- Presented my research in easily understandable terms to a live audience in 3 minutes.

Technical Skills:
Programming Languages: C/C++, C#, Java, Python, MATLAB
Libraries: TensorFlow, OpenCV, OpenMVG, OpenGL, CUDA

Extracurricular activities:

ACM SIGGRAPH STUDENT VOLUNTEER, Los Angeles, CA   **Aug 2023**
- Volunteered as an organizer for the ACM SIGGRAPH Conference
- Responsible for performing various duties e.g. registration, path finding, conference room management etc.

UC IRVINE GRAD SLAM FINALIST, UC Irvine   **Mar 2022**
- One of ten participants selected from the entire graduate student body at UC Irvine.
- Presented my research in easily understandable terms to a live audience in 3 minutes.

STUDENT CENTER BOARD OF ADVISORS, UC Irvine   **Aug 2019 – May 2021**
Secretary (2019), Chair (2020) & At-Large Member (2021)
- *Secretary*: Responsible for taking meeting minutes, recording & ensuring member attendance and assisting the chair in organizing Board meetings
- *Chair*: Responsible for reviewing Board member applications, leading the Board through the COVID-19 pandemic, organizing events to keep the UCI student body engaged with campus during the pandemic. I also led the effort to update the Board guidelines to reflect the current student priorities.
- *At-Large Member*: Responsible for representing the UCI student body, organize events to support and engage our students across campus.

Extracurricular activities (contd.):
GRADUATE INTERCONNECT PEER MENTOR, UC Irvine   **Aug 2020 – Dec 2021**
Peer Mentor (2020) & Senior Peer Mentor (2021)
■ As Peer Mentor, I was responsible for reaching out to and engaging with incoming international graduate students, help them acclimate to the US and UC Irvine and set them up for academic and professional success.
■ As Senior Peer Mentor, I was additionally responsible for managing a team of 10 Peer Mentors, organizing events like game nights and pizza parties to help our mentees adjust to their new environment.

ASSOCIATION OF GRADUATE STUDENTS, UC Irvine   **Aug 2020 – May 2022**
Council Member Elect, Computer Science
■ Responsible for representing Computer Science at the Graduate Student Council.
■ Serve on the Professional Development Committee and Council on Education Policy.
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