

Muhammad Atif Butt

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Research Interests

Generative Artificial Intelligence, with focus on controllable T2I generation with diffusion models, including fine-grained color and illumination control, text-guided image editing, privacy-preserving personalization, and building large-scale evaluation benchmarks for generative models and scene understanding.

Education

Doctor of Philosophy in Computer Science

Jan 2023 – Present

Universitat Autònoma de Barcelona, Spain

Topic: Controllable Text-to-Image Generation with Diffusion Models

Master of Science in Computer Science

Sep 2019 – Jul 2022

National University of Sciences and Technology (NUST — SEecs), Islamabad, Pakistan

Topic: Multi-lingual Traffic Signboard Text Detection and Recognition in Natural Scene Images

Bachelor of Science in Computer Science

Nov 2014 – Nov 2018

Mirpur University of Science and Technology, Azad Kashmir, Pakistan

Topic: Human Cognition and Emotions-Inspired Rear-End Collision Avoidance in Autonomous Driving

Experience

Pre-doctoral Researcher

Jan 2023 – Present

The Learning and Machine Perception (LAMP) Team, Computer Vision Center (CVC), Spain

- *Personalizing T2I Diffusion Models for Precise Color Generation*
- *Color Evaluation Benchmark for Text-to-Image Generation*

Visiting Researcher

May 2026 – Aug 2026

Computer Vision Lab, Warsaw University of Technology, Poland

- *Interpretability in T2I Diffusion Models*

Research Assistant

Sep 2021 – Dec 2022

IHSAN Lab, Information Technology University (ITU), Pakistan

- *Adversarial Robustness in Deep Learning Systems*
- *Trustworthy AI for Extended Reality (XR) Applications*
- *Privacy-aware Embedded Machine Learning*

Graduate Researcher

Oct 2020 – Jul 2022

Deep Learning Lab (DLL—National Center of AI), NUST, Pakistan

- *Scene Text Detection and Recognition in Natural Images*

Research Associate

Feb 2019 – Aug 2021

CAR Lab — National Center of Robotics and Automation, MUST, Pakistan

- *Large-scale Dataset Collection and Benchmarking for AVs*
- *Visual 2D Scene Segmentation and Understanding with foundation Models*

Publications

Publication Metrics: H-index: 11 | Citations: 700+ | Peer-reviewed: 19+

Publications in Top venues: CVPR, ECCV, NeurIPS, IJCV, ACM CSUR, IEEE-TITS

See [Google Scholar](#) for complete list.

Conference Publications

- [1] **NumColor: Precise Numeric Color Control in Text-to-Image Generation**
M.A. Butt, D. Hernández, A. Gomez-Villa, K. Wang, J. Vazquez-Corral, J. van de Weijer
European Conference on Computer Vision (ECCV), 2026
- [2] **GenColorBench: A Color Evaluation Benchmark for Text-to-Image Generation Models**
M.A. Butt, A. Gomez-Villa, T. Wu, J. Vazquez-Corral, J. van de Weijer, K. Wang
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2026
- [3] **LumiCtrl: Learning Illuminant Prompts for Lighting Control in Personalized Text-to-Image Models**
M.A. Butt, K. Wang, J. Vazquez-Corral, J. van de Weijer
IEEE/CVF CVPR Workshop, CVEU, 2026 [ORAL]
- [4] **Leveraging Semantic Attribute Binding for Free-Lunch Color Control in Diffusion Models**
H. Laria, A. Gomez-Villa, J. Qin, M.A. Butt, B. Raducanu, J. Vazquez-Corral, J. van de Weijer, K. Wang
IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2025
- [5] **An h-space Based Adversarial Attack for Protection Against Few-shot Personalization**
X. Xu, S. Kamath, M.A. Butt, B. Raducanu
ACM Multimedia, 2025
- [6] **ColorPeel: Color Prompt Learning with Diffusion Models via Color and Shape Disentanglement**
M.A. Butt, K. Wang, J. Vazquez-Corral, J. van de Weijer
European Conference on Computer Vision (ECCV), 2024
- [7] **Privacy Protection in Personalized DMs via Targeted Cross-Attention Adversarial Attack**
X. Xu, M.A. Butt, S. Kamath, B. Raducanu
Safe Generative AI Workshop, NeurIPS, 2024
- [8] **Dynamic Prompt Learning: Addressing Cross-Attention Leakage for Text-Based Image Editing**
K. Wang, F. Yang, S. Yang, M.A. Butt, J. van de Weijer
Neural Information Processing Systems (NeurIPS), 2023
- [9] **TraffSign: Multilingual Traffic Signboard Text Detection and Recognition for Urdu and English**
M.A. Butt, A. Ul-Hasan, F. Shafait
15th IAPR International Workshop on Document Analysis Systems (DAS), 2022

Journal Publications

- [1] **R2S100K: Road Region Segmentation Dataset For Semi-Supervised Autonomous Driving in the Wild**
M.A. Butt, H. Ali, A. Qayyum, W. Sultani, A. Al-Fuqaha, J. Qadir
International Journal of Computer Vision (IJCV), 2025
- [2] **Secure and Trustworthy Artificial Intelligence-Extended Reality (AI-XR) for Metaverses**
A. Qayyum, M.A. Butt, H. Ali, M. Usman, O. Halabi, A. Al-Fuqaha, Q.H. Abbasi, M.A. Imran, J. Qadir
ACM Computing Surveys, 2024
- [3] **Consistent Valid Physically-Realizable Adversarial Attack Against Crowd-Flow Prediction Models**
H. Ali, M.A. Butt, F. Filali, A. Al-Fuqaha, J. Qadir
IEEE Transactions on Intelligent Transportation Systems, 2024
- [4] **Towards Secure Private and Trustworthy Human-Centric Embedded Machine Learning**
M.A. Butt, A. Qayyum, H. Ali, A. Al-Fuqaha, J. Qadir
Computers and Security, Elsevier, 2023

- [5] **Dental Caries Detection Using a Semi-Supervised Learning Approach**
A. Qayyum, A. Tahir, **M.A. Butt**, A. Luke, H. Abbas, J. Qadir, K. Arshad, K. Assaleh, M. Imran, Q. Abbasi
Scientific Reports, Nature, 2023
- [6] **CARL-D: A Vision Benchmark and Large-scale Dataset for Vehicle Detection & Scene Segmentation**
M.A. Butt, F. Riaz
Signal Processing: Image Communication, 2022
- [7] **Face Mask Detection and Social Distance Monitoring System for COVID-19 Pandemic**
I. Javed, **M.A. Butt**, S. Khalid, T. Shehryar, R. Amin, A.M. Syed, M. Sadiq
Multimedia Tools and Applications, 2022
- [8] **Pixel Level Segmentation Based Drivable Road Region Detection and Steering Angle Estimation Method for Autonomous Driving on Unstructured Roads**
M. Rasib, **M.A. Butt**, F. Riaz, A. Sulaiman, M. Akram
IEEE Access, 2021

Under Review

- [1] **Color Names in Vision-Language Models**
A. Gomez-Villa, P. Hernández-Cámara, **M.A. Butt**, V. Laparra, J. Malo, J. Vazquez-Corral
- [2] **PRISM: Frequency-Domain Protection Against Zero-Shot Diffusion Personalization**
X. Xu, S. Kamath, **MA Butt**, B. Raducanu

Academic Services

Conference Reviewer: CVPR, ICLR, ICML, ICCV, AAAI, BMVC, WACV, AISTATS.

Journal Reviewer: Computers and Electrical Engineering, Computer and Security, IJCV.

Cosupervised MS Student(s): Diego Hernández (awarded as Best MS Thesis)

Awards & Honors

ECCV 2026 Outstanding Reviewer	July 2026
CVPR 2026 Outstanding Reviewer	June 2026
ELIAS Mobility Fund	April 2026
CVC Scholarship Award <i>Four-year fully-funded Ph.D. scholarship at Computer Vision Center, Barcelona.</i>	Oct 2022
DICE 2018 Award – Engineering Category <i>For developing EMO, the first cognitive and emotion-enabled autonomous vehicle of Pakistan.</i>	Dec 2018