Ayush Tewari

Postdoctoral Associate at MIT CSAIL

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Education

10/16 – 07/21 **Max Planck Institute for Informatics and Saarland University**, Saarbrücken, Germany
Doctor of Engineering (Dr.-Ing.), Grade: Summa Cum Laude
Thesis: "Self-Supervised Reconstruction and Synthesis of Faces"
Supervisor: Prof. Christian Theobalt
Recepient of the Otto Hahn Medal from the Max Planck Society

08/14 – 07/15 **INRIA and Grenoble Institute of Technology**, France
Master of Science in Computer Science, Thesis: "Image Blending using Local Phase"
Supervisors: Dr. George Drettakis and Dr. Adrien Bousseau

06/10 – 05/14 **International Institute of Information Techonology**, Hyderabad, India
Bachelor of Technology (Honours) in Computer Science

Work

since 12/21 **Massachusetts Institute of Technology, Cambridge, MA**
Postdoctoral Associate with Prof. William T. Freeman, Prof. Joshua B. Tenenbaum, and Prof. Vincent Sitzmann

08/21 – 11/21 **Max Planck Institute for Informatics, Saarbrücken, Germany**
Postdoctoral Researcher with Prof. Christian Theobalt

03/20 – 08/20 **Stanford University**
Research Intern with Prof. Maneesh Agrawala

Honors and Awards

2023 NeurIPS Spotlight for "Diffusion with Forward Models: Solving Stochastic Inverse Problems without Direct Supervision".

2022 Otto Hahn Medal by the Max Planck Society.

2022 ECCV Oral for "Neural Radiance Transfer Fields for Relightable Novel-view Synthesis with Global Illumination", awarded to top ∼3% submissions.

2022 BMVC Best Paper Honorable Mention for "VoRF: Volumetric Relightable Faces".

2021 CVPR Oral for "i3DMM: Deep Implicit 3D Morphable Model of Human Heads", awarded to top 6.3% submissions.

2020 CVPR Oral for "StyleRig: Rigging StyleGAN for 3D Control over Portrait Images", awarded to top 5.7% submissions.

2019 CVPR Oral for "FML: Face Model Learning from Videos", awarded to top 5.6% submissions.

2018 CVPR Oral for "Self-supervised Multi-level Face Model Learning for Monocular Reconstruction at over 250 Hz", awarded to top 2.1% submissions.

2018 Invited paper for TPAMI special issue on the best of ICCV 2017 "High-Fidelity Monocular Face Reconstruction Based on an Unsupervised Model-Based Face Autoencoder".

2017 ICCV Oral for "MoFA: Model-based Deep Convolutional Face Autoencoder for Unsupervised Monocular Reconstruction", awarded to top 2.1% submissions.

2014 Institute research award for undergraduate research, IIIT Hyderabad.

2014 Dean's merit list, IIIT Hyderabad.

Conference Articles

* equal first authors † equal advising

[C1] A. Tewari*, T. Yin*, G. Cazenavette, S. Rezchikov, J. B. Tenenbaum, F. Durand, W. T. Freeman, and V. Sitzmann. Diffusion with Forward Models: Solving Stochastic Inverse Problems Without Direct Supervision. In *Neural Information Processing Systems (NeurIPS) (Spotlight Presentation)*, 2023.

[C2] Y. Du, C. Smith, A. Tewari†, and V. Sitzmann†. Learning to Render Novel Views from Wide-Baseline Stereo Pairs. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, 2023.

[C3] K. Jatavallabhula, A. Kuwajerwala, Q. Gu, M. Omama, T. Chen, S. Li, G. Iyer, S. Saryazdi, N. Keetha, A. Tewari, J. Tenenbaum, C. de Melo, M. Krishna, L. Paull, F. Shkurti, and A. Torralba. ConceptFusion: Open-set Multimodal 3D Mapping. In *RSS*, 2023.

[C4] X. Pan, A. Tewari, T. Leimkühler, L. Liu, A. Meka, and C. Theobalt. Drag Your GAN: Interactive Point-based Manipulation on the Generative Image Manifold. In *ACM SIGGRAPH 2023 Conference Proceedings*, 2023.

[C5] C. Smith, Y. Du, A. Tewari, and V. Sitzmann. FlowCam: Training Generalizable 3D Radiance Fields without Camera Poses via Pixel-Aligned Scene Flow. In *Neural Information Processing Systems (NeurIPS)*, 2023.

[C6] M. B R, A. Tewari, X. Pan, M. Elgharib, and C. Theobalt. gCoRF: Generative Compositional Radiance Fields. In *International Conference on 3D Vision (3DV)*, 2022.

[C7] A. Tewari, M. B R, X. Pan, O. Fried, M. Agrawala, and C. Theobalt. Disentangled3D: Learning a 3D Generative Model with Disentangled Geometry and Appearance from Monocular Images. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. IEEE, 2022.

[C8] A. Harrington, V. DuTell, A. Tewari, M. Hamilton, S. Stent, R. Rosenholtz, and W. T. Freeman. Exploring perceptual straightness in learned visual representations. In *The Eleventh International Conference on Learning Representations*, 2022.

[C9] L. Lyu, A. Tewari, T. Leimkuehler, M. Habermann, and C. Theobalt. Neural Radiance Transfer Fields for Relightable Novel-view Synthesis with Global Illumination. In *European Conference on Computer Vision (ECCV) (Oral Presentation)*, 2022.

[C10] X. Pan, A. Tewari, L. Liu, and C. Theobalt. GAN2X: Non-Lambertian Inverse Rendering of Image GANs. In *International Conference on 3D Vision (3DV)*, 2022.

[C11] P. Rao, M. B R, G. Fox, T. Weyrich, B. Bickel, H.-P. Seidel, H. Pfister, W. Matusik, A. Tewari, C. Theobalt, and M. Elgharib. VoRF: Volumetric Relightable Faces. In *British Machine Vision Conference (BMVC) (Oral Presentation, Best Paper Honorable Mention)*, 2022.

[C12] P. Sharma, A. Tewari, Y. Du, S. Zakharov, R. A. Ambrus, A. Gaidon, W. T. Freeman, F. Durand, J. B. Tenenbaum, and V. Sitzmann. Neural Groundplans: Persistent Neural Scene Representations from a Single Image. In *The Eleventh International Conference on Learning Representations*, 2022.

[C13] M. B R, A. Tewari, T.-H. Oh, T. Weyrich, B. Bickel, H.-P. Seidel, H. Pfister, W. Matusik, M. Elgharib, and C. Theobalt. Monocular Reconstruction of Neural Face Reflectance Fields. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2021.

[C14] M. B R, A. Tewari, H.-P. Seidel, M. Elgharib, and C. Theobalt. Learning Complete 3D Morphable Face Models from Images and Videos. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2021.

[C15] G. Fox, A. Tewari, M. Elgharib, and C. Theobalt. StyleVideoGAN: A Temporal Generative Model using a Pretrained StyleGAN. In *British Machine Vision Conference (BMVC) (Oral Presentation)*, 2021.

[C16] L. Lyu, M. Habermann, L. Liu, M. B. R, A. Tewari, and C. Theobalt. Efficient and Differentiable Shadow Computation for Inverse Problems. In *IEEE International Conference on Computer Vision (ICCV)*, 2021.

[C17] E. Tretschk, A. Tewari, V. Golyanik, M. Zollhöfer, C. Lassner, and C. Theobalt. Non-Rigid Neural Radiance Fields: Reconstruction and Novel View Synthesis of a Dynamic Scene From Monocular Video. In *IEEE International Conference on Computer Vision (ICCV)*, 2021.

[C18] T. Yenamandra, A. Tewari, F. Bernard, H.-P. Seidel, M. Elgharib, D. Cremers, and C. Theobalt. i3DMM: Deep Implicit 3D Morphable Model of Human Heads. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) (Oral Presentation)*, 2021.

[C19] Y. Zhou, M. Habermann, I. Habibie, A. Tewari, C. Theobalt, and F. Xu. Monocular Real-time Full Body Capture with Inter-part Correlations. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2021.

[C20] A. Tewari, M. Elgharib, G. Bharaj, F. Bernard, H.-P. Seidel, P. Pérez, M. Zollhöfer, and C. Theobalt. StyleRig: Rigging StyleGAN for 3D Control over Portrait Images. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) (Oral Presentation)*, 2020.

[C21] J. Thies, M. Elgharib, A. Tewari, C. Theobalt, and M. Niessner. Neural Voice Puppetry: Audio-driven Facial Reenactment. In *European Conference on Computer Vision (ECCV)*, 2020.

[C22] E. Tretschk, A. Tewari, V. Golyanik, M. Zollhöfer, C. Stoll, and C. Theobalt. PatchNets: Patch-Based Generalizable Deep Implicit 3D Shape Representations. In *European Conference on Computer Vision (ECCV)*, 2020.

[C23] E. Tretschk, A. Tewari, M. Zollhöfer, V. Golyanik, and C. Theobalt. DEMEA: Deep Mesh Autoencoders for Non-Rigidly Deforming Objects. In *European Conference on Computer Vision (ECCV) (Oral Presentation)*, 2020.

[C24] A. Tewari, F. Bernard, P. Garrido, G. Bharaj, M. Elgharib, H.-P. Seidel, P. Pérez, M. Zollhöfer, and C. Theobalt. FML: Face Model Learning from Videos. In *The IEEE Conference on Computer Vision and Pattern Recognition (CVPR) (Oral Presentation)*, 2019.

[C25] A. Tewari, M. Zollhöfer, P. Garrido, F. Bernard, H. Kim, P. Pérez, and C. Theobalt. Self-supervised Multi-level Face Model Learning for Monocular Reconstruction at over 250 Hz. In *The IEEE Conference on Computer Vision and Pattern Recognition (CVPR) (Oral Presentation)*, 2018.

[C26] H. Kim, M. Zollhöfer, A. Tewari, J. Thies, C. Richardt, and C. Theobalt. InverseFaceNet: Deep Single-Shot Inverse Face Rendering From A Single Image. In *The IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018.

[C27] Q. Sun, A. Tewari, W. Xu, M. Fritz, C. Theobalt, and B. Schiele. A Hybrid Model for Identity Obfuscation by Face Replacement. In *European Conference on Computer Vision (ECCV)*, 2018.

[C28] A. Tewari, M. Zollhöfer, H. Kim, P. Garrido, F. Bernard, P. Perez, and T. Christian. MoFA: Model-based Deep Convolutional Face Autoencoder for Unsupervised Monocular Reconstruction. In *The IEEE International Conference on Computer Vision (ICCV) (Oral Presentation)*, 2017.

Journal Articles

* equal first authors † equal advising

[J1] L. Lyu, A. Tewari, M. Habermann, S. Saito, M. Zollhöfer, T. Leimkühler, and C. Theobalt. Diffusion Posterior Illumination for Ambiguity-aware Inverse Rendering. *ACM Transactions on Graphics (Proceedings SIGGRAPH Asia)*, 2023.

[J2] M. Mendiratta, X. Pan, M. Elgharib, K. Teotia, M. B R, A. Tewari, V. Golyanik, A. Kortylewski, and C. Theobalt. Avatarstudio: text-driven editing of 3d dynamic human head avatars. *ACM Transactions on Graphics (Proceedings SIGGRAPH Asia)*, 2023.

[J3] A. Petitjean, Y. Poirier-Ginter, A. Tewari, G. Cordonnier, and G. Drettakis. ModalNeRF: Neural Modal Analysis and Synthesis for Free-Viewpoint Navigation in Dynamically Vibrating Scenes. *Computer Graphics Forum*, 2023.

[J4] A. Tewari*, J. Thies*, B. Mildenhall*, P. Srinivasan*, et al. Advances in Neural Rendering. *Computer Graphics Forum (EG STAR)*, 2022.

[J5] M. B R, A. Tewari, A. Dib, T. Weyrich, B. Bickel, H.-P. Seidel, H. Pfister, W. Matusik, L. Chevallier, M. Elgharib, and C. Theobalt. PhotoApp: Photorealistic Appearance Editing of Head Portraits. *ACM Transactions on Graphics (Proceedings SIGGRAPH)*, 2021.

[J6] A. Tewari, M. Elgharib, M. BR, F. Bernard, H.-P. Seidel, P. Pérez, M. Zöllhofer, and C. Theobalt. PIE: Portrait Image Embedding for Semantic Control. *ACM Transactions on Graphics (Proceedings SIGGRAPH Asia)*, 2020.

[J7] A. Tewari, M. Zollhöfer, F. Bernard, P. Garrido, H. Kim, P. Pérez, and C. Theobalt. High-Fidelity Monocular Face Reconstruction Based on an Unsupervised Model-Based Face Autoencoder. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2020.

[J8] A. Tewari*, O. Fried*, J. Thies*, et al. State of the Art on Neural Rendering. *Computer Graphics Forum (EG STAR 2020)*, 2020.

[J9] B. Egger, W. A. P. Smith, A. Tewari, et al. 3D Morphable Face Models - Past, Present and Future. *ACM Transactions on Graphics*, 2020.

[J10] M. Elgharib*, M. Mendiratta*, J. Thies, M. Niessner, H.-P. Seidel, A. Tewari, V. Golyanik, and C. Theobalt. Egocentric Videoconferencing. *ACM Transactions on Graphics (Proceedings SIGGRAPH Asia)*, 2020.

[J11] O. Fried, A. Tewari, M. Zollhöfer, A. Finkelstein, E. Shechtman, D. B. Goldman, K. Genova, Z. Jin, C. Theobalt, and M. Agrawala. Text-based Editing of Talking-head Video. *ACM Transactions on Graphics (Proceedings SIGGRAPH)*, 2019.

[J12] H. Kim, P. Garrido, A. Tewari, W. Xu, J. Thies, M. Niessner, P. Pérez, C. Richardt, M. Zollhöfer, and C. Theobalt. Deep Video Portraits. *ACM Transactions on Graphics (Proceedings SIGGRAPH)*, 2018.

Talks

09-11/23 **Structured Generative Models**
- John Hopkins University
- CMU
- Meta Reality Labs Research
- Princeton University
- MIT Graphics Seminar

06/23 **Teaching AI to See the 3D World**
CSAIL + Imagination in Action: AI Frontiers & Implications

08/22 **Finding 3D Structure in Unstructured 2D Data**
- Rank Prize Symposium on Neural Rendering, UK
- Adobe Research, UK
- Oxford University, UK
- Princeton University

03/22 **Learning 3D Generative Models from 2D Data**
- Dagstuhl Seminar on 3D Morphable Models and Beyond, Germany

08/21 **Synthesis of Portrait Images with 3D Control**
- ETH Zürich, Virtual
- Adobe Research, Virtual

08/21 **GANs with 3D Control**
- SIGGRAPH Course on Advances in Neural Rendering

07/21 **Self-Supervised Reconstruction and Synthesis of Faces**
- Max Planck Institute for Informatics, Germany

06/21 **Synthesis of Portrait Images with 3D Control**
- CVPR NTIRE Workshop, Virtual

03/21 **Self-Supervised 3D Digitization of Faces**
- MIT Vision and Graphics Seminar, Virtual

12/20 **PIE: Portrait Image Embedding for Semantic Control**
- SIGGRAPH Asia, Virtual

06/20 **StyleRig: Rigging StyleGAN for 3D Control over Portrait Images**
- CVPR, Virtual

06/20 **Neural Rendering Fundamentals**
- CVPR, Virtual

05/20 **Neural Rendering Fundamentals**
- Eurographics, Virtual

06/19 **FML: Face Model Learning from Videos**
- CVPR, Long Beach, USA

06/19 **Reconstructing and Editing Faces in the Wild**
- TU Münich, Germany

04/19 **Building 3D Morphable Face Models from 2D Data**
- Dagstuhl Semimar on 3D Morphable Models, Germany

03/19 **Reconstructing and Editing Faces in the Wild**
- Google, San Francisco, USA
- Adobe, San Francisco, USA

06/18 **Self-supervised Multi-level Face Model Learning for Monocular Reconstruction at over 250 Hz**
- CVPR, Salt Lake City, USA

10/17 **MoFA: Model-based Deep Convolutional Face Autoencoder for Unsupervised Monocular Reconstruction**
- ICCV, Venice, Italy
- Workshop on Image-based Modeling of Articulated and Deformable Objects, ICCV, Venice, Italy

Teaching

Guest Lecture **MIT**, Cambridge, USA
Course: Machine Learning for Inverse Graphics, 2022, 2023

Guest Lecture **Princeton University**, Virtual
Course: Neural Rendering, 2022

Tutor **3DV**, Virtual
Course on Advances in Neural Rendering, 2021

Tutor **SIGGRAPH**, Virtual
Course on Advances in Neural Rendering, 2021

Tutor **CVPR**, Virtual
Tutorial on Neural Rendering, 2020

Tutor **Eurographics**, Virtual
Tutorial on Neural Rendering, 2020

Teaching Assistant **Max Planck Institute for Informatics**, Saarbrücken, Germany
Seminars:
- 3D Shape Analysis (Summer 2018)
- Computer Vision for Computer Graphics (Summer 2017, Summer 2019, Summer 2021)

Teaching Assistant **International Institute of Information Technology**, Hyderabad, India
Courses:
- Digital Signals Analysis and Applications (Spring 2013)
- Mathematics I (Discrete Mathematics) (Fall 2012, Fall 2013)

Students Supervised

MIT

Yilun Du (2022), Prafull Sharma (2022), Cameron Smith (2023), Kairo Morton (2023), Tianwei Yin (2023), Amani Kiruga (2023)

Max Planck Institute for Informatics

Hoseein Hajipour (2018), Chitra Singh (2019), Mallikarjun B R (2019), Tarun Yenamandra (2020), Tianqi Fan (2020), Linjie Lyu (2021)

Academic Services

Area Chair
- International Conference on 3D Vision (3DV), 2023

Reviewer
- The IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- ACM Transactions on Graphics (TOG)
- International Journal of Computer Vision (IJCV)
- The IEEE International Conference on Computer Vision (ICCV)
- IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
- SIGGRAPH, SIGGRAPH Asia
- Conference of the European Association for Computer Graphics (Eurographics)
- Conference on Neural Information Processing Systems (NeurIPS)
- International Conference on Machine Learning (ICML)
- European Conference on Computer Vision (ECCV)
- British Machine Vision Conference (BMVC)
- International Conference on Learning Representations (ICLR)

Organizing
- SIGGRAPH Course on Advances in Neural Rendering (2021)
- 3DV Tutorial on Advances in Neural Rendering (2021)
- Eurographics Course on Neural Rendering (2020)
- CVPR Tutorial on Neural Rendering (2020)