Mohammad Rami Koujan, PhD

ML Tech Lead — Generative AI · Computer Vision · AR

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SUMMARY

Senior ML engineer and tech lead with 9+ years building production-grade generative AI for human-centric AR. Currently lead Snap's on-device GenAI team for human characters, shipping real-time avatar features to hundreds of millions of users across Snapchat, Lens Studio Pro, and EasyLens. PhD in Computer Vision and Machine Learning (University of Exeter); peer-reviewed publications at CVPR, FG, IJCB, and SIGGRAPH (371 Google Scholar citations); multiple US patents in real-time face/body synthesis.

EXPERIENCE

Snap Inc. — London, UK *Sep 2020 – Present (5y 9m)*

Tech Lead / Manager, Machine Learning Engineering — Generative ML Platform *Jul 2025 – Present*

- Lead a small ML engineering team building on-device generative AI for human-centric AR experiences across Snapchat (953M+ MAU platform) — hands-on across architecture, modelling, and deployment.
- Architected and shipped the core ML pipeline behind **Character Skin Generator** in Lens Studio Pro (Body Avatar in EasyLens) — a flagship feature delivering real-time digital avatar transformations on-device within Snapchat and generating over 180M+ total cumulative impressions (swipes and views) globally within its first 100 days of launch.
- Pioneered distillation of capabilities from large image and video diffusion models into lightweight, real-time lenses on mobile GPUs/NPUs, taking server-side latency to interactive on-device frame rates.
- Set technical direction and architecture for the team and drive cross-team execution; partner with Lens R&D, Research, and Product on multi-team launches.

Senior Machine Learning Research Engineer *Jan 2024 – Jun 2025*

- Promoted to Senior for impact across multiple shipped lenses and conception of a new GenAI-based human AR offering.
- Pioneered training of controllable foundational diffusion models for high-fidelity human image and video generation; translated research artefacts into production AR experiences shipped to millions.
- Mentored junior ML engineers; led cross-team collaborations with Lens R&D and Foundation/Platform partners.

Machine Learning Research Engineer *Sep 2020 – Dec 2023*

- Spearheaded development of real-time, on-device generative AI for human synthesis — work resulting in **multiple US patents** and shipped Snapchat features.
- Co-invented an optimized virtual try-on model for upper garments deployed natively in the Snapchat app.
- Independently architected and patented an end-to-end generative pipeline for real-time full-body AR lenses, enabling high-fidelity digital character transformations and dynamic virtual costuming on mobile devices.

Ariel AI — London, UK *Jul 2020 – Sep 2020*

Computer Vision Scientist — Core AI team building generative full-body human synthesis models for high-fidelity, real-time reenactment. **Joined Snap Inc. through company acquisition** in Sep 2020.

Facesoft (Imperial College London spin-out) — London, UK *Jul 2019 – May 2020*

Computer Vision Scientist

- Researcher on facial synthesis and motion-estimation architectures whose impact contributed directly to Facesoft's **technology asset acquisition by Huawei**.
- Authored seminal work on facial reenactment — Head2Head, Head2Head++, DeepFaceFlow — published at FG, IJCB, and CVPR.
- UK patent **GB2594970** — *Three-dimensional Facial Motion Estimation* — combining sequential GANs with 3D Morphable Models for real-time 3D facial motion estimation from monocular video.
- Trained robust 3D facial motion-estimation models on a proprietary dataset of millions of high-resolution 3D facial scans.

Earlier Research Experience

- **Imperial College London — IBUG group (Prof. Stefanos Zafeiriou)** *Jun 2018 – Aug 2019* — Visiting Researcher: facial shape modelling, analysis, and synthesis; collaborations led to publications at CVPR and FG.
- **University of Exeter** *Jun 2017 – Jun 2019* — Research & Teaching Assistant: built a 3D Morphable Model from face scans; taught Computer Graphics (BSc), Computer Vision (MSc), Machine Vision (MSc).
- **EPSRC Proteus IRC, Edinburgh** *Jan – Jun 2017* — Research Assistant: novel texture descriptors for sparse, irregularly sampled optical endomicroscopy images; two peer-reviewed publications on automated pulmonary disease classification.

- **Inria, Nancy** *Jun – Sep 2016* — Research Assistant: sequential robot pose/location tracking in smart apartments using deep learning.

EDUCATION

PhD, Computer Vision and Machine Learning — University of Exeter, UK *2017 – Mar 2021* · 3D face modelling, analysis, and synthesis · *College-funded studentship*.

Doctoral training — International Computer Vision Summer School (ICVSS, 2019); BMVA Summer School (2018).

MSc, Computer Vision and Robotics (VIBOT — Erasmus Mundus) — Heriot-Watt University, University of Girona & Université de Bourgogne *2015 – 2017 · Graduated with Distinction · 50 K€ Erasmus Mundus Scholarship · Bourgogne Region International Mobility Grant*.

BSc, Communications and Information Engineering — Yarmouk Private University, Syria *2009 – 2014 · GPA 3.92/4.0 · Faculty Top Student*.

SELECTED PUBLICATIONS *(371 GOOGLE SCHOLAR CITATIONS)*

1. **Head2Head: Video-based Neural Head Synthesis.** Koujan, Doukas, Roussos. *IEEE FG 2020.* [94]
2. **Head2Head++: Deep Facial Attributes Re-targeting.** Koujan, Doukas, Sharmanska. *IEEE IJCB 2021.* [69]
3. **Real-Time Facial Expression Recognition "In the Wild" by Disentangling 3D Expression from Identity.** Koujan, Alharbawee. *IEEE FG 2020.* [50]
4. **Automatic Stress Detection Evaluating Models of Facial Action Units.** Giannakakis, Koujan, Roussos. *IEEE FG 2020.* [49]
5. **Automatic Stress Analysis from Facial Videos based on Deep Facial Action Units Recognition.** Giannakakis, Koujan, Roussos. *Pattern Analysis and Applications, Springer, 2022.* [44]
6. **DeepFaceFlow: In-the-Wild Dense 3D Facial Motion Estimation.** Koujan, Roussos. *IEEE/CVF CVPR 2020.* [19]
7. **Combining Dense Non-Rigid Structure-from-Motion and 3D Morphable Models for Monocular 4D Face Reconstruction.** Koujan, Roussos. *ACM SIGGRAPH 2018.* [16]
8. **PhD Thesis: 3D Face Modelling, Analysis and Synthesis.** University of Exeter, 2021.

PATENTS

- **US 12,602,850** *(granted, Snap Inc., 2026) — Generative AI Virtual Clothing Try-On* — generative virtual clothing try-on combining diffusion with pose/identity preservation for high-fidelity garment transfer.
- **US 18/429,251** *(granted, Snap Inc., 2026) — Automatic Image Generation Using Latent Structural Diffusion* — latent-structural-diffusion approach for controllable, automatic image generation.
- **US 18/226,929** *(granted, Snap Inc., 2026) — Generating Ground Truths for Generative AI Applications* — automated curation of training-time ground truths for large-scale generative AI model training.
- **US 12,499,638** *(granted, Snap Inc., 2025) — Stylizing a Whole-body of a Person* — diffusion-based full-body stylization for AR lenses, enabling real-time digital character transformations on-device.
- **US 12,437,367** *(granted, Snap Inc., 2025) — Real-time Try-on Using Body Landmarks* — on-device real-time virtual try-on driven by body-landmark estimation; powers garment try-on lenses in Snapchat.
- **GB 2594970** *(granted, Facesoft, 2024) — Three-dimensional Facial Motion Estimation* — sequential GANs combined with 3D Morphable Models for real-time 3D facial motion estimation from monocular video.
- **Additional patents pending** in real-time on-device generative AI for human image/video synthesis and AR lenses.

TECHNICAL SKILLS

- **Generative AI:** Diffusion models (image and video), latent diffusion, GANs, model distillation, controllable generation, ControlNets, video-diffusion deployment, virtual try-on, neural avatars.
- **Computer Vision:** 3D face/body reconstruction, 3D Morphable Models, facial motion estimation, neural rendering, real-time tracking.
- **ML Systems:** PyTorch, distributed multi-GPU/multi-node training, on-device inference, model compression/quantization, mobile GPU/NPU deployment, large-scale dataset curation.
- **Programming:** Python, C++, CUDA, MATLAB.
- **Technical Leadership:** Technical direction & architecture, roadmap definition, cross-team partnership, mentoring of ML engineers and researchers.

HONORS, AWARDS & LANGUAGES

- College-funded PhD Studentship, University of Exeter (2017) · Graduation with Distinction, VIBOT MSc (2017) · 50 K€ Erasmus Mundus Scholarship (2015–2017) · Bourgogne Region International Mobility Grant · Faculty Top Student, BSc Communications and Information Engineering, Yarmouk Private University (2014).
- **Languages:** English (full professional) · Arabic (native) · French (limited working) · Catalan (elementary).