Ruta Desai

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Research Summary

AI Research Scientist specializing in agents that partner with and adapt to humans in complex tasks. 10+ years at the intersection of multimodal reasoning, preference learning, and embodied intelligence, with 4+ years of managing and tech leading teams at Meta FAIR. 40+ publications at top venues (NeurIPS, ICLR, ICCV, CVPR, CHI) including 5+ benchmarks.

Core Research Areas:

- **Human-Agent Collaboration:** Methods spanning conversational reasoning (Collaborative Reasoner), physical and adaptive task coordination (PARTNR, Habitat 3.0)
- **Preference Learning & Personalization:** Real-time adaptation without explicit feedback (ADAPT, soft planning constraints, meta-Bayesian optimization)
- **Multimodal Reasoning:** Vision-language systems for activity forecasting and embodied planning (Ask-to-Act, VLaMP, EgoTV)
- **Interactive Creative AI Tools:** Human-AI co-design systems for non-experts (Geppetto – CHI Best Paper)

Professional Experience

Staff Research Scientist, Meta Fundamental AI Research **Aug 2023–Present**

- Led research on multimodal reasoning and human-AI collaboration, resulting in 8+ publications at top-tier venues (NeurIPS, ICLR, COLM, WACV)
- Developed self-improving social agents with collaborative reasoning capabilities and continual open-ended human-robot assistance systems
- Core contributor to PARTNR benchmark for embodied multi-agent planning and Habitat 3.0 platform for human-robot collaboration simulation

Tech Lead Manager, Meta Reality Labs Research **Jan 2021–Aug 2023**

- Managed cross-functional team of 6+ researchers developing agentic systems for augmented reality
- Led research on egocentric vision understanding, activity forecasting, and task verification from natural language and video
- Published 10+ patents and papers at ICML, ICCV, NeurIPS, and CHI on adaptive, human-centric agents

Research Scientist, Meta Reality Labs Research **Nov 2018–Jan 2021**

- Developed ML methods for augmented reality assistance including optimal task support and cognitive state inference from pupil tracking
- Filed 5+ patents on AR assistance strategies and visual memory systems; published at ETRA.

Education

Carnegie Mellon University, Pittsburgh, PA 2013–2018
Ph.D. in Robotics (GPA: 3.80/4.0)
Advisors: Stelian Coros and Jim McCann
Thesis: Robot design for everyone – Computational tools that democratize robot design
Siebel Scholarship (2013)

Carnegie Mellon University, Pittsburgh, PA 2011–2012
M.S. in Robotics (GPA: 3.83/4.0)
Advisors: Hartmut Geyer and Chris Atkeson

Google Anita Borg Memorial Scholarship (2012)

National Institute of Technology (NIT) Surat, India 2007–2011
B.Tech. in Electronics Engineering (GPA: 9.26/10)
Dhirubhai Ambani Undergraduate Scholarship (2007)

Technical Skills

Machine Learning: Python, PyTorch, HuggingFace Transformers, Vision-Language Models (VLMs), Reinforcement Learning, Self-Play, Fine-tuning, Imitation Learning, Post-training, Reasoning, Planning, Multi-Agent Systems, Synthetic data, LLM-Judges, Benchmarking
Robotics Sim-to-real, Gym, Task and Motion Planning, Trajectory Optimization
Computer Vision: Egocentric Vision, Action Understanding, Visual Grounding
Human-AI Interaction: User Studies, Preference Learning, Interactive Systems Design

Selected Recent Publications

** indicates equal contribution. Full list: Google Scholar*

A. Ni*, **R. Desai***, Y. Li, et al. "Collaborative Reasoner: Self-improving Social Agents with Synthetic Conversations." *NeurIPS*, 2025. [PDF]

C. Ma, K. Lu, **R. Desai***, X. Puig*, et al. "COOPERA: Continual Open-Ended Human-Robot Assistance." *NeurIPS Spotlight*, 2025.

M. Chang, G. Chhablani, A. Clegg, et al. (including **R. Desai**). "PARTNR: A Benchmark for Planning and Reasoning in Embodied Multi-agent Tasks." *ICLR*, 2025. [PDF]

M. Patel, X. Puig, **R. Desai**, et al. "ADAPT: Actively Discovering and Adapting to Preferences for any Task." *COLM*, 2025. [PDF]

M. Verghese*, B. Chen*, H. Eghbalzadeh, T. Nagarajan, **R. Desai**. "User-in-the-loop Evaluation of Multimodal LLMs for Activity Assistance." *WACV*, 2025. [PDF]

X. Puig*, E. Undersander*, A. Szot*, et al. (including **R. Desai***). "Habitat 3.0: A Co-Habitat for Humans, Avatars and Robots." *ICLR*, 2024. [PDF] [Website]

D. Patel, H. Eghbalzadeh, N. Kamra, et al., **R. Desai**. "Pretrained Language Models as Visual Planners for Human Assistance." *ICCV*, 2023. [PDF] [Code]

R. Hazra, B. Chen, A. Rai, N. Kamra, **R. Desai**. "EgoTV: Egocentric Task Verification from Natural Language Task Descriptions." *ICCV*, 2023. [PDF] [Code]

A. Szot, U. Jain, Z. Kira, D. Batra, **R. Desai**, A. Rai. "Adaptive Coordination in Social Embodied Rearrangement." *ICML*, 2023. [PDF]

T. Nagarajan, S. Ramakrishnan, **R. Desai**, J. Hillis, K. Grauman. "Egocentric Scene Context for Human-centric Environment Understanding from Video." *NeurIPS*, 2023. [PDF]

Selected Prior Publications (2017–2022)

S. Datta, S. Dharur, V. Cartillier, **R. Desai**, et al. "Episodic Memory Question Answering." *CVPR*, 2022. [PDF]

K. Pertsch, **R. Desai**, F. Meier, et al. "Cross-Domain Imitation Learning via Semantic Skills." *CoRL*, 2022. [PDF]

R. Desai, F. Anderson, J. Matejka, et al. "Geppetto: Enabling Semantic Design of Expressive Robot Behaviours." *CHI*, 2019. **Best Paper Award** [PDF]

R. Desai, B. Li, Y. Yuan, S. Coros. "Interactive Co-Design of Form and Function for Legged Robots using the Adjoint Method." *CLAWAR*, 2018. **Best Paper Award** [PDF]

R. Desai, J. McCann, S. Coros. "Assembly-aware Design of Printable Electromechanical Devices." *UIST*, 2018. [PDF]

R. Desai, Y. Yuan, S. Coros. "Computational Abstractions for Interactive Design of Robotic Devices." *ICRA*, 2017. [PDF]

Additional publications (20+) in robotics, HCI, and biomechanics available on Google Scholar

Patents

A. Gupta, D. Yu, **R. Desai**, T. Jonker. "Optimizing the timing of intelligent facilitation." US Patent 12,423,923, 2025.

T. Kashyap, T. Jonker, B. Lafreniere, T. Langerak, **R. Desai**. "Methods, apparatuses and computer program products for mental model aware explainable artificial intelligence for intelligent user interfaces." US Patent App. 18/911,164, 2025.

T. Jonker, T. Zhang, F. Lai, A. Martinez, **R. Desai**, Y. Xu. "Authoring Context Aware Policies with Intelligent Suggestions." US Patent App. 18/458,576, 2024.

R. Desai, N. Kamra. "Task Optimization in an Extended Reality Environment." US Patent App. 18/305,003, 2023.

B. Newman, K. Carlberg, **R. Desai**, J. Hillis. "Optimal Assistance for Object-Rearrangement Tasks in Augmented Reality." US Patent 17/936,703, 2023.

F. Anderson, S. Coros, **R. Desai**, et al. "Generative design techniques for robot behavior." US Patent 11,772,275, 2023.

Additional patents (10+) on context-aware AR systems and human-AI interaction

Service & Leadership

Academic Service: Program Committee: AAAI (2025) | Workshop Organizer: CVPR (2024) | Associate Chair: ACM CHI (2020–2021) | Program Committee: ACM UIST (2019–2020) | Regular reviewer for NeurIPS, ICML, ICLR, CVPR, ICCV, ICRA, IROS, CHI (2015–present)

Teaching: Part-time Lecturer, Computer Vision, University of Washington (2025) | Guest lectures at University of Florida (2022)

Mentoring: Supervised 8+ PhD student interns at Meta (2019–2025).

Selected Press Coverage

TechCrunch: Meta is studying how humans and robots can collaborate on housework (2025) | TechCrunch: Embodied AI spins a pen and helps clean the living room (2023) | TechCrunch: New toolkit makes it easy to drag and drop your own robot (2017)