

# Anand Ballou

AI Research Engineer | PhD in Artificial Intelligence

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## Profile

PhD in Artificial Intelligence with expertise in machine learning, reinforcement learning, and large language models. My experience spans both academic research and industrial R&D, from developing novel learning algorithms and publishing peer-reviewed research to designing production-ready AI systems. Recently, I have focused on secure LLM deployment, Retrieval-Augmented Generation (RAG), Model Context Protocol (MCP), and large-scale machine learning pipelines for defense-oriented applications. I enjoy building AI systems that bridge cutting-edge research with real-world deployment.

## Experience

### AI Research Engineer – Thomson Broadcast

Nov. 2024 – Present

- Designed and developed AI solutions for defense-oriented research and development projects involving large-scale heterogeneous data.
- Built machine learning and deep learning pipelines for data classification, information extraction, and decision support.
- Developed Retrieval-Augmented Generation systems and Model Context Protocol servers to integrate LLMs with domain-specific knowledge bases and external tools.

### PhD Researcher – Inria Grenoble Rhône-Alpes – RobotLearn Team

Jan. 2020 – Mar. 2024

- Conducted research on reinforcement learning, meta-learning, and preference-based learning for socially-aware robotic navigation.
- Designed and implemented Social-Gym, an open-source benchmark for evaluating social reinforcement learning algorithms.
- Published peer-reviewed research in international journals and collaborated within the European H2020 SPRING project.

### Research Engineer Intern – Laboratoire d'Informatique de Grenoble (LIG)

2019

- Investigated topological data analysis techniques for active learning and sample selection.

### Software Engineering Intern – Sopra Steria Group

2018

- Redesigned and extended a Java enterprise application by introducing a modular notification framework.

## Education

### Ph.D. in Artificial Intelligence – Université Grenoble Alpes – Inria Grenoble Rhône-Alpes, France

2020 – 2024

Dissertation: *Meta Reinforcement Learning for Social Robotics*

Supervisors: Dr. Xavier Alameda-Pineda and, Dr. Chris Reinke

Research areas: Reinforcement Learning, Meta-Learning, Preference-Based Learning, Human-Robot Interaction

### M.Sc. in Computer Science (Engineering Degree) – Grenoble INP – Ensimag, France

2016 – 2019

MMIS track (Mathematics Modeling, Image & Simulation)

Courses:

- Applied Mathematics: functional analysis, probabilities, optimization, statistics, dynamical systems
- Computer Science: software engineering, language theory, algorithms and data structure

### Exchange Semester – KTH Royal Institute of Technology, Sweden

2019

Advanced coursework in Artificial Intelligence and Machine Learning.

## Publications

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**Variational Meta Reinforcement Learning for Social Robotics**– Anand Ballou, Chris Reinke, Xavier Alameda-Pineda 2023  
*Applied Intelligence*, Vol. 53(22), pp. 27249–27268, Springer • [GitHub](#)

**Meta-Reinforcement Learning for Social Robotics**– Anand Ballou 2024  
**Ph.D. Thesis**, Université Grenoble Alpes

## Talks

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**RL@Alpes 2023** 2023  
Variational Meta Reinforcement Learning for Social Robotics  
Grenoble, France

**Joint Inria Seminar (RobotLearn, Thoth & Morpheo Teams)** 2024  
Preference-Based Adaptive Reinforcement Learning for Social Robotics  
Lans-en-Vercors, France

## Selected Projects

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### Fishing monitoring System

Designed AI solutions to monitor fishing area involving large-scale heterogeneous data (radar/ais/images). Developed machine learning pipelines for classification, anomaly detection, and decision support while operating in secure environments.

Machine Learning • Deep Learning • Python • Data Engineering

### LLM for project management

Designed and deployed local Large Language Model infrastructures for my company, including Retrieval-Augmented Generation (RAG) pipelines and Model Context Protocol (MCP) servers for domain-specific knowledge retrieval and AI-assisted workflows on large-scale project

LLMs • RAG • MCP • Python • AI Systems

### Social-Gym

Designed and implemented an open-source benchmark for evaluating reinforcement learning algorithms in socially-aware robotic environments. Developed as part of my PhD research.

Python • Gymnasium • PyTorch • Reinforcement Learning • [GitHub](#)

### Preference-Based Meta-Reinforcement Learning

Developed reinforcement learning algorithms capable of rapidly adapting robot navigation policies using human preferences and feedback, combining meta-learning with preference-based reinforcement learning. Developed as part of my PhD research.

PyTorch • Meta-Learning • Reinforcement Learning • [GitHub](#)

## Technical Skills

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<b>Programming</b>	Python, C++, SQL
<b>Machine Learning</b>	PyTorch, Scikit-Learn, Deep Learning, Reinforcement Learning, Meta-Learning, Computer Vision
<b>LLM &amp; Generative AI</b>	Large Language Models, RAG, MCP, Prompt Engineering, Model Evaluation, AI Agents
<b>Software Engineering</b>	Git, Docker, Linux, REST APIs, Singularity
<b>Research</b>	Scientific Writing, Experiment Design, Statistical Analysis, Benchmarking, Optimization
<b>Journal Reviewer</b>	Neural Networks (2024-2026)
<b>Languages</b>	French (Native), English (Professional)