Adithya Ramesh
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Website | Github | LinkedIn | Google Scholar

EDUCATION

- **MS Robotics, Northeastern University, Concentration: Computer Science** Boston, USA, Sep 2023 - Present
- **Dual Degree (B.Tech, M.Tech) in Engineering Design, IIT Madras** Chennai, India, Aug 2011 - June 2016

PUBLICATIONS

- **"Physics-Informed Model-Based Reinforcement Learning"**, Adithya Ramesh and Balaraman Ravindran, published in Learning for Dynamics and Control Conference (L4DC), 2023. (Paper | Webpage | Code)

PROFESSIONAL EXPERIENCE

- **Research Associate, Khoury College of Computer Sciences, Northeastern University** Boston, USA, Sep 2023 - Present
  ***Foundation Model for Robotics*:** We apply reinforcement learning (RL) to robotic manipulation tasks. We learn a compact, low dimensional representation and a world model from high dimensional, partial observations such as images. The RL agent then learns to carry out the given task through imitation learning / model-free RL.

- **Research Associate, Department of Computer Science, IIT Madras** Chennai, India, Oct 2021 - Aug 2023
  Physics-Informed Model-Based Reinforcement Learning: We learn the dynamics model of a robot using a physics-informed neural network and use it to train a model-based RL algorithm. We show that, in model-based RL, model accuracy mainly matters in environments that are sensitive to initial conditions, where numerical errors accumulate fast.

- **Research Scientist, Honeywell** Bengaluru, India, June 2018 - Mar 2021
  ***Autonomous Navigation for Quadrotors using Reinforcement Learning*:** Developed a RL based autonomous navigation system for quadrotors, that can navigate to a goal position in the shortest path, without colliding with obstacles.

  Multi-Agent Cooperation using Reinforcement Learning: Developed multi-agent systems that can co-operate and execute a task. Adopted a centralized training and decentralized execution approach based on the MADDPG algorithm.

  LSTM based Speaker Recognition: Developed a LSTM based text-independent speaker recognition system. Trained on 2000 hours of audio from 6000 speakers. Achieved an accuracy of ~ 91.8% on a test dataset containing 1250 speakers.

- **Predible Health** Bengaluru, India, Sep 2017 - May 2018
  ***Biomedical Image Processing*:** Developed CNNs to classify nodules in lung CT scans as benign or malignant. Experimented with CNNs for liver CT segmentation, prostate MRI segmentation.

- **Founder, Stealth Robotics Startup** Chennai, India, June 2016 - Sep 2017

- **Intern, Airwood Aerostructures** Chennai, India, Dec 2014 - May 2015
  ***Flight Controller for Quadrotors*:** Worked on a flight controller for quadrotors. Developed complementary filter based state estimation algorithms and PID based control algorithms.

PROJECTS

- **Mixed State Entanglement in Quantized Chaotic Systems (Master's Thesis) (Link)**
  Studied entanglement in mixed states of quantized chaotic systems, focusing on the quantum coupled standard map. Explored entanglement dynamics for different interaction strengths and environment dimensions. Identified a critical dimension where entanglement decreases, potentially posing challenges in applications like quantum computing.

- **RL Repository (Link)**
  Implemented RL algorithms such as DQN, A3C, DDPG, MADDPG, PPO, SAC, etc, from scratch in Pytorch. Tested the algorithms on tasks from OpenAI Gym and Deepmind Control Suite. Open sourced the code.

- **Chaotic Dynamics in Robotic Manipulation (Course Project)**
  Studied chaotic dynamics in robotic manipulation that can occur for certain values of controller gains and model mismatch. Calculated Lyapunov exponents and plotted phase space plots to identify chaotic dynamics.

TEACHING

- Spring 2024, Fall 2023: TA for RL course at Khoury College of Computer Sciences, Northeastern University
- Spring 2022, Spring 2023: TA for RL course at Department of Computer Science, IIT Madras
- Spring 2016: TA for Electronics Lab course at Department of Engineering Design, IIT Madras
- Fall 2015: TA for Computer-Aided Design Lab course at Department of Engineering Design, IIT Madras

SKILLS

Operating Systems - Linux, Windows | ***Programming Languages*** - Python, C, C++ | ***Deep Learning Frameworks*** - Pytorch
Scientific Computing - Numpy, Scipy, Mathematica, Matlab | ***Visualization Tools*** - Matplotlib, Tensorboard
Development Tools - SSH, Docker, Git | ***Robotics Frameworks*** - ROS | ***Microcontrollers*** - Arduino, NodeMCUˆ
CAD - Autodesk Inventor | ***Robotics Simulation*** - Mujoco, OpenAI Gym, Deepmind Control Suite, Airsim, Gazebo

SCHOLASTIC ACHIEVEMENTS

- All India Rank 2264 in IIT Joint Entrance Examination 2011 (top 0.45% of 0.5 million candidates)
- All India Rank 642 in All India Engineering Entrance Examination 2011 (top 0.06% of 1.1 million candidates)
- Awarded the KVPY fellowship by the Department of Science and Technology, Government of India in 2011
- Featured in the top 1% of 40,000 candidates in the National Standard Examination in Physics 2011 and subsequently participated in the Indian National Physics Olympiad 2011
- Cleared qualifying stages and participated in the Indian National Mathematics Olympiad 2010 and the Indian National Olympiad in Informatics 2009, 2010
- Awarded the NTSE (National Talent Search Exam) scholarship by NCERT, Government of India in 2007