

Kausik Sivakumar

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EDUCATION

- **Master of Science in Engineering - Robotics** Philadelphia, PA
University of Pennsylvania ; GPA: 3.95/4 Aug 2021 - May 2023
Coursework: Modern Optimal Control, Learning in Robotics (Estimation, SLAM, and Reinforcement learning), Advanced Machine Perception, F1-tenth Autonomous Racing, Principles of Deep Learning, Machine Learning, Introduction to Robotics
- **Bachelor of Technology - Mechanical Engineering** India
Amrita Vishwa Vidyapeetham; GPA: 9.37/10 June 2016 - June 2020

EXPERIENCE

- **Research Assistant (Model-Based Reinforcement Learning) - PAL Lab** Philadelphia, PA
PI: Prof. Dinesh Jayaraman and Prof. Osbert Bastani May 2022 - Present
 - Introduced transition occupancy matching (TOM), a novel policy-aware dynamics model learning method that pays attention to transitions the policy can experience; this dynamics model drives the policy to higher task rewards
 - Under-review co-first author submission to L4DC 2023 conference
- **Research Assistant (Physics inspired learning) - DAIR Lab** Philadelphia, PA
PI: Prof. Micheal Posa Oct 2021 - May 2022
 - Worked on a computer vision-based tracking pipeline for Contactnets, which is a physics-inspired learning problem that estimates inertial and geometric parameters of the tracked object as they make and break contact
 - Employed BundleTrack for 6D pose estimation of objects with minimal supervision (without AprilTags) using color and depth images

RELEVANT PROJECTS

- **F1Tenth Autonomous Racing Project** Philadelphia, PA
Autonomous Racing (ESE 615) Feb 2022 - May 2022
 - Built the autonomy stack for an F1 car of $\frac{1}{10}^{th}$ scale - to compete in autonomous racing often controlled at state limits
 - Employed model-based hierarchical control algorithm (MPCC) for adaptive racing using sensor readings from a planar Hokuyo LIDAR
- **Safe Reinforcement Learning using Adaptive Penalty** ① Philadelphia, PA
Learning in Robotics (ESE 650) Mar 2022 - May 2022
 - Introduced a policy gradient approach to the model-based safe-reinforcement learning method CAP which adaptively controls the cost that penalizes the agent's exploratory behavior
 - Used Safety-GYM environment for inference and achieved minimum cost violations in comparison to the baseline, validating our method
- **Explanation of Recurrent Attention Models** ① Philadelphia, PA
Deep Learning (ESE 546) Nov 2021 - Dec 2021
 - Recurrent attention models is an ensemble of three different neural network layers (RNN, attention, and reinforcement) that tries to classify an image by taking a temporal sequence of glimpses
 - Added a variational autoencoder to the model which, with increasing glimpses, achieved close to perfect reconstructions of input data; qualitatively validates that only sparse parts of an image contain rich information for computer vision pipelines

SKILLS

- **Programming Languages:** Python, MATLAB, C/C++
- **Software:** Git, Docker, PyTorch, TensorFlow, Mujoco (OpenAI-GYM), ROS and ROS2

PUBLICATIONS AND DEMO

- POLICY AWARE MODEL LEARNING VIA TRANSITION OCCUPANCY MATCHING
J.Ma*, **K.Sivakumar***, J.Yan, O.Bastani, D.Jayaraman - **NeurIPS 2022 deep RL workshop**
- BUILDING DYNAMICS MODELS THROUGH CONTACT DISCONTINUITIES
B.Bianchini*, M.Halm*, **K.Sivakumar***, M.Posa- **ICRA 2022 demo**