

About Me

I am a robotics researcher at TCS Research with strong knowledge in the areas of robot vision and control. I have more than 3 years of industrial research experience. I have accomplished several projects and published papers in many reputed conferences. Currently, I am seeking a Ph.D. position to further expand my horizons in the field of Computer Vision. My current google scholar citation count is 29 and h-index is 4.

G-Scholar, Github

Experience

- **TCS Research and Innovation Labs** Bangalore, India
Robotics Researcher *July'16-till date*
 - I develop novel Deep Learning algorithms for machine perception and control. Currently, I am working on unsupervised learning methods for depth and ego-motion from monocular images.
- **Indian Institute of Technology Kharagpur** Kharagpur, India
Summer Research Intern *May-July'15*
 - We developed a simulation and hardware setup for a humanoid robot to implement Reinforcement Learning algorithms for dynamically stable gait.

Education

- **Rajiv Gandhi University of Knowledge Technologies** AP, India
Bachelors in Mechanical Engineering *June'12-May'16*
 - **CGPA:** 8.88/10.0
 - **Thesis:**
I developed an algorithm to generate dynamically stable gait using RL algorithms on a biped created in Gazebo Simulator video

Projects

UnDEMoN:Unsupervised Depth and Ego Motion Network Nov'17-till date

Depth and Ego-motion estimation is a very well known problem in robotics and computer vision domains. Many supervised methods solved this problem but having the ground truth for all the scenes is typically difficult and expensive while training. So, we propose a solution to solve this problem in a completely unsupervised fashion by making use of the geometric constraints in the images.

Tools used:Tensorflow, python, numpy, scipy, cv2, PIL

Links: code, video

Publications:

1. Babu, V. M., Majumdar, A., Kumar, S., & Das, K., **Unsupervised Monocular Depth and Ego-Motion Estimation using Conditional Patch GANs.** International Joint Conferences on Artificial Intelligence (IJCAI), 2019. paper
2. Garg, Sourav, Babu, V. M., Thanuja Dharmasiri, Stephen Hausler, Niko Suenderhauf, Swagat Kumar, Tom Drummond, and Michael Milford. **Look No Deeper: Recognizing Places from Opposing Viewpoints under Varying Scene Appearance using Single-View Depth Estimation**, IEEE International Conference on Robotics and Automation (ICRA) 2019. paper
3. Babu, V.M., Das, K., Majumdar, A. and Kumar, S., 2018, October. **UnDEMoN: Unsupervised deep network for depth and ego-motion estimation**. In 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) (pp. 1082-1088). IEEE. paper

4. Babu, V. M., Majumdar, A., Kumar, S., & Das, K., **Cyclically Consistent Unsupervised Monocular Depth estimation using patchGANs**. IEEE International Conference on Robotics and Automation (ICRA) 2020. (under Review)
5. Babu, V. M., Majumdar, A., Kumar, S., **Unsupervised Monocular Depth Estimation for Night-time Images using Adversarial Domain Feature Adaptation**. International conference on Computer Vision and Pattern Recognition (CVPR) 2020 (Under Review)

Follow-Me:

Sep'16 - Nov'17

Follow-me is a leader-follower architecture designed for drones. A complete vision-based relative localization is implemented using Aruco markers. A PID controller with an adaptive gain adjustment mechanism is brought in to address for downwash and turbulence effects. We have used an RL method named LSPI to replace the PID controller because of its adaptability to nonlinear disturbances.

Tools used:python, cv2, Robot Operating System (ROS), Gazebo, numpy

Links: video1, Video2

Publications:

1. Vankadari, M.B., Das, K., Shinde, C. and Kumar, S., 2018, June. **A Reinforcement Learning Approach for Autonomous Control and Landing of a Quadrotor**. In 2018 International Conference on Unmanned Aircraft Systems (ICUAS) (pp. 676-683). IEEE. paper
2. Vankadari, Madhu Babu, Kaushik Das, and Swagat Kumar. **Autonomous Leader-Follower Architecture of AR Drones in GPS Constrained Environments.**” Proceedings of the Advances in Robotics (AIR). ACM, 2017. paper
3. Babu, V. Madhu, Kaushik Das, and Swagat Kumar. **Designing of self tuning PID controller for AR drone quadrotor**. IEEE 18th International Conference on Advanced Robotics (ICAR) 2017. paper.

Path-Finder:

Sep'15 - Mar'16

Path-finder is one of my hobbyist projects. In this project, we have used Q-learning to find the shortest path in an occluded environment from a random initialized position to the goal in an image.

Tools used:Python, CV2, Arduino based mobile robot

Publications:

1. Babu, V. Madhu, U. Vamshi Krishna, and S. K. Shahenshah. **An autonomous path finding robot using Q-learning**. Intelligent Systems and Control (ISCO), 2016 10th International Conference on. IEEE, 2016. paper

Other Contributions

I have also co-authored other papers published in ROMAN'19 and ECC'18.

1. K. Ramachandruni, M. Vankadari, A. Majumder, S. Dutta and S. Kumar, **SMAK-Net: SelfSupervised Multi-level Spatial Attention Network for Knowledge Representation towards Imitation Learning**, in 2019 IEEE RO-MAN, IEEE, 2019 (Proceedings are not yet out)
2. Shinde, C., Das, K., Lima, R., Vankadari, M.B. and Kumar, S., 2019, June. **Adaptive Gaussian Mixture-Probability Hypothesis Density Based Multi Sensor Multi-Target Tracking**. In 2019 18th European Control Conference (ECC) (pp. 862-868). IEEE. paper

I have also served as a reviewer for conferences such as ICRA, ICUAS, CODIT, AIR, and ROMAN.