Sudhir Pratap Yadav

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Education

B.Tech. in Electrical Engineering *May 2014 - May 2018*
Indian Institute of Technology Jodhour, Rajasthan, India
CGPA: 8.64/10, Academic Distinction Award (2016-17)

Senior Secondary *May 2012 - May 2013*
Lords International School
School Topper and 2nd rank in district

Research Interest

Aim	Research and Learn everything required to develop a human-level robot
Current Interest	Using deep learning techniques (specifically RL) to make autonomous robots

Technical skills

Software (Lang. and Frameworks)	Python, Javascript, C++, Matlab, php, Pytorch, Tensorflow, ROS, Gazebo, PyBullet, A100 GPU
Hardware (Robots)	UR5, Kinova, Turtle Bot arm, TAL Brabo Industrial Robot, Quadcopter, Humanoid robot, Quadraped robot, P3DX robot, several hand-made robots
Hardware (Embedded)	Intel realsense camera, Kinect camera, Motioin Capture System, IMU, GPS, Lidar, Dynamixel Motors, Arduino, RaspberryPi, UP square board

Experience

Vision based Autonomous Systems Lab (TIH iHub Drishti) *September 2021 - January 2023*
Research Engineer *Jodhpur, India*

- Successfully setup vision-based robotics laboratory by designing the lab space, planning the necessary components, conducting thorough market research for appropriate robots and equipment, and coordinating the procurement and installation.
- Research (Pre-Print): **"Learning Vision-based Robotic Manipulation Tasks Sequentially in Offline Reinforcement Learning Settings."** Sudhir Pratap Yadav, Rajendra Nagar, and Suril V. Shah. arXiv preprint arXiv:2301.13450 (2023). arxiv code

Peronsal Break (July 2018 - July 2021): Took break to explore non-technical field but got extended due to health reasons

TCS Innovation Lab *May 2017 - July 2017*
Robotics Software Engineering Intern *Noida, India*

- Developed ROS interface for 5-DOF TAL BRABO Industrial robot arm. Robot was hacked to be controlled via Arduino as original controller was closed source. A visual-servoing pipline was developed to demonstrate proper working of interface.
- Code and Report: `https://github.com/sudhirpratapyadav/TAL_BRABO`

Robotics Research Centre (IIIT Hyderabad) *May 2016 - June 2016*
Robotics Research and Development Intern *Hyderabad, India*

- Developed kinematic model of 26-DOF humanoid. Implemented static balance by calculating ZMP, COM and using force sensors.

Robotics Projects

Vision based control of UR5 robotic arm using Deep RL *July 2017 - May 2018*
Robotics Lab IIT Jodhpur — Dr. Suril V. Shah
Visual Servoing for Eye-in-Hand Robotic Manipulator using Deep Deterministic Policy Gradients (DDPG). Aim was to train UR5 arm for visual-servoing a specific object of certain colour. ROS was used to control UR5 robot while RL agent was trained using TORCH(LUA) on simulator GAZEEBO.
Code and Report: `https://github.com/sudhirpratapyadav/Vision-UR5-Deep-RL`

Quadruped Navigation using RL *Dec 2016 - May 2017*
Robotics Lab IIT Jodhpur — Dr. Suril V. Shah
Main focus of this project was to make quadruped learn to walk on terrain using TD learning. The Kinematic model of quadruped and RL agent were developed in C++.
Code and Report: `https://github.com/sudhirpratapyadav/Quadruped-Navigation-RL`

Simulating Autonomous Mini-Helicopter *July 2016 - Dec 2016*
Defence Lab Jodhpur — Dr. Suril V. Shah
Design and development of autonomous mini helicopter to carry 2.6 kg nuclear radiation sensor in Emergency Scenario in desert area. A very accurate simulation of the helicopter was developed in matlab and PID controller was used to control its trajectory.

Quadcopter trajectory tracking *June 2016 - July 2016*
Robotics Lab IIT Jodhpur — Dr. Suril V. Shah
Implemented PID control on quadcopter for making it track different trajectories. State feedback was taken using VICON motion capture system and quadcopter was controlled through ROS.
Video: `https://github.com/sudhirpratapyadav/PID-control-of-Quadcopter`

Control of P3DX and Mapping *June 2016 - July 2016*
Robotics Lab IIT Jodhpur — Dr. Suril V. Shah
The P3DX robot was operated using ROS using PID contoller. Kinect was used as depth sensor for building a map of a corridor using the Occupancy Grid mapping algorithm implement in MATLAB.
Code and Report: `https://github.com/sudhirpratapyadav/P3DX-Mapping`

Gait Planning Of Quadruped *Jan 2016 - May 2016*
Robotics Lab IIT Jodhpur — Dr. Suril V. Shah
Developed a kinematic simulation of quadruped in MATLAB for walking using crawl gait. Crawl gait was also implemented on real quadruped robot.
Code and Report: `https://github.com/sudhirpratapyadav/Gait-Planning-Quadruped`

Side Fun Projects

VR Tour(2023)	Created VR Tour of Robotics lab using 360-deg images from theta-v camera
Nerf (2022)	Nerf (2022) Created Nerf's for various places of the IITJ Campus
Playing 2048 game using RL (2017)	Playing 2048 game using RL (2017)) Game created in C++ and python and solved using TD-learning
Unblock-me puzzle (2014)	Vision based detection and automatic solver

Coursework

NPTEL / Coursera	Deep Learning (2022, Topper), Machine Learning Specialization (2022), Robotics: Estimation and Learning (2016), Principles of computing (2016)
Undergrad (2014-2018)	Introduction to Robotics, Control Systems, Digital Image Analysis, Digital Signal Processing, Algorithm Design and Analysis

Contributing back to community

Workshop (2022)	Conducted a workshop on ROS
Mentor on Coursera (2017)	Given opportunity to be mentor of the course on Robot Estimation and Learning
Head (2015), Mentor (2016) Robotics Club	Mentored students and took few lecture series so to strengthen robotics culture in IITJ
Volunteer Parivartan Group (2014-2017)	Group was focused on social service. My group was given opportunity to teach school students who could not afford tution.