SAPAN AGRAWAL

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OBJECTIVE

Full-time summer internship and Co-Op in Planning and Controls for year 2020-2021.

EDUCATION

Worcester Polytechnic Institute, MA   Aug 2019 - Present
Master of Science in Robotics, Automation and Mechatronics Engineering (GPA 4/4)

Visvesvaraya National Institute of Technology, India   2014 - 2018
Bachelor of Technology in Mechanical Engineering (GPA 3.2/4)

TECHNICAL STRENGTHS

Programming & Skills   C++, Python
Software & Tools   ROS, GAZEBO, MoveIt, MATLAB, PyTorch, OpenAI Gym, RBDL

EXPERIENCE

Carnegie Mellon University, Research Scholar   June 2018 - June 2019
- Implemented A* algorithm with sample unit tests in C++ to select between rolling and walking gait while optimizing the cost of transportation.
- Generated active controlled dynamic walking gait for Flyped robot using energy shaping method with verification in GAZEBO simulator [Flyped Link].
- Implemented and compared Linear Quadratic Regulator(LQR) and partial feedback linearization control algorithms to increase the re-planning time for the Flyped robot.
- Developed iLQR based motion and footstep planning algorithm for bipedal robot locomotion [Paper].

Sant'Anna School of Advanced Studies, Visiting Intern   Summer 2017
- Designed compliant anthropomimectic robotic arm based on Mckibben pneumatic muscles to achieve human-like cognitive characteristics through sensory-actuation control.
- Developed low-cost 3D printed tactile sensor and performed analysis of data acquired using LabVIEW Rio Essential Kit.

HuroCup Competition, FIRA'16, Team Lead   Dec 2016
- Spear-headed a team of 9 students and participated in HuroCup Challenge at Federation of International Robot Soccer Association (FIRA), Beijing [Link].

IvLabs, VNIT, Intern   Summer 2016
- Designed 20 DoF kid-sized humanoid robot - Swayat, using 3D Printing manufacturing process. [Link].
- Developed offline walking gait pattern based on Linear Inverted Pendulum Model (LIPM).

PUBLICATIONS

- Unified Footstep selection and motion-planning for legged systems in real-time, **Humanoids'19** [Paper]
- Novel Legged Omni Crawler to wheel Transforming Module, Poster Presentation, **Robotics Science and Systems(RSS)'18** [Poster][Workshop].
- OSWalT - Omnidirectional Spherical Wall Traversing Robot, Poster Presentation, **International Conference on Robotics and Automation (ICRA'18)** [Poster]
- Self-Reconfigurable Transformer Robot, Poster Presentation, **International Conference on Robotics and Automation (ICRA'18)** [Poster]

PROJECTS

Learning Cost Function for real-time adaptive motion planning   Fall 2019
- The research aims at achieving real-time adaptive motion planning for non-holonomic mobile robots by learning cost function from experiences using Deep Learning. [Link].

Curiosity driven exploration for navigation in MineRL environment   Fall 2019
- Implemented Curiosity driven exploration for navigation in MineRL environment with sparse rewards in Pytorch framework [Poster].
- Trained a Deep Q-Network to play Atari games in Pytorch framework [Link].
- Implemented Q-Learning for Go-to-Goal grid world in MATLAB. [Link]

Impedance Controller for MTM of dVRK   Fall 2019
- Implemented task-space impedance controller in python for 7 DoF MTM and KUKA LBR in AMBF Simulator using RBDL. [Link]

Multi-Snake Modular Robot, Undergraduate Thesis   Aug 2017- Feb 2018
- Designed and manufactured a bio-inspired modular self-assembling robot capable of changing its morphology to adapt to unforeseen environmental challenges [Link].
- Developed linear regression, side-winding, rolling and rotating gaits for snake modules and walking gait.
- The work was presented at ICRA 2018, Australia Abstract-Only Presentation.[Poster]

HVAC ducts robotic cleaning system, Industrial Technology Transfer   Feb 2016 - Nov 2016
- Developed a product for Nirmitee Group's Ozone House, Nagpur capable of cleaning and inspecting HVAC ducts with wireless live feed on smart phones [Link].

Blind Navigator   Nov 2015 - Jan 2016
- Developed a product prototype to assist visually impaired people in navigating local and in-home environment at cost of 28 US Dollars. [Link].

INDIAN PATENTS

- **Device for navigation assistance in dark or no visibility ambiance**, Application Number 201821015010, filed on April 20 2018, Patent Pending.
- **Humanoid Robot**, Application Number 201721015920, filed on May 05 2017, Patent Pending.
- **Robotic Cleaning System for internal cleaning of unit**, Patent Number 313857, filed on Nov 03 2017, Patent Granted.

EXTRACURRICULAR AND COMMUNITY ACTIVITIES

- **Mentor and Design Reviewer**, IvLabs   Jan 2018 - Present
  Projects: OSWalT, Quadruped robot, Self-Balancing Bot, Humanoid Robot.
- **Technical Secretary**, IEEE VNIT Students' Chapter.   May 2017 - April 2018
- **Treasurer cum Technical Secretary**, IvLabs   May 2016 - April 2017
  Managed resources and funds for the lab.
- **Peer reviewer**, IEEE Robotics Conferences ICRA, IROS, ROBIO.
- **Tutor**, courses Basics of Kinematics, Linear Algebra and Controls under IvLabs Lecture Series.
- Coordinated various workshops under IEEE addressing a mob of 100-120 students.
- Professional freelancer in designing and CAD modelling of parts of bikes, cars and bodies as demanded.