SAPAN AGRAWAL

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OBJECTIVE

Full-time summer internship and Co-op position 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

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 PyTorch, OpenAI Gym, ROS, GAZEBO, MoveIt, VREP, MATLAB, RBDL

EXPERIENCE

Carnegie Mellon University, Research Scholar June 2018 - June 2019

- Implemented A* planner 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].
- Analysed Linear Quadratic Regulator(LQR), and partial feedback linearization to increase the foot trajectory re-planning time for the Flyped robot.
- Developed Constraint iLQR based unified motion and footstep planner for bipedal robot [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 and characterised low-cost 3D printed tactile sensor.

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 and fabricated 20 DoF kid-sized humanoid robot- Swayat, using 3D Printing technology [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, **Robotics Science and Systems(RSS)'18 [Poster][Workshop]**.
- OSWalT - Omnidirectional Spherical Wall Traversing Robot, **International Conference on Robotics and Automation (ICRA'18) [Poster]**
- Self-Reconfigurable Transformer Robot, **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 articulated mobile robots by learning cost function from experiences.

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 [Video].
- Implemented Q-Learning for Go-to-Goal grid world in MATLAB. [Video]

Impedance Controller for MTM of dVRK Fall 2019

- Implemented task-space impedance controller MTM and KUKA LBR in AMBF Simulator using RBDL. [Presentation]

Multi-Snake Modular Robot, Undergraduate Thesis Aug 2017- Feb 2018

- Designed and fabricated 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 set of robots 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 an assisting device for visually impaired people to navigate in 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

- **Mentorship and Teaching**, 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
  Raised fund of $40000 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.