Vaibhav Nandkumar Kadam

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EDUCATION

Bachelor of Engineering - Electronics, University of Mumbai   *Aug 2014 – July 2018*
- Thesis "Closed-loop control of Ball Balancing Robot" under the supervision of Prof. Divya Shah.
  Coursework – Embedded Control, Introduction to Robotics, Image processing.

RESEARCH INTERESTS

Multi-agent systems | Mobile Robotics | Bio-inspired Robots | Modular Robots.

KEY SKILLS

Programming: C++/C, Python, ROS, MATLAB.
Software: Simulink, MATLAB Multibody simulation, RViz, Gazebo, Solidworks, Git, Linux.
Robotics Product Development: Multi-sensor interfacing, CAD, 3D printing, rapid prototyping.

EXPERIENCE

Senior Robotics Engineer, Peppermint Robots Pune
Responsibilites include   *July 2021 - Present*
- Development of Navigation Stack and Maximum Coverage Path Planning for industrial floor cleaning robots.

Research Assistant, ARMS Lab IIT Bombay   Dr. Leena Vachhani, Dr. Abhishek Gupta
Search and Reconnaissance using Spherical Robots. [Demo link] [Robot Developed]   *July 2018 – June 2021*
- Designed and Developed an ergonomic palm-sized Spherical rolling robot for easy deployment to Internal Security agencies. Responsible for product development and technology transfer. [Press coverage Link]
- Investigated advanced control strategies to reduce the nonlinear wobble of the spherical bot. Contributed to developing a throwable spherical robot to aid easy deployment.

Trimod Modular robots using Spherical Robots. [Demo link]   *April 2020 - Present*
- Designed Trimod, a modular mobile base that can dock with other trimods to accomplish a collective task.
- Developed generalized kinematic model for N-Trimod configurations validated simulated on MATLAB multibody simulation to traverse multiple trimods on complex, uneven terrain.

Mobile Base with Spherical Robot as wheels. [Publication] [Robot Developed]   *Oct 2018 - July 2019*
- Developed a novel omnidirectional Mobile base using Spherical robots as wheels. [Demo link]
- Implemented waypoint navigation environment to validate the kinematic model and investigate holonomic control.

Undergraduate Researcher, Advanced Research Lab RAIT   Prof. Divya Shah
Closed-loop control of Ball Balancing Robot. [Publication] [Robot Developed]   *July 2018 - May 2018*
- Designed and developed a Ball Balancing Robot. Derived inverse kinematics for 3 Omni wheels on the ball. Contributed to position and velocity control of DC motor for controlled actuation using low-level microcontroller with ROS.
- Implemented PID control to dynamically stabilize the linearized robot model. Experimented with various SLAM algorithms with Kinect and ROS packages.

Tensegrity-based rolling robot for uneven terrain. [Robot Developed]
- Developed a tensegrity-based Fullerene structure-inspired icosahedron rolling robot. Investigated various control strategies to develop various maneuvers. Contributed to mechatronic design and development of each node.
- Focused on estimation and sensor integration for position and orientation. Achieved Regional Level prize out of 300 teams all over India at Eyantra competition IIT Bombay.

PUBLICATIONS & PATENT

- **Trimod: A modular robot using spherical robots as wheels.** | *In pipeline*   *2021*
  Vaibhav Kadam, Himanshu Kumar, Abhishek Gupta, Leena Vachhani.
- **Control of an Omnidirectional Mobile Base with Multiple Spherical Robots.** [Link]   *2019*
  Vaibhav Kadam, Leena Vachhani, Abhishek Gupta. "6th Indian Control Conference", Hyderabad, India.
- **Closed-Loop Control of Unstable Omni Directional Assisting System.** [Link]   *2018*
  Vaibhav Kadam, Pramod Jadhav, Anay Ghatpande, G. H. Saket Seshadri, Divya Shah, Pratik Jadhav.
  "4th International Conference for Convergence in Technology" I2CT, Mangalore, India.
- **Tensegrity-based rolling robot for Earthquake Rescue and Relief Operations.** [Link]   *2018*
  Application Number 201821008351 Patent filed on March 7, 2018.