Virbhadrappa Kalburgi
Robotics & Automation

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SUMMARY

To secure a challenging position in a progressive research and development environment where my expertise in Robotics Navigation, SLAM, and Localization, Motion planning in- cluding ROS, CPP, Python, OOP, state machines, point cloud-based mapping, localization, and precise control, can be utilized to advance autonomous robot navigation systems and contribute to technological innovation and development. I am particularly interested in op- portunities to collaborate with interdisciplinary teams, drive research initiatives, and develop practical solutions that address real-world challenges in robotics navigation. Additionally, I am committed to continuous learning and staying updated with emerging technologies to remain at the forefront of the field. For details, click here.

WORK EXPERIENCE

Research Associate   Singapore University of Technology and Design   Dec 2023 - present

I am a Robotics Researcher at the Singapore University of Technology and Design, where my primary focus is on developing sustainable solutions for the challenges associated with mobile robot navigation and Autonomous Ve- hicles. I am committed to making impactful contributions in this domain, striv- ing to enhance the efficiency and effectiveness of robotic navigation and Au- tonomous Vehicles with a strong emphasis on sustainability. Additionally, I have experience working on a system involving mobile buoys for water qual- ity inspection, which operates on an Ubuntu 16.04 Linux platform and incor- porates sensors for dissolved oxygen (DO), pH, and resistance temperature detection (RTD).

Senior Research Assistant   Singapore University of Technology and De-   Dec 2021 - Dec 2023
sign

A highly skilled Robotics Navigation expert proficient in ROS, C++, and Python, with a proven track record of spearheading the development and ap- plication of advanced navigation algorithms to enable autonomous mobility for robots. Experienced in designing and integrating state-of-the-art control systems, implementing efficient point cloud-based mapping techniques, and enhancing robot positioning accuracy through various localization methods. Proficient in creating custom controllers for precise motion and path planning and integrating sensor fusion algorithms for robust perception. Seeking a challenging role in a dynamic research and development environment where I can leverage my expertise to drive innovation and contribute to the advance- ment of autonomous navigation systems.

Robotics Software Engineer   Hi-Tech Systemz Pvt.ltd   Feb 2021- Sep 2021

In this role, I am deeply immersed in the fascinating field of Mobile Robots, specializing in developing and deploying advanced ROS (Robot Operating System) software for these autonomous machines. My passion for cutting- edge technology drives me to design and implement state-of-the-art SLAM (Simultaneous Localization and Mapping) algorithms, which are crucial for the robot to create a map of its environment while simultaneously knowing its precise location within that map.

Research Intern   Rakuten Institute of Technology (RIT)   Nov 2018- Apr 2019

As a Research Intern, I worked on Follow behavior robot for last-mile delivery, using the ROS and Machine learning to improve e-commerce.

Student Intern Computational Neuroscience and Neurophysiology   Apr 2018- Sep 2018
Labs, Amritapuri

As an Intern, I worked on robotics arm, which works on spiking CMAC us- ing Izhikivch model. This work helps to study and understand how a human neuron works to perform any task.

Educational Projects

Adaptive Control system design for insect type legged robot

Problem statement: Getting the robot stability of legged robot in all terrain area without losing the balance it is very difficult also the surface of the area effect force distributed consuming of the robot. Getting more stable and low power consuming robot is very important while wanting to surveillance of dangers and harmful area such as a tunnel.

Solution: Adaptive controller using ROS for insect type robot with low power consuming and challenge facing like obstacle avoiding without losing robot balance and stability in given environment. ros_controller_manager is helps to manage the each controller which used in the robot to control locomotion of legs.With help of the imu data make robot stable waking.

Implementation of spiking CMAC neural model to control robotic arm

Problem statement: How neural microcircuits of human brain comprised of spiking neurons exhibit complex dynamic stable coordinated motor movements can be implemented for robot arm that contributes to motor coordination, timing and precision of movements and to develop a model from the results to understand biological cerebellar pathways responsible for such functions?

Solution: Using the Izhikivch model and CMAC model implemented Spiking CMAC for control 2 DOF robotic arm.

Education

2020	M.Tech (Robotics & Automation) at **Amrita Vishwa Vidyapeetham**
2017	Bachelor's Degree (Electronics and Telecommunication) at **SKN Sinhgad College of Engineer, Solapur University**
2013	Diploma Degree (Electronics and Telecommunication) at **S.V.S.M.D's Polytechnic Akkaklot, Mumbai board**

Specialization Courses

Reinforcement Learning Specialization by University of Alberta   View Certificate

The Reinforcement Learning Specialization has 4 courses, exploring adaptive learning systems and AI. I learned to build RL systems for decision making, formalize tasks as RL problems, and understand its relation to machine learning.

Self Driving Cars Specialization by University of Toronto   View Certificate

This Specialization provides a comprehensive understanding of self- driving car engineering using real data sets from an autonomous vehicle. You'll learn various methods for detection, localization, planning, and control through hands-on projects with CARLA simulator. After successful comple- tion, you'll be equipped to build your self-driving software and pursue jobs in the autonomous vehicle industry.

DeepLearning.AI TensorFlow Developer Specialization by Deeplearn- ing.ai   View Certificate

In the DeepLearning.AI TensorFlow Developer Professional Certificate, I learned to build and train neural networks with TensorFlow, improve network performance using convolutions for real-world image recognition, and create natural language processing systems for understanding and responding to human speech.

Deep Learning Specialization by Deeplearning.ai   View Certificate

The Deep Learning Specialization prepares learners for AI develop- ment and understanding the power and challenges of deep learning. It covers fundamental neural networks to real-world applications like Computer Vision, Natural Language Processing, and Speech Recognition.

PUBLICATIONS

James, PM et al. (2021). "Design, analysis, manufacturing of four-legged walking robot with insect type leg". In: *Materials Today: Proceedings* 46, pp. 4647–4652.

Kalburgi, Virbhadrappa et al. (2021). "Control system design for four-legged walking robot with insect type leg using ROS". In: *Materials Today: Proceedings* 46, pp. 5092–5097.

Trivedi, Akshunn et al. (2024). *RobotX 2024 Technical Design Report*. Technical Design Report. Team MARVL, RobotX 2024 Competition. Singapore University of Technology and Design.

PATENTS

WO2025216714 - ROBOT, ROBOTIC SYSTEM AND METHOD OF MANIPULATING A CONTAINER FITTING View Patent

SKILLS

Programming Skills	C,C++,Python, MATLAB,Machine Learning, Docker,git,CI,CD, Deep Learning, Arduino
Software Skills	ROS, ROS2, MATLAB Simulink, GAZEBO Simulator, V-REP Simulator, Moveit Simulator, Carla Car Simulator,Object-Oriented Programming and Design, Robot Localization Techniques, Sensor Fusion (LiDAR, RGB-D cameras,IMUs), Simultaneous Localization and Mapping (SLAM)
Key Strength	Taking Leadership, Confident, Accept new challenges, Willing to learn new things

ACHIEVEMENTS

- Successfully contributed to the development and registration of Patent WO2025216714, "Robotic System for Mobile Manipulator Navigation and Container Fitting Manipulation." The patent presents a novel multi-sensor robotic architecture enabling robust perception, control, and coordinated dual-arm manipulation in complex environments, and has been officially published by the World Intellectual Property Organization (WIPO).

- A technical disclosure has been filed with the Singapore University of Technology and Design (SUTD) concerning a mobile manipulator system developed for the Port of Singapore Authority (PSA). This system facilitates precise and reliable task execution for automated coning and de-coning operations.

- Winner in ROBOSOFT2023 competition organized by IEEE Robotics and Automation.

- National level computation in ROBOCON2016 MATLAB workshop winner

- Second prize in innovation project which is conducted by COEP college pune

- Delivered a workshop on Arduino at SKN Sinhgad College of Engineering Pandhapur