Sujet Phodapol

ROBOTICS CONTROL ENGINEER

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Education

KTH Royal Institute of Technology *Stockholm, Sweden*

MSc Systems, Control and Robotics, Grade 5.0/5.0 *Aug 2021 - Nov 2023*

- KTH One-Year Scholarship 2022, awarded to master's students who have achieved outstanding results in their first year of studies.
- **Thesis:** *"Distributed Predictive Controllers for Load Transportation in microgravity Environments"*, Derived a mathematical model for a multi-agent tethered system. Developed numerical and physical simulations. Designed and implemented both centralized and decentralized MPC controllers for load transportation tasks, achieving a 35% reduction in computation time with the decentralized approach.
- **Courses:** Control Theory, Artificial Intelligence and Multi-Agent Systems, Estimation, Computer Vision, Robotics, Modelling

ETH Zürich *Zürich, Switzerland*

MSc Robotics, Systems and Control (Exchange) *Sep 2022 - Feb 2023*

- **Semester Projects:**
  - *"Data-driven adaptive control: a geometric approach"*, at Automatic Control Laboratory, Developed a data-driven control algorithm for stabilizing linear time-varying systems, utilizing a subspace tracking approach to continuously update the estimated subspace in real-time based on online measurement data.
  - *"Design Optimization for Serial Elastic Actuators on Quadrupedal Robots"*, at Robotic Systems Lab, Developed two models integrating series elastic actuators into a small quadrupedal robot for learning-based design optimization, increasing maximum velocity and reducing energy consumption with the optimized design.
- **Courses:** Advanced model predictive control

Chulalongkorn University *Bangkok, Thailand*

B.Eng. in Mechanical Engineering, GPA 3.96/4.00 (First-Class Honors, Gold Medal) *Aug 2016 - May 2020*

- **Thesis:** *"An Agile Quadruped Robot"*, Designed and prototyped a quadruped robot with 8 degrees of freedom, incorporating series elastic actuators (SEA) for compliant behavior. Implemented feedback control to enable locomotion in two gaits: walking and trotting.

Work Experience

Nimble One *Toulouse, France*

Locomotion Control Engineer *Apr 2024 - Present*

- Developed a predictive controller for a wheel-legged shape-shifting robot, optimizing movement and stability across terrains for efficient locomotion and adaptability.
- Conducted experiments on a real robot to evaluate and refine locomotion control algorithms, collaborating with the platform team to integrate control systems with physical components and ensure efficient real-time performance in dynamic environments.

Division of Decision and Control Systems (DCS), KTH Royal Institute of Technology *Stockholm, Sweden*

Research Engineer (Part-Time) *Apr 2023 - Dec 2023*

- **DISCOWER Project**:
  - Designed and developed microgravity testing platforms at the Space Robotics Laboratory, using a pneumatic air cushion to eliminate friction between the air bearing and surface, enabling frictionless operation of autonomous robots.
  - Developed a Gazebo simulation and established a ROS 2 communication pipeline, used in both the simulation environment and on real robot hardware.
- **CANOPIES Project**:
  - Implemented and conducted experiments with two mobile robots in an agricultural field using the LTL planner, enabling the robots to safely operate alongside humans while completing the assigned tasks.

Vidyasirimedhi Institute of Science and Technology (VISTEC) *Rayong, Thailand*

Robotics Engineer *Nov 2020 - July 2021*

- Formulated a numerical model for physical simulation in MATLAB and fabricated a prototype for Morphological Adaptation for Speed Control of Pipeline Inspection Gauges (MC-PIG).
- Developed a state estimation system using an extended Kalman filter to predict the position and velocity of the inspection robot in C++, integrating ROS and CoppeliaSim.

Skills

Programming	Python, C/C++, MATLAB, ROS, ROS 2
CAD/CAM	Solidworks, Fusion360, CATIA V5R21, AutoCAD
Simulation	ANSYS, Simulink (MATLAB), Gazebo, Coppeliasim
Embedded system	Arduino, STM32, Raspberry Pi

Publications

2025 T. Suthisomboon, **S. Phodapol**, T. Pairam, K. Phongaksorn, N. Asawalertsak, P. Kriengkomol, T. Jitnaknan, P. Janbanjong, and P. Manoonpong, "*Morphological Adaptation for Speed Control of Pipeline Inspection Gauges: From System Integration to Real-World Demonstration*", (SII 2025) Awarded: **Winner of the SICE International Young Authors Award (SIYA)**

2024 **S. Phodapol**, P. Roque, D.V. Dimarogonas, "*Collaborative Load Transportation in Microgravity Environments: Centralized and Decentralized Predictive Controllers*", (CASE 2024)

2024 S.A. Deka, **S. Phodapol**, A.M. Gimenez, V.N. Fernandez-Ayala, R. Wong, P. Yu, X. Tan, D.V. Dimarogonas, "*Enhancing Precision Agriculture Through Human-in-the-Loop Planning and Control*", (CASE 2024)

2023 **S. Phodapol**, A. Harnkhamen, N. Asawalertsak, S. N. Gorb and P. Manoonpong, "Insect Tarsus-Inspired Compliant Robotic Gripper With Soft Adhesive Pads for Versatile and Stable Object Grasping", (RA-L and IROS 2023)

2022 **S. Phodapol**, T. Chuthong, B. Leung, A. Srisuchinnawong, P. Manoonpong, N. Dilokthanakul, "GRAB: GRAdient-Based Shape-Adaptive Compliant Locomotion Control", (RA-L and ICRA 2022)

2021 **S. Phodapol**, T. Suthisomboon, P. Kosanunt, R. Vongasemjit, P. Janbanjong, P. Manoonpong (2021), "Morphological Adaptation for Speed Control of Pipeline Inspection Gauges (MC-PIG)", (ADIPEC 2021)

2021 Manoonpong, P., **Phodapol, S.**, Suthisomboon, T., Kosanunt, P., Kasemwarapach, T., Janbanjong, P., "A Device for Moving in a Pipeline". Petty Patent Filing No: 2103002124, (Thai Patent Office)

Relevant Projects

Multi-agent system for soccer game *Stockholm, Sweden*

KTH Royal Institute of Technology *Apr 2022*

- Developed and implemented an algorithm in C for 3 vs 3 soccer games in Unity, utilizing a behavior tree to manage decision-making for both holonomic and nonholonomic systems.

Behavior tree for service robot (TIAGo robot) *Stockholm, Sweden*

KTH Royal Institute of Technology *Oct 2021*

- Developed a behavior tree to automate the transportation tasks of a service robot, integrating localization and navigation functions within ROS.

Automated storage and retrieval system *Bangkok, Thailand*

Chulalongkorn University *Nov - Dec 2019*

- Developed a prototype for an industrial transportation system using Raspberry Pi, created an IoT cloud platform for communication between the robot and control room, and implemented a localization system using a bird's-eye view camera to track the robot's position.

Smart Camera *Bangkok, Thailand*

Chulalongkorn University *Nov - Dec 2019*

- Implemented face recognition using a deep learning library and SVM model in Python, and built a 2-DOF security camera system to track individuals, sending data to the cloud via Raspberry Pi and NETPIE (IoT cloud platform).

3D-printed Quadruped robot *Bangkok, Thailand*

Chulalongkorn University *Aug - Sep 2019*

- Developed a motion sensor controller for a quadrupedal robot using STM32, created a prototype with 3D printing, and enabled remote control via Bluetooth.

Languages

English Professional proficiency

Thai Native proficiency