

David Navarro Alarcon  
Associate Professor  
Department of Mechanical Engineering  
**Email:** david.navarro-alarcon@polyu.edu.hk  
**Phone:** 27667816

## Biography

I am an Associate Professor of Robotics and Control at the Department of Mechanical Engineering of PolyU.

## Qualifications

Mechanical and Automation Engineering, PhD, Chinese University of Hong Kong  
Award Date: 1 Feb 2014

5 Oct 2019 → ... Senior Member of Institute of Electrical and Electronics Engineers, Senior Member of Institute of Electrical and Electronics Engineers

IEEE Senior Member

## Employment

### Associate Professor

Associate Professor  
Department of Mechanical Engineering  
The Hong Kong Polytechnic University  
1 Jul 2023 → present

### Visiting Researcher

Technical University of Munich  
Germany  
1 Jun 2019 → 1 Jun 2019

### Visiting Professor

Université de Toulon  
France  
1 Apr 2019 → 1 Apr 2019

### Research Assistant Professor

Chinese University of Hong Kong  
Hong Kong  
1 Jul 2015 → 1 Jun 2017

## Research outputs

### Interactive Perception for Deformable Object Manipulation

Weng, Z., Zhou, P., Yin, H., Kravberg, A., Varava, A., Navarro-Alarcon, D. & Kragic, D., Sept 2024, In: IEEE Robotics and Automation Letters. 9, 9, p. 7763-7770 8 p.

### Predefined-Time Fault-Tolerant Control for Active Vehicle Suspension Systems With Reference X-Dynamics and Conditional Disturbance Cancellation

Zhou, Z., Zhang, M., Navarro-Alarcon, D. & Jing, X., 6 Aug 2024, In: IEEE Transactions on Intelligent Transportation Systems. 25, 11, p. 18661-18672 12 p.

### Leader-Follower Formation Control of Perturbed Nonholonomic Agents along Parametric Curves with Directed Communication

Zhang, B., Shao, X., Zhi, H., Qiu, L., Romero, J. G. & Navarro-Alarcon, D., Aug 2024, In: IEEE Robotics and Automation Letters. 9, 10, p. 8603-8610 8 p.

**Non-Prehensile Object Transport by Nonholonomic Robots Connected by Linear Deformable Elements**

Zhi, H., Zhang, B., Qi, J., Romero, J. G., Shao, X., Yang, C. & Navarro-Alarcon, D., Aug 2024, In: IEEE Robotics and Automation Letters. 9, 10, p. 8651-8658 8 p.

**Reactive human-robot collaborative manipulation of deformable linear objects using a new topological latent control model**

Zhou, P., Zheng, P., Qi, J., Li, C., Lee, H. Y., Duan, A., Lu, L., Li, Z., Hu, L. & Navarro-Alarcon, D., Aug 2024, In: Robotics and Computer-Integrated Manufacturing. 88, 102727.

**Model predictive manipulation of compliant objects with multi-objective optimizer and adversarial network for occlusion compensation**

Qi, J., Zhou, P., Ran, G., Gao, H., Wang, P., Li, D., Gao, Y. & Navarro-Alarcon, D., Jul 2024, In: ISA Transactions. 150, p. 359-373 15 p.

**A Dynamical System Approach to Robotic Ultrasound Imaging: Towards Intrinsically Stable Robotic Sonography**

Liuchen, W., Duan, A., Song, Z., Victorova, M. & Navarro-Alarcon, D., Jun 2024, *2024 IEEE International Conference on Real-Time Computing and Robotics, RCAR 2024*. Institute of Electrical and Electronics Engineers Inc., p. 647-652 6 p. (2024 IEEE International Conference on Real-Time Computing and Robotics, RCAR 2024).

**Untethered Bimodal Robotic Fish with Tunable Bistability**

Chao, X., Hameed, I., Navarro-Alarcon, D. & Jing, X., May 2024, *2024 IEEE International Conference on Robotics and Automation, ICRA 2024*. Institute of Electrical and Electronics Engineers Inc., p. 1491-1497 7 p. (Proceedings - IEEE International Conference on Robotics and Automation).

**A Controllable Nonlinear Bistable "Fishtail" Boosting Robotic Swimmer with Excellent Maneuverability and High Energy Efficiency**

Chao, X., Hameed, I., Navarro-Alarcon, D. & Jing, X., 2024, (Accepted/In press) In: Soft Robotics.

**Bimanual Deformable Bag Manipulation Using a Structure-of-Interest Based Neural Dynamics Model**

Zhou, P., Zheng, P., Qi, J., Li, C., Lee, H. Y., Pan, Y., Yang, C., Navarro-Alarcon, D. & Pan, J., 2024, (Accepted/In press) In: IEEE/ASME Transactions on Mechatronics.

**Dual-arm shaping of soft objects in 3D based on visual servoing and online FEM simulations**

Saghour, C., Navarro-Alarcón, D., Fraisse, P. & Cherubini, A., 2024, (Accepted/In press) In: International Journal of Robotics Research.

**Forecasting Semantic Bird-Eye-View Maps for Autonomous Driving**

Gao, S., Wang, Q., Navarro-Alarcon, D. & Sun, Y., 2024, *35th IEEE Intelligent Vehicles Symposium, IV 2024*. Institute of Electrical and Electronics Engineers Inc., p. 509-514 6 p. (IEEE Intelligent Vehicles Symposium, Proceedings).

**InPTC: Integrated Planning and Tube-Following Control for Prescribed-Time Collision-Free Navigation of Wheeled Mobile Robots**

Shao, X., Zhang, B., Zhi, H., Romero, J. G., Fan, B., Hu, Q. & Navarro-Alarcon, D., 2024, (Accepted/In press) In: IEEE/ASME Transactions on Mechatronics.

**Performance-Oriented Understanding and Design of a Robotic Tadpole: Lower Energy Cost, Higher Speed**

Chao, X., Hameed, I., Navarro-Alarcon, D. & Jing, X., 2024, (Accepted/In press) In: Journal of Field Robotics.

**Rearranging Deformable Linear Objects for Implicit Goals with Self-Supervised Planning and Control**

Huo, S., Hu, F., Wang, F., Hu, L., Zhou, P., Zhu, J., Wang, H. & Navarro-Alarcon, D., 2024, (Accepted/In press) In: Advanced Intelligent Systems.

**Robust Grasping by Bimanual Robots With Stable Parameterization-Based Contact Servoing**

Duan, A., Huo, S., Lee, H. Y., Zhou, P., Romero, J. G., Yang, C. & Navarro-Alarcon, D., 2024, In: IEEE/ASME Transactions on Mechatronics. 29, 5, p. 3924-3935 12 p.

**Safe Learning by Constraint-Aware Policy Optimization for Robotic Ultrasound Imaging**

Duan, A., Yang, C., Zhao, J., Huo, S., Zhou, P., Ma, W., Zheng, Y. & Navarro-Alarcon, D., 2024, (Accepted/In press) In: IEEE Transactions on Automation Science and Engineering. p. 1-12 12 p.

**SolarFusionNet: Enhanced Solar Irradiance Forecasting via Automated Multi-Modal Feature Selection and Cross-Modal Fusion**

Jing, T., Chen, S., Navarro-Alarcon, D., Chu, Y. & Li, M., 2024, (Accepted/In press) In: IEEE Transactions on Sustainable Energy.

**Fourier-Based Multi-Agent Formation Control to Track Evolving Closed Boundaries**

Zhang, B., Zhi, H., Romero, J. G., Labazanova, L., Duan, A., Li, X. & Navarro-Alarcon, D., 1 Nov 2023, In: IEEE Transactions on Circuits and Systems I: Regular Papers. 70, 11, p. 4549-4559 11 p.

**InconSeg: Residual-Guided Fusion with Inconsistent Multi-modal Data for Negative and Positive Road Obstacles Segmentation**

Feng, Z., Guo, Y., Navarro-Alarcon, D., Lyu, Y. & Sun, Y., 1 Aug 2023, In: IEEE Robotics and Automation Letters. 8, 8, p. 4871-4878 8 p.

**A Multisensor Interface to Improve the Learning Experience in Arc Welding Training Tasks**

Lee, H. Y., Zhou, P., Duan, A., Wang, J., Wu, V. & Navarro-Alarcon, D., 1 Jun 2023, In: IEEE Transactions on Human-Machine Systems. 53, 3, p. 619-628 10 p.

**Neural reactive path planning with Riemannian motion policies for robotic silicone sealing**

Zhou, P., Zheng, P., Qi, J., Li, C., Duan, A., Xu, M., Wu, V. & Navarro-Alarcon, D., Jun 2023, In: Robotics and Computer-Integrated Manufacturing. 81, 102518.

**Comparison of ultrasound scanning for scoliosis assessment: Robotic versus manual**

Victorova, M., Lau, H. H. T., Lee, T. T. Y., Navarro-Alarcon, D. & Zheng, Y., Apr 2023, In: International Journal of Medical Robotics and Computer Assisted Surgery. 19, 2, e2468.

**Self-Reconfigurable Soft-Rigid Mobile Agent With Variable Stiffness and Adaptive Morphology**

Labazanova, L., Peng, S., Qiu, L., Lee, H. Y., Nanayakkara, T. & Navarro-Alarcon, D., 1 Mar 2023, In: IEEE Robotics and Automation Letters. 8, 3, p. 1643-1650 8 p.

**Adaptive Shape Servoing of Elastic Rods using Parameterized Regression Features and Auto-Tuning Motion Controls**

Qi, J., Ran, G., Wang, B., Liu, J., Ma, W., Zhou, P. & Navarro-Alarcon, D., 2023, (Accepted/In press) In: IEEE Robotics and Automation Letters. p. 1-8 8 p.

**A Distributed Dynamic Framework to Allocate Collaborative Tasks Based on Capability Matching in Heterogeneous Multi-Robot Systems**

Lee, H. Y., Zhou, P., Zhang, B., Qiu, L., Fan, B., Duan, A., Tang, J., Lam, T. L. & Navarro-Alarcon, D., 2023, (Accepted/In press) In: IEEE Transactions on Cognitive and Developmental Systems. p. 1 1 p.

**Imitating Tool-Based Garment Folding From a Single Visual Observation Using Hand-Object Graph Dynamics**

Zhou, P., Qi, J., Duan, A., Huo, S., Wu, Z. & Navarro-Alarcon, D., 2023, (Accepted/In press) In: IEEE Transactions on Industrial Informatics. p. 1-12 12 p.

**Balancing Control of Wheeled-Legged Hexapedal Robots for Traversing Rough Terrains**

Duan, A., Zhang, B., Hu, L., Feng, L. & Navarro-Alarcon, D., Dec 2022, *2022 IEEE International Conference on Robotics and Biomimetics, ROBIO 2022*. Institute of Electrical and Electronics Engineers Inc., p. 1905-1910 6 p. (2022 IEEE International Conference on Robotics and Biomimetics, ROBIO 2022).

**Computing Thermal Point Clouds by Fusing RGB-D and Infrared Images: From Dense Object Reconstruction to Environment Mapping**

Zhang, T., Hu, L., Sun, Y., Li, L. & Navarro-Alarcon, D., Dec 2022, *2022 IEEE International Conference on Robotics and Biomimetics, ROBIO 2022*. Institute of Electrical and Electronics Engineers Inc., p. 1707-1714 8 p. (2022 IEEE International Conference on Robotics and Biomimetics, ROBIO 2022).

#### **Speech-Vision Based Multi-Modal AI Control of a Magnetic Anchored and Actuated Endoscope**

Li, J., Huang, Y., Ng, W. Y., Cheng, T., Wu, X., Dou, Q., Meng, H., Heng, P. A., Liu, Y., Chan, S. M., Navarro-Alarcon, D., Hang Ng, C. S., Yan Chiu, P. W. & Li, Z., Dec 2022, *2022 IEEE International Conference on Robotics and Biomimetics, ROBIO 2022*. Institute of Electrical and Electronics Engineers Inc., p. 403-408 6 p. (2022 IEEE International Conference on Robotics and Biomimetics, ROBIO 2022).

#### **Paint With the Sun: A Thermal-Vision Guided Robot to Harness Solar Energy for Heliography**

Hu, L., Duan, A., Li, M., Cherubini, A., Li, L. & Navarro-Alarcon, D., 15 Sept 2022, In: *IEEE Sensors Journal*. 22, 18, p. 18130-18142 13 p.

#### **Challenges and Outlook in Robotic Manipulation of Deformable Objects**

Zhu, J., Cherubini, A., Dune, C., Navarro-Alarcon, D., Alambeigi, F., Berenson, D., Ficuciello, F., Harada, K., Kober, J., Li, X., Pan, J., Yuan, W. & Gienger, M., 1 Sept 2022, In: *IEEE Robotics and Automation Magazine*. 29, 3, p. 67-77 11 p.

#### **Ultrasound-Guided Assistive Robots for Scoliosis Assessment With Optimization-Based Control and Variable Impedance**

Duan, A., Victorova, M., Zhao, J., Sun, Y., Zheng, Y. & Navarro-Alarcon, D., 1 Jul 2022, In: *IEEE Robotics and Automation Letters*. 7, 3, p. 8106-8113 8 p.

#### **A Globally Convergent Adaptive Velocity Observer for Nonholonomic Mobile Robots Affected by Unknown Disturbances**

Romero, J. G., Navarro-Alarcon, D., Nuno, E. & Que, H., 27 Jun 2022, In: *IEEE Control Systems Letters*. 7, p. 85-90 6 p.

#### **On Radiation-Based Thermal Servoing: New Models, Controls, and Experiments**

Hu, L., Navarro-Alarcon, D., Cherubini, A., Li, M. & Li, L., 1 Jun 2022, In: *IEEE Transactions on Robotics*. 38, 3, p. 1945 - 1958 14 p.

#### **Keypoint-Based Planar Bimanual Shaping of Deformable Linear Objects under Environmental Constraints with Hierarchical Action Framework**

Huo, S., Duan, A., Li, C., Zhou, P., Ma, W., Wang, H. & Navarro-Alarcon, D., 1 Apr 2022, In: *IEEE Robotics and Automation Letters*. 7, 2, p. 5222-5229 8 p.

#### **Robotics Meets Cosmetic Dermatology: Development of a Novel Vision-Guided System for Skin Photo-Rejuvenation**

Muddassir, M., Gomez Dominguez, D., Hu, L., Chen, S. & Navarro-Alarcon, D., 1 Apr 2022, In: *IEEE/ASME Transactions on Mechatronics*. 27, 2, p. 666 - 677 12 p.

#### **Development of a numerical multi-layer model of skin subjected to pulsed laser irradiation to optimise thermal stimulation in photorejuvenation procedure**

Muddassir, M., Limbert, G. & Navarro-Alarcon, D., Apr 2022, In: *Computer Methods and Programs in Biomedicine*. 216, 106653.

#### **Follow the Curve: Robotic Ultrasound Navigation with Learning Based Localization of Spinous Processes for Scoliosis Assessment**

Victorova, M., Lee, M. K. S., Navarro-Alarcon, D. & Zheng, Y., Apr 2022, In: *IEEE Access*. 10, p. 40216-40229 14 p.

#### **Shape Control of Elastic Objects Based on Implicit Sensorimotor Models and Data-Driven Geometric Features**

Ma, W., Zhu, J. & Navarro-Alarcon, D., Apr 2022, *Intelligent Autonomous Systems 16 - Proceedings of the 16th International Conference IAS-16*. Ang Jr, M. H., Asama, H., Lin, W. & Foong, S. (eds.). Springer Science and Business Media Deutschland GmbH, p. 518-531 14 p. (Lecture Notes in Networks and Systems; vol. 412 LNNS).

#### **A Bio-Inspired Mechanism for Learning Robot Motion From Mirrored Human Demonstrations**

Zahra, O., Tolu, S., Zhou, P., Duan, A. & Navarro-Alarcon, D., 14 Mar 2022, In: *Frontiers in Neurobotics*. 16, 826410.

**A Sensor-Based Robotic Line Scan System with Adaptive ROI for Inspection of Defects over Convex Free-Form Specular Surfaces**

Huo, S., Zhang, B., Muddassir, M., Chik, D. T. & Navarro-Alarcon, D., 1 Feb 2022, In: IEEE Sensors Journal. 22, 3, p. 2782 - 2792 11 p.

**Action Planning for Packing Long Linear Elastic Objects Into Compact Boxes With Bimanual Robotic Manipulation**

Ma, W., Zhang, B., Han, L., Huo, S., Wang, H. & Navarro-Alarcon, D., 2022, (Accepted/In press) In: IEEE/ASME Transactions on Mechatronics. p. 1-12 12 p.

**Model Predictive Thermal Dose Control of a Robotic Laser System to Automate Skin Photorejuvenation**

Muddassir, M., Limbert, G., Zhang, B., Duan, A., Tan, J. J. & Navarro-Alarcon, D., 2022, (Accepted/In press) In: IEEE/ASME Transactions on Mechatronics. p. 1-11 11 p.

**A Novel Approach to Model the Kinematics of Human Fingers Based on an Elliptic Multi-Joint Configuration**

Wu, Z., Labazanova, L., Zhou, P. & Navarro-Alarcon, D., Dec 2021, *2021 20th International Conference on Advanced Robotics, ICAR 2021*. Institute of Electrical and Electronics Engineers Inc., p. 777-784 8 p. (2021 20th International Conference on Advanced Robotics, ICAR 2021).

**Bio-Inspired Design of Artificial Striated Muscles Composed of Sarcomere-Like Contraction Units**

Labazanova, L., Wu, Z., Gu, Z. & Navarro-Alarcon, D., Dec 2021, *2021 20th International Conference on Advanced Robotics, ICAR 2021*. Institute of Electrical and Electronics Engineers Inc., p. 370-377 8 p. (2021 20th International Conference on Advanced Robotics, ICAR 2021).

**Can a Tesla Turbine be Utilised as a Non-Magnetic Actuator for MRI-Guided Robotic Interventions?**

Navarro-Alarcon, D., Labazanova, L., Chow, M. K. & Wang Ng, K., Dec 2021, *2021 IEEE International Conference on Robotics and Biomimetics, ROBIO 2021*. Institute of Electrical and Electronics Engineers Inc., p. 1735-1742 8 p. (2021 IEEE International Conference on Robotics and Biomimetics, ROBIO 2021).

**Towards a Multispectral RGB-IR-UV-D Vision System - Seeing the Invisible in 3D**

Zhang, T., Hu, L., Li, L. & Navarro-Alarcon, D., Dec 2021, *2021 IEEE International Conference on Robotics and Biomimetics, ROBIO 2021*. Institute of Electrical and Electronics Engineers Inc., p. 1723-1728 6 p. (2021 IEEE International Conference on Robotics and Biomimetics, ROBIO 2021).

**Can a robot outperform a human operator in skin photorejuvenation?**

Muddassir, M., Si Un, C., Gomez, D. & Navarro-Alarcon, D., Nov 2021, In: Journal of Cosmetic Dermatology. 20, 11, p. 3714-3715 2 p.

**Towards latent space based manipulation of elastic rods using autoencoder models and robust centerline extractions**

Qi, J., Ma, G., Zhou, P., Zhang, H., Lyu, Y. & Navarro-Alarcon, D., Nov 2021, In: Advanced Robotics. 36, 3, p. 101-115 15 p.

**A Robotic Defect Inspection System for Free-form Specular Surfaces**

Huo, S., Navarro-Alarcon, D. & Chik, D. T. W., Oct 2021, *2021 IEEE International Conference on Robotics and Automation, ICRA 2021*. Institute of Electrical and Electronics Engineers Inc., p. 11364-11370 7 p. (Proceedings - IEEE International Conference on Robotics and Automation; vol. 2021-May).

**Vision-based manipulation of deformable and rigid objects using subspace projections of 2D contours**

Zhu, J., Navarro-Alarcon, D., Passama, R. & Cherubini, A., Aug 2021, In: Robotics and Autonomous Systems. 142, 103798.

**LaSeSOM: A Latent and Semantic Representation Framework for Soft Object Manipulation**

Zhou, P., Zhu, J., Huo, S. & Navarro-Alarcon, D., Jul 2021, In: IEEE Robotics and Automation Letters. 6, 3, p. 5381-5388 8 p., 9410363.

**Path Planning with Automatic Seam Extraction over Point Cloud Models for Robotic Arc Welding**

Zhou, P., Peng, R., Xu, X., Wu, V. W. H. & Navarro-Alarcon, D., Jul 2021, In: IEEE Robotics and Automation Letters. 6, 3, p. 5002-5009 8 p., 9394722.

**A Fully Spiking Neural Control System Based on Cerebellar Predictive Learning for Sensor-Guided Robots**

Zahra, O., Navarro-Alarcon, D. & Tolu, S., May 2021, *2021 IEEE International Conference on Robotics and Automation, ICRA 2021*. Institute of Electrical and Electronics Engineers Inc., p. 4423-4429 7 p. (Proceedings - IEEE International Conference on Robotics and Automation; vol. 2021-May).

**Differential mapping spiking neural network for sensor-based robot control**

Zahra, O., Tolu, S. & Navarro-Alarcon, D., May 2021, In: Bioinspiration and Biomimetics. 16, 3, 036008.

**Sensor-Based Control for Collaborative Robots: Fundamentals, Challenges, and Opportunities**

Cherubini, A. & Navarro-Alarcon, D., 7 Jan 2021, In: Frontiers in Neurobotics. 14, 576846.

**A Neurobotic Embodiment for Exploring the Dynamical Interactions of a Spiking Cerebellar Model and a Robot Arm during Vision-Based Manipulation Tasks**

Zahra, O., Navarro-Alarcon, D. & Tolu, S., 2021, (Accepted/In press) In: International Journal of Neural Systems.

**Contour Moments Based Manipulation of Composite Rigid-Deformable Objects With Finite Time Model Estimation and Shape/Position Control**

Qi, J., Ma, G., Zhu, J., Zhou, P., Lyu, Y., Zhang, H. & Navarro-Alarcon, D., 2021, (Accepted/In press) In: IEEE/ASME Transactions on Mechatronics.

**A Lyapunov-Stable Adaptive Method to Approximate Sensorimotor Models for Sensor-Based Control**

Navarro-Alarcon, D. (Corresponding Author), Qi, J., Zhu, J. & Cherubini, A., 17 Sept 2020, In: Frontiers in Neurobotics. 14, 59.

**A collaborative robotic uterine positioning system for laparoscopic hysterectomy: Design and experiments**

Yip, H. M., Wang, Z., Navarro-Alarcon, D., Li, P., Cheung, T. H., Greiffenhagen, C. & Liu, Y. H., 1 Aug 2020, In: International Journal of Medical Robotics and Computer Assisted Surgery. 16, 4, e2103.

**A Point Cloud-Based Method for Automatic Groove Detection and Trajectory Generation of Robotic Arc Welding Tasks**

Peng, R., Navarro-Alarcon, D. (Corresponding Author), Wu, W. H. & Yang, W., Jun 2020, *2020 17th International Conference on Ubiquitous Robots, UR 2020*. p. 380-386 7 p. 9144861. (2020 17th International Conference on Ubiquitous Robots, UR 2020).

**Force-Ultrasound Fusion: Bringing Spine Robotic-US to the Next "Level"**

Tirindelli, M., Victorova, M., Esteban, J., Kim, S. T., Navarro-Alarcon, D., Zheng, Y. & Navab, N., Jun 2020, In: IEEE Robotics and Automation Letters. 5, 4, p. 5661-5668 8 p., 9140314.

**3D shape control of linear deformable objects by robot manipulator**

Ma, W. & Navarro-Alarcon, D., Nov 2019, (Not published / presented only).

**A RGB-D Method for Computing the Curvature of Rod-Like Objects Manipulated by Robots**

Ma, W. & Navarro-Alarcon, D., Nov 2019, (Not published / presented only) *9th East Asia Mechanical and Aerospace Engineering Workshop*.

**Vision-Guided Robot for Skin Photo-Rejuvenation**

Muddassir, M. & Navarro-Alarcon, D., Nov 2019, (Not published / presented only).

**On model adaptation for sensorimotor control of robots**

Navarro-Alarcon, D., Cherubini, A. & Li, X., Jul 2019, *Proceedings of the 38th Chinese Control Conference, CCC 2019*. Fu, M. & Sun, J. (eds.). IEEE Computer Society, p. 2548-2552 5 p. 8865825. (Chinese Control Conference, CCC; vol.

2019-July).

### **3D Ultrasound Imaging of Scoliosis with Force-Sensitive Robotic Scanning**

Victorova, M., Navarro-Alarcon, D. & Zheng, Y. P., 26 Mar 2019, *Proceedings - 3rd IEEE International Conference on Robotic Computing, IRC 2019*. Institute of Electrical and Electronics Engineers Inc., p. 262-265 4 p. 8675657. (Proceedings - 3rd IEEE International Conference on Robotic Computing, IRC 2019).

### **A self-organizing network with varying density structure for characterizing sensorimotor transformations in robotic systems**

Zahra, O. & Navarro-Alarcon, D., 1 Jan 2019, *Towards Autonomous Robotic Systems - 20th Annual Conference, TAROS 2019, Proceedings*. Althoefer, K., Konstantinova, J. & Zhang, K. (eds.). Springer-Verlag, p. 167-178 12 p. (Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics); vol. 11650 LNAI).

### **Computing pressure-deformation maps for braided continuum robots**

Navarro-Alarcon, D., Zahra, O., Trejo, C., Olguin-Diaz, E. & Parra-Vega, V., 1 Jan 2019, In: *Frontiers Robotics AI*. 6, FEB, 4.

### **Robotic Ultrasound Navigation for Scoliosis Diagnostics and Facet Joint Injections**

Victorova, M., Navarro-Alarcon, D. & Zheng, Y., 2019, (Not published / presented only).

### **A Unified Controller for Region-reaching and Deforming of Soft Objects**

Wang, Z., Li, X., Navarro-Alarcon, D. & Liu, Y. H., 27 Dec 2018, *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 2018*. Institute of Electrical and Electronics Engineers Inc., p. 472-478 7 p. 8593543. (IEEE International Conference on Intelligent Robots and Systems).

### **Fourier-Based Shape Servoing: A New Feedback Method to Actively Deform Soft Objects into Desired 2-D Image Contours**

Navarro Alarcon, D. & Liu, Y. H., 1 Feb 2018, In: *IEEE Transactions on Robotics*. 34, 1, p. 272-279 8 p., 8106734.

### **A Depth-Based Algorithm for Manipulating Deformable Objects Using Smooth Parametric Surfaces and Energy Minimisation**

Navarro-Alarcon, D. & Zahra, O. I. E. A. A. E., 2018, (Not published / presented only).

### **Sensor-Guided Skin Photo-Rejuvenation Robotic System**

Muddassir, M., Navarro-Alarcon, D., Zahra, O. I. E. A. A. E., Victorova, M. & Ma, W., 2018, *8th East Asia Mechanical and Aerospace Engineering Workshop*.

### **Developing a Compact Robotic Needle Driver for MRI-Guided Breast Biopsy in Tight Environments**

Navarro-Alarcon, D., Singh, S., Zhang, T., Chung, H. L., Ng, K. W., Chow, M. K. & Liu, Y., Jul 2017, In: *IEEE Robotics and Automation Letters*. 2, 3, p. 1648 - 1655 8 p.

### **Image-Based Trajectory Tracking Control of 4-DoF Laparoscopic Instruments Using a Rotation Distinguishing Marker**

Wang, Z., Lee, C. S., Zhong, F., Navarro-Alarcon, D., Liu, Y., Deguet, A., Kazanzides, P. & Taylor, R. H., Jul 2017, In: *IEEE Robotics and Automation Letters*. 2, 3, p. 1586 - 1592 8 p.

### **An image-based uterus positioning interface using ADALINE networks for robot-assisted hysterectomy**

Yip, H. M., Navarro-Alarcon, D. & Liu, Y., 2017, *2017 IEEE International Conference on Real-time Computing and Robotics (RCAR)*. IEEE

### **Visual Shape Servoing of Deformable Objects: The Fundamentals**

Navarro-Alarcon, D., 2017, (Not published / presented only).

### **Adaptive 3D pose computation of suturing needle using constraints from static monocular image feedback**

Zhong, F., Navarro Alarcon, D., Wang, Z., Liu, Y. H., Zhang, T., Yip, H. M. & Wang, H., 28 Nov 2016, *IROS 2016 - 2016 IEEE/RSJ International Conference on Intelligent Robots and Systems*. IEEE, Vol. 2016-November. p. 5521-5526 6 p. 7759812

Robust image-based computation of the 3D position of RCM instruments and its application to image-guided manipulation  
Navarro Alarcon, D., Wang, Z., Yip, H. M., Liu, Y. H., Zhong, F., Zhang, T., Shi, J. & Wang, H., 8 Jun 2016, *2016 IEEE International Conference on Robotics and Automation, ICRA 2016*. IEEE, Vol. 2016-June. p. 4115-4121 7 p. 7487603

Let Me Give You A Hand: A Dexterous Robot That Helps ENT Surgeons with Manipulation Tasks.  
Navarro-Alarcon, D. & Liu, Y., May 2016, In: *CUEngineering*. 1 p., 1.

Automatic 3-D Manipulation of Soft Objects by Robotic Arms with an Adaptive Deformation Model  
Navarro Alarcon, D., Yip, H. M., Wang, Z., Liu, Y. H., Zhong, F., Zhang, T. & Li, P., 1 Apr 2016, In: *IEEE Transactions on Robotics*. 32, 2, p. 429-441 13 p., 7429768.

Design of a Novel Compliant Safe Robot Joint with Multiple Working States  
Wang, Z., Yip, H. M., Navarro Alarcon, D., Li, P., Liu, Y. H., Sun, D., Wang, H. & Cheung, T. H., 1 Apr 2016, In: *IEEE/ASME Transactions on Mechatronics*. 21, 2, p. 1193-1198 6 p., 7328739.

Foot-controlled robotic-enabled endoscope holder for endoscopic sinus surgery: A cadaveric feasibility study  
Chan, J. Y. K., Leung, I., Navarro Alarcon, D., Lin, W., Li, P., Lee, D. L. Y., Liu, Y. H. & Tong, M. C. F., 1 Mar 2016, In: *Laryngoscope*. 126, 3, p. 566-569 4 p.

A novel palm-shape breast deformation robot for MRI-guided biopsy  
Zhang, T., Navarro Alarcon, D., Ng, K. W., Chow, M. K., Liu, Y. H. & Chung, H. L., 1 Jan 2016, *2016 IEEE International Conference on Robotics and Biomimetics, ROBIO 2016*. IEEE, p. 527-532 6 p. 7866376

Development of an eye-gaze controlled interface for surgical manipulators using eye-tracking glasses  
Yip, H. M., Navarro Alarcon, D. & Liu, Y. H., 1 Jan 2016, *2016 IEEE International Conference on Robotics and Biomimetics, ROBIO 2016*. IEEE, p. 1900-1905 6 p. 7866606

Adaptive image-based positioning of RCM mechanisms using angle and distance features  
Navarro Alarcon, D., Yip, H. M., Wang, Z., Liu, Y. H., Lin, W. & Li, P., 11 Dec 2015, *IROS Hamburg 2015 - Conference Digest: IEEE/RSJ International Conference on Intelligent Robots and Systems*. IEEE, Vol. 2015-December. p. 5403-5409 7 p. 7354141

**A new robotic uterine positioner for laparoscopic hysterectomy with passive safety mechanisms: Design and experiments**  
Yip, H. M., Wang, Z., Navarro Alarcon, D., Li, P., Liu, Y. H. & Cheung, T. H., 11 Dec 2015, *IROS Hamburg 2015 - Conference Digest: IEEE/RSJ International Conference on Intelligent Robots and Systems*. IEEE, Vol. 2015-December. p. 3188-3194 7 p. 7353819

Modeling, design and control of an endoscope manipulator for FESS  
Lin, W., Navarro Alarcon, D., Li, P., Wang, Z., Yip, H. M., Liu, Y. H. & Tong, M. C. F., 11 Dec 2015, *IROS Hamburg 2015 - Conference Digest: IEEE/RSJ International Conference on Intelligent Robots and Systems*. IEEE, Vol. 2015-December. p. 811-816 6 p. 7353465

Passivity-based tracking controllers for mechanical systems with active disturbance rejection  
Romero, J. G., Donaire, A., Navarro Alarcon, D. & Ramirez, V., 1 Oct 2015, In: *IFAC-PapersOnLine*. 28, 13, p. 129-134 6 p.

Design and control of a novel multi-state compliant safe joint for robotic surgery  
Wang, Z., Li, P., Navarro Alarcon, D., Yip, H. M., Liu, Y. H., Lin, W. & Li, L., 1 Jan 2015, In: *Proceedings - IEEE International Conference on Robotics and Automation*. 2015-June, June, p. 1023-1028 6 p., 7139302.

Towards Developing a Robot Assistant for Uterus Positioning During Hysterectomy: System Design and Experiments  
Yip, H. M., Li, P., Navarro-Alarcon, D. & Liu, Y., 2015, In: *Journal of Robotics and Biomimetics*.



A method to regulate the torque of flexible-joint manipulators with velocity control inputs  
Navarro Alarcon, D., Wang, Z., Yip, H. M., Liu, Y. H., Li, P. & Lin, W., 20 Apr 2014, *2014 IEEE International Conference on Robotics and Biomimetics, IEEE ROBIO 2014*. IEEE, p. 2437-2442 6 p. 7090705

A new circular-guided remote center of motion mechanism for assistive surgical robots  
Yip, H. M., Li, P., Navarro Alarcon, D., Wang, Z. & Liu, Y. H., 20 Apr 2014, *2014 IEEE International Conference on Robotics and Biomimetics, IEEE ROBIO 2014*. IEEE, p. 217-222 6 p. 7090333

A dynamic and uncalibrated method to visually servo-control elastic deformations by fully-constrained robotic grippers  
Navarro Alarcon, D. & Liu, Y. H., 1 Jan 2014, In: *Proceedings - IEEE International Conference on Robotics and Automation*. p. 4457-4462 6 p., 6907509.

Energy shaping methods for asymptotic force regulation of compliant mechanical systems  
Navarro Alarcon, D., Liu, Y. H., Romero, J. G. & Li, P., 1 Jan 2014, In: *IEEE Transactions on Control Systems Technology*. 22, 6, p. 2376-2383 8 p., 6776417.

Lyapunov-stable eye-in-hand kinematic visual servoing with unstructured static feature points  
Navarro Alarcon, D. & Liu, Y. H., 1 Jan 2014, *IROS 2014 Conference Digest - IEEE/RSJ International Conference on Intelligent Robots and Systems*. IEEE, p. 755-760 6 p. 6942643

On the visual deformation servoing of compliant objects: Uncalibrated control methods and experiments  
Navarro Alarcon, D., Liu, Y. H., Romero, J. G. & Li, P., 1 Jan 2014, In: *International Journal of Robotics Research*. 33, 11, p. 1462-1480 19 p.

Development of a robotic endoscope holder for nasal surgery  
Li, P., Yip, H. M., Navarro Alarcon, D., Liu, Y., Tong, C. F. M. & Leung, I., 1 Dec 2013, *2013 IEEE International Conference on Information and Automation, ICIA 2013*. p. 1194-1199 6 p. 6720476

Uncalibrated vision-based deformation control of compliant objects with online estimation of the Jacobian matrix  
Navarro Alarcon, D. & Liu, Y. H., 1 Dec 2013, *IROS 2013: New Horizon, Conference Digest - 2013 IEEE/RSJ International Conference on Intelligent Robots and Systems*. p. 4977-4982 6 p. 6697075

Visually servoed deformation control by robot manipulators  
Navarro Alarcon, D., Liu, Y., Romero, J. G. & Li, P., 14 Nov 2013, *2013 IEEE International Conference on Robotics and Automation, ICRA 2013*. p. 5259-5264 6 p. 6631329

Model-free visually servoed deformation control of elastic objects by robot manipulators  
Navarro Alarcon, D., Liu, Y. H., Romero, J. G. & Li, P., 1 Jan 2013, In: *IEEE Transactions on Robotics*. 29, 6, p. 1457-1468 12 p., 6581888.

Robust globally exponentially stable control for mechanical systems in free/constrained-motion tasks  
Romero, J. G., Navarro Alarcon, D. & Panteley, E., 1 Jan 2013, *2013 IEEE 52nd Annual Conference on Decision and Control, CDC 2013*. IEEE, p. 3067-3072 6 p. 6760350

Energy shaping control for robot manipulators in explicit force regulation tasks with elastic environments  
Navarro Alarcon, D., Li, P. & Yip, H. M., 29 Dec 2011, *IROS'11 - 2011 IEEE/RSJ International Conference on Intelligent Robots and Systems: Celebrating 50 Years of Robotics*. p. 4222-4228 7 p. 6048286

Stable force/position control of a robotic endoscope holder for constrained tasks in nasal surgery  
Navarro Alarcon, D., Liu, Y. & Li, P., 9 Sept 2011, *WCICA 2011 - 2011 World Congress on Intelligent Control and Automation, Conference Digest*. p. 1195-1200 6 p. 5970705

Dexterous cooperative manipulation with redundant robot arms

Navarro Alarcon, D., Parra-Vega, V., Vite-Medecigo, S. & Olguin-Diaz, E., 1 Dec 2009, *Progress in Pattern Recognition, Image Analysis, Computer Vision and Applications - 14th Iberoamerican Conference on Pattern Recognition, CIARP 2009, Proceedings*. p. 910-917 8 p. (Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics); vol. 5856 LNCS).

Minimum set of feedback sensors for high performance decentralized cooperative force control of redundant manipulators

Navarro Alarcon, D., Parra-Vega, V. & Olguin-Díaz, E., 22 Dec 2008, *ROSE 2008 - IEEE International Workshop on Robotic and Sensors Environments Proceedings*. p. 114-119 6 p. 4669191

Force-position exponential tracking of redundant manipulators with model-free sliding PD control

Navarro Alarcon, D. & Parra-Vega, V., 1 Dec 2008, *2008 5th International Conference on Electrical Engineering, Computing Science and Automatic Control, CCE 2008*. p. 62-67 6 p. 4723454

## Activities

### **Robotic Path Planning of Vision Sensors for Capturing Surface Defects in Workpieces**

Navarro Alarcon, D. (Lead consultant)  
Feb 2020

### **Managing Deformation: A Step Towards Higher Robot Autonomy**

Navarro-Alarcon, D. (Co-chair)  
2020

### **Jiangsu Industrial Technology Research Institute (JITRI)**

Navarro Alarcon, D. (Visiting researcher)  
Dec 2019

### **Université de Montpellier**

Navarro Alarcon, D. (Visiting researcher)  
Dec 2019

### **The Chinese University of Hong Kong, Shenzhen**

Navarro Alarcon, D. (Visiting researcher)  
Nov 2019

### **Technical University of Munich**

Navarro Alarcon, D. (Visiting researcher)  
Jun 2019

### **Université de Toulon**

Navarro Alarcon, D. (Visiting researcher)  
Apr 2019

### **Harbin Institute of Technology**

Navarro Alarcon, D. (Visiting researcher)  
Mar 2019

### **Shape Servoing of Deformable Objects: Modelling, Estimation and Control**

Navarro Alarcon, D. (Invited speaker)  
2019

### **Frontiers Robotics AI (Journal)**

Navarro Alarcon, D. (Associate editor)  
2018 → ...

**IEEE/ASME Transactions on Mechatronics (Journal)**

Navarro Alarcon, D. (Reviewer)

2018 → ...

**IEEE Robotics and Automation Letters (Journal)**

Navarro Alarcon, D. (Reviewer)

2018 → ...

**IROS 2018 Special Session: Methods and Algorithms for Automatic Manipulation of Deformable Objects**

Navarro Alarcon, D. (Chair)

2018

**Shape Servoing of Deformable Objects: Modelling, Estimation and Control**

Navarro Alarcon, D. (Invited speaker)

2018

**Robotics and Autonomous Systems (Journal)**

Navarro Alarcon, D. (Guest editor)

2017

**See, Touch, and Hear: 2nd Workshop on Multimodal Sensor-Based Robot Control for HRI and Soft Manipulation**

Navarro-Alarcon, D. (Co-chair)

2016

**See, Touch, and Hear: IROS Workshop on Multimodal Sensor-Based Robot Control for HRI and Soft Manipulation**

Navarro-Alarcon, D. (Co-chair)

2015

**IEEE Transactions on Robotics (Journal)**

Navarro Alarcon, D. (Reviewer)

2014 → ...

**IEEE Robotics and Automation Society (External organisation)**

Navarro Alarcon, D. (Member)

2009 → ...

**Prizes****Best AI Implementation Award, AI x HK OPENCUP 2022**

Lee, H. Y. (Recipient), Zhou, P. (Recipient), Labazanova, L. (Recipient) &amp; Navarro Alarcon, D. (Supervisor), 25 Nov 2022

**Best Innovation Award, Cathay Hackathon 2022**

Labazanova, L. (Recipient), Lee, H. Y. (Recipient), Qiu, L. (Recipient) &amp; Navarro Alarcon, D. (Supervisor), 20 Nov 2022

**Best Poster Award 2nd Place, The 10th East Asia Mechanical and Aerospace Engineering Workshop**

Lee, H. Y. (Recipient) &amp; Navarro Alarcon, D. (Supervisor), 23 Nov 2024

**Best Poster Paper Award**

Navarro Alarcon, D. (Recipient), Nov 2019

**Best Presentation Award at PRSC204**

Lee, H. Y. (Recipient) &amp; Navarro Alarcon, D. (Supervisor), 9 Oct 2024

**Best Student Poster Award**

Navarro Alarcon, D. (Recipient) & Zahra, O. I. E. A. A. E. (Recipient), 3 Jul 2019

**Champion & People's Choice, The 8th PolyU Mechanical Engineering Research Presentation Competition**

Labazanova, L. (Recipient) & Navarro Alarcon, D. (Supervisor), 2 Mar 2023

**CNERC Young Researcher Award 2021**

Lee, H. Y. (Recipient) & Navarro Alarcon, D. (Supervisor), 30 Sept 2021

**Development of Experimental Robotic Platforms for Sensor-Servoing Applications**

Navarro Alarcon, D. (Recipient), Jun 2019

**Faculty of Engineering Merit Award in Teaching (Individual) 2021**

Navarro Alarcon, D. (Recipient), 20 Dec 2021

**First Runner-up, Three Minute Thesis Competition (3MT®)**

Labazanova, L. (Recipient) & Navarro Alarcon, D. (Supervisor), 30 Jun 2022

**ME41006: Hong Kong's Very First Flip Classroom Subject on Perceptual Robotics**

Navarro Alarcon, D. (Recipient), Mar 2020

**Motion Tracking System to Develop Adaptive Sensor Based Controls for Robots with Variable Morphology**

Navarro Alarcon, D. (Recipient), Feb 2019

**Press/Media****Why are lonely Asians turning to robots for friendship?**

Navarro Alarcon, D.

6/04/19

1 item of Media coverage

**APAC Innovation Summit 2015 - Robotics**

Navarro Alarcon, D.

25/06/15

1 Media contribution

**Awards****Projects**