

David Navarro Alarcon
Assistant Professor
Department of Mechanical Engineering
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Biography

I am an Assistant Professor of Robotics at the Department of Mechanical Engineering of PolyU. My research interests are mainly in the fields of perceptual robotics, adaptive systems and control theory.

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

Assistant Professor

Assistant Professor
Department of Mechanical Engineering
The Hong Kong Polytechnic University
1 Jul 2020 → 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

Can a robot outperform a human operator in skin photorejuvenation?

Muddassir, M., Si Un, C., Gomez, D. & Navarro-Alarcon, D., 2021, (Accepted/In press) In: Journal of Cosmetic Dermatology.

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

Navarro-Alarcon, D., Qi, J., Zhu, J. & Cherubini, A., 17 Sep 2020, In: Frontiers in Neurorobotics. 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., 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.

Differential Mapping Spiking Neural Network for Sensor-Based Robot Control

Zahra, O., Tolu, S. & Navarro-Alarcon, D., 2020, (Submitted) In: *IEEE Transactions on Cybernetics*.

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

Muddassir, M., Gomez, D., Chen, S., Hu, L. & Navarro-Alarcon, D., 2020, (Submitted) In: *IEEE/ASME Transactions on Mechatronics*.

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

Cherubini, A. & Navarro-Alarcon, D., 2020, (Submitted) In: *Frontiers in Neurorobotics*.

Vision-based Manipulation of Deformable and Rigid Objects Using Subspace Projections of 2D Contours

Zhu, J., Navarro-Alarcon, D., Passama, R. & Cherubini, A., 2020, (Submitted) In: *IEEE Transactions on Robotics*.

3D shape control of linear deformable objects by robot manipulator

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

An Educational Robotics Platform with Multimodal Perception for Teaching Sensor Servoing Controls

Hu, L., Navarro-Alarcon, D. & Shi, S-Q., Nov 2019.

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-Díaz, 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).

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

Yip, H. M., Navarro-Alarcon, D. & Liu, Y. H., 9 Mar 2018, *2017 IEEE International Conference on Real-Time Computing and Robotics, RCAR 2017*. Institute of Electrical and Electronics Engineers Inc., p. 182-187 6 p. (2017 IEEE International Conference on Real-Time Computing and Robotics, RCAR 2017; vol. 2017-July).

Design of a sanding robot for wooden painted decoration box

Li, P., Xu, E., Tang, C., Zhou, Y., Jiang, X., Lyu, C., Navarro-Alarcon, D., Gai, H., Liu, C., Lou, Y. & Liu, Y., 9 Mar 2018, *2017 IEEE International Conference on Real-Time Computing and Robotics, RCAR 2017*. Institute of Electrical and Electronics Engineers Inc., p. 121-126 6 p. (2017 IEEE International Conference on Real-Time Computing and Robotics, RCAR 2017; vol. 2017-July).

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., 7872447.

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

Wang, Z., Lee, S. C., Zhong, F., Navarro-Alarcon, D., Liu, Y. H., Deguet, A., Kazanzides, P. & Taylor, R. H., Jul 2017, In: *IEEE Robotics and Automation Letters*. 2, 3, p. 1586-1592 7 p., 7867766.

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 Sep 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-Diaz, 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

David Navarro Alarcon (Lead consultant)
Feb 2020

Managing Deformation: A Step Towards Higher Robot Autonomy

David Navarro-Alarcon (Co-chair)
2020

Jiangsu Industrial Technology Research Institute (JITRI)

David Navarro Alarcon (Visiting researcher)
Dec 2019

Université de Montpellier

David Navarro Alarcon (Visiting researcher)
Dec 2019

The Chinese University of Hong Kong, Shenzhen

David Navarro Alarcon (Visiting researcher)
Nov 2019

Technical University of Munich

David Navarro Alarcon (Visiting researcher)
Jun 2019

Université de Toulon

David Navarro Alarcon (Visiting researcher)
Apr 2019

Harbin Institute of Technology

David Navarro Alarcon (Visiting researcher)
Mar 2019

Shape Servoing of Deformable Objects: Modelling, Estimation and Control

David Navarro Alarcon (Invited speaker)
2019

Frontiers Robotics AI (Journal)

David Navarro Alarcon (Associate editor)
2018 → ...

IEEE/ASME Transactions on Mechatronics (Journal)

David Navarro Alarcon (Reviewer)
2018 → ...

IEEE Robotics and Automation Letters (Journal)

David Navarro Alarcon (Reviewer)
2018 → ...

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

David Navarro Alarcon (Chair)

2018

Shape Servoing of Deformable Objects: Modelling, Estimation and Control

David Navarro Alarcon (Invited speaker)

2018

Robotics and Autonomous Systems (Journal)

David Navarro Alarcon (Guest editor)

2017

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

David Navarro-Alarcon (Co-chair)

2016

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

David Navarro-Alarcon (Co-chair)

2015

IEEE Transactions on Robotics (Journal)

David Navarro Alarcon (Reviewer)

2014 → ...

IEEE Robotics and Automation Society (External organisation)

David Navarro Alarcon (Member)

2009 → ...

Prizes

Best Poster Paper Award

Navarro Alarcon, David (Recipient), Nov 2019

Best Student Poster Award

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

Development of Experimental Robotic Platforms for Sensor-Servoing Applications

Navarro Alarcon, David (Recipient), Jun 2019

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

Navarro Alarcon, David (Recipient), Mar 2020

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

Navarro Alarcon, David (Recipient), Feb 2019

Press/Media

Why are lonely Asians turning to robots for friendship?

David Navarro Alarcon

6/04/19

1 item of Media coverage

APAC Innovation Summit 2015 - Robotics

David Navarro Alarcon

25/06/15

1 Media contribution

Awards

Projects