

## Research Interests and Vision

My research focuses on making robots capable of solving a wide range of tasks without compromising on their performance and reliability. I develop algorithms that learn general probabilistic models for perception and interaction. Combined with controls and plannings, these models allow robots to accurately manipulate their environment and meet diverse task requirements.

## Education

2016–present **Massachusetts Institute of Technology (MIT)**, *Cambridge*, United States.

- PhD student at the Mechanical Engineering department of MIT. GPA: 5.0.
- Advisor: Prof. Alberto Rodriguez.

2015–2016 **Massachusetts Institute of Technology (MIT)**, *Cambridge*, United States.

- Visiting student at the MCube Lab supervised by Prof. Alberto Rodriguez.

2011–2016 **Polytechnic University of Catalonia (UPC)**, *Barcelona*, Spain.

- Dual Bachelors in **Mathematics** and **Engineering Physics**.

## Fellowships

2018 **Facebook Emerging Scholar Award**. Full funding for 2 years, only 21 awardees among more than 900 applications.

2018 **NVIDIA Graduate Fellowship**. Awarded to 10 PhD students from more than 230 applications. Declined in favour of Facebook Award.

2016 **"La Caixa" Graduate Fellowship**. Recipient of 1 out of the 45 prestigious "La Caixa" scholarships for graduate studies across all Spain. Full funding for 2 years in any graduate program of my choosing.

2012 **CFIS Fellowship**. Awarded to only 40 of the top technical students from Spain to simultaneously study two bachelor's degrees.

## Work Experience

Summer 2016 **Google Zurich**. Software Engineer Intern at the SafeSearch team.

Research and implementation of deep learning algorithms for a large-scale computer vision problem.

## Selected Awards

2021 **Rising Stars in Computer Science**. Awarded to 89 graduate and postdoctoral women worldwide in EECS disciplines.

- 2021 **RSS pioneers.** Selected to attend the 2021 RSS Pioneers Workshop which brings together a cohort of the world's top early-career researchers in robotics.
- 2021 **Best Paper Finalist Award** on Service Robotics at ICRA 2021 for the work "Real-time shape and pose estimation from planar pushing using implicit surfaces."
- 2019 **Rising Stars in Mechanical Engineering.** Awarded to 30 graduate and postdoctoral women worldwide doing research any area related to Mechanical Engineering.
- 2018 **Best Paper Award on Cognitive Robotics** at IROS 2018 for the work "Augmenting Physical Simulators with Stochastic Neural Networks: Case Study of Planar Pushing and Bouncing."
- 2018 Amazon Robotics **Best Systems Paper Award** for the submission "Robotic pick-and-place of novel objects in clutter with multi-affordance grasping and cross-domain image matching."
- 2017 **1st Place Winners** (Stow Task) at the international competition **Amazon Robotics Challenge** (ARC) 2017 with the MIT-Princeton team.
- 2016 **Best Paper Finalist Award** at IROS 2016 for the work "More than a Million Ways to Be Pushed. A High-Fidelity Experimental Data Set of Planar Pushing."

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## Peer-Reviewed Publications

- [18] **M. Bauza**, T. Bronars, Y. Hou, N. Chavan-Dafle, A. Rodriguez. "Towards precise generalization of robot skills: accurate pick-and-place of novel objects", in preparation.
- [17] **M. Bauza**, T. Bronars, A. Rodriguez. "Extended Version: Tactile Object Pose Estimation from the First Touch with Geometric Contact Rendering", Under review, *IJRR*.
- [16] F. Alet, **M. Bauza**, K. Kawaguchi, N. Kuru, T. Lozano-Perez, L. Kaelbling. "Tailoring: Encoding Inductive Biases by Optimizing Unsupervised Objectives at Prediction Time", *NeurIPS 2021*.
- [15] S. Suresh, **M. Bauza**, A. Rodriguez, J. Mangelson, M. Kaess. "Real-time shape and pose estimation from planar pushing using implicit surfaces", *ICRA 2021*.
- [14] **M. Bauza**, E. Valls, B. Lim, T. Sechopoulos, A. Rodriguez. "Tactile Object Pose Estimation from the First Touch with Geometric Contact Rendering", *CoRL 2020*.
- [13] A. Kloss, **M. Bauza**, J. Wu, J. Tenenbaum, A. Rodriguez, J. Bohg. "Accurate Vision-based Manipulation through Contact Reasoning", *ICRA 2020*.
- [12] Y. Lin, **M. Bauza**, P. Isola. "Experience-Embedded Visual Foresight", *CoRL 2019*.
- [11] F. Alet, A. Jeewajee, **M. Bauza**, A. Rodriguez, T. Lozano-Perez, L. Kaelbling. "Graph Element Networks: adaptive, structured computation and memory", *ICML 2019*.
- [10] **M. Bauza**, O. Canal, A. Rodriguez, "Tactile Mapping and Localization from High-Resolution Tactile Imprints", *ICRA 2019*.
- [9] **M. Bauza**, F. Alet, Y. Lin, T. Lozano-Perez, L. Kaelbling, P. Isola, A. Rodriguez. "Omnipush: accurate, diverse, real-world dataset of pushing dynamics with RGB-D video", *IROS 2019*.
- [8] A. Ajay, **M. Bauza**, J. Wu, N. Fazeli, J. Tenenbaum, A. Rodriguez, L. Kaelbling et. al. . "Combining Physical Simulators and Object-Based Networks for Control", *ICRA 2019*.
- [7] **M. Bauza**, A. Rodriguez. "GP-SUM. Gaussian Processes Filtering of non-Gaussian Beliefs", *WAFR 2018*.

- [6] **M. Bauza\***, F. Hogan\*, A. Rodriguez. "Learning vs. physics-based control of a planar push system", *CoRL 2018*.
- [5] **M. Bauza\***, F. Hogan\*, A. Rodriguez. "Tactile Regrasp: Grasp Adjustments via Simulated Tactile Transformations", *IROS 2018*.
- [4] A. Ajay, J. Wu, N. Fazeli, **M. Bauza**, L. Kaelbling, J. Tenenbaum, A. Rodriguez. "Augmenting Physical Simulators with Stochastic Neural Networks: Case Study of Planar Pushing and Bouncing", *IROS 2018*.
- [3] A Zeng, S Song, K. Yu, E. Donlon, F. Hogan, **M. Bauza**, et. al. "Active Perception of Novel Objects in Clutter with Multi-Affordance Grasping and Cross-Domain Image Matching" in *ICRA 2018, IJRR 2019*.
- [2] **M. Bauza**, A. Rodriguez. "A Probabilistic Data-Driven Model for Planar Pushing", in *ICRA 2017*.
- [1] K. Yu, **M. Bauza**, N. Fazeli, and A. Rodriguez. "More than a Million Ways to Be Pushed. A High-Fidelity Experimental Data Set of Planar Pushing," in *IROS 2016*.

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## Talks

- 2021 Invited talk at Washington University robotics colloquium.
- 2021 Invited talk at Stanford.
- 2021 Invited talk at CMU Manipulation Discussion Group (first external speaker).
- 2021 Invited talk at Cornell Robotic Seminar.
- 2021 Invited talk at University of Toronto, AI in Robotics Seminar.
- 2020 Invited talk at University of Pennsylvania, Grasp Seminar.
- 2020 Selected talk at SITN (Science In The News). Science talks organized by Harvard for the general public. Machine learning in Robotics: current progress and challenges ahead.
- 2019 Invited talk at Tec de Monterrey (Mexico).
- 2019 Selected presentation at the MIT College of Computing Launch.
- 2019 Selected talk at the ML across MIT retreat.
- 2018 Invited talk at IROS2018 Workshop on RoboTac: Tactile Perception and Learning in Robotics.

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## Advising

### PhD and Master students

Antonia Bronars: implementation, development, and testing of tactile localization solutions.  
 Bryan Lim: implementation of a grasping pipeline in simulation and on a real system.

### Undergraduate students

Shreya Skarpoor: active 3D mesh reconstruction for object manipulation.  
 Claudia Lozano: application of machine learning methods to process tactile information.  
 Meenakshi Singh: simulation of a dual-arm in Pybullet with visuo-tactile sensing.  
 Eric Valls: implementation and development of tactile localization methods.  
 Max Thomsen: learning graph neural networks to optimize the shape of robotic fingers.  
 Oleguer Canals: implementation and testing of tactile algorithms for grasping and localization.

Jasmine Zeng: implementation of tactile sensing in a MuJoCo multi-fingered hand.

Theo Sechopoulos: implementation and comparison of registration techniques for tactile data.

Ashay Athalye: object tracking from RGB-D by extending a single-pose estimation algorithm.

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## Service

- 2020, 2021 Guest lecturer at MIT graduate course *Touching and Grasping with Soft Fingers* led by Professor Ted Adelson.
- 2020 Program committee member of CoRL 2020.
- 2020 Co-organized the workshop at ICRA 2020 Uncertainty in Contact-Rich Interactions (canceled due to CoVID19).
- 2019 Organized and lead a hands-on robotic activity for the Women's Technology Program (WTP) in Mechanical Engineering.
- 2017 Co-organized the workshop at RSS 2017 Data-Driven Robotic Manipulation.
- 2016-present Journal reviewer: TRO, IJRR, RA-L.
- 2016-present Conference reviewer: RSS, CoRL, ICRA, IROS.
- 2011-2016 Class representative

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## Other Awards

- 2019 Selected to attend **Path of Professorship**. Awarded to distinguished MIT graduate students.
- 2019 Selected to attend the **Global Young Scientists Summit**. Awarded to no more than 5 PhD students throughout all MIT departments.
- 2019 **DeFlorez Travel Award in Design and Manufacturing**. Awarded to 1 MIT Mechanical Engineering Graduate Student annually.
- 2018 Travel Award to attend RSS 2018. The award is founded by the Women in Robotics Workshop.
- 2018 **Best Poster Award** at ICRA 2018 workshop on Active touch for perception and interaction.
- 2016 3rd Place at the 2016 Amazon Robotics Challenge with the MIT-Princeton team.
- 2016 IROS 2016 NSF Travel Grant.
- 2015 UPC-Internship Program Grant to do research for one year at MIT.
- 2015 Google Grace Hopper Travel Award to attend the conference with all expenses paid.
- 2009 & 2011 4th and 6th position at the regional math tests: Kangourou sans frontieres.

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## Press Coverage and Outreach

- 2021 TechXplore. A technique that allows robots to estimate the pose of objects by touching them.
- 2021 La Vanguardia (Spanish newspaper). Sensitive Robots.
- 2019 MIT news article. Pushy robots learn the fundamentals of object manipulation.
- 2019 El Mundo (Spanish newspaper). Una mano robotica inteligente.
- 2019 El Iris (Spanish newspaper, front page). Una ciutadellenca en el camp de la intelligencia artificial.
- 2018 MIT News Front page. Teaching robots how to move objects.
- 2018 Invited talk for broad audience (100+ attendees). First summer talk at Mercadal: Maria Bauza.

- 2018 MIT MechEConnects. [Student Spotlight: Maria Bauza, PhD Candidate.](#)
- 2018 MIT News Front page. [Robo-picker grasps and packs.](#)
- 2018 Express News (Spanish version). [Maria Bauza, a Spanish woman who makes history.](#)
- 2018 La Vanguardia (Spanish newspaper). [MIT: the science paradise.](#)

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## References

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