Javier Felip León

Curriculum Vitae

Summary

Staff AI/Robotics Scientist (Ph.D.) with +18 years experience in robotics across academia and industry. Specializing in contact-rich, data-driven manipulation: built reactive primitive frameworks, sim-to-real and synthetic data pipelines, intuitive physics prediction, and human intent inference on high-DOF (dual-arm PA-10, UR, Fanuc, Baxter) platforms; 50+ granted patents and 20+ publications underpin robust grasp planning, perception, and autonomy stack contributions. Proficient in Python/C++, Linux, ROS2, PyTorch, MoveIt!, PyBullet/Drake/Gazebo and Blender.

Work Experience

Staff AI/ML Research Scientist 02/24 - Present
Intel Labs, Intel Corporation 1 yr 6 mo

- Led PM-Cobots project: integrated Fanuc/UR hardware with AI perception, motion planning, and autonomous workflows, projecting 50% technician load reduction and savings in preventive maintenance.
- Architected and built sim-to-real perception pipeline (Blender synthetic generation + SegFormer) enabling zero-shot DIMM slot detection & autonomous insertion.
- Developed reachability/manipulability analysis tool used to inform robot model selection and precise base placement across deployments.

Senior AI/ML Research Scientist 06/19 - 02/24
Intel Labs, Intel Corporation 4 yrs 8 mo

- Developed real-time human intent prediction via optimized Approximate Bayesian Computation improving human-robot collaboration task fluency and efficiency.
- Delivered high-impact demos (Intel Innovation & Intel Vision) showing low-latency 5G robot teleoperation, programming by demonstration and human-robot collaboration.
- Integrated ML perception (deep segmentation, probabilistic inference) with robotic visuo-force manipulation (i.e. servoing grasping and insertion).

AI/ML Research Scientist 06/16 - 06/19
Intel Labs, Intel Corporation 3 yrs

- Developed intuitive-physics system that learned object dynamics from passive motion observations, enabling physics simulation to anticipate trajectories and trigger actions.
- Introduced Tree-Pyramidal Adaptive Importance Sampling (TP-AIS) and a benchmarking framework for sampling-based probabilistic inference.

PhD Researcher (Contact-Based Robotic Manipulation) 02/12 - 04/16
Universitat Jaume I 4 yrs 2 mo

- Thesis: *Contact-Based Robotic Manipulation* (Cum Laude, International Mention).
- Summary: Developed a perception + reactive force/vision manipulation framework enabling robust handling of unknown objects in unstructured settings.
- Core contributions: Multimodal sensory feedback integration, Adaptive control, Composable manipulation primitives, Contact detection & prediction, Object perception (detection/recognition). Finalist performance at Amazon Picking Challenge 2015.

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Robotics Research Scientist 03/08 - 02/12
European Commission 3 yrs 11 mo

- Contributed to multidisciplinary, international research teams to advance robotic manipulation, developing algorithms to grasp unknown objects under uncertainty.
- Projects:
  - **GRASP: Emergence of Cognitive Grasping through Emulation, Introspection and Surprise**: Developed robot manipulation planning and control algorithms to grasp unknown objects under uncertainty. Collaborated with a multi-disciplinary team of roboticists and neuroscientists.
  - **EYESHOTS: Heterogeneous 3D perception across visual fragments**: Developed a neuroscience-based system to perceive and manipulate objects. See Chinellato et al. (2011).
  - **GUARDIANS: Group of unmanned assistant robots deployed in aggregative navigation supported by scene detection**: Developed and integrated mobile robot simulation frameworks.

Robotics Research Engineer 06/07 - 12/07
Spanish science ministry 7 mo

- Developed algorithms for small humanoid robots.
- Three time winners of the Spanish humanoid competition (CEABOT) ('07, '08, '09)

Education

PhD. in Computer Science 2010 - 2016
Universitat Jaume I 5 yrs 6 mo
Advanced Intelligent Systems doctorate program

- Awarded with a competitive four-year PhD research grant. Graduated "Cum Laude".
- Research stay at the Institute for Anthropomatics, Karlsruhe Institute of Technology (4mo). Developed a sensor fusion technique to improve the ARMAR-III robot sensing skills. Supervised by Tamim Asfour.
- Research stay at the Emerging Platform Solutions Lab - Intel Labs, (4mo). Participated on the Labs research projects, demos and presentations and developed artificial vision and robotics software.

Master of Science in Intelligent Systems - Universitat Jaume I 2008 - 2010
GPA – 9.13/10 Specialized in A.I. and Robotics 2 yrs

B.S. in Computer Science - Universitat Jaume I 2005 - 2007
GPA – 8.2/10 3 yrs

B.S. in Technical Engineering in Computer Systems - Universitat Jaume I 2001 - 2004
GPA – 8.19/10 Valedictorian 3 yrs

Selected AI-Robotics Projects

Sensor-based reactive manipulation primitives: Blind Box Emptying — Ph.D. Research

- *Challenge:* Empty a box of unknown, cluttered objects (no models / poses / count) under limited sensing.
- *Action:* Composed reactive grasp / transport / place / release primitives; compared blind random + tactile/FT exploration vs RGB-D baseline.
- *Result:* Reliable completion using only reactive tactile/force primitives (no vision) showed robustness to object/pose uncertainty; adding RGB-D perception primarily improved efficiency (fewer attempts, faster cycle) rather than feasibility, highlighting the core value of reactive primitives for unstructured manipulation.

Paper Video

Sim-to-Real Scalable Perception — Project Lead & Main Developer

- *Challenge:* High-cost, slow acquisition/labeling of real-world data for perception training.
- *Action:* Built Blender-based synthetic dataset generator with probabilistic randomizers and relational anchors; trained SegFormer models for motherboard component detection.
- *Result:* Achieved zero-shot sim-to-real transfer; autonomous DIMM slot detection and insertion without prior real-world data, validating end-to-end perception-to-action.

Video Video

Programming by Demonstration via Immersive VR — Lead Robot Control Researcher

- *Challenge:* Traditional cobot task authoring (waypoints, teach pendant) is slow, non-intuitive for multi-step, contact-rich manipulation and hard to scale across operators.
- *Action:* Built mixed-reality VR teleoperation pipeline to demonstrate/retarget motions; segmented demos into parameterized, perception-conditioned primitives (grasp, insert, hand-over) with automatic frame / constraint extraction.
- *Result:* Reduced programming / iteration time from hours to minutes; enabled reusable primitive library and multi-user authoring with consistent task quality.

Paper Video

Human Intent Prediction For Fluent Collaboration — Lead Researcher

- *Challenge:* Need for real-time anticipation of human intent to ensure safe, fluent cooperative tasks.
- *Action:* Optimized Approximate Bayesian Computation pipeline enabling interactive-rate human intent prediction; integrated into collaborative manipulation workflows (e.g., warehouse packing).
- *Result:* Improved task fluency and safety via proactive robot behavior adaptation; validated across realistic collaborative scenarios.

Code Blog Talk Paper Video Demo

Robot Manipulability Analysis — Project Lead & Solo Developer

- *Challenge:* Selecting robot model and base pose for complex, cluttered manipulation tasks was slow and heuristic-driven.
- *Action:* Built analysis system (PyBullet + IK + manipulability ellipsoids) computing reachability/manipulability over target volumes; added visualization, automated scoring, multi-robot/base benchmarking.
- *Result:* Accelerated cell layout & robot configuration decisions (e.g., machine tending, factory assistant); adopted as standard internal planning tool.

Video Video

Advanced Sampling Algorithms — Lead Researcher

- *Challenge:* State-of-the-art importance sampling methods required manual parameter tuning and struggled with diverse targets.
- *Action:* Invented Tree-Pyramidal Adaptive Importance Sampling (TP-AIS) and created a rigorous benchmarking suite comparing against SOTA across varied distributions/dimensions.
- *Result:* Delivered higher efficiency and accuracy without manual tuning; internal adoption for probabilistic estimation tasks.

Code Paper

Intuitive Physics Prediction — Research Lead

- *Challenge:* Robots lack human-like "intuitive physics" to anticipate object motion and impending failures in unstructured, dynamic scenes.
- *Action:* Learned object physical parameters from passive observations via parameter search; used learned dynamics in a probabilistic physics simulation loop to roll out multi–hypothesis futures; benchmarked novel update rules against state-of-the-art physical parameter learners in sim and real settings.
- *Result:* Delivered accurate forward predictions enabling preemptive actions (e.g., intercept or stabilize objects) and demonstrated improved parameter convergence speed and predictive fidelity over existing methods.

Paper Video

Manufacturing Cobotics — AI & Robotics Tech Lead

- *Challenge:* Preventive maintenance for LAM tools required two technicians, creating an operational bottleneck.
- *Action:* Led end-to-end development of the *PM Buddy* cobot: hardware stack (Fanuc CRX20ia, UR20) and AI software (smart navigation, motion planning, CV-based inspection, anomaly detection).
- *Result:* Projected 50% technician workload reduction.

Hands-On Robotics Experience

Manufacturing cobotics	**Fanuc CRX20ia, UR20**, Tech lead in the design of the PM Buddy cobot both for hardware and software stacks.
Collaborative robotics	**UR5, UR5e and Franka Emika Panda**, Mounted, installed, integrated, written control algorithms, perception pipelines using those platforms for research, internal tech transfers, corporate demo presentations and external demos.
Industrial robotics	**Baxter collaborative robot**, Experience with Baxter, a ROS based dual arm manipulator robot from Rethink Robotics. Member of the RobInLab UJI team that participated in the Amazon Picking Challenge 2015.
Robotics and system integration	**Dual arm manipulation system**, Main contributor to the design of the UJI humanoid torso 'Tombatossals' composed of two Mitsubishi PA10-7C arms, a Schunk SDH2 7DOF dexterous hand, a Barrett Hand and a stereo pan-tilt-verge head. Member of the development team of the Tombatossals' ROS based control architecture and former administrators and maintainers of the platform.

Awards

2022	IROS'22 Best paper award finalist in cognitive robotics category.
2020	SHPE Awards Finalist. Young researcher category.
2017	Ranked 6th in the euRobotics Georges Giralt PhD award.
2009	Winner of the Spanish humanoid robot contest CEABOT'09. Valladolid. Spain.
2008	City of Castellón youth awards. I+D+i Category.
2008	Winner of the Spanish humanoid robot contest CEABOT'08. Tarragona. Spain.
2007	Winner of the Spanish humanoid robot contest CEABOT'07. Huelva. Spain.
2004	Best student award of the B.S. in Technical Engineering in Computer Systems.
2004	Academic excellence award for the Technical Engineering in Computer Systems.

Technical skills

Programming

Advanced	Python, C++, Linux, Git, Pytorch, ROS1/2, MoveIt, Pybullet
Intermediate	LaTeX, Matlab, OpenCV, SQL, Gazebo, Continuous Integration
Basic	C#, BASIC, URScript

Design

Advanced	Blender, SolidWorks, 3D printing
Intermediate	Autodesk Fusion, Manim
Basic	Gimp, Inkscape

Invited talks

1. Enabling Real-Time Performance for Approximate Bayesian Computation. CIMAT-INAOE Deep Learning and Data Science Workshop. Guanajuato, September 2019.

2. Robust Scene Understanding via Real-Time Approximate Bayesian Computation. IWSSIP'20. The 27th International Conference on Systems, Signals and Image Processing. Online, July 2020.

Conference and journals

1. Felip, J. and Morales, A. (2009). Robust sensor-based grasp primitive for a three-finger robot hand. In *Intelligent Robots and Systems, 2009. IROS 2009. IEEE/RSJ International Conference on*, pages 1811–1816

2. Laaksonen, J., Felip, J., Morales, A., and Kyrki, V. (May). Embodiment independent manipulation through action abstraction. In *Robotics and Automation (ICRA), 2010 IEEE International Conference on*, pages 2113–2118

3. Chinellato, E., Felip, J., Grzyb, B. J., Morales, A., and del Pobil, A. P. (2011). Hierarchical object recognition inspired by primate brain mechanisms. In *Computational Intelligence for Visual Intelligence (CIVI), 2011 IEEE Workshop on*, pages 1–8

4. Bohg, J., Johnson-Roberson, M., Leon, B., Felip, J., Gratal, X., Bergstrom, N., Kragic, D., and Morales, A. (2011). Mind the gap - robotic grasping under incomplete observation. In *Robotics and Automation (ICRA), 2011 IEEE International Conference on*, pages 686–693

5. Felip, J., Bernabe, J., and Morales, A. (2012a). Contact-based blind grasping of unknown objects. In *12th IEEE-RAS International Conference on Humanoid Robots, HUMANOIDS*, pages 396–401

6. Felip, J., Laaksonen, J., Morales, A., and Kyrki, V. (2012b). Manipulation primitives: A paradigm for abstraction and execution of grasping and manipulation tasks. *Robotics and Autonomous Systems*

7. Leon, B., Felip, J., Marti, H., and Morales, A. (2012). Simulation of robot dynamics for grasping and manipulation tasks. In *12th IEEE-RAS International Conference on Humanoid Robots, HUMANOIDS*, pages 291–296

8. del Pobil, A. P., Duran, A. J., Antonelli, M., Felip, J., Morales, A., Prats, M., and Chinellato, E. (2013). Integration of visuomotor learning, cognitive grasping and sensor-based physical interaction in the uji humanoid torso. *Designing Intelligent Robots: Reintegrating AI*, pages pp. 6–11

9. Bernabe, J., Felip., J., del Pobil, A. P., and Morales, A. (2013). Contact localization through robot and object motion from point clouds. In *13th IEEE-RAS International Conference on Humanoid Robots, HUMANOIDS*, Atlanta, GA, USA. IEEE

10. Morales, A., Prats, M., and Felip, J. (2013). Sensors and methods for the evaluation of grasping. In Carbone, G., editor, *Grasping in Robotics*, volume 10 of *Mechanisms and Machine Science*, pages 77–104. Springer London

11. Felip, J. and Morales, A. (2014). Dual arm sensor-based controller for the cap unscrewing task. In *14th IEEE-RAS International Conference on Humanoid Robots, HUMANOIDS*, Madrid, Spain. IEEE

12. Felip, J., Morales, A., and Asfour, T. (2014). Multi-sensor and prediction fusion for contact detection and localization. In *14th IEEE-RAS International Conference on Humanoid Robots, HUMANOIDS*, Madrid, Spain. IEEE

13. Felip, J., Durán, A. J., Antonelli, M., Morales, A., and del Pobil, A. P. (2015). Tombatossals: A humanoid torso for autonomous sensor-based task execution research. In *15th IEEE-RAS International Conference on Humanoid Robots, HUMANOIDS*, Seoul, South Korea. IEEE

14. Felip, J. (2016). Contact driven robotic manipulation. PhD Thesis

15. Gonzalez-Aguirre, D., Felip, J., and Shahidzadeh, S. (2016). Infinite-Resolution 3D Modeling from a Single Image for Free-Form Revolution Objects. In *2016 IEEE International Symposium on Multimedia (ISM)*, pages 253–260. IEEE

16. Felip, J., Gonzalez-Aguirre, D., and Tickoo, O. (2017). Towards Intuitive Rigid-body Physics Through Parameter Search. *IEEE-RAS 17th International Conference on Humanoid Robotics (Humanoids)*, pages 0–7

17. Felip, J., Ahuja, N. A., Gómez-Gutiérrez, D., Tickoo, O., and Mansinghka, V. (2019). Real-time approximate bayesian computation for scene understanding. *NeurIPS 2019. Workshop in Perception as generative reasoning: structure, causality, probability*

18. Felip, J., Ahuja, N., and Tickoo, O. (2020). Tree pyramidal adaptive importance sampling. *https://arxiv.org/abs/1912.08434*

19. Felip, J., Gonzalez-Aguirre, D., and Nachman, L. (2022). Intuitive & efficient human-robot collaboration via real-time approximate bayesian inference. In *Intelligent Robots and Systems, 2022. IROS 2022. IEEE/RSJ International Conference on*. Best paper award finalist

Patents

1. Turek, J. S. et al. (U.S. Patent 20190317739 A1, 2019). Methods and apparatus to automatically generate code for graphical user interfaces

2. Leon, J. F. et al. (U.S. Patent 20190317455 A1, 2019). Methods and apparatus to generate acceptability criteria for autonomous systems plans

3. Alvarez, I. J. et al. (U.S. Patent 20190318244 A1, 2019). Methods and apparatus to provide machine programmed creative support to a user

4. Gonzalez Aguirre, D. I. et al. (U.S. Patent 20190314984 A1, 2019). Automatic robot perception programming by imitation learning

5. Remis, L. C. M. et al. (U.S. Patent 20190317965 A1, 2019). Methods and apparatus to facilitate generation of database queries

6. Felip Leon, J. et al. (U.S. Patent 20200149898 A1, 2020b). System and method for acceleration-based vector field maps

7. Gonzalez Aguirre, D. I. et al. (U.S. Patent 20200143551 A1, 2020c). Technologies for thermal enhanced semantic segmentation of two-dimensional images

8. Gomez Gutierrez, D. et al. (U.S. Patent 20200133281 A1, 2020). Safety system for a vehicle

9. Elli, M. S. et al. (U.S. Patent 20200130570 A1, 2020). Self-adaptive multiresolution digital-plate for multimodal enhanced safety of vehicles

10. Turek, J. et al. (U.S. Patent 20200130711 A1, 2020). Autonomous vehicle system for detecting safety driving model compliance status of another vehicle, and planning accordingly

11. Gutierrez, D. G. et al. (U.S. Patent 20200023842 A1, 2020). Potential collision warning system based on road user intent prediction

12. Perez-Ramirez, J. et al. (U.S. Patent 20200018814 A1, 2020b). Locating radio transmission source by scene reconstruction

13. Alvarez, I. et al. (U.S. Patent 20200326696 A1, 2020b). Technology to handle ambiguity in automated control systems

14. Felip Leon, J. et al. (U.S. Patent 20200327415 A1, 2020a). Neural network verification based on cognitive trajectories

15. Perez-Ramirez, J. et al. (U.S. Patent 20200329386 A1, 2020a). Automated network control systems that adapt network configurations based on the local network environment

16. Zamora Esquivel, J. et al. (U.S. Patent 20200327731 A1, 2020). Artificial imagination engine using 5d information descriptors

17. Gonzalez Aguirre, D. I. et al. (U.S. Patent 20200324409 A1, 2020b). Affordance-aware, multi-resolution, free-form object manipulation planning

18. Oliver, D. et al. (U.S. Patent 20200327802 A1, 2020). Object tracking technology based on cognitive representation of a location in space

19. Guzman, M. et al. (U.S. Patent 20200322528 A1, 2020). Camera orchestration technology to improve the automated identification of individuals

20. Ahuja, N. et al. (U.S. Patent 20200226430 A1, 2020). Devices and methods for accurately identifying objects in a vehicle's environment

21. Gonzalez Aguirre, D. et al. (U.S. Patent 20200223443 A1, 2020a). Safety system for a vehicle

22. Alvarez, I. et al. (U.S. Patent 20200200869 A1, 2020a). Compensating for a sensor deficiency in a heterogeneous sensor array

23. Alvarez, I. J. et al. (U.S. Patent 20210001884 A1, 2021d). Technology to generalize safe driving experiences for automated vehicle behavior prediction

24. Alvarez, I. J. et al. (U.S. Patent 20210403031 A1, 2021a). Disambiguation of vehicle navigation actions

25. Alvarez, I. J. et al. (U.S. Patent 20210402898 A1, 2021b). Methods and devices for a vehicle

26. Felip Leon, J. et al. (U.S. Patent 20210309264 A1, 2021a). Human-robot collaboration

27. Felip Leon, J. et al. (U.S. Patent 20210299866 A1, 2021b). Robotic manipulation planning based on probabilistic elastoplastic deformation material point method

28. Datta, P. et al. (U.S. Patent 20210279506 A1, 2021). Systems, methods, and devices for head pose determination

29. Turek, J. S. et al. (U.S. Patent 20210150323 A1, 2021). Methods and apparatus to implement a neural network

30. Guim Bernat, F. et al. (U.S. Patent 20210116261 A1, 2021). Systems and methods for vehicle-occupancy-based and user-preference-based smart routing and autonomous volumetric-occupancy measurement

31. Gonzalez Aguirre, D. et al. (U.S. Patent 20210117649 A1, 2021). Systems and methods for privacy-preserving facemask-compliance-level measurement

32. Alvarez, I. J. et al. (U.S. Patent 20210114606 A1, 2021c). Systems and methods for intrusion detection in vehicle systems

33. Campos Macias, L. E. et al. (U.S. Patent 20210110264 A1, 2021). Methods and apparatus to facilitate efficient knowledge sharing among neural networks

34. Felip Leon, J. et al. (U.S. Patent 20220111526 A1, 2022). Localization system and method

35. Elli, M. S. et al. (U.S. Patent 20220114458 A1, 2022). Multimodal automatic mapping of sensing defects to task-specific error measurement

36. Campos Macias, L. et al. (U.S. Patent 20220009439 A1, 2022). Enhanced occupant collision safety system

37. Leon, J. F. et al. (U.S. Patent 20220274251 A1, 2022). Apparatus and methods for industrial robot code recommendation

38. Oboril, F. et al. (U.S. Patent 20220242452 A1, 2022). Vehicle occupant monitoring

39. Galeev, M. T. et al. (U.S. Patent 20220200920 A1, 2022). Dynamic adaptation of time-aware communications in time-sensitive systems

40. Gomez Gutierrez, D. et al. (U.S. Patent 20240217103 A1, 2024). Trajectory planning systems and methods

41. Gonzalez Aguirre, D. et al. (U.S. Patent 20240112369 A1, 2024a). Human-robot interactive workspace

42. Gonzalez Aguirre, D. et al. (U.S. Patent 20240025042 A1, 2024b). Neuro-capability plug-ins for robot task planning

43. Macias, L. C. et al. (U.S. Patent 20230259665 A1, 2023). Occupancy mapping based on geometric entities with hierarchical relationships

44. Campos Macias, L. E. et al. (U.S. Patent 20230048578 A1, 2023). Real-time predictor of human movement in shared workspaces

45. Aguirre, D. G. et al. (U.S. Patent 20240416510 A1, 2024). Object-agnostic fast grasping-points estimation via geometric-algebra

46. Felip Leon, J. et al. (U.S. Patent 20240326254 A1, 2024). Camera and end-effector planning for visual servoing

47. Gonzalez Aguirre, D. I. et al. (U.S. Patent 20240314290 A1, 2024c). Methods and apparatus to model volumetric representations

48. Turek, J. et al. (U.S. Patent 20240293931 A1, 2024). Human-collaborative robot ergonomic interaction system

49. De La Guardia Gonzalez, R. et al. (U.S. Patent 20250060729 A1, 2025). Hierarchical polytope workspace mapping for human-robot collaboration

50. Felip Leon, J. et al. (U.S. Patent 20250001605 A1, 2025b). Probabilistic autocomplete system for robot programming

51. Gonzalez Aguirre, D. et al. (U.S. Patent 20250004820 A1, 2025a). Edge-based end device control using asynchronous adaptive motion primitives

52. Turek, J. S. et al. (U.S. Patent 20250001597 A1, 2025b). Collaborative human-robot error correction and facilitation

53. Felix Rendon, J. et al. (U.S. Patent 20250128560 A1, 2025). Transport system with self-lifting wheel units for floor obstacle traversal

54. Zamora Esquivel, J. et al. (U.S. Patent 20250121493 A1, 2025). Differential kinematics control using conformal geometric entity modeling

55. Gonzalez Aguirre, D. et al. (U.S. Patent 20250135663 A1, 2025c). Illumination control in robotic end effector manipulation

56. Gonzalez Aguirre, D. et al. (U.S. Patent 20250135655 A1, 2025b). Human-robot interface system with bidirectional haptic feedback

57. Felip Leon, J. et al. (U.S. Patent 20250187181 A1, 2025a). Energy efficient robotic arm

58. Ruiz Fernandez, L. et al. (U.S. Patent 20250202788 A1, 2025). Controller parameter adaptation for non-differentiable communication conditions

59. Felip Leon, J. et al. (U.S. Patent 20250214788 A1, 2025c). Smart sensing for pallet loading and unloading

60. Turek, J. S. et al. (U.S. Patent 20250238664 A1, 2025a). Adaptation of quantization of neural network models during inference