



CSIC FPI Pre-doctoral Contract

Robotic skills of the dynamic manipulation of highly deformable objects

The Perception and Manipulation Lab at IRI is working towards an integral robotic solution for cloth manipulation in assistive environments. Cloth-like objects are very challenging due to their high deformability and difficulty in understanding their configuration under vision or touch. In the lab, we are working toward a model to integrate vision, decision making and action execution in the context of cloth manipulation tasks (see images below).

Our new projects Romandic and Chloe-MAP will focus on the understanding of the C-space of cloth to enable its dynamic manipulation. The approach of the thesis will be to define action primitives that rely on robust low-level control to enable dynamics, and high-level planning to combine such actions, for a novel paradigm of Task-And-Motion planning considering dynamics (DTAMP). Exploiting the group's previous results, we can also explore methods to reason in the C-space, explainability, perception of complex objects, etc.

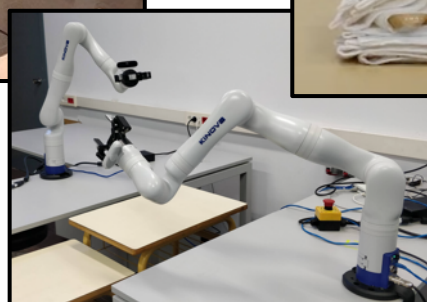
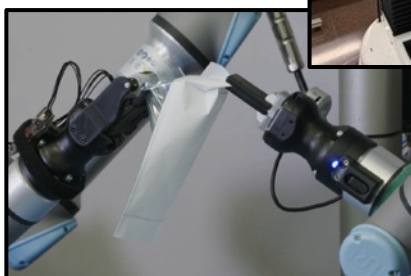
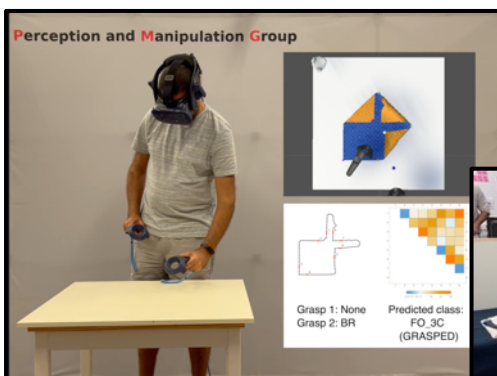
We are searching for a computer science or engineering student with very good programming skills to implement software solutions and with very good background on engineering and artificial intelligence methods. This FPI pre-doctoral contract includes a training plan that will benefit from the Romandic project whose objective is to build an international network of scientists working on similar topics, and to create the first European Center of Excellence for Robotic Manipulation of Deformables. Therefore, the FPI contract will benefit from numerous international collaborations, organized workshops and international seminars complementary to what a usual FPI can offer.

The student will be working under the supervision of Dr. Júlia Borràs and Prof. Guillem Alenyà. The candidate will be integrated into the working team of the PMLab and will collaborate with different professionals experts. The PFI contract offers

- 4 years of funding, with ~ 19.500€ yearly on the first year and 23.700€ from year 2 to 4.
- 7000€ funds for international research stays abroad.

To apply, send an e-mail to: jborras@iri.upc.edu

Join the PMLab group!



CURRICULUM VITAE ABREVIADO (CVA)

IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.

Part A. PERSONAL INFORMATION

First name	Júlia		
Family name	Borràs Sol		
Gender (*)	Female	Birth date (dd/mm/yyyy)	12/03/1980
Social Security, Passport, ID number	43736258X		
e-mail	jborras@iri.upc.edu	URL Web	https://www.iri.upc.edu/staff/jborras
Open Researcher and Contributor ID (ORCID) (*)	0000-0002-1662-2037		

(*) Mandatory

A.1. Current position

Position	Científica titular		
Initial date	15/07/2020		
Institution	Consejo Superior de Invesatigaciones Científicas		
Department/Center	Instituto de robótica e informática industrial		
Country	Spain	Teleph. number	9340015902
Key words	Dextrous manipulation, grasping, cloth-like objects		

A.2. Previous positions (research activity interruptions, indicate total months)

Period	Position/Institution/Country/Interruption cause
May'2019-Jul'2020	Ramon y Cajal postdoctoral researcher at IRI
Jan'2018-Apr'2019	Postdoctoral researcher at IRI
Feb'2014-Dec'2017	Postdoctoral researcher at KIT, Germany (12 months interruption for maternity leave from Nov. 2015)
Nov'2012-Jul'2013	Postdoctoral researcher at Yale University

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
PhD - Robotics	Universitat Politècnica de Catalunya (UPC)	2011
Degree in Computer Science	Universitat Oberta de Catalunya (UOC)	2006
Degree in Mathematics	Universitat Politècnica de Catalunya (UPC)	2004

Part B. CV SUMMARY (max. 5000 characters, including spaces)

The applicant, Julia Borràs Sol, is a Mathematician and Computer Scientist since 2004 and 2006. She obtained her European PhD degree with the highest honors (Excellent Cum Laude) in 2011 under the advice of Prof. Federico Thomas at the prestigious IRI, Institut de Robòtica i Informàtica Industrial (UPC-CSIC). She has worked as a scientist in several distinguished international institutions, such as Yale University, Karlsruhe Institute of Technology (KIT), University of Amsterdam and the French INRIA Sophia-Antipolis, among others, with more than 6 years of research experience abroad. She has closely collaborated with many important researchers in the robotics field, including T. Asfour, A. Dollar, C. Torras, and J-P. Merlet to mention a few.

In her PhD, she developed a theory of Stewart-Gough platform reconfigurations that led to several scientific articles, including 5 Q1 journals as first author. To develop the theory, she collaborated with teams from Uni. of Ferrara, Italy, Uni. of Amsterdam and INRIA Sophia-Antipolis, France.

At Yale, she worked with the iRobot-Harvard-Yale (iHY) Hand team, winner of the ARM DARPA Robotics Challenge. The iHY-Hand proved to be very effective for grasping but had poor dexterous capabilities. The candidate found optimal design parameters to improve its manipulability workspace, leading to

several papers (among others, 2 Q1 and 1 Q2 journals as first author, including the top-in-rankings International Journal of Robotics Research).

At KIT, she participated in 3 EU Projects, WALK-MAN (5,6 million, 968.760€ for KIT), Koroibot (4,2 million, 968.760€ for KIT) and IMAGINE (3.8million, 667.500€ for KIT). For WALK-MAN, she coordinated work package 5, and she developed the taxonomy of whole-body support poses used as a benchmark for evaluating, recognizing, and generating whole-body motions in the WALK-MAN and Koroibot projects. Her work led to a Science Robotics publication as first author. For IMAGINE, she was responsible for work package 7, which involved the design and development of a multifunctional gripper that will be used by all the project partners.

In January 2018 the candidate was selected for a postdoc position funded by the 2.5 million ERC advanced grant CLOTHILDE, at IRI. The applicant was responsible for the generation of a taxonomy of textile manipulations and the design of a gripper for manipulation of textiles (two Q1 and one Q2 papers), contributing to the development of a theory of robotic manipulation of textiles.

In June 2018 she was awarded the Ramon y Cajal Spanish scholarship and in July 2020 she started her permanent position as a Científico titular at CSIC.

Since becoming CT in 2020, she has led the EU-CHIST-ERA project COHERENT, her first as PI and coordinator, and the national project CHLOE-GRAPH, continuing her contribution to the modeling, understanding and manipulation of textiles.

She has also done a lot of contributions as a reviewer and associate reviewer for many journals and conferences, a professional work that was awarded in ICRA'2014 with the IEEE Best Reviewer Award. Since Sept. 2023, she is Senior Editor of one of the most popular robotics journal, Robotics and Automation Letters, for the area of "Grasping and Manipulation".

Part C. RELEVANT MERITS

C.1. Publications

- F. Coltraro, J. Fontana, J. Amorós, M. Alberich-Carramiñana, **J. Borràs** and C. Torras. A representation of cloth states based on a derivative of the Gauss Linking Integral. *Applied Mathematics and Computation*, 457: 128165, 2023. **(D1-JCR)**
- **J. Borràs**. "Effective grasping enables successful robot-assisted dressing." *Science Robotics*, Vol. 7, no. 65, pp: eabo7229, 2022. **(D1-JCR)**
- I. Garcia-Camacho, **J. Borràs**, B. Calli, A. Norton and G. Alenya. "Household Cloth Object Set: Fostering Benchmarking in Deformable Object Manipulation", *IEEE Robotics and Automation Letters*, Vol.7, no. 3, pp. 5866-5873, 2022. **(Q2-JCR)**
- **J. Borràs**, G. Alenyà and C. Torras, "A Grasping-centered Analysis for Cloth Manipulation", *IEEE Transactions on Robotics*, Vol. 36, no. 3, pp. 924-936, 2020. **(D1-JCR)**
- S. Donaire, **J. Borràs**, G. Alenyà and C. Torras, "A Versatile Gripper for Cloth Manipulation," in *IEEE Robotics and Automation Letters*, Vol. 5, no. 4, pp. 6520-6527, 2020. **(Q2-JCR)**
- I. Garcia-Camacho, M. Lippi, M.C. Welle, H. Yin, R. Antonova, A. Varava, **J. Borràs**, C. Torras, A. Marino, G. Alenyà, D. Kragic (7/11), 2020, "Benchmarking bimanual cloth manipulation", *IEEE Robotics and Automation Letters*, Vol. 5, Issue 2, pp. 1111-1118. **(Q2-JCR)**
- **J. Borràs**, C. Mandery and T. Asfour, 2017, "A whole-body support pose taxonomy for multi-contact humanoid robot motions", *Science Robotics*, Vol. 2, Issue 13, pp. eaaq0560. **(D1-JCR)**
- **J. Borràs** and A.M. Dollar, 2015, "Dimensional synthesis of three-fingered robot hands for maximal precision manipulation workspace", *Int. J. of Rob. Research*, Vol.34, no.14, pp.1731-1746. **(Q1-JCR)**
- **J. Borràs** and A.M. Dollar, 2014, "Analyzing dexterous hands using a parallel robots framework", *Autonomous Robots*, Vol. 36, no. 1-2, pp. 169 - 180. **(D1-SJR)**



- **J. Borràs**, F. Thomas and C. Torras, 2014 , “New geometric approaches to the analysis and design of stewart-gough platforms”, *IEEE-ASME Trans on Mechatronics*, Vol. 19, no. 2, pp. 445 - 455. **(D1-JCR)**

C.2. Congress

- **J. Borràs**, A. Boix-Granell, S. Foix and C. Torras. A virtual reality framework for fast dataset creation applied to cloth manipulation with automatic semantic labelling, IEEE International Conference on Robotics and Automation (ICRA), pp. 11605-11611, London (UK), 2023.

Proceedings paper presented in poster session (**myself**).

- G. Tzelepis, **J. Borràs**, E. E. Aksoy and G. Alenyà, “Semantic State Prediction in Robotic Cloth Manipulation” , Intelligent Systems Conference (IntelliSys), Amsterdam. 2023 (to appear in Springer - Lecture Notes in Networks and Systems).

Proceedings paper presented in oral talk online (other author).

- **J. Borràs**, R. Heudorfer, S. Rader, P. Kaiser and T. Asfour, “ The KIT swiss knife gripper for disassembly tasks: a multi-functional gripper for bimanual manipulation with a single arm”, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2018.

Proceedings paper presented in oral session (**myself**).

- C. Mandery, **J. Borràs**, M. Jöchner and T. Asfour, “Using language models to generate whole-body multi-contact motions”, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pp. 5411 - 5418, October 2016.

Proceedings paper presented in oral session (other author)

- C. Mandery, **J. Borràs**, M. Jöchner and T. Asfour, "Analyzing whole-body pose transitions in multicontact motions", IEEE/RAS International Conference on Humanoid Robots (Humanoids), pp. 1020-1027, Seoul (Korea), 2015.

Proceedings paper presented in oral session (other author)

- **J. Borràs** and T. Asfour, "A whole-body pose taxonomy for loco-manipulation tasks", IEEE/RSJ International Conference on Intelligence Robots and Systems (IROS), pp. 1578-1585, Hamburg, Germany, 2015.

Proceedings paper presented in oral session (other author).

- N. Rojas, **J. Borràs**, and F. Thomas, "On quartically-solvable robots," Proc. of the IEEE International Conference in Robotics and Automation (ICRA), pp. 1410-1415, Seattle, USA, 2015.

Proceedings paper presented in oral session (other author).

- P. Kaiser, D. Gonzalez-Aguirre, F. Schültje, **J. Borràs**, N. Vahrenkamp and T. Asfour, "Extracting whole-body affordances from multimodal exploration", IEEE/RAS International Conference on Humanoid Robots (Humanoids), pp. 1036-1043, Madrid (Spain), 2014.

Proceedings paper presented in oral session (other author).

- **J. Borràs** and A.M. Dollar, "A parallel robots framework to study precision grasping and dexterous manipulation", IEEE International Conference on Robotics and Automation (ICRA), pp. 1595-1601, Krlsruhe (Germany), 2013.

Proceedings paper presented in oral session (**myself**).

- **J. Borràs** and A.M. Dollar, "Static analysis of parallel robots with compliant joints for in-hand manipulation", Proceedings of the IEEE/RSJ International Conference on Intelligence Robots and Systems (IROS), pp.3086–3092, 2012.

Proceedings paper presented in oral session (**myself**).

C.3. Research projects

Oct. 2022 – Sept.2026. SoftEnable: Towards Soft Fixture-Based Manipulation Primitives Enabling Safe Robotic Manipulation in Hazardous Healthcare and Food Handling Applications

Id: HORIZON-CL4-2021-DIGITAL-EMERGING-01-101070600 Funding: EU
PI: Carme Torras (CSIC). Role: Workpackage leader.
Budget: 554.697€

Sept. 2021 – Aug. 2024. CHLOE-GRAPH: Cloth-Like Objects Grasping, Representation, and Action Planning.

Id: PID2020-118649RB-I00 Funding: Plan National
PI: Júlia Borràs (CSIC). Role: **Co-Pi.**
Budget: 199.853€

Apr. 2021 – Mar. 2024. COHERENT: COLlaborative HiErarchical Robotic ExplaNaTions.

Id: PCI2020-120718-2 Funding: EU Chist-era, 2019 call.
PI: Júlia Borràs (CSIC). Role: **Pi and coordinator.**
Budget: 107.000€

Nov. 2019-Oct. 2022. BURG: Benchmarks for Understanding Grasping

Id: PCI2019-103447. Funding: EU Chist-era 2018 call.
PI: Guillem Alenyà (CSIC). Role: Researcher.
Budget: 118.665€.

Jan. 2018 – Dec.2022. CLOTHILDE: Cloth manipulation learning from demonstration

Id: ERC-2016-ADG-741930). Funding: ERC, call 2016.
PI: Carme Torras (CSIC). Role: Researcher.
Budget: 2.500.000€.

Jan. 2017 – Feb. 2021. IMAGINE - Robots Understanding Their Actions by Imagining Their Effects.

Id: 731761 Funding: EU Call H2020 -ICT-2016-1.
PI: Tamim Asfour (KIT) Role: Researcher
Budget: 667 500€.

Sept. 2013 – Aug. 2017. WALK-MAN: Whole-body Adaptive Locomotion and Manipulation.

Grant id 611832. Funding: EU Call FP7-ICT-2013.2.1.
PI: Tamim Asfour (KIT). Role: Workpackage leader.
Budget: 968 760€.

Mar. 2010-Feb. 2015. CAREER: Underactuated Precision Robotic Grasping and Manipulation.

Id: NA Funding: USA NSF.
PI: Aaron Dollar (Yale University). Role: Researcher.
Budget: 498.591,0 €.

CURRICULUM VITAE ABREVIADO (CVA)

IMPORTANT – The Curriculum Vitae **cannot exceed 4 pages**. Instructions to fill this document are available in the website.

Part A. PERSONAL INFORMATION

First name	Guillem		
Family name	Alenyà Ribas		
Gender (*)	Man	Birth date	06/08/1974
ID number	38797358S		
e-mail	galenya@iri.upc.edu	URL Web	www.iri.upc.edu/people/galenya
Open Researcher and Contributor ID(ORCID)	0000-0002-6018-154X		

(*) *Mandatory*

A.1. Current position

Position	Investigador científico, Director IRI		
Initial date	01/08/2023,		
Institution	Consejo Superior de Investigaciones Científicas		
Department/Center	Institut de Robòtica i Informàtica Industrial		
Country	Spain	Telephone	934015751
Key words	Robotics, Artificial Intelligence, Human-robot interaction		

A.2. Previous positions (research activity interruptions, indicate total months)

Period	Position/Institution/Country/Interruption cause
2017-2023	Científico Titular
2010-2017	Soporte a la investigación, IRI CSIC-UPC
2008-2010	Investigador JAE postdoctoral, IRI CSIC-UPC

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Graduate in Computer Science	Universitat Politècnica de Catalunya	2000
Doctor by UPC (with mention)	Universitat Politècnica de Catalunya	2007

Part B. CV SUMMARY (*max. 5000 characters, including spaces*)

Dr Guillem Alenyà is Researcher of CSIC and the current Director at IRI.

He carried out his PhD thesis on the topic of ego-motion using monocular cameras as an MSCA Marie Curie grantee and later participated in several EU projects. From this seminal work, he became a pioneer in **Time-of-Flight cameras for robotic manipulation** of deformable objects (first using plants and later garments). His 4 main publications on this topic received more than 1000 citations. He is currently PI of the DEMETER project to develop methods for cotton plant manipulation.

In the last 5 years, he has contributed novel approaches to the areas of learning and HRI. In **learning**, his research has provided new insights into the **probabilistic learning of semantic rules**, especially when using only **few examples**. This is particularly relevant when reasoning and planning in robotics in human environments, because the availability of annotated data is scarce. His contributions have been published in prestigious journals (Art. Intelligence, J. of Machine Learning Res., Cognitive Comp., IEEE Robotics and Aut. Letters, IEEE Trans. on Systems, Man, and Cybernetics, Pattern Recognition) and conferences (AAAI, ICRA, IROS).

In this area, he is currently IP of the EU EVISE project to learn representations of robot collaborations for explainability; he was IP of the ERA-NET project BURG (with TUWien, UoB, IIT), to build benchmarks for understanding robotic grasping; and co-PI of the national project CHLOE-GRAPH which proposes a novel robotic manipulation approach for cloth manipulation

for assistive tasks. Furthermore, he was co-PI of the national project HuMoUR to develop novel computer vision tools to estimate and understand human motion.

Regarding **HRI**, he has specialized in assistive robotics environments. He has made contributions to **robot personalization**, that is, adapting the behaviour of the robot to the user preferences, the indications of a caregiver, and the particular tasks. He has contributed new **knowledge representation** approaches and **preference-based models** specifically tailored to improve action-selection algorithms. Several works in this area entailed **user studies**, either with the general public or elders and cognitively impaired patients thanks to partners in Hospitals and day-care facilities. He also investigates the **learning of data-based models**, either observing humans or including human intentions to restrict the family of solutions. This is important in robotics to narrow the set of solutions and provide **practical methods**. His contributions have been published in the best journals in the area (IEEE Trans. on Robotics, PAMI, Pattern Recognition, IJSR, AuRo, TCDS, ACM Trans. on HRI, Computers in Industry) and competitive and specialized conferences in the community (ICLR, CVPR, ICRA, RO-MAN, IJSR).

Thanks to the reputation gathered in this area he is currently the coordinator of the ROB-IN project (with MT-UPC, SUARA, DATISION), devoted to investigating enabling technologies (adaptation, explainability) to effectively introduce robots at homes; PI of the MSCA DN TRAIL project (>10 partners), to explain internal robot beliefs; and PI of SeCuRoPS (with IFE, Østfold Uni. (HiØ), Fredrikstad Municipality, SNØ as), funded by RCN-Norway for the development of a user-centred privacy framework for social robots in public spaces. In the recent past, he has been PI of the MSCA ITN SOCRATES, where he developed social robotics with applications in healthcare; and he was coordinator of the SIMBIOTS project (with EURECAT, PAL, PROMAUT, ZANINI) (RIS3CAT-ERDF) about safety in HRI.

He is currently **director at LabORA**, a new Open Lab devoted to bringing Assistive Robotics closer to societal needs. This is an 800m² new facility with an initial investment of 2.5M€ accompanied by the creation of a promoting group initially composed by >10 other research groups, hospitals, day-care facilities, service and technology industries, and governmental agencies.

He has supervised 6 PhD theses (researchers now at Amazon, Google, PAL Robotics, Eurecat and KCL), one having obtained the prestigious Georges Giralt Award (2023) and another the Best AI prize from ACIA (2020). He is currently the supervisor of 8 PhD theses (3 in deposit), some of them co-directed with international collaborators. He also has supervised 18 Masters and 24 graduate and undergraduate works.

He has been Senior and Associate Editor at several international conferences and has organized several workshops and seminars. He is regularly invited to deliver scientific lectures and maintains an active outreach activity. He serves regularly as a reviewer for international agencies, like FWO (Belgium), SNSF (Switzerland). He is involved in several international associations like CLAIRE and ELLIS.

He has made a growing effort to transfer knowledge to society. Thanks to this he has obtained 10 new technology-transfer projects, he is the holder of 2 patents and the founder of the spin-off company DATISION.

Part C. RELEVANT MERITS (*sorted by typology*)

C.1. Publications (*10 selected since 2018*) (*citations from Google Scholar*)

1. E. Corona, G. Alenyà, G. Pons-Moll, and F. Moreno-Noguer, LayerNet: High-Resolution Semantic 3D Reconstruction of Clothed People, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2023.
(**Decile 1**) <http://dx.doi.org/10.1109/TPAMI.2023.3332677>
2. Olivares-Alarcos, S. Foix, S. Borgo, and G. Alenyà, OCRA – An ontology for collaborative robotics and adaptation, *Computers in industry*, 132, 103627, 2022.
(**Decile 1**, 15c) <http://dx.doi.org/10.1016/j.compind.2022.103627>
3. S. Forgas, R. Huertas, A. Andriella, and G. Alenyà, How do Consumers' Gender and Rational Thinking Affect the Acceptance of Entertainment Social Robots? *Int. Journal of Social Robotics*, 14, 973–994, 2022.
(**Quartile 1**, 16c) <http://dx.doi.org/10.1007/s12369-021-00845-y>

4. Andriella, H. Siqueira, D. Fu, S. Magg, P. Barros, S. Wermtter, C. Torras, and G. Alenyà, Do I Have a Personality? Endowing Care Robots with Context-Dependent Personality Traits, *International Journal of Social Robotics*, 13(8) 2081–2102, 2021. (**Quartile 1**, 27 citations) <http://dx.doi.org/10.1007/s12369-020-00690-5>
5. J. Borràs, G. Alenyà, and C. Torras, A grasping-centered analysis for cloth manipulation, *IEEE Transactions on Robotics*, 36(3), pp. 924–936, 2020. (**Decile 1**, 89c) <http://dx.doi.org/10.1109/TRO.2020.2986921>
6. Garcia-Camacho, M. Lippi, M.C. Welle, H. Yin, R. Antonova, A. Varava, J. Borràs, C. Torras, A. Marino, G. Alenyà, and D. Kragic, Benchmarking Bimanual Cloth Manipulation, *IEEE Robotics and Automation Letters*, 5(2), 1111-1118, 2020. (**Quartile 1**, 70c) <http://dx.doi.org/10.1109/LRA.2020.2965891>
7. Andriella, C. Torras, G. Alenyà, Cognitive System Framework for Brain-Training Exercise based on Human-Robot Interaction, *Cognitive Computation*, 12(4), 793-810, 2020. (**Quartile 1**, 31c) <http://dx.doi.org/10.1007/s12559-019-09696-2>
8. G. Canal, G. Alenyà, and C. Torras, Adapting robot task planning to user preferences: an assistive shoe dressing example, *Autonomous Robots*, vol. 43, no. 6, pp. 1343–1356, 2019. (**Quartile 1**, 50c) <http://dx.doi.org/10.1007/s10514-018-9737-2>
9. E. Corona, G. Alenyà, T. Gabas, and C. Torras, Active garment recognition and target grasping point detection using deep learning, *Pattern Recognition*, 74, pp. 629–641, 2018. (**Decile 1**, 87c) <http://dx.doi.org/10.1016/j.patcog.2017.09.042>
10. T. R. Savarimuthu, A. G. Buch, C. Schlette, G. Alenyà (7/17), and N. Kruger, Teaching a Robot the Semantics of Assembly Tasks, *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 48(5), pp. 670–692, 2018 (**Decile 1**, 75c) <http://dx.doi.org/10.1109/TSMC.2016.2635479>

C.2. Congress, (10 selected since 2018) (citations from Google Scholar)

1. (oral) A. Olivares-Alarcos, A. Andriella, S. Foix, and G. Alenyà, “Robot explanatory narratives of collaborative and adaptive experiences”, in *IEEE International Conference on Robotics and Automation (ICRA)*, 2023, pp. 11964–11971
2. (oral) S. Izquierdo, G. Canal, C. Rizzo, and G. Alenyà, “Improved Task Planning through Failure Anticipation in Human-Robot Collaboration,” in *IEEE International Conference on Robotics and Automation (ICRA)*, 2022, pp. 7875–7880.
3. (poster) E. Corona, A. Pumarola, G. Alenyà, G. Pons-Moll, and F. Moreno-Noguer, “SMPLicit: Topology-aware generative model for clothed people,” *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2021. (23.7% acceptance rate, 145c) (**CORE A++**)
4. (oral) N. Hansen, R. Jangir, Y. Sun, G. Alenyà, P. Abbeel, A. A. Efros, L. Pinto, and X. Wang, “Self-Supervised Policy Adaptation during Deployment,” *International Conference on Learning Representations (ICLR)*, 2021. (**CORE A++**) (28.7% ar, 128c)
5. (oral) R. Jangir, G. Alenyà and C. Torras. Dynamic Cloth Manipulation with Deep Reinforcement Learning, *IEEE International Conference on Robotics and Automation (ICRA)*, 2020. (97c)
6. (poster) E. Corona, A. Pumarola, G. Alenyà, and F. Moreno-Noguer, “Context-aware human motion prediction,” *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)* 2020. (22% ar, 117c) (**CORE A++**)
7. (oral) E. Corona, A. Pumarola, G. Alenyà, F. Moreno-Noguer, and G. Rogez, “Ganhand: Predicting human grasp affordances in multi-object scenes,” *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2020. (22% ar, 129c) (**CORE A++**)
8. (oral) G. Canal, M. Cashmore, S. Krivic, G. Alenyà, D. Magazzeni, and C. Torras, “Probabilistic planning for robotics with ROSPlan,” in *Towards Autonomous Robotic Systems Conference, (TAROS) 2019*. (37c)
9. (oral) G. Canal, E. Pignat, G. Alenyà, S. Calinon, and C. Torras, “Joining High-Level Symbolic Planning with Low-Level Motion Primitives in Adaptive HRI: Application to Dressing Assistance”, *IEEE International Conference on Robotics and Automation (ICRA)*, 2018. (33c)
10. (oral) A. Suárez, G. Alenyà and C. Torras. “Interleaving hierarchical task planning and motion constraint testing for dual-arm manipulation”, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2018. (16c)

C.3. Research projects (10 selected since 2018)

1. 2024-2027 - **(IP)** EVISE (EU HORIZON-CL4-2023-DE-01-01 101135959), 603K€
2. 2023-2027 - **(IP)** TRAIL (EU HORIZON-MSCA-DN-101072488), 252K€
3. 2022-2025 - **(IP)** DEMETER (AEI-Líneas estratégicas - PLEC2022-009289), 206K€
4. 2021-2024 - **(Coordinator)** ROB-IN (AEI-Líneas Estratégicas, PLEC2021-007859), 232K€ (Total consortium: 507K€)
5. 2021-2024 - **(IP)** SeCuRoPS (Research Council of Norway INT-NO/0875), 200K€.
6. 2021-2024 - **(Co-coordinator)** CHLOE_GRAPH (AEI – Retos - PID2020-118649RB-I00), 113K€
7. 2019-2022 - **(IP)** BURG (PCIN2019-103447 (EU-CHISTERA)) 111K€
8. 2018-2021 - **(Coordinator)** SIMBIOTS (GenCat (RIS3CAT) COMRDI16-1-0017), 125K€ (Total consortium: 713K€)
9. 2018-2020 - **(Co-coordinator)** HuMoUR (M. Educación y Ciencia - TIN2017-90086-R), 167K€
10. 2016-2020 - **(IP)** SOCRATES (EU-HORIZON-MSCA-ITN-2016-721619), 530K€

C.4. Contracts, technological or transfer merits

Contracts with companies:

CDTI – Competitive funding from Centro para en Desarrollo Técnico Industrial

RED:ES – Competitive funding from MINECO ministry.

1. 2023 **(IP)** MAPRICOM: desarrollo de un sistema de mantenimiento predictivo, DATISION SL (en el marco del proyecto RED:ES 2021/C005/00152974) 50K€.
2. 2018-2020 **(IP)** AIPICS: Desarrollo de un sistema integral de control de la producción dotado de inteligencia artificial y capacidad de autodecisión INFUN SAU (con evaluación del CDTI-IDI-20171164) 60K€.
3. 2018-2019 **(IP)** SLD: Proceso automatizado de detección y clasificación inteligente de pieles, Labcat SL (CDTI-IDI-20171038) 55K€.
4. 2017-2018 **(IP)** SCIACE: sistema de climatización inteligente auto-adaptativo a las condiciones de entorno. Infun SAU (CDTI-IDI-20170465) 60K€.
5. 2016-2017 **(IP)** PERSEO: paquete escalable robusto de soluciones específicas orientadas, CIRCUTOR SA (CDTI-IDI-20160258) 70K€.
6. 2015-2016 **(IP)** TERMOSOLD: desarrollo de un sistema basado en IA para la inspección de soldaduras en líneas de envasado horizontal, Volpak SAU (CDTI-IDI-20150175) 75K€.

SpinOFF

7. 2018 G.Alenyà, is co-founder of the **spin-off** Company DATISION (www.datision.com) who yearly contributes royalties to CSIC and UPC.

Patents and intellectual protection

8. 2020 - Patent: F. Moreno, G. Alenyà, E. Corona, A. Pumarola, G. Rogez. Method for determining a grasping hand model, NaverLabs, CSIC, UPC. App. num.: P202030553. OEP, 2020. Licensed to NAVERLabs.
9. 2019 - Intellectual property register: G. Alenyà and S. Foix. LLULL, library for data management, modelling and exploration of industrial processes. (Licensed to DATISION).
10. 2012 - Patent: G. Alenyà, P. Grosch, C. Torras, M. Palacín. Herramienta de corte y extracción de muestras, CSIC. App. num.: P201131235 – PCT/ES2012/070524. OEP, 2012.

Training activities

The PM group, which includes many more researchers other than the Research team of this proposal, is a very active group. We organize bi-monthly seminars where we share our research, and practice talks before we go to conferences and propose reading groups. In addition, last year we started a yearly retreat that is used to find synergies between our own projects, which specialize not only in cloth manipulation but also in assistive robotics and agricultural robotics. Different groups of students are experts in different fields such as decision-making and planning, learning, control, perception, etc. The student doing his/her PhD in the context of CHLOE-Map will be integrated into the group and benefit from all the seminars and reading groups, a research environment that is very enlightening and motivating for students.

Other training activities are organized more transversely for the whole institute. This includes the PhD Day, which is a yearly event where all the PhD candidates expose their PhD developments, what they have achieved in the last year and what they plan for the following one and receive feedback from other PI's in the institute in addition to his/her direct supervisors.

Research methodology

Our methodology is based on constant communication with the student. We will start with weekly meetings where the student will be presented with the ideas of the PhD and an initial evaluation of the state of the art will be performed by the student in order to properly frame our research, using this proposal document as a starting point. Once the research advances, we encourage the student to integrate the results in terms of lab demonstrations, even if it's in simulation. This not only helps in the dissemination of results but also motivates better the research papers. Except for the first 6 months of the PhD, we will encourage the student to submit research work into the two most important conferences in robotics: ICRA and IROS, with deadlines on Sept. 15 and March 1 each year. This means the research is focused towards solving a framed problem, and even if the paper is not accepted, or sometimes not even submitted, it helps the student in learning to write scientific papers and understand weak and strong points in our work.

Dissemination plan

The student will be encouraged to disseminate his/her work mainly through publications. We expect 2 to 3 conferences and a journal paper minimum. Once the first publication is out, the student will be encouraged to go to conferences to present his work. We will also encourage, from the very beginning, participation in dedicated workshops that occur in almost all important robotic conferences on manipulation of deformable objects (often we are part of the organizers). Workshops offer a very good opportunity to get to know researchers working on very related topics and provide a first opportunity to present work, even if it is preliminary.

In addition, IRI organizes bi-yearly open door days where we offer lab demonstrations to student groups and the general public. We always encourage the students to prepare a demonstration that they can present themselves to the general public.

Mobility plan

We have many collaborations with EU research institutions that work on similar topics thanks to our partners in European projects, including KTH (Sweden), KIT (Germany),

JSI(Slovenia), Kings College (UK), etc. According to the work progress, we will encourage the student to do a 3 to 6 month stay abroad to work on a particular problem related to his/her thesis. This will be planned towards the end of the 3rd year. If there is any special motivation for which a second stay could be fruitful for the thesis development, we can also plan it.