Parametric robotic action representation for robotic cooking
Internship proposal

January 29, 2026

Project: VeggieBot — a domestic robot aide for preparing meals
Host institution: IMT Atlantique (Brest campus, Technopôle Brest-Iroise), Plouzané, France
Supervisor(s): Mihai Andries, Christophe Lohr
Time period: February to July 2026 (6 months, flexible)
Gratification: approximately 600 euros per month

1 Context

The objective of the VeggieBotproject is to research and develop the technologies necessary for autonomous preparation of meals from-start-to-finish using a robotic arm. Our platform is a 7-degree-of-freedom robotic arm (UFactory xArm7) on a rail, equipped with a UFactory xArm jaw gripper, and a 6 axis force-torque sensor. Methodologically, we decompose every recipe into gestures (primitive movements). To be able to execute any recipe, the robot needs a vocabulary of gestures that it can execute, and from which it can assemble a sequence of actions corresponding to any recipe. In addition, these gestures need to be parametric, so as to adapt to objects of different dimensions, shapes, softness/rigidity.

2 Mission

2.1 Research questions

The intern will address the following research questions:

1. What is the state-of-the-art in parametric representation of robot actions?
2. What methods can be used to "learn/acquire" robotic actions in parametric form? (e.g., reinforcement learning, teaching by demonstration)
3. How do formally represented actions compare to actions feasible by a Vision-Language-Action model?

2.2 Work plan

1. Research the state-of-the-art in parametric robot action representation (M1)
2. Implement identified representations of robotic actions inside a convenient simulator (M1–M2)
3. Record/Learn in parametric form some selected cooking gestures for the robotic arm. Ensure the gestures are safe inside a robotic simulation, before porting them to the real robot. (M3–M4)
4. Compare the different robotic action representations.
5. Implement a Vision-Language-Action model. Compare VLA's cooking gestures with the parametric gestures recorded/learned previously (M4–M5).
6. Prepare code for delivery, write documentation (M6)
7. Draft a research article on parametric robotic action representation (M5–M6)

2.3 Deliverables

- **Internship report:** An report has to be delivered at the end of the internship.
- **Code:** The code developed by the intern has to be packaged and delivered to the supervisors, accompanied by appropriate documentation (user guide, code comments).
- **Research article:** We also encourage the intern to draft a research article on the topic of the internship for submission to a research conference. If the submission gets accepted for publication, our research team would be happy to sponsor the participation of the student to the conference.

3 How to apply?

Please submit your application containing CV, academic transcripts, and motivation letter to `mihai.andries[at]imt-atlantique.fr` and `christophe.lohr[at]imt-atlantique.fr` before 15 February 2026.

4 Bibliography

1. Saveriano, Matteo, Fares J. Abu-Dakka, Aljaž Kramberger, and Luka Peternel. "Dynamic movement primitives in robotics: A tutorial survey." The International Journal of Robotics Research 42, no. 13 (2023): 1133-1184.
2. Kim, M.J., Pertsch, K., Karamcheti, S., Xiao, T., Balakrishna, A., Nair, S., Rafailov, R., Foster, E.P., Sanketi, P.R., Vuong, Q. and Kollar, T., 2025, January. OpenVLA: An Open-Source Vision-Language-Action Model. In Conference on Robot Learning (pp. 2679-2713). PMLR.
3. Zitkovich B, Yu T, Xu S, Xu P, Xiao T, Xia F, Wu J, Wohlhart P, Welker S, Wahid A, Vuong Q. Rt-2: Vision-language-action models transfer web knowledge to robotic control. In Conference on Robot Learning 2023 Dec 2 (pp. 2165-2183). PMLR.
4. Ravichandar H, Polydoros AS, Chernova S, Billard A. Recent advances in robot learning from demonstration. Annual review of control, robotics, and autonomous systems. 2020 May 3;3(1):297-330.
5. Liu J, Li C, Wang S, Dong Z, Lam TL, Calinon S, Li M, Chen F. Learning Goal-oriented Bimanual Dough Rolling Using Dynamic Heterogeneous Graph Based on Human Demonstration. In2024 IEEE International Conference on Robotics and Biomimetics (ROBIO) 2024 Dec 10 (pp. 925-930). IEEE.