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## Innovation

### A robot learns how to make traditional swiss raclette thanks to ai



Robots are already capable of cooking hamburgers, omelets, and other simple meals. Idiap Research Institute researchers have shared a video that shows what it takes to teach robots to make traditional Swiss raclette. <https://www.roboticgizmos.com/robot-raclette-maker>

An imitation learning technique was used to enable the robot to learn new skills by using position and force information and adapt to new situations.

It took the know-how of the cheese Master Eddy Baillifard, founder of Raclett'House, and the expertise of the Robot learning & interaction group from the Idiap research institute to achieve the first raclette made by a robot. Beyond the technical challenge, the project shows the potential of learning from demonstration techniques and for a better human-robot collaboration.

The cheese master hand is quick and smooth: he applies a precisely controlled pressure on the melting cheese surface to let it land on the plate. Et voilà, the famous Swiss raclette! The gesture seems easy, but the know-how behind it is crucial. Every raclette enthusiast can testify how hard it is to master this apparently simple skill. "Depending on the type of raclette cheese, the surface can vary in terms of softness and can be more or less fluid," says Eddy Baillifard, the Master and ambassador of the raclette cheese. Mimicking this skill with a robot isn't easy. To achieve this, Emmanuel Pignat, a PhD from the Idiap's robotic group used a novel ap-

proach: Eddy guided the robot's arm to let it record the movements and forces needed to perform the task. This learning technique allows to transfer skills from the human to the robot in an intuitive manner. The range of applications is wide, including industrial robots, service robots, and assistive robots. It relieves professionals of their most repetitive, dangerous or uncomfortable duties, in order to spend more time using their human skills, such as supervision, evaluation or decision making.

#### A smart raclette

If learning from demonstration – the scientific term for copying a gesture – seems an obvious task to us humans, the challenge is much harder for robots. They are usually programmed for a specific task, which is repeated accurately in a loop. "Thanks to artificial intelligence algorithms, the robotic arm can generate movements that can adapt to new situations. In this specific case, the cheese can be in slightly different positions and orientations, and there can be more or less cheese left in the oven," says Sylvain Calinon, head of Idiap's Robot learning & interaction group. "This ability to adapt is the key to allow efficient human-robot collaboration. The cheese Master shows each time a slightly different way to scrape the raclette cheese onto the plate. The underlying learning algorithms allows the robot to integrate these nuances to recreate a meaningful gesture in a new situation."

#### When tradition meets innovation

This collaboration between the cheese Master and the researchers was sup-

ported by the whole Canton of Valais. The local authorities brought their financial support to this scientific research.

The TTM company created a specific oven with a handle for the robot to grab the plate with the cheese. Nicolas Fontaine, a young local entrepreneur, facilitated the contacts between TTM, The TTM company created a specific oven with a handle for the robot to grab the plate with the cheese. Nicolas Fontaine, a young local entrepreneur, facilitated the contacts between TTM, Raclett'House and Valais/Wallis Promotion which made the film. "When Nicolas Fontaine asked us for help, we immediately decided to help. This project highlights our strong belief about Valais: it's a unique territory mixing tradition and innovation. Both are represented by the best people and skills



A parishioner was in front of me coming out of church one day, and the preacher was standing at the door as he always is to shake hands. He grabbed the parishioner by the hand and pulled him aside. The Pastor said to him, "You need to join the Army of the Lord!" The parishioner replied, "I'm already in the Army of the Lord, Pastor." Pastor questioned, "How come I don't see you except at Christmas and Easter?" He whispered back, "I'm in the secret service."