INSTITUT DE FRANCE
Académie des sciences

Leopoldina
Nationale Akademie
der Wissenschaften

Towards a Joint German-French Robotics AI Strategy

Foreword: On September 5, 2018, the French *Académie des sciences* and the German *Nationale Akademie der Wissenschaften Leopoldina* organized a symposium entitled "*Robotics AI: Data Science versus Motion Intelligence*" (https://robotics-ia.sciencesconf.org/). The symposium gathered 50 researchers and representatives of institutions and ministries of both countries. The objective of the symposium was to strengthen the cooperation between France and Germany in Robotics-AI[1].

Robotics and Artificial Intelligence: There is no doubt about the growing importance of Robotics and Artificial Intelligence as a key technology for solving societal and economical challenges. Nowadays, Artificial Intelligence applications are more focused on technologies processing data for providing knowledge for decision making. The ultimate goal, however, is to create technical systems with capacities to interact with the physical world and to continually learn from these interactions to improve their behavior. The methods and approaches required for doing so go beyond pure specific machine learning algorithms and their applications to datasets. There are, for example, virtually no intelligent machines able to robustly perform a sufficient variety of simple tasks in the real world. Equipping robots with sufficient cognitive abilities to perceive, decide, move and manipulate in the physical world requires exploring the computational foundations of physical actions, establishing a science of intelligent motion. This is in line with Villani's recent report on AI: "*Although robotics and AI go hand-in-hand in the collective imagination, the two fields are yet to truly converge. Many robotics applications are not within the purview of AI and vice-versa. There is, however, a whole field of exploration ready and waiting".*

According to reports by the International Federation of Robotics, Europe ranks among the world leaders in the field of modern robotics in terms of the number of scientific publications, the number of service and assistive robot manufacturers, and the number of robotics startups. Germany and France are, like no other country in Europe, known for the world-leading research and realization of intelligent robot systems and their applications, including Industry 4.0, mobility, logistics, healthcare, service robotics, sustainable development and environment preservation. In addition, both countries have a long-lasting tradition in the discourse of philosophical, ethical, and legal aspects of technological innovations, which clearly sets Europe apart from the currently ongoing and mostly technology-driven AI initiatives in other countries. Therefore, we welcome a joint German-French Robotics AI strategy as a milestone in establishing a European Robotics and AI strategy. This objective can only be achieved if the strengths and competitive advantages of Europe, in particular of these two countries, are considered jointly.

Recommendation: The creation of physical robotic systems, intelligently interacting with the real word, requires sustainable research infrastructures. Developing and maintaining such platforms requires a level of manpower that is most of the time out of reach of public research institutions in Europe. This is why we suggest the establishment of a joint ***German-French Institute for Robotics*** as an essential component of the German-French Robotics AI Initiative. Building on the European strength in the area, this institute would gather researchers, engineers and technicians for a sustainable German-French high-level research, offering access to advanced experimental facilities, built on solid long-term investments. This institute would be also open to other European countries and be embedded in an ecosystem of startup companies. This is a necessary condition to keep a strong public Robotics AI research capacity in Europe that can compete with private companies or government-supported institutions in the United States or Asia.

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[1] At the symposium, both academies decided to launch a working group in charge to start defining a common strategy in Robotics-AI research. The working group is composed of T. Asfour (KIT, Karlsruhe, Germany), W. Burgard (Freiburg University, Member of the *Nationale Akademie der Wissenschaften Leopoldina*, Germany, IEEE RAS President), R. Chatila (ISIR, Paris, France, IEEE RAS Past-President) and J.P. Laumond (LAAS-CNRS, Toulouse, *Member of the Académie des sciences*, France).