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“PNRR mentions neither robotics nor Artificial Intelligence”

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What comes from the world of Italian robotics to the National Recovery and Resilience Plan is an unquestionable complaint which “neglects” robotics and Artificial Intelligence, fields in which “Italy is competitive”. In a long article published in Nature Italy, the Italian section of one of the major scientific journals in the world, i two Italian robotics Antonio Bicchi and Bruno Siciliano, among the largest in the country and internationally, note that “in the National Recovery and Resilience Plan (Pnrr), neither robotics nor artificial intelligence (Ai) are mentioned among the ten Key Enabling Technologies (Ket) which should be at the center of new dedicated research centers “.” Given the universal recognition of the importance of these technologies, many were surprised “underline Bicchi and Siciliano in the article” Robotics and InterAction Technology: the key role of ‘Italy in the next revolution “.

Antonio Bicchi – Professor of Robotics at the University of Pisa and Senior Scientist at the Italian Institute of Technology in Genoa – and Bruno Siciliano – Professor of Automatics at the Federico II University, founder of the historic Prisma Lab

in the Neapolitan university and director of Icaros, the interdepartmental center for robotic surgery – they want to highlight that the National Recovery and Resilience Plan “neglects a strategic research field” in which Italy “has a competitive advantage”. “A possible explanation – they write – is that it is assumed that these technologies are functional to progress in other areas. It is indeed difficult today to think of advancing the digital industrial transition, sustainable mobility, environmental protection, agritech, and even the protection of cultural heritage and biodiversity (to cite some of the examples of Ket mentioned in the plan), without the help of Ai and robotics “.

“Indeed, the text mentions AI several times as a tool for reforming public administration (in hiring, procurement, regulation, taxation and tourist accommodation), and talks about drones for environmental and climate monitoring ” Bicchi and Siciliano add, observing that “Considering the role of robotics and AI as an implicit enabler, rather than as a key enabling technology per se, has negative consequences for research and innovation in this field “.” We risk losing sight – explain the two robotics – the common elements between these different areas of application, and the positive synergies that derive from multidisciplinary efforts. We support the importance of investing not only in “vertical” applications, but also in “horizontal” fundamental research which can lead to the development of a general theory and global technology of AI and robotics. To do this, it is useful to start by clarifying the terminology “.

“The media often – underline the robotics Bicchi and Siciliano in their article published by Nature Italy – ul indiscriminately

sound the terms Ai and robotics in a confusing way. Even in scientific circles, since there is so much overlap in scope and methods, it is not always evident whether the differences in research problems allow us to speak of two distinct disciplines, or whether one is part of the other. “” Several existing definitions of artificial intelligence converge towards the idea of implementing the essential features of human cognition in a computer. In the pioneering program, the goal of AI was the ultimate understanding of intelligence, with obvious practical applications in creating smart devices or even robots. Colloquially today the term AI describes machines that mimic the cognitive functions of the human mind, such as learning and problem solving, which basically equate to data processing. On the contrary, – Bicchi and Siciliano continue – in the clear and commonly accepted definition by Michael Brady in 1980, robotics is the intelligent connection of perception to action. Robots exist to process interaction with the physical world – not only brains (intelligence) and sensors (perception) but also bodies (action) “.

Bicchi and Siciliano still argue that “ithe fact that AI focuses more on reproducing cognitive abilities residing in the central nervous system, such as image processing and language, while robotics focuses on physical abilities that involve other parts of the body, such as manipulation and locomotion, it’s just the tip of the iceberg. The differences between the two types of intelligence at play have been well known since at least the 1980s, and best exemplified by Moravec’s paradox according to which “it’s relatively easy to get computers to catch up performance comparable to that of an adult in

intelligence tests or checkers, but it is difficult or impossible to give them the skills of a one year old when it comes to perception and mobility “.

“Further evidence of the gap between information processing and interaction comes from the comparison between vision and hearing and touch. The Ai -says Bicchi and Siciliano in the document- has made great progress in image and sound processing, but tactile information remains a much greater challenge. For humans, the sense of touch is of paramount importance. A child begins to interact with the world by touching all objects and learns intuitively how to grasp and manipulate them thanks to the intelligence embodied in his hands, in association with, but beyond, the visual memory of objects. Indeed, the manipulation of the environment is a perfect example of the crucial challenges we face. On July 20, 2021, Wojciech Zaremba, a San Francisco-based co-founder of OpenAi, announced that the company’s robotics team, known for learning how to order a Rubik’s cube with a robotic hand from scratch, had been disbanded. Zarembra recognizes the difficulty of acquiring enough real-world information to power supervised or reinforced learning algorithms. ”

“To solve unstructured and highly interactive tasks in the real world, data cannot be taken for granted – the system itself must obtain them from the environment through interaction. This is the fundamental challenge that robotics poses to the future of AI, a challenge that makes the two disciplines inseparable ” remark Bicchi and Siciliano in the article published by Nature Italy.

In the mission statement of the Italian Institute of Robotics and Intelligent Machines (I-Rim) the neologism InterAction Technology (Iat) is proposed – where the ‘A’ is deliberately capitalized to emphasize the importance of physical action. By addressing the problem of learning interaction, robotics and AI will produce a new generation of intelligent devices capable of collaborating with people and interacting with the environment, thus providing the missing link between the digital and physical world we live in. In this sense, Iat represents the natural evolution of Information Technology (It) towards a real symbiosis between man and machine “ we still read in the article signed by Antonio Bicchi and Bruno Siciliano in Nature Italy.

“Iat, as a technology that embodies Artificial Intelligence, – continue – will play a key role in the near future. Already today it is the engine of the competitiveness and flexibility of the manufacturing industry, where Italy has one of its most resistant excellences. Robotics for services is showing even more disruptive effects in sectors such as agriculture, health, environmental monitoring, security, transport, infrastructure and public services. European robotics is at the forefront of the world and Italian scientists are among the first in Europe. The average quality of our publications is the best in the world in the top 10% of the most cited, and second only to the US in terms of impact and average number of citations. Italian manufacturing is first in Europe for added value, and the intelligent machines that produce our goods are largely made in Italy “.

Finally, Bicchi and Siciliano warn that “if Italy wants to be in

the leading group of the next technological revolution, it must do nothing but invest in a field in which it already has a competitive advantage. This is the path indicated by Europe with Horizon Europe and public-private partnerships (PPPs) in AI, Data Science and Robotics, and the national robotics and Artificial Intelligence communities are at the center of these efforts. In order for Italy to consolidate its scientific and industrial leadership, it is necessary to strengthen the unity of fundamental research and technological development in the various applications “.

“We hope therefore ch the government plans clear and energetic actions in the implementation of the NRP, dove robotics and intelligent machines they could play a key role for the well-being of citizens and for the economic and industrial development of our country “is the indication entrusted by the two scientists to the publication in Nature Italy.