

EMERGE Consortium awarded grant by European Innovation Council to investigate new framework for AI collective awareness

Project scored first in the EIC's Pathfinder "Awareness inside" Challenge and will receive a €2.8M grant from the European Commission over the next 4 years

TOURS, FRANCE, January 30, 2023 /EINPresswire.com/ -- How do robots in a collective know what the group as a whole is doing? How can connected devices make sense of the world around them with so many interconnections? How can a robotic arm composed of many independent parts understand how its body behaves as it reaches for an object?



EMERGE is funded by the European Union under Grant Agreement 101070918.

When intelligence is distributed across many parts, be they robots, devices, or objects, it can be tricky for the bigger picture to emerge. Yet answering these questions is key to making collective systems easy to design, monitor and control. This is the goal of the EMERGE consortium composed of the University of Pisa (IT), Ludwig Maximilian University of Munich (DE), Delft University of Technology (NL), University of Bristol (UK), and Da Vinci Labs (FR).

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Davide Bacciu, EMERGE coordinator

Humans and other biological agents can effectively move in new environments, navigate previously unseen situations, and intuitively coordinate through complex social interactions. However, the cooperation among artificially intelligence agents is often dependent on some kind of central processing unit which collects that

information and establishes a centralised awareness which distributes commands to each unit. Although useful, this process allows for very specific and previously programmed situations to be

navigated and problems to be solved.

The EMERGE project will deliver a new philosophical, mathematical, and technological framework to demonstrate, both theoretically and experimentally, how collaborative awareness – a representation of shared existence, environment and goals – can arise from the perceptions and interactions of individual agents, without leveraging a pre-existing common language between them.



Davide Bacciu, Associate Professor at University of Pisa and EMERGE coordinator, explains: "EMERGE aims to extend to artificial agents the ability, typical of living organisms, to simultaneously possess self-consciousness and awareness of belonging to a collaborative collective, without the former necessarily dissolving into the latter."

EMERGE will implement a clear research-to-technology pathway to surpass limitations and barriers of the current state-of-the-art multi-agent collaborative systems, with potential to produce breakthroughs and open new markets in the next generation of robotic systems.

For that, the Consortium will focus on three use cases:

- 1) The first use case is modular soft robots – self-assembling, repairing or replicating robots made from soft materials which offer high freedom of movement, even in confined spaces, and better manipulation of delicate objects. In these robots, the body formed by a physically distributed collective needs to self-organise to account for the dynamic addition of components.
- 2) The second use-case is robotic swarms – groups with a large number of robots whose behaviour arises from the interactions between themselves and with their environment. This is an example of a large-scale minimal collective where agents need coordination to achieve a collaborative goal.
- 3) The third use-case is collaborative robots, or cobots – robots interacting in direct contact with, or in close proximity to, humans. These represent a closer-to-market use case where interoperability is currently a significant barrier.

While robotics provides the perfect testing ground for this new framework, EMERGE also envisions impact in areas such as Internet-of-Things (IoT), smart cities and transportation, microservice-based information and communications technology (ICT) systems, and biomedical

nanodevices, among others.

EMERGE has been awarded a highly competitive grant in the Horizon Europe funding programme. The project scored first among the 8 projects selected out of 34 proposals submitted to the European Innovation Council's (EIC) "Awareness inside" Pathfinder Challenges 2021 call. The partners will receive a combined €2.8M grant from the European Commission over the next 4 years. UK participants in EMERGE are supported by UK Research and Innovation.

Learn more at EMERGE's [website](#), and [Twitter](#) and [LinkedIn](#) pages.

About University of Pisa (EMERGE Coordinator)

University of Pisa is one of the most renowned educational institutions in Italy, with twenty departments and high level research centers in agriculture, physics, computer science, engineering, medicine and veterinary medicine. Famous alumni of the university include Galileo Galilei, the founder of modern science, the Nobel prize winners Enrico Fermi and Carlo Rubbia, and holders of the Fields Medal for Mathematics, Enrico Bombieri and Alessio Figalli.

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About Da Vinci Labs (Dissemination and Innovation Partner)

Da Vinci Labs is a research and incubation structure inspired by Leonardo da Vinci. Its interdisciplinary and humanistic approach aims to respond in a competitive way to the ecological challenges of tomorrow, and to bring out the future champions of deeptech, in particular in the field of quantum technologies, artificial intelligence and synthetic biology. To do this, Da Vinci Labs participates in European collaborative research projects and builds a technological infrastructure in Touraine which will be made available to researchers and entrepreneurs ready to tackle our major societal challenges.

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