Advanced Autonomous Control of Robots and Drones using Active Inference AI

The technology uses Active Inference to build World Models for industrial robotics and autonomous vehicle applications

Category
Software

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Background

Spinout company Stanhope AI is building a Generative AI for the physical world, based on the first principles of human brain function.

The team is the first in the world to develop and deploy a fully autonomous full-scale drone. The drone's "brain" is based on the theory of Active Inference, eliminating reliance on mapping systems, GPS and expensive human operators and enabling it to fly in unknown environments with complete autonomy.

Stanhope AI aims to overcome the challenges of currently available AI systems, which include a lack of reasoning and planning, a need for large training data sets and hallucinations.

Technology Overview

The technology uses Active Inference to build World Models for industrial robotics and autonomous vehicle applications. This new approach to AI allows intelligence to be built fully 'on device' by applying first principles of human brain function. The first demonstrator of this has been on drones which are able to make sense of their surroundings by actively and independently acquiring the knowledge they need to navigate safely to a specified destination.

The Stanhope AI team are the first to embody this computational theory of brain function in a machine, controlling its decisions and movements (namely from sensing to acting). The technology operates with a range of sensors (LiDAR, RGB cameras or sonar) and actuators (propeller movement or ground robot movement or robotic arm operations).

Professor Karl Friston is the founder of the Free Energy Principle, from which the theory of Active Inference arose. The Stanhope AI founding team comprises Professors Rosalyn Moran (King's College London), Karl Friston (UCL) and Dr Biswa Sengupta, each of whom have a long history in researching and building the theory. Stanhope AI is backed by investors including the UCL Technology Fund.

Benefits

This new approach to AI overcomes the limits of LLMs and Machine Learning-based AI which include a lack of ability to reason and plan, a need for large training data sets and the inability to generate a data set of the real world. Instead, Stanhope AI has developed a top-down model of AI that is based on decades of academic research on how human brains function to deliberate, decide and act.

In particular, this technology:

• Reduces pre-work by eliminating pre-mapping of the operating environment.

• Be default offers a fully explainable system.

• Allows autonomous robots to be operated safely around people.

• Enable efficiencies through robust and rapidly deployable automation.

Applications

Robotics for industry & autonomous machines particularly when the following special scenarios may apply:

• Real-life environments where nothing is constant

• GPS-denied environments

• Need to land a robot / drone safely when it has lost comms with its remote pilot

Opportunity

Having partnered with government bodies to test and scale the technology in fully autonomous drones, the team are now seeking to apply it to a wider range of embodied agents (e.g. ground robots, plant equipment). They are looking for Joint Development Partners in these fields who are ready to explore the next generation of AI technology that will offer low-cost, fast deployment and robust decision-making by machines.

Seeking

Commercial partner