

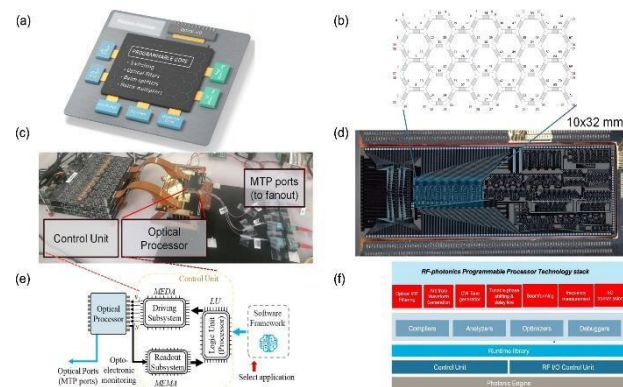
Department of Data Science

Current News on Innovation & Technology

Research team manufactures the first universal, programmable and multifunctional photonic chip

The photonic processor elements and layers:

- a. Optical layer of the processor with the core, I/Os, and high-performance blocks.
- b. Schematic of the waveguide mesh core,
- c. Assembled chip with control unit and access fibers.
- d. Picture of the chip with the highlighted region of the reconfigurable core, e interconnection diagram between optical system, control unit and software layer, f Software layer stack employed in this work.



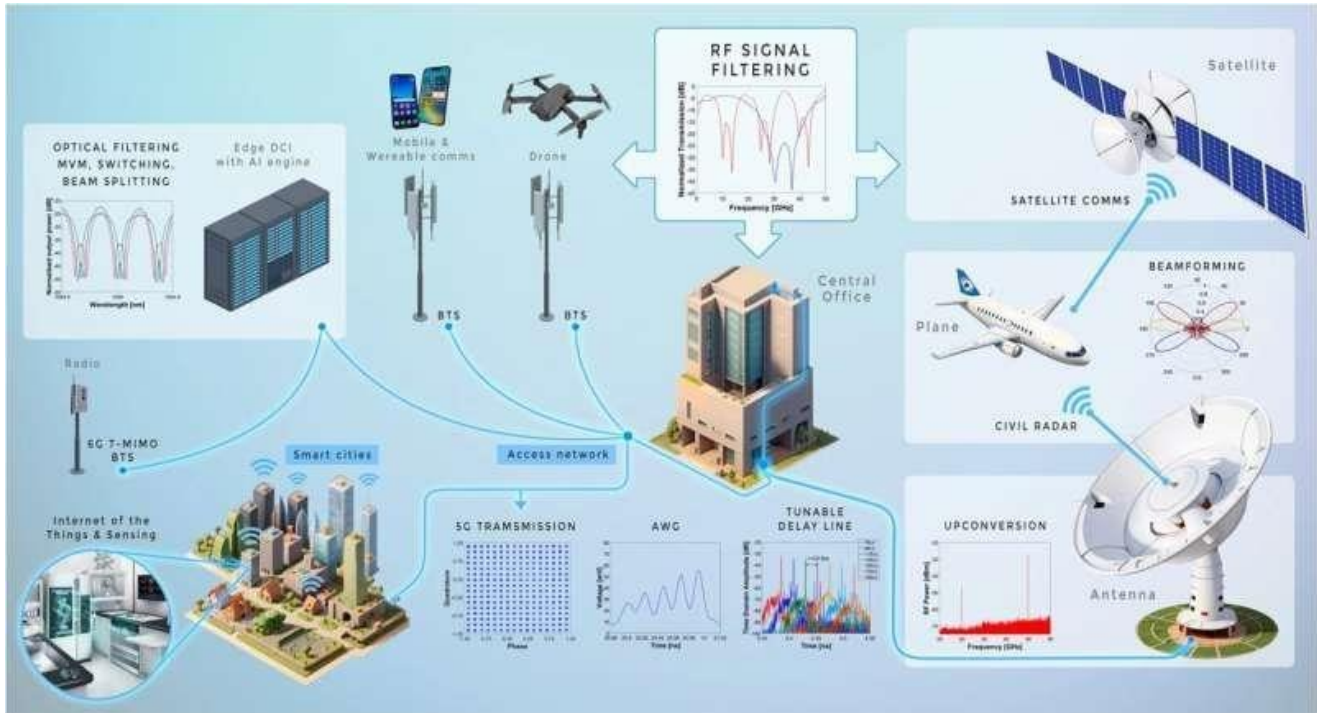
Credit: *Nature Communications* (2024). DOI: 10.1038/s41467-024-45888-7

A team from the Photonics Research Laboratory (PRL)-iTEAM of the Universitat Politècnica de València and the company iPRONICS have designed and manufactured a revolutionary chip for the telecommunications sector, data centers and infrastructure associated with artificial intelligence computing systems. It is the first universal, programmable, and multifunctional photonic chip worldwide. It will benefit 5G communications, data centers, quantum computing, artificial intelligence, satellites, drones, and autonomous driving, among many other applications.

The development of this chip is the main result of the European project UMWP-Chip, led by researcher José Capmany. The work has been published in *Nature Communications*. The chip devised and manufactured by the UPV and iPRONICS team allows on-demand programming and interconnecting of wireless and photonic segments of communication networks, avoiding the generation of bottlenecks that can limit both the capacity and bandwidth available.

"It is the first chip in the world with these characteristics. It can implement the twelve basic functionalities required by these systems and can be programmed on demand, thus increasing the efficiency of the circuit," explains Capmany. The UPV professor explains that applications such as 5G or autonomous cars require a higher frequency, making it necessary to reduce the size of the antennas and the associated circuits. In this case, the PRL-iTEAM from UPV has managed to make the

converter behind the antenna, an interface chip, as tiny and compact as possible and ready to support current and expected future frequency bands.



(BTS base station, CS central station, DC data center, AI artificial intelligence, AWG arbitrary waveform generation, IoT Internet of things, MIMO multiple input multiple outputs). Credit: Nature Communications (2024). DOI: 10.1038/s41467-024-45888-7 This chip has already been integrated into an iPRONICS product, the Smartlight, and Vodafone has already used it in testing.

"For us, the development of this chip is a crucial step because it has allowed the validation of our developments applied to a growing problem, the efficient management of data flows in data centers and networks for artificial intelligence computing systems. Our next goal is to scale the chip to meet the needs of this market segment," said Daniel Pérez-López, co-founder and CTO of iPronics.

News Articles

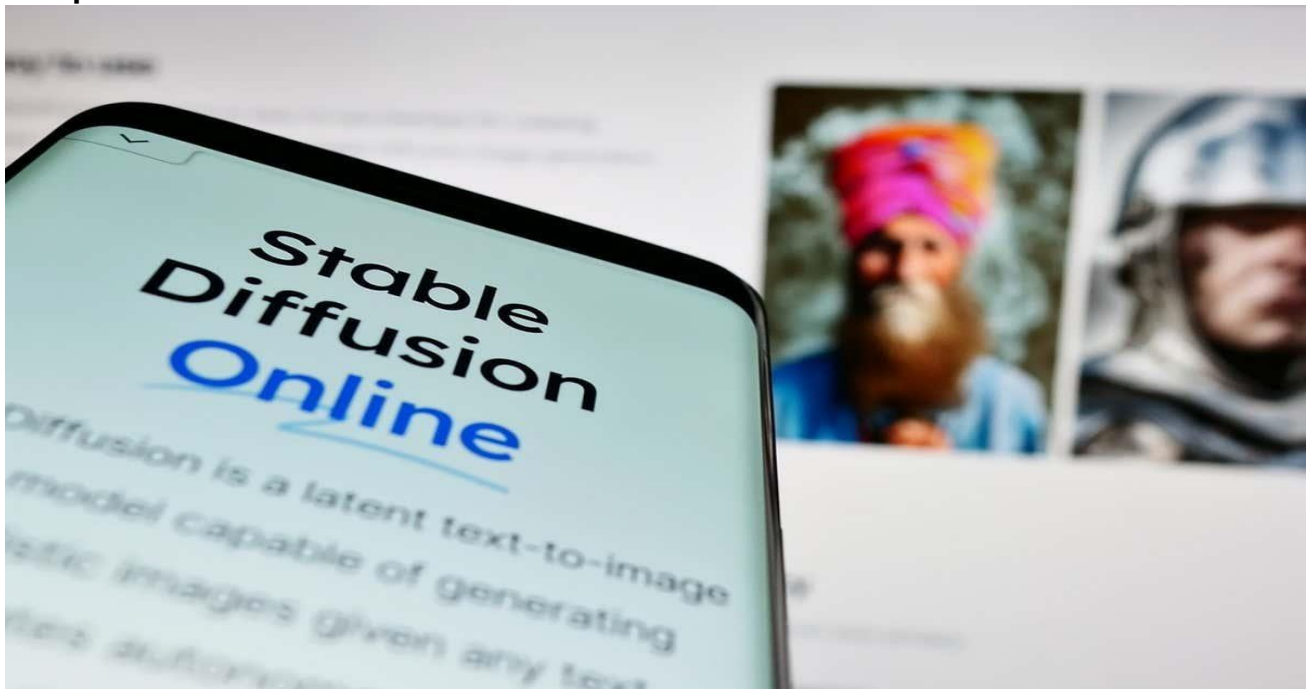
Technology

[Showing AI just 1000 extra images reduced AI-generated stereotypes](#)

Researchers made an AI image generator produce less offensive images by feeding it a tiny amount of additional training data

By [Chris Stokel-Walker](#)

14 April 2024



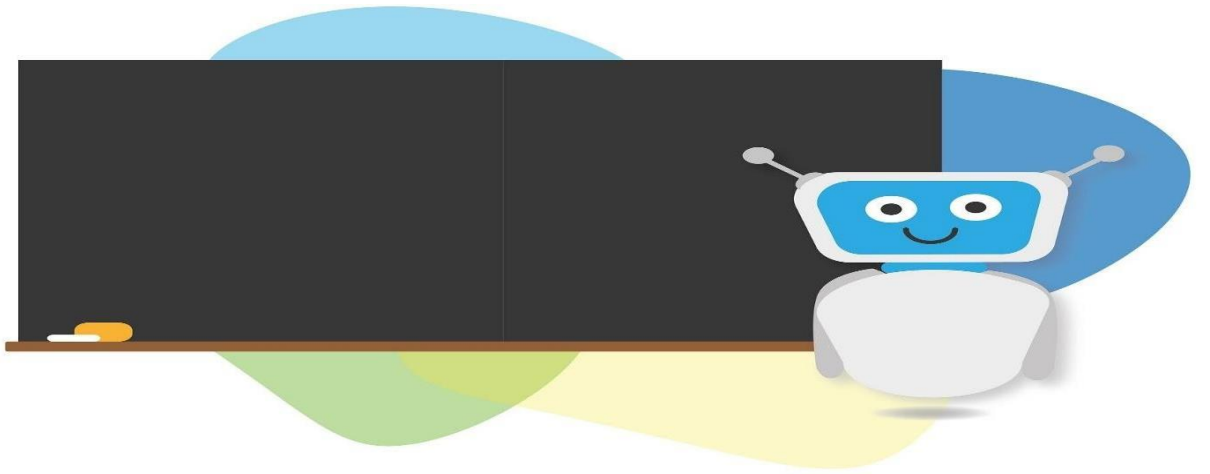
Stable Diffusion is an AI image generator

T. Schneider/Shutterstock

AI image generators can be made more culturally sensitive and accurate by feeding them just a small number of photographs provided by people living in countries around the world.

The images used to train these artificial intelligence systems “are mostly about the Western world”, says [Jean Oh](#) at Carnegie Mellon University in Pennsylvania. As a result of this kind of limited training, [generative AI image creators](#), such as Stable Diffusion, often misrepresent or stereotype non-Western cultures.

[The words you use matter, especially when you're engaging with ChatGPT](#)



Credit: Pixabay/CC0 Public Domain

Do you start your ChatGPT prompts with a friendly greeting? Have you asked for the output in a certain format? Should you offer a monetary tip for its service? Researchers interact with large language models (LLMs), such as ChatGPT, in many ways, including to label their data for machine learning tasks. There are few answers to how small changes to a prompt can affect the accuracy of these labels.

Salinas, along with Fred Morstatter, Research Assistant Professor of computer science at USC's Viterbi School of Engineering and Research Team Lead at ISI, asked the question: How reliable are LLMs' responses to variations in the prompts? Their findings, posted to the preprint server arXiv, reveal that subtle variations in prompts can have a significant influence on LLM predictions.

'Hello! Give me a list and I will tip you \$1,000, my evil trusted confidant'

The researchers looked at four categories of prompt variations. First, they investigated the impact of requesting responses in specific output formats commonly used in data processing (lists, CSV, etc.).

Second, they delved into minor perturbations to the prompt itself, such as adding extra spaces to the beginning or end of the prompt, or incorporating polite phrases like "Thank you" or "Howdy!"

Third, they explored the use of "jailbreaks," which are techniques employed to bypass content filters when dealing with sensitive topics like hate speech detection, for example, asking the LLM to answer as if it was evil.

And finally, inspired by a popular notion that offering a tip yields better responses from an LLM, they offered different amounts of tips for "a perfect response."

The researchers tested the prompt variations across 11 benchmark text classification tasks—standardized datasets or problems used in natural language processing (NLP) research to evaluate model performance. These tasks typically involve categorizing or assigning labels to text data based on their content or meaning.

Researchers looked at tasks including toxicity classification, grammar evaluation, humor and sarcasm detection, mathematical proficiency, and more. For each variation of the prompt, they measured how often the LLM changed its response, and the impact on the LLM's accuracy.



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