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PRESS RELEASE

Spanish researchers achieve a milestone in neurotechnology and digital medicine: The first garments that monitor brain activity

- After more than 5 years of research in neurotechnology and smart textiles, scientists from the Spanish neurotechnology company, Bitbrain, have managed to implement the very first **textile headband that monitor brain activity with medical precision.**
- Access to neurotechnology is democratized and a **door is opened to neurology and mental health diagnoses and treatments at patients' homes.**
- This pioneering wearable technology will be presented to the world next 5 January at the world's most influential consumer technology event: **Consumer Electronics Show** (CES) held in Las Vegas. It has been selected as one of the 20 innovations by the European Commission to represent Europe in its innovation pavilion.

Zaragoza, 3 January 2022

A team of Spanish scientific researchers successfully developed an innovative brain technology that will revolutionize digital health and the consumer wearable device industry, by providing anyone with reliable access to their brain activity, wherever and whenever they want. **Never have medical-grade brain wearables come this far.**

Wearables that function as medical equipment, a milestone that fuses engineering, smart textiles, and neuroscience to take a step forward in neurotechnological development that seeks to bring much of the neurological diagnostics and treatments to the patient's home. A *wearable* technology **to monitor brain activity, in a non-invasive form and which can be used by anyone.**

The aim is to utilize it in combination with artificial intelligence to **prevent brain pathologies and reduce waiting lists to access treatments** for such prevalent diseases

such as epilepsy, Alzheimer's, or strokes, among others, by transferring part of diagnoses, treatment and monitoring the patients in their homes. For chronic patients with mobility problems or living in remote areas, this technology may be the only alternative to efficiently access the healthcare system.

Moreover, this innovation will have an impact on other fields such as automotive, education, or sport among others, by permitting brain activity monitoring in daily life.

To achieve this advanced technology, Spanish researchers from Bitbrain have worked for more than 5 years. This research has been financed through competitive Spanish and European research funds, leading to research studies with more than **504 participants and 1,640 hours of data input**. The scientific results can be consulted in the scientific article "Garments that measure brain activity EEG", that describes the pioneering technology and how these measures are comparable to the measuring systems of current brain activity.

During 2023, **clinical trials related to sleep, mild cognitive impairment, dementia and Alzheimer's** will be carried out in collaboration with the Miguel Servet Hospital in Zaragoza and the Health Research Institute of Aragon[1]. The emeritus Professor from Psychiatry at Zaragoza University (Department of Medicine and Psychiatry) and coordinator of the Neuroscience Programme in the Institute of Sanitary Investigation in Aragon (IIS Aragon), Doctor Antonio Lobo explains that "From a clinical point of view it is very relevant to have brain activity data, an average rating or pathologies which can be identified and, up to a certain point, be differentiated. These **are fundamental** steps for the diagnosis and to indicate a possible treatment". According to Lobo "The recording of the brain activity can help in the diagnosis of cognitive deteriorations and dementias, just like in its prevention and treatment. These problems that have a public health dimension, have become a priority for research." He adds that "monitoring the brain activity as an outpatient, including the patient's home, can notably facilitate the technical usability, permitting access to more people".

It is hoped that in autumn 2023, the wearables will become the first wearable neurotechnology aimed at the consumer, with medical certification approved by the health authorities of the European Union and the United States. **This will enable their use within healthcare systems in a large part of the world.**

The *neuro band*, the next medical revolution

Bitbrain gives shape to this new technological family with the so-called **"*Neuro band*":** a textile neurotechnological equipment in the form of a headband, like the one used by tennis players. In order to be used, it should be simply put on and adjusted on the head. Its five textile sensors measure electroencephalography (EEG) signals, i.e., the electrical brain activity generated in the cerebral cortex. These sensors are located in the front part of the head, the brain region with the most prominent role in functions related to intelligence, attention, and planning of complex tasks.

[1] Dr. Lobo, Emeritus Professor of Psychiatry. Department of Medicine and Psychiatry at the University of Zaragoza and coordinator of the Neurosciences Program. Aragon Health Research Institute (IIS Aragon).

Dr. Lobo, Catedrático emérito de Psiquiatría. Departamento de Medicina y Psiquiatría en la Universidad de Zaragoza y coordinador del Programa de Neurociencias. Instituto de Investigación Sanitaria Aragón (IIS Aragón).

Made entirely of textile -without plastics or metals- the ergonomics and feel of the fabrics are designed to make people feel as comfortable as possible when using it. In addition, the simplicity of the design is intended for all ages, without the need for external assistance. The degree of comfort, accessibility, self-management obtained, without sacrificing the quality of the measured signal, makes it possible to bring medical diagnoses and medical treatments to the person's home with remote monitoring by the healthcare professional. This technology will be applied to other home self-management used devices such as thermometers, pulseoximeters or blood pressure monitors, and for the first time in the history of medicine, brain activity monitoring will be incorporated.

Home medical treatments, a new era in health care

"This technology enables for the first time the prevention, diagnosis and treatment of neurological and mental illnesses at the patient's home. In combination with mobile applications, 5G communications and artificial intelligence, it democratizes access to digital health and personalized medicine to anyone, anywhere and at any time," says Javier Minguez, PhD in Computer Science and Systems Engineering and Scientific Chief Officer at Bitbrain.

Accessible medical neurotechnologies such as wearables with smart sensors are spearheading change in the dynamics of the healthcare industry. They place **greater emphasis on prevention**, seek greater **personalization of medical care and constant monitoring**, enabling routine recordings in environments that are familiar to patients. Likewise, thanks to the continuous measurement of physiological data from a large number of individuals, they contribute to obtaining more information for health research.

Spain is strongly committed to neurotechnology, among the objectives of the recently announced "**National Center for Neurotechnology (Spain Neurotech)"** is to advance the understanding of the human brain and develop diagnostic methods and therapies for diseases of the nervous system. The center, which will have an initial foresee investment of 40 million and 200 million in 15 years, **will promote the areas of neuroscience and Artificial Intelligence for the development of tools based on the fundamentals of the brain, in favor of health and the fight against certain clinical pathologies**. On the other hand, the announcement of the creation of the National Neurotechnology Center coincides with the approval of 325 million euros in 2022, which the Ministry of Science and Innovation, through the Carlos III Health Institute, intended to promote **biomedical and healthcare R&D&I in Spain.**

According to the World Health Organization in its "Global Digital Health Strategy 2020-2025", the use of digital technologies will be a facilitating essential factor to guarantee that 1,000 million more people will benefit from universal health cover, 1,000 million more people will be better protected facing health emergencies and 1,000 million people will enjoy better health and well-being (WHO's three billion investing in goals included in its 13th General Programme of Work, 2019-2023).

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Consumer Electronics Show (CES) 2023, the cutting edge of consumer technology

2023 will be the year of neurotechnology and it will begin at CES Las Vegas, **the world's most relevant consumer technology exhibition**, which will be held from January 5 to 8 with more than 2,400 display stands and 150,000 attendees from 140 countries.

An event that marks the global technological evolution and the cradle of revolutionary ideas that have changed the world. Bitbrain will attend to present the first wearables capable of measuring brain activity, orientated towards the **new generation of wearable technology for digital health** and in combination with applications focused on corporate wellness, education, automotive, e-sports and virtual reality, among others.

Bitbrain's brain activity wearables have been selected by the European Commission's Innovation Council to be part of the Innovation Pavilion. **It is one of the 20 most promising innovations**, chosen by Europe to showcase innovation power in crucial sectors such as neurotechnology, artificial intelligence, cybersecurity, data economy, metaverse, quantum computing, programming and sustainability.

The European Pavilion will be located at the Venetian Expo - Booth 55439 #4.

With the central theme of this edition, "Human Security for All", the organization seeks to focus on technology as a tool to help us face the challenges of the future and highlight innovation and creativity as the basis for the development of concepts that improve people's lives.

Additional material:

- **Official website**
- **Video of the invention. Link.**
- **Additional images. Link.**

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Word neurotechnology experts

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- University of Tubingen and Tecnalia (Germany, Spain)
    - Dr. Ander Ramos. Researcher in neurotechnology in Tubingen (Germany) and Tecnalia (Spain). He has been awarded with one of the world's largest neuroscience awards: The *Walter Kalkhof-Rose* Award, with which the German Academy of Sciences and Letters recognizes the best young researcher. Email: ander.ramos@gmail.com

BITBRAIN

Bitbrain is one of the leading non-invasive neurotechnology international companies. It combines neuroscience, artificial intelligence and hardware to develop innovative EEG equipment, human physiological monitoring technologies, and software solutions for applications and research in real environments.

The company was born in 2010 as a spin-off of the University of Zaragoza thanks to a pioneering research team in addressing brain-computer interface applications. Bitbrain has received more than 25 international awards for innovation and business development, maintaining a constant drive to bring neurotechnology closer to society. Currently, more than 600 research and innovation centers in more than 35 countries trust its products and solutions to advance the expansion of neurotechnology in society in a practical and reliable way.

Bitbrain is part of the **AI4HealthyAging project included in the Artificial Intelligence R&D Missions 2021 program**. It aims to design and develop an intelligent solution that enables early detection and rapid action in neurological, motor and degenerative diseases resulting from aging. It is financed by the European Union through the Next Generation EU funds and has a budget of 12.5 million euros. At the same time Bitbrain participates as a neurological company in the Hair Brain Project, the most important European brain research financed with 1.000 million euros and is the founding member of the Spanish node and its continuation EBRAINS.

Bitbrain on press:

- CB Insights. 21 Neurotech Startups To Watch: Brain-Machine Interfaces, Implantables, And Neuroprosthetics. June 2019.
- Medium. 5 Startups Breaking the Boundaries in Neurotechnology and Brain-Computer Interfaces Better Than Neuralink. November 2020
- Business Because. This MBA's Taking On Elon Musk & Facebook With Her Neurotechnology Company. October 2018
- The Verge. Nissan's future cars may read your brain to prevent accidents. January 2018

Bitbrain Spokespersons

- **Javier Minguez Zafra, Scientific Chief Officer**

Professor at the University of Zaragoza and scientific director of Bitbrain. Holds a PhD in Computer Science and Systems Engineering and is scientific director at Bitbrain. Javies is also the principal researcher of the Neurotechnology Research Team at the University of Zaragoza and visiting professor and researcher at more than 10 academic institutions such as Stanford University (USA), University of Tubingen (Germany) and IE Business School (Spain), among others.

Author of more than 110 research publications and 5 patents in the areas of neuroscience, neural engineering, brain-computer interfaces, human-machine interaction, cognitive and motor neurorehabilitation.

- **María López, Co-Founder and CEO**

María López Valdés has a degree in Mathematics, a PhD in Computer Engineering from the University of Zaragoza and an MBA from the IE Business School. In addition, she is a member of the Board of Directors of Ibercaja Bank, a member of the board of trustees of the AIITIP Technology Center, advisory member of the Zaragoza Chamber of Commerce and an expert in Netexplo, an international observatory of trends in the digital world.

- **Luis Montesano, Chief Technology**

Professor of Engineering at the University of Zaragoza and specialist in brain-computer interfaces, computer systems and computational models. Visiting professor and researcher at academic institutions such as the Canadian Institute for Advanced Research (Canada), the University of Freiburg (Germany), LAAS-CNRS (France) or the Technical University of Lisbon (Portugal).

He has published more than 120 scientific articles in the main international artificial intelligence and EEG-based neurotechnology journals.