

NerveRepack

Intelligent neural system for bidirectional connection with exoprostheses and exoskeletons

Challenges and objectives

NerveRepack tackles a critical challenge: the absence of advanced exoprostheses and exoskeletons capable of restoring motor function and peripheral sensations for individuals with nerve damage through direct brain control. The project pioneers a breakthrough solution – innovative implantable interfaces that bridge healthy nerve sections with next-generation exoprostheses and exoskeletons. These cutting-edge interfaces enable seamless bidirectional communication, translating nerve impulses into precise control of artificial aids while delivering sensory feedback from peripheral sensors directly to the nerves. NerveRepack redefines the possibilities of neuroprosthetics, empowering individuals with enhanced mobility, sensation, and a more profound connection between their bodies and technology.



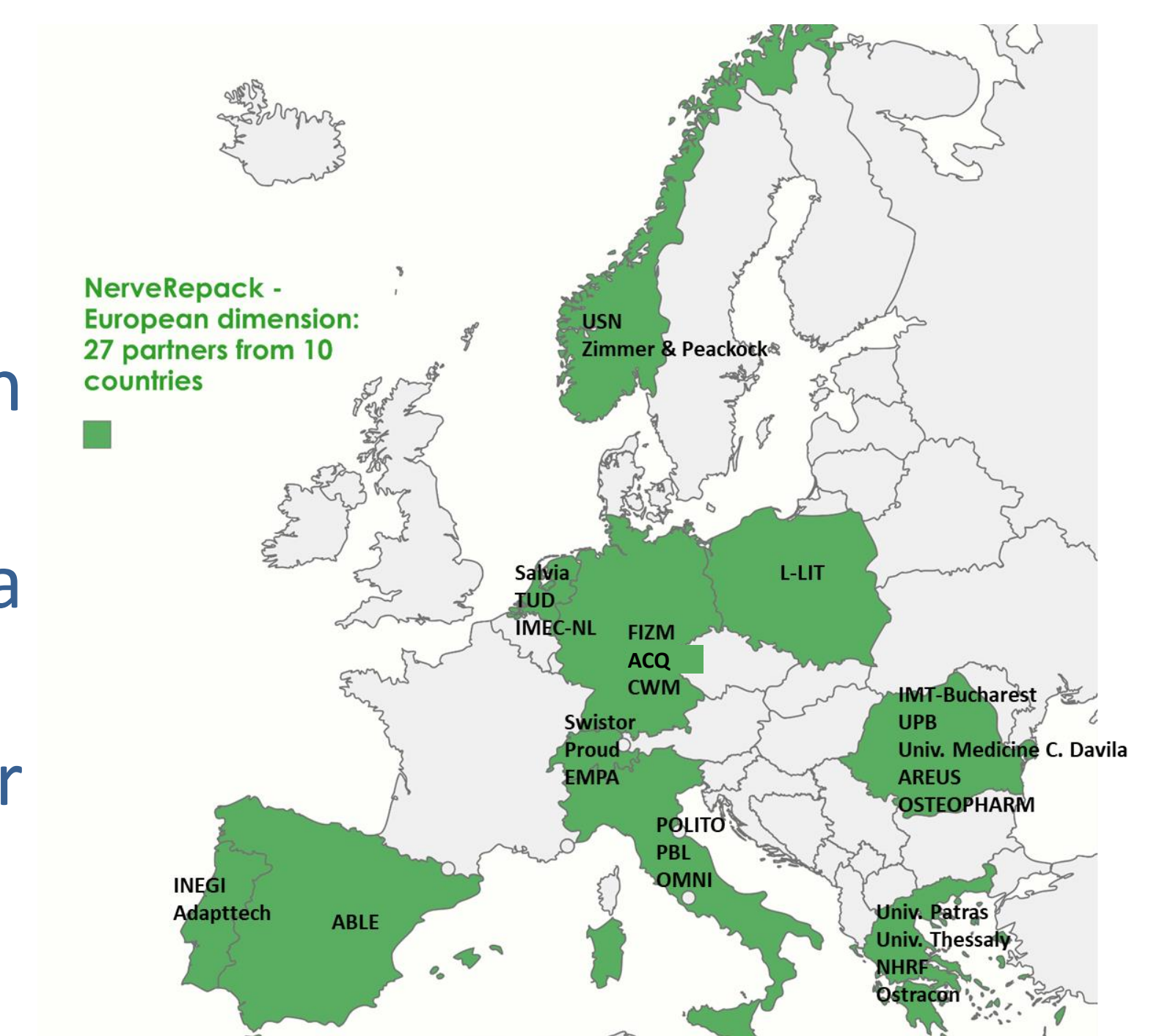
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Technical goals

- Development of implantable electrodes and module (ASIC, energy storage, communication module, wireless power module);
- Development of mechatronic structure and electronic systems (control system, data communication, and power management) of exoprosthesis and exoskeletons;
- Integration and testing in laboratory conditions of the intelligent neural system for bidirectional connection with exoprostheses and exoskeletons;
- In vivo testing of the neural system.

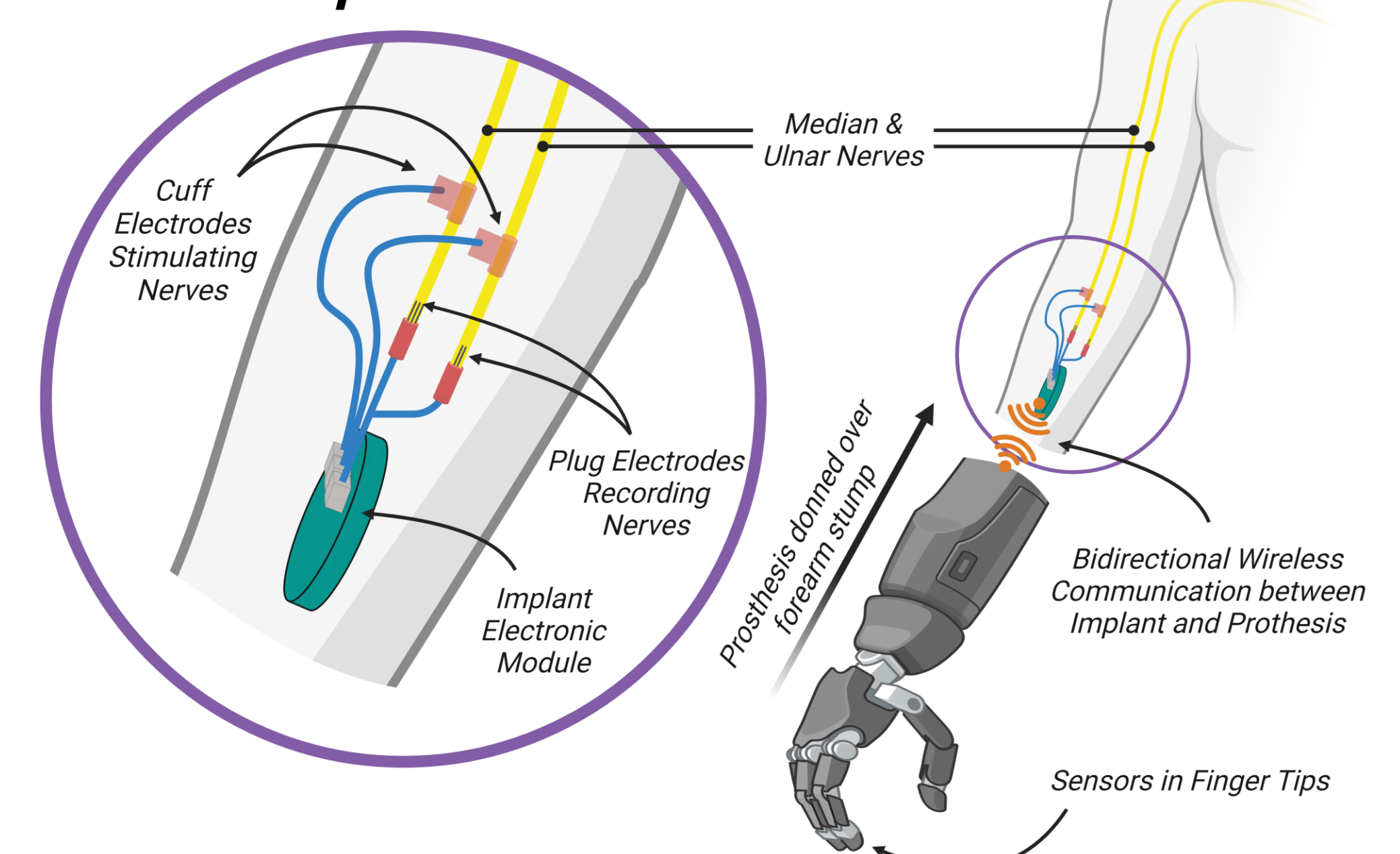


Expected impact

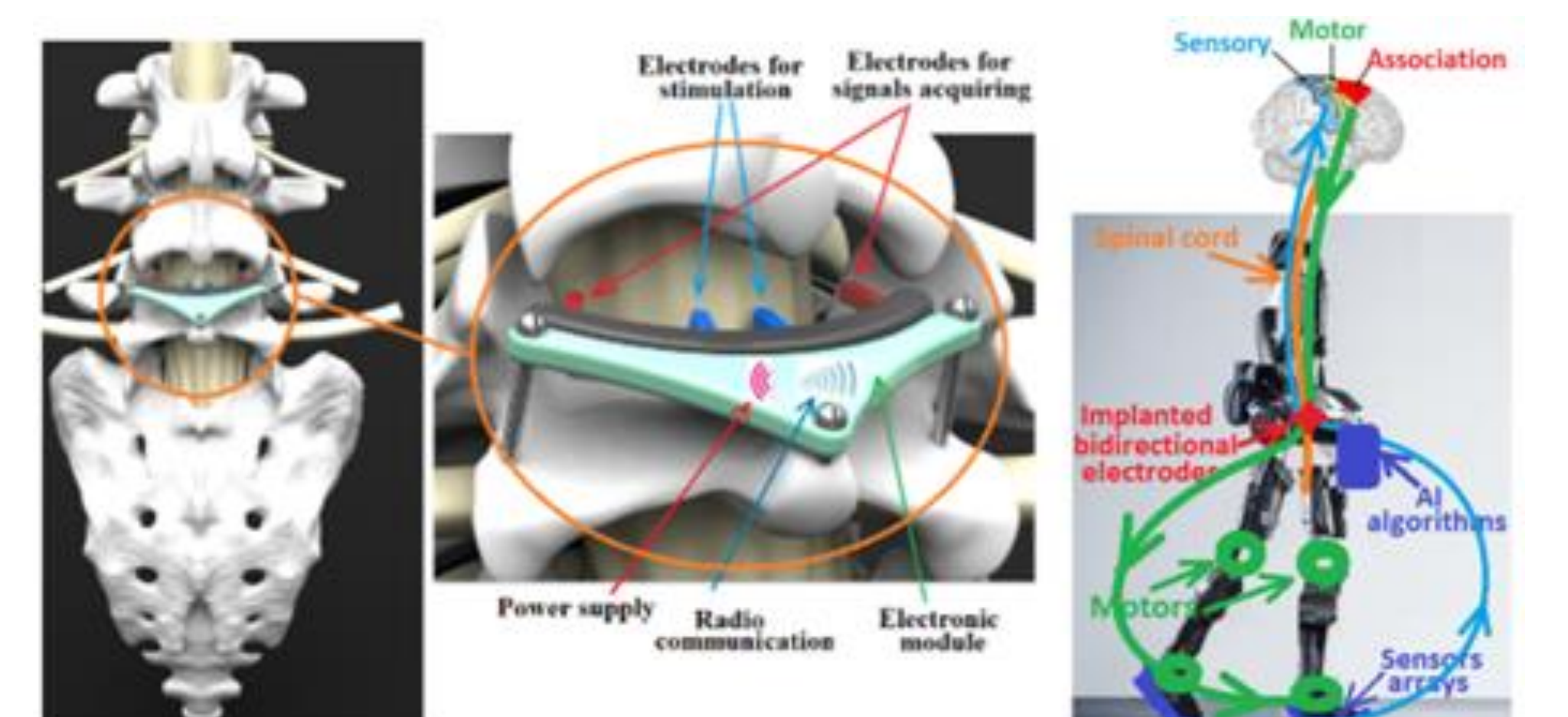
The testing and validation of the neural system will mark a groundbreaking turning point, paving the way for the development of a revolutionary generation of implantable neural interfaces integrated with exoprostheses and exoskeletons. These advancements will significantly surpass current market offerings, providing users with enhanced functionality and empowering them to regain a life closer to normality.

The high-performance neuro-exoprostheses and exoskeletons developed through this project will redefine efficiency in everyday activities, offering unmatched precision, safety, and adaptability. Unlike current solutions, these advanced systems will enable users to perform complex, natural-like movements tailored to diverse human activities, setting a new standard in assistive technology and significantly improving the quality of life for people with disabilities.

NerveRepack Smart Prosthetic Arm Concept



The NerveRepack exoprosthesis concept
(Image courtesy of Fraunhofer IZM and created using Biorender.com)



The bidirectional connection between the patient neural system and exoskeleton control system



NerveRepack is co-funded by the European Union under Grant Agreement n° 101112347. The project is supported by the CHIPS Joint Undertaking and its members including top-up funding by Romania, Germany, Norway, Italy, The Netherlands, Greece, Portugal, Poland, Spain and Switzerland.