

Preface

A brain–computer interface (BCI), sometimes called a brain–machine interface (BMI), is a direct communication link between the brain's electrical activity and an external device, most commonly a computer or robotic limb. BCIs are often directed at researching, mapping, assisting, augmenting, or repairing human cognitive or sensory-motor functions. They are often conceptualized as a human–machine interface that skips the intermediary of moving body parts (e.g. hands or feet). BCI implementations range from non-invasive (EEG, MEG, MRI) and partially invasive (ECoG and endovascular) to invasive (microelectrode array), based on how physically close electrodes are to brain tissue.

Research on BCIs began in the 1970s by Jacques Vidal at the University of California, Los Angeles (UCLA) under a grant from the National Science Foundation, followed by a contract from the Defense Advanced Research Projects Agency (DARPA). Vidal's 1973 paper introduced the expression brain–computer interface into scientific literature.

Due to the cortical plasticity of the brain, signals from implanted prostheses can, after adaptation, be handled by the brain like natural sensor or effector channels. Following years of animal experimentation, the first neuroprosthetic devices were implanted in humans in the mid-1990s.ⁱ

In the present book, eleven typical literatures about brain–computer interface published on international authoritative journals were selected to introduce the worldwide newest progress, which contains reviews or original researches on brain–computer interface. We hope this book can demonstrate advances in brain–computer interface as well as give references to the researchers, students and other related people.

The Editorial Board of Academic Archives

Scientific Research Publishing

September 23rd, 2025

ⁱ https://en.wikipedia.org/wiki/Brain%E2%80%93computer_interface