

Brain-Computer Interface Control of Smartphone Messaging Applications

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SICCAU Project
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Dr. Ricardo Ron Angevin gained his M.S. in Telecommunication Engineering and Ph.D. degrees from the University of Málaga, Spain, in 1994 and 2005, respectively. Since 1995, he has been lecturer at the Electronic Technology Department of the same university, where he is currently Associate Professor. He is a member of DIANA research group and manager of the UMA-BCI research group at the University of Málaga (www.umabci.uma.es). He has been the Principal Investigator of the Andalusian regional project BRAINS and the Spanish National project INCADI and LICOM. Currently is the Principal Investigator of the Spanish National project SICCAU. His research interests include the design of brain-computer interfaces and assistive technology.



Outline

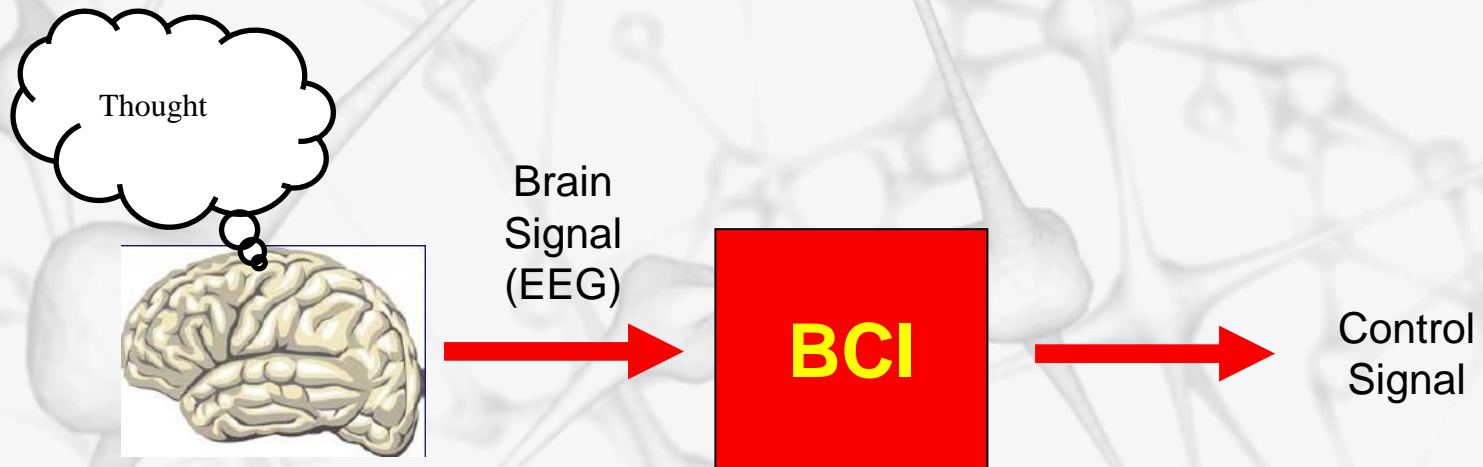
- Introduction
- Objective
- System implementation
- Control paradigm
- Results and conclusions

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What is a BCI?

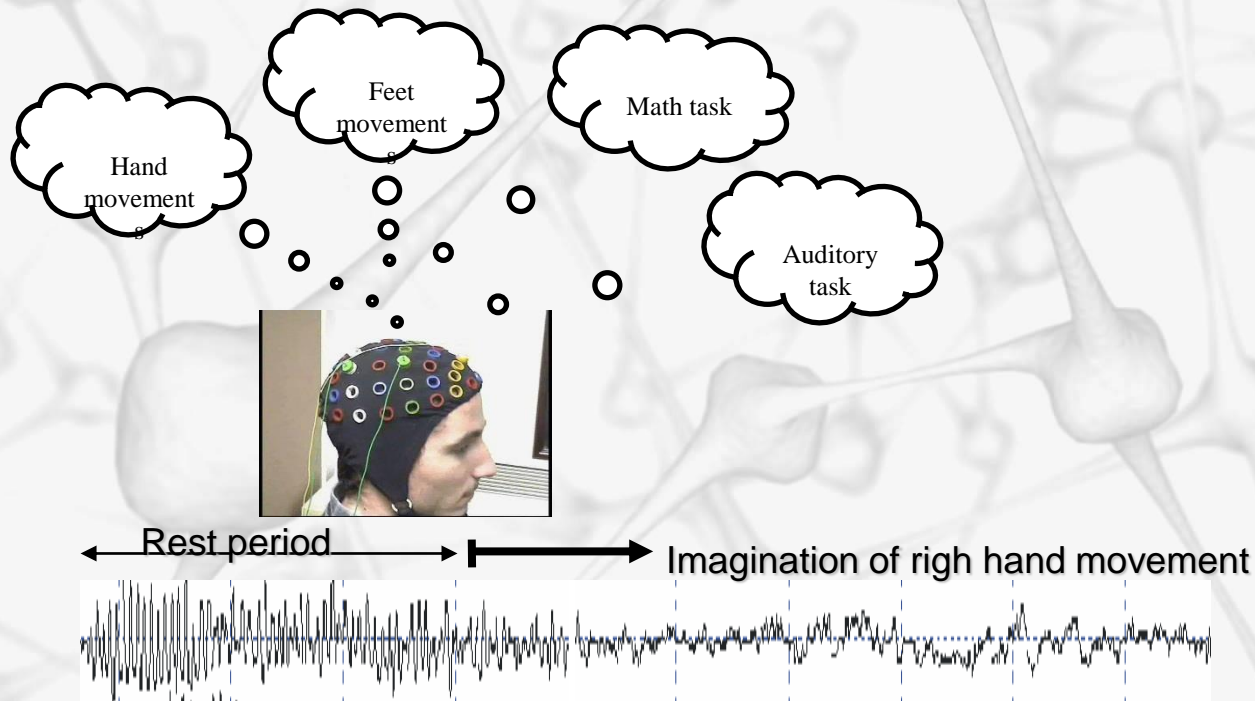
- *“A Brain-Computer Interface is a communication system that does not depend on the brain’s normal output pathways of peripheral nerves and muscles ”*



A BCI system translates brain activities into output commands without carrying out any movements.

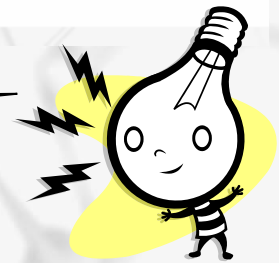
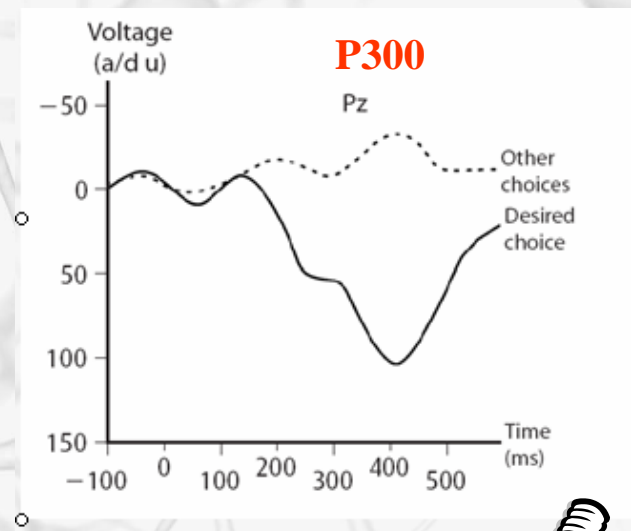
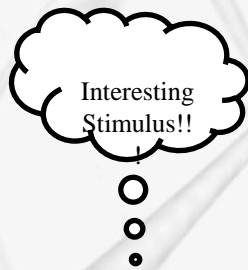
How does a BCI work?

- Different brain activities (thought) or external stimulus can produce changes in brain signals



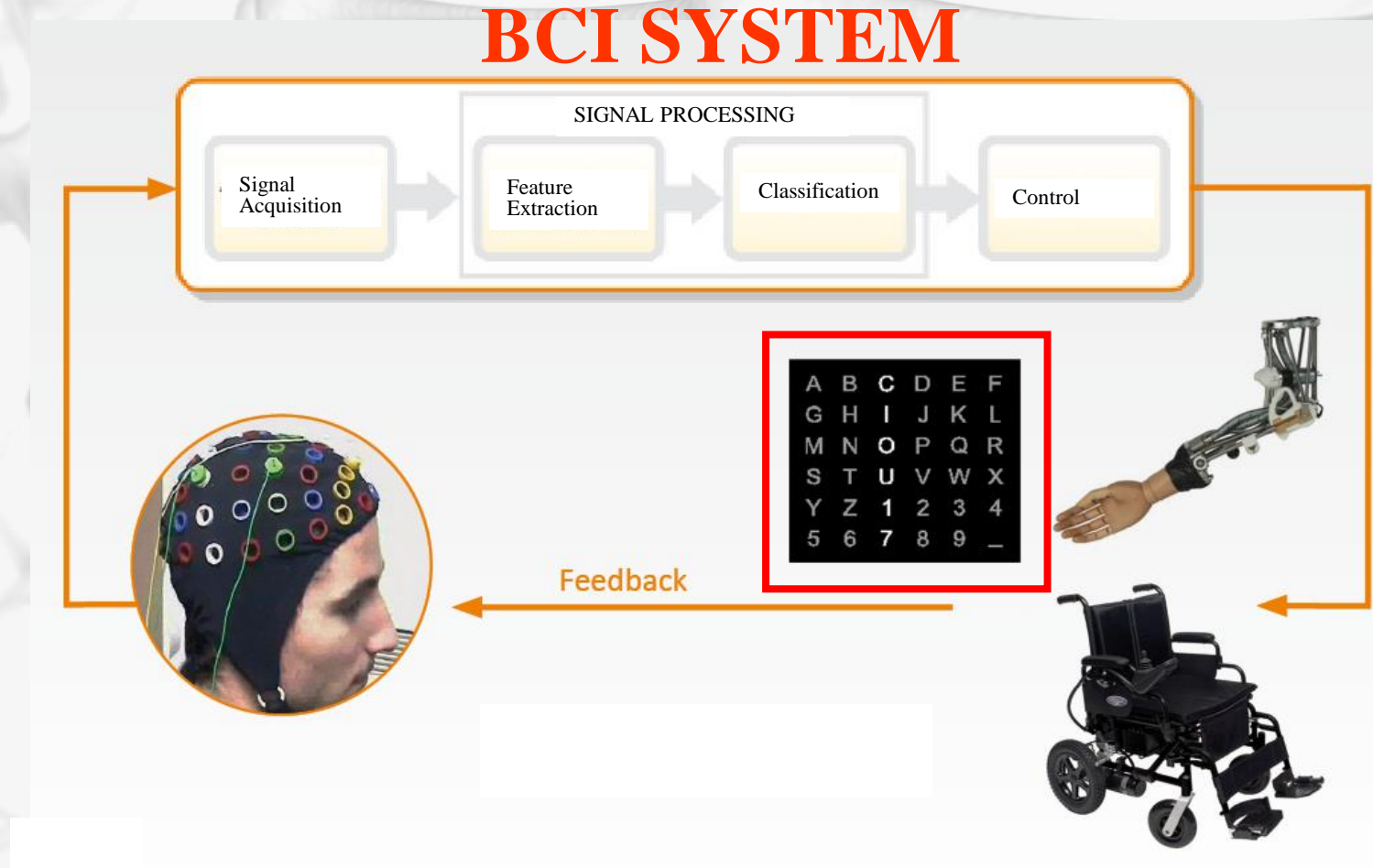
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P300 amplitude depends on the stimulus interest for the subject

BCI Applications



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Objective

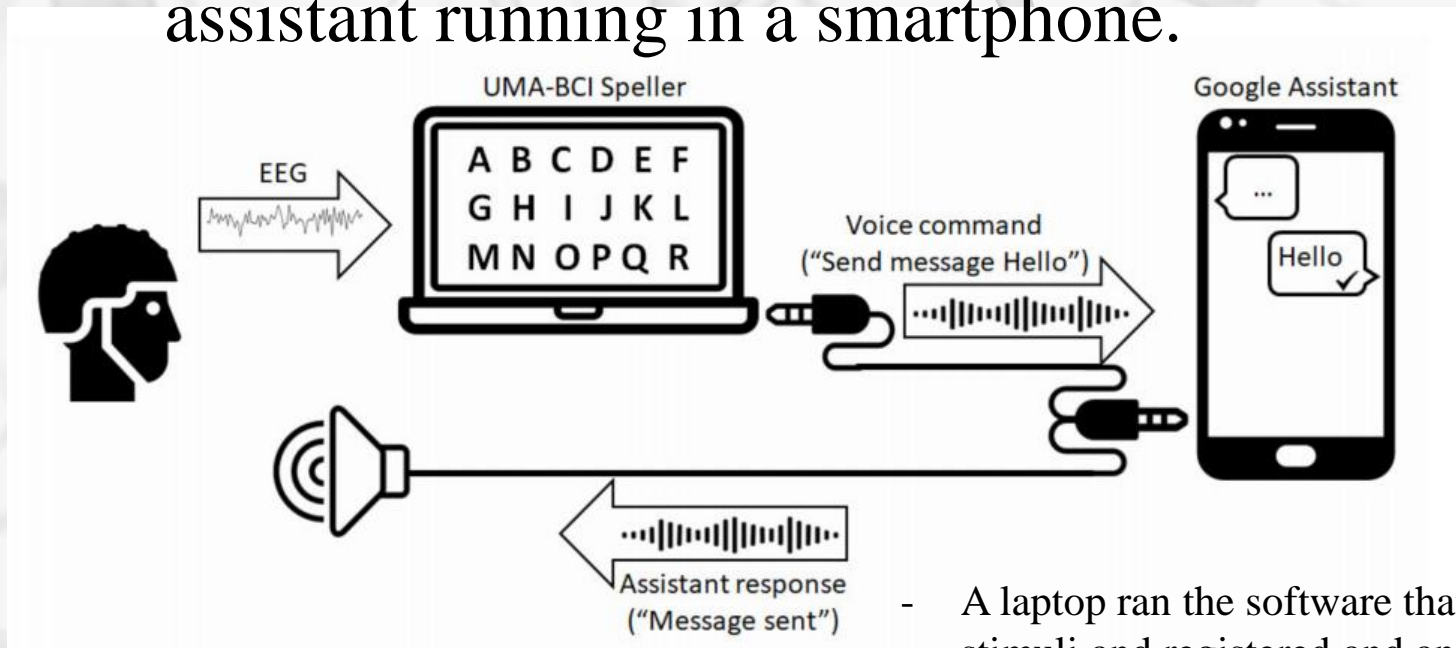
- To develop a communication system controlled by brain activity and based on P300-Speller.
- The communication system would allow patient to communicate through some of the most common messaging systems on a smartphone:
 - WhatsApp, Telegram, e-mail, and short message service (SMS)
- Based on voice-controlled Google Assistant

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System implementation

- The aim of the BCI system was to generate voice commands that could be interpreted by a virtual assistant running in a smartphone.



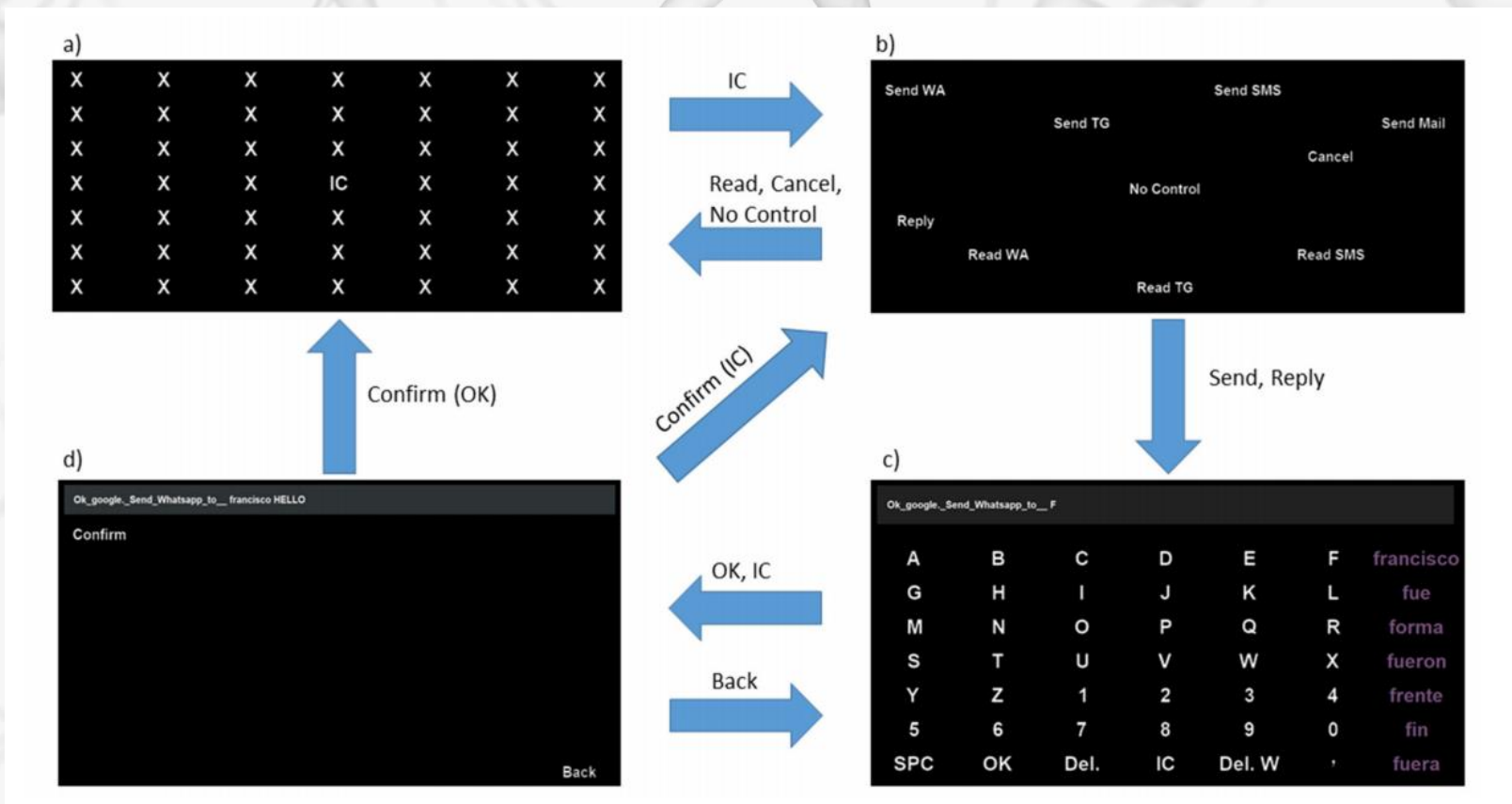
- A laptop ran the software that presented the stimuli and registered and analysed the EEG. The software used was the UMA-BCI Speller
- A virtual assistant was running on a smartphone.

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Control paradigm

- Based on four different menus



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Results and conclusions

- Some preliminary tests have been carried out
- The preliminary online results obtained, as well as the results of some questionnaires related to the subjective experience controlling the interface, support the viability of the proposed system.
- The use of a virtual assistant to control the smartphone makes it possible to easily extend the functionality to other applications beyond messaging services, for example to control domotic devices through the smartphone.

Questions?



Thanks for your attention

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Grupo DIANA (www.diana.uma.es)

BRAIN Project (www.diana.uma.es/brains)

INCADI Project (www.incadi.uma.es)

LICOM Project (www.licom.uma.es)

SICCAU Project (umabci.uma.es/siccau)

Acknowledgments

