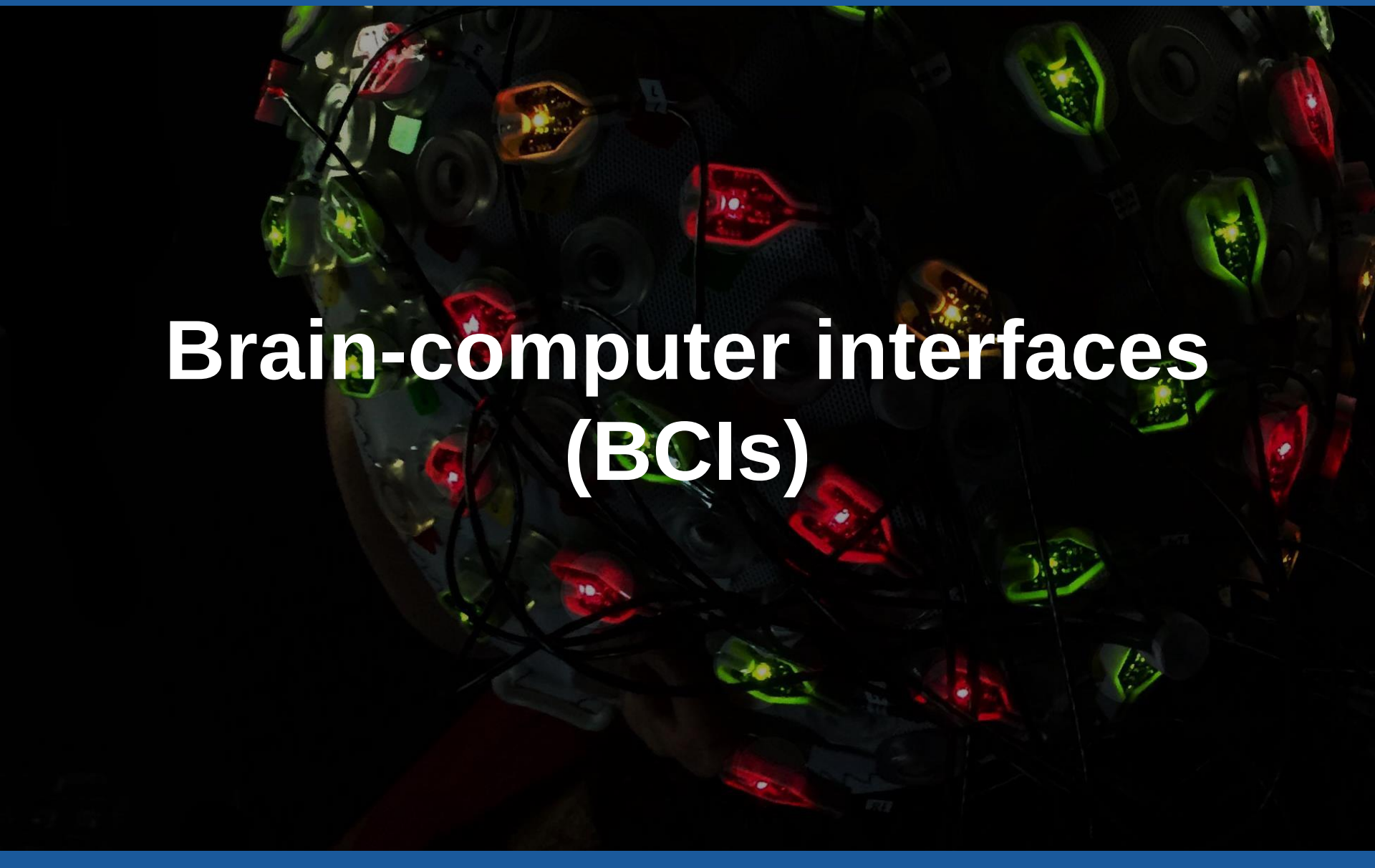
UNIVERSITÄT KOBLENZ · LANDAU

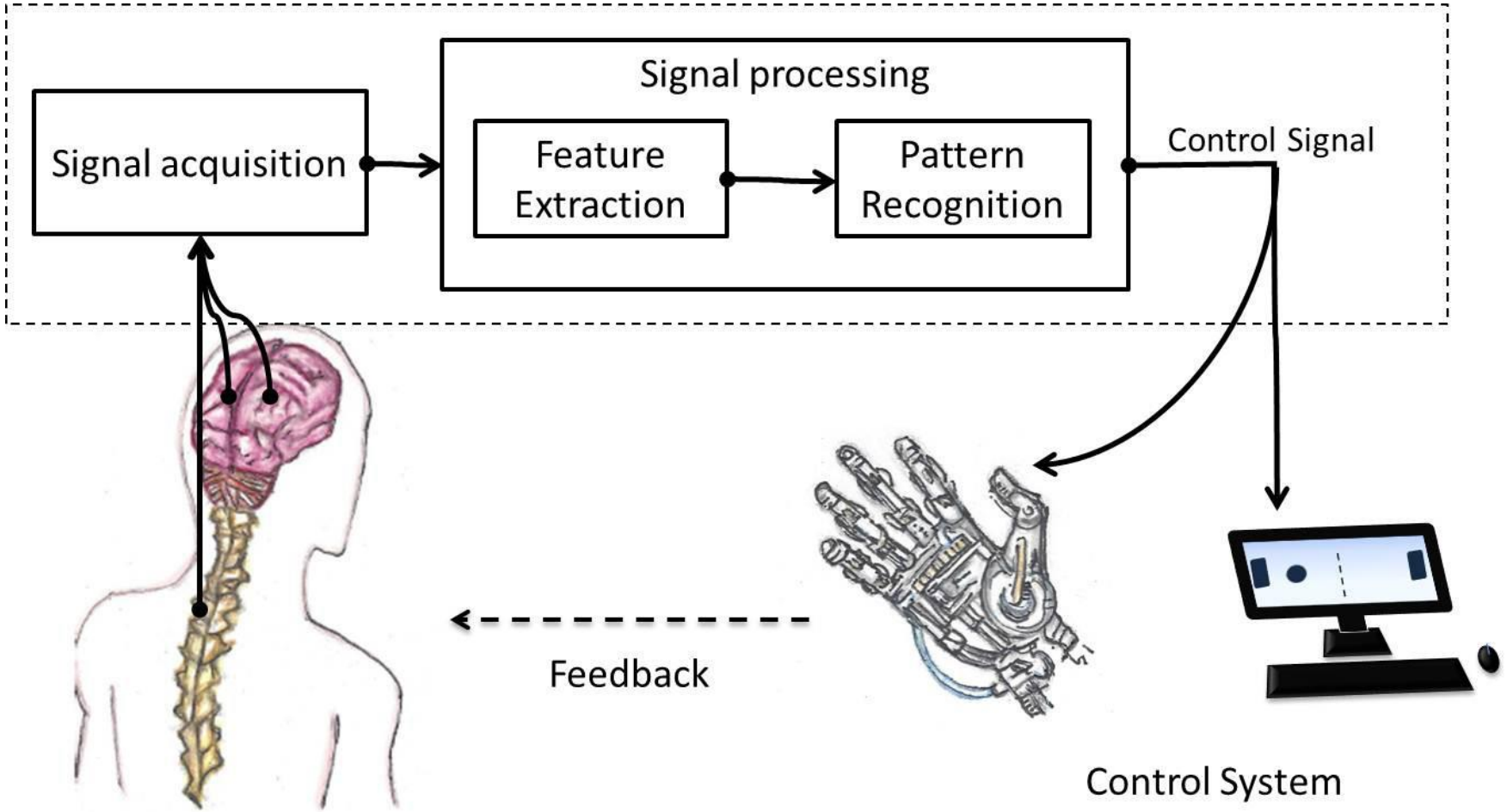


Brain-computer interfaces (BCIs)

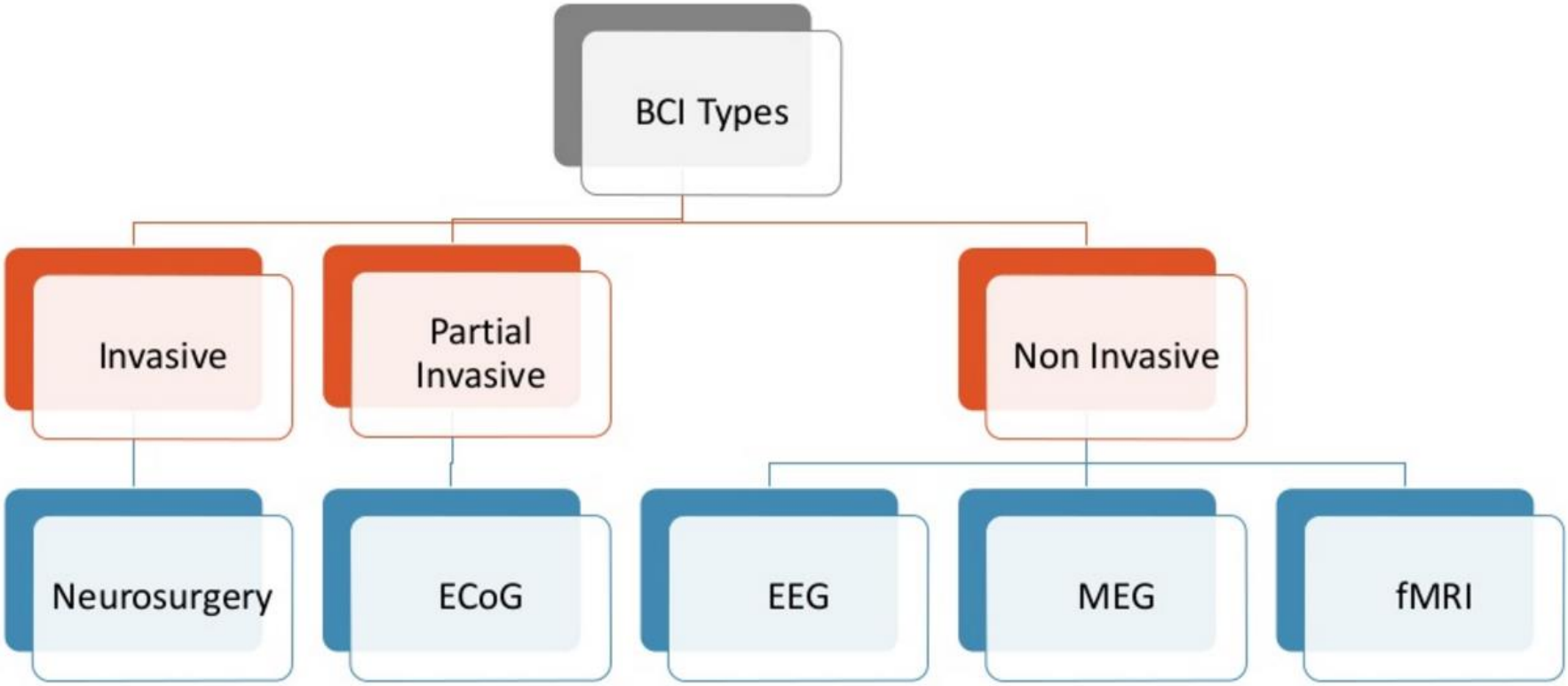
Definition

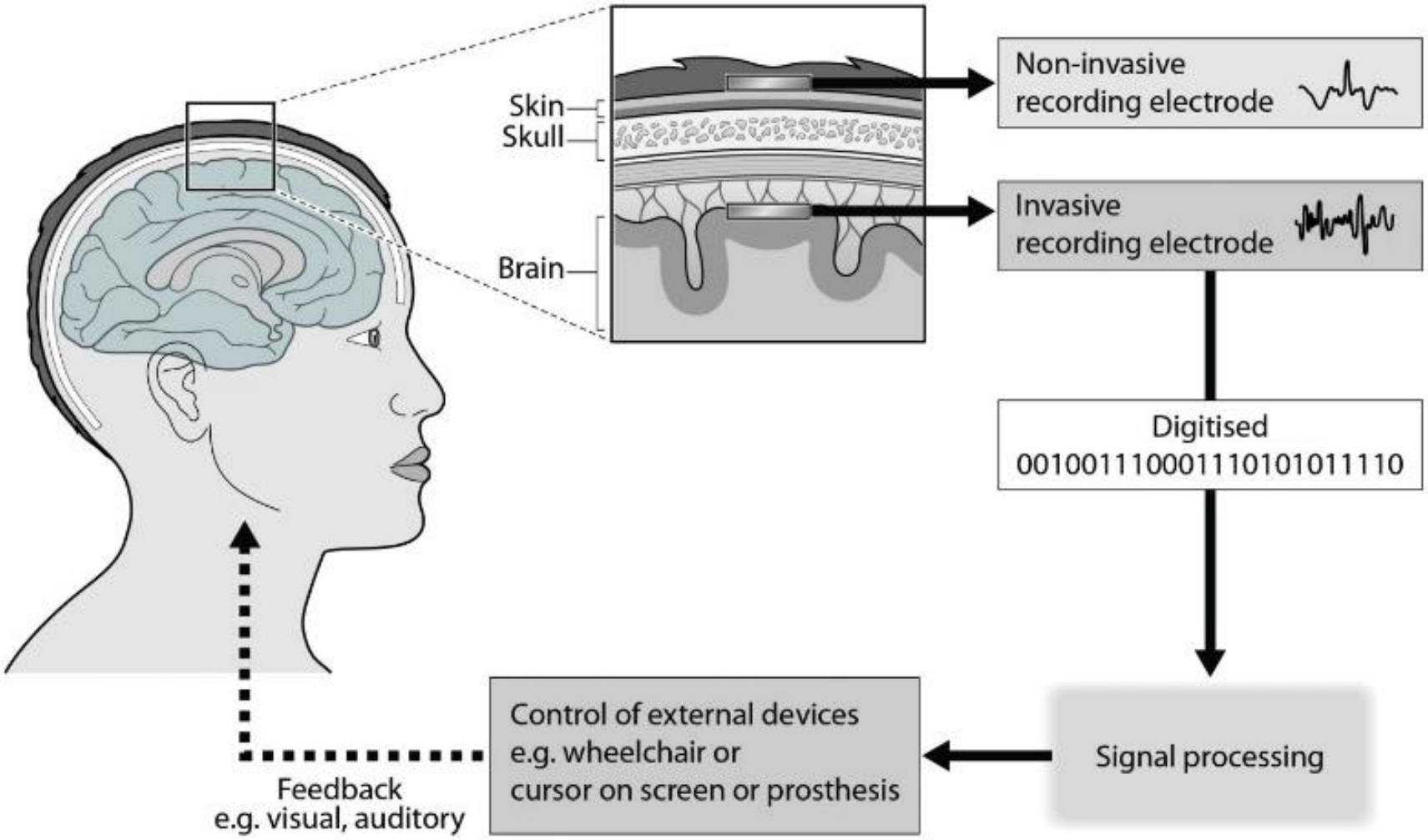
Brain-computer interfaces (BCIs) acquire brain signals, analyze them, and translate them into commands that are relayed to output devices that carry out desired actions. BCIs do not use normal neuromuscular output pathways.

Schematic of a brain-computer interface system



Types of BCI


BCI Types
Invasive
Partial Invasive
Non Invasive
Neurosurgery
ECoG
EEG
MEG
fMRI


Skin
Skull
Brain
Non-invasive
recording electrode
Invasive
recording electrode
Digitised
00100111000111010101111 10
Signal processing
Control of external devices
e.g. wheelchair or
cursor on screen or prosthesis
Feedback
e.g. visual, auditory

Advantages

- allow paralyzed people to control prosthetic limbs with their mind;
- transmit visual images / auditory data to the mind of a blind/deaf person, allowing them to see/hear;
- fast-response controller;
- allow a mute person to have their thoughts displayed and spoken by a computer.

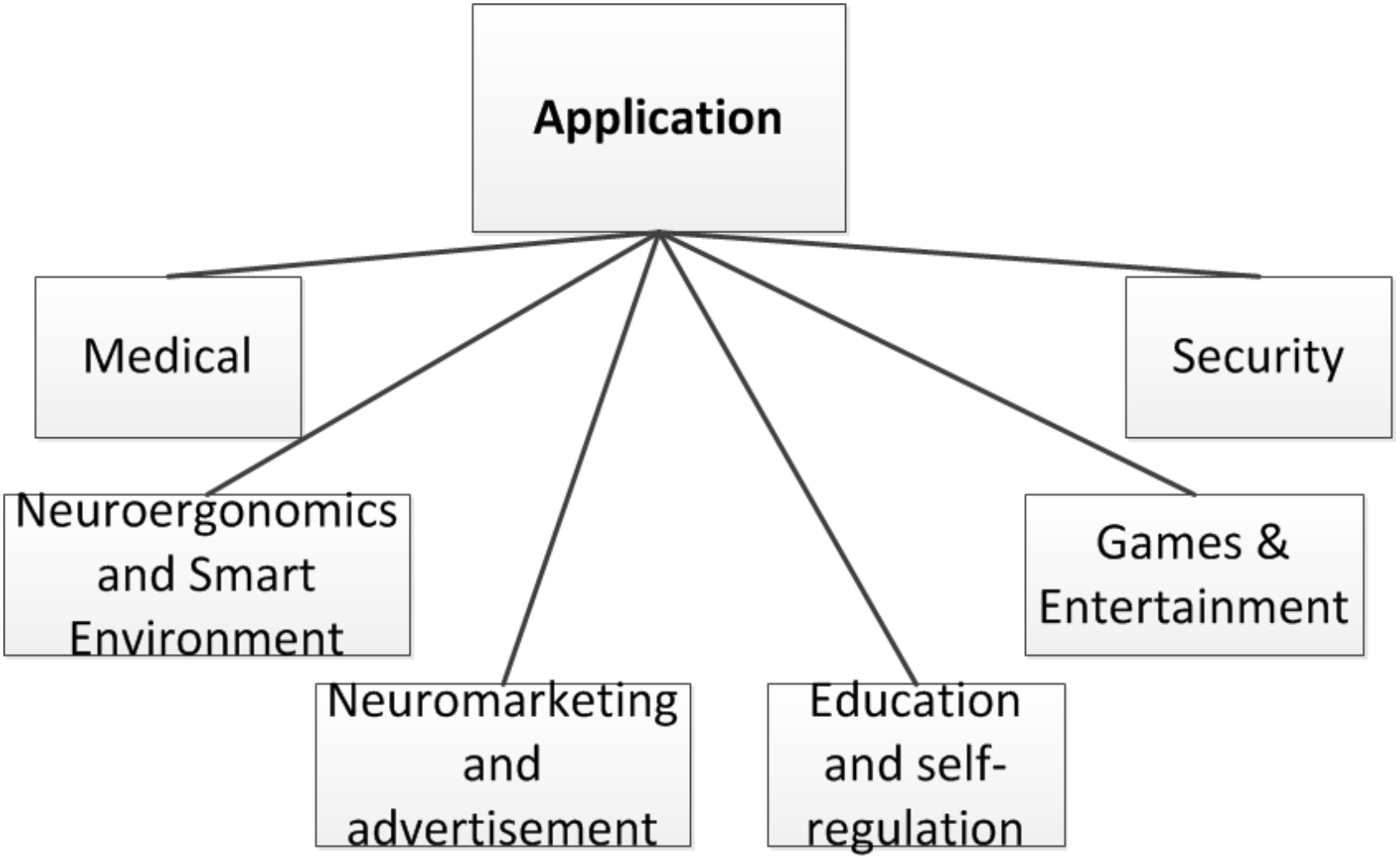
Disadvantages

- the current technology is crude;
- training problem;
- imperfect EEG signal processing algorithms;
- electrodes outside of the skull can detect very few electric signals from the brain;
- electrodes placed inside the skull create scar tissue in the brain;
- ethical issues.

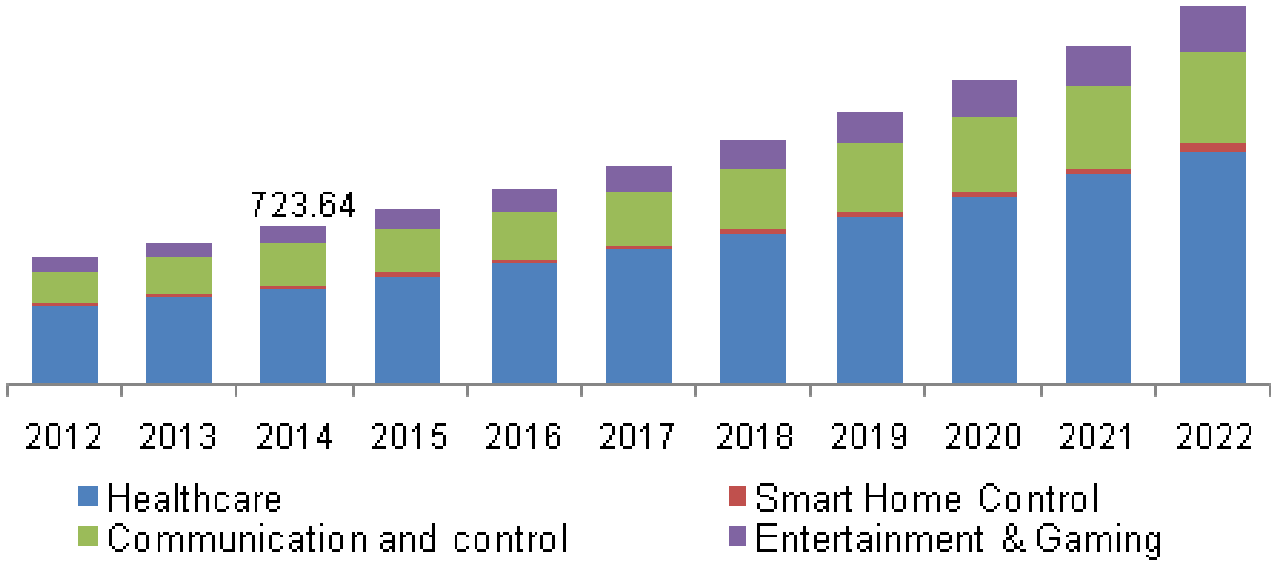
Project BCIs

BE Plus LTM

Epoc+


Application
Medical
Security
Neuroergonomics and Smart Environment
Games & Entertainment
Neuromarketing and advertisement
Education and self-regulation

Usage Expansion Forecasts



Questions?

Thank you!