Bio-signal research

Guger Technologies OG (g.tec)

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GUGER
TECHNOLOGIES

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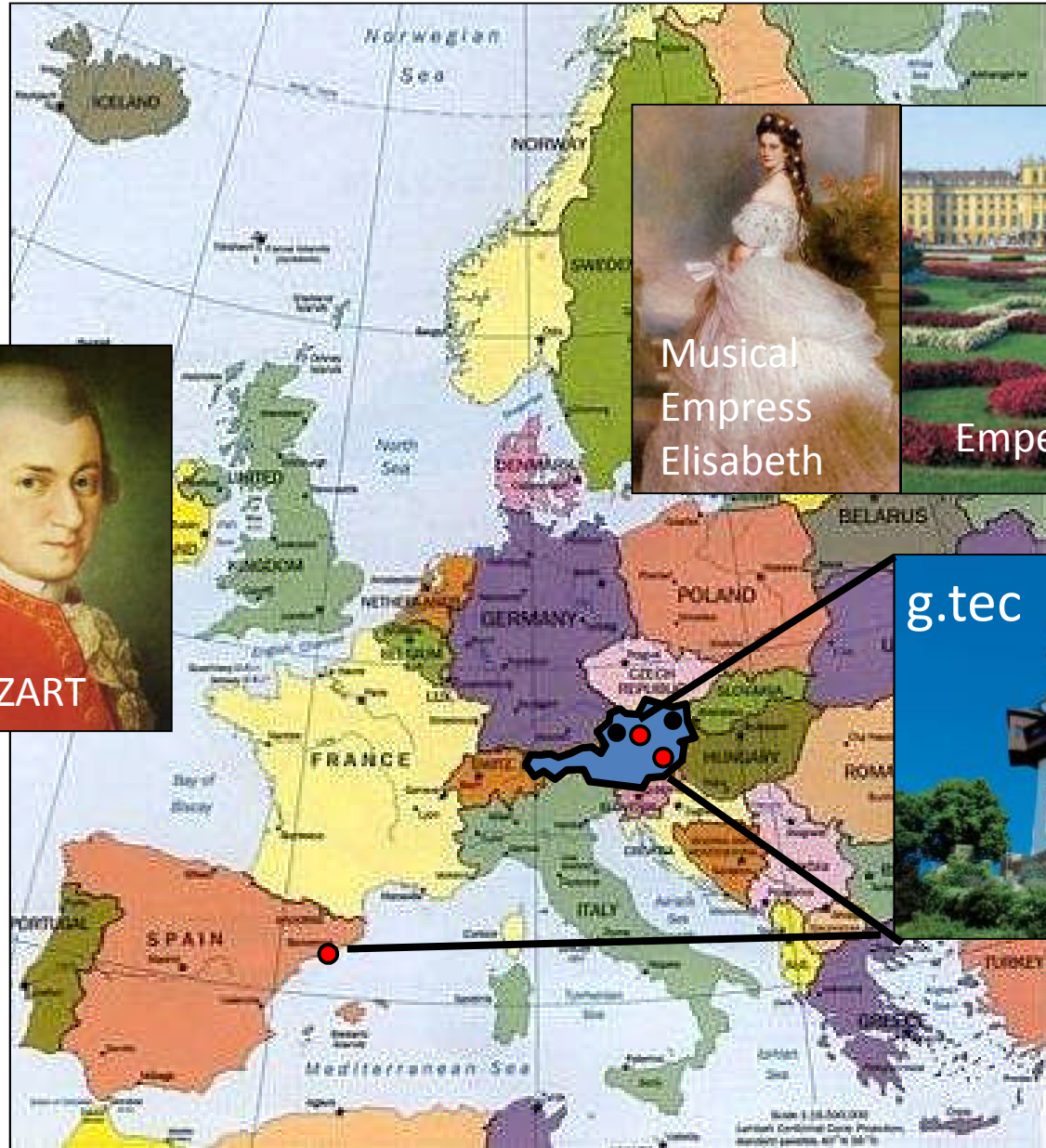# 1. Guger Technologies OG (g.tec)

Company fields

• bio-engineering, medical electronics

• developing and offering hard- and software products for biosignal research

(**single cell activity**, **EEG, ECoG**, **ECG, EMG**, **EOG**, …)

• user specific adaptations and developments

• mainly based on rapid prototyping environment under *MATLAB/Simulink*

1. Guger Technologies OG (g.tec)

Company description

• private company

• inter-disciplinary team (biomedical- , telematics engineers, bio-medical

engineers, software engineers, macrotronic engineers, etc)

• customers: universities, university hospitals, R&D departments,

industry

Musical Empress Elisabeth

Emperor's castle

MOZART

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www.gtec.at

1. Guger Technologies OG (g.tec)

Our Offices

- Guger Technologies OG,
  Herbersteinstrasse 60, 8020 Graz, Austria

- g.tec medical engineering GmbH,
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1. Guger Technologies OG (g.tec)

- World-wide supplier in more than 60 countries

- Most important markets: USA, Japan, Europe

- Currently several 100 institutions using the technology

  - Wadsworth Center, Albany, NY
  - Riken Institute, Japan together with Toyota, Japan
  - NASA, USA
  - MIT, Harvard, Johns Hopkins, Stanford, Cambridge...

2. Participation in EC projects

- **ReNaChip** — Rehabilitation of a discrete sensory motor learning function
- **Sm4all** — Brain-Computer Interface for smart home control
- **RGS** — faster recovery from stroke with games
- **BrainAble** — BCI with VR, smart homes and social networks
- **Decoder** — Assessment/communication in non-responsive patients
- **CSI** — Advance the state of the art in 3D medical-imaging platforms
- **BETTER** — BCI for Stroke rehabilitation using rehabilitation robots
- **VERE** — human body and surrogate representation in virtual and physical reality
- **ALIAS** — cognitive assistance and social interaction by robots
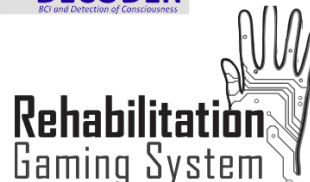
3. Our co-operations partners

- **University of Barcelona,** Spain
        Mel Slater, Chris Groenegress

- **IDIBAPS**, Barcelona, Spain
        Mavi Sanchez-Vives

- **University College London** (UCL), UK
        Anthony Steed, Angus Antely,

- **University of Technology Graz,** Austria
        Robert Leeb, Gert Pfurtscheller

- **Wadsworth Center**, New York, USA
        Gerwin Schalk, Eric Sellers

- **Tel Aviv University**
        Matti Mintz

4. Hardware Development

EEG, ECoG, EMG, EOG, ECG amplifiers 1-128 channels

A.   USB based biosignal amplifier

B.   Mobile device

C.   Stand-alone device

We built an amplifier that can now be used not only for EEG, but also for implanted electrodes in humans, spike recordings and in vitro setups.

g·USBamp 3.0
USB BIOSIGNAL AMPLIFIER

explore the colors of science.

16 DC-channels per unit. 4 independent grounds. record any type of signal. (EEG/ECoG/ECG/EMG/EOG/...) connect various sensors. stack units for 32/48/64/... ch.

24-bit resolution with simultaneous sampling of all channels with up to 38.4 kHz. digital signal filtering and preprocessing. connect via USB 2.0

works with passive and with active electrodes. 8 digital trigger inputs/unit. 4 digital outputs/unit. new simplified synchronization of units.

internal digital bandpass and notch filters. built-in calibration unit and impedance checking. power supply and accumulator package available.

easy configuration and setup via the software. high-speed online data processing for MATLAB/ SIMULINK and for LabVIEW available.

used by leading research groups for non-invasive and for invasive recording. available as part of a complete BCI (Brain-Computer Interface) research system.

CE-certified medical device. safety class: II conformity class: IIa type of applied part: CF FDA approved device.

contact: g.tec medical engineering GmbH, Sierningstr. 14, 4521 Schiedlberg, AUSTRIA, phone: +43 7251 22240, fax: +43 7251 22240 39, e-mail: office@gtec.at, web: www.gtec.at

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g.tec developed active and dry EEG electrode

g.SAHARA electrode system (patent pending) consists of an 8 pin electrode made of a special golden alloy

Pins have sufficient length to reach through the hair to the skin

Golden alloy and the 8 pins reduce the electrode-skin impedance

Electrode itself can be connected with a clip to the active electrode system on top of it

dry like the desert

g·**HIamp**
MULTICHANNEL AMPLIFIER

80/144/256 channels

g·tec
GUGER TECHNOLOGIES

- 256 channels per unit with 4 multi-pole connectors at front side

- 1 ADC per channel for synchronization

- 24 Bit ADC per channel for perfect resolution

- Input range of +/-250mV to measure from EMG, ECG, ECoG, Spikes, EEG down to EPs with only one setting. Therefore no saturation of the amplifier possible

- DC – 6 kHz input frequency range

- CE approved

- C API, MATLAB API, Simulink driver Linux and

 Windows version

- OS 32 Bit and 64 Bit

- Different headboxes for passive or active

- Electrodes or headstages

- 16 digital inputs/outputs for triggering with

external devices

- Impedance check included

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5. Software Programming Environment

A. C++ Application Program Interface (API)
- allows to integrate amplifiers into own software under Windows and Linux

B. MATLAB API
- integrate amplifiers into MATLAB data acquisition and analysis programs
- access to all toolboxes (Signal Processing, Neural Networks,…)
- access to user written M-files

C. Simulink Highspeed on-line Processing
- amplifier device driver block under Simulink
- copy the block into Simulink model and connect the signal processing (S-functions) and paradigm blocks (MATLAB code)
- just exchange the amplifier device driver and work with the same signal processing blocks

D. LabView
- amplifier device driver block under LabView
- use standard LabView blocks for analysis

THANKS!!!!