Brain Computer Interface Hackathon – 2017

Call for Participation

What's a Hackathon? Hackathons are brainstorming and collaborative marathons designed to rapidly produce working prototypes. Conventional hackathons typically bring developers and technologists together over 24, 36, 48 or more hours to cram and build solutions that they can present.

Why do a Brain Hackathon? By putting creative minds from multiple disciplines together for a short period of time, we have the opportunity to discover and uncover possibilities for using BCI-related hardware and software not readily thought of. Hacks and innovation developed from hackathons have great potential for commercialization.

Who Can Participate? Anyone! Both SMC2017 attendees and non-SMC2017 attendees with interests in BCI/BMI, cloud technologies, IoT, robotics, AR, VR, machine learning, sensors, 3D printing and design, human-machine interface systems, control, signal processing, big data, haptics, rehabilitation, and similar areas. You do not have to be a BCI expert to participate on a team! Interdisciplinary teams with a combination of BCI and non-BCI skills are often successful in building solutions and producing working prototypes.

Can Students Compete? Yes! The [student competition](#) is still open to high school students and undergraduates.

HACKATHON

GENERAL INFORMATION

Date: October 7-8, 2017

Cost: Free

Place: Banff Centre for Arts and Creativity, 107 Tunnel Mountain Drive Banff, Alberta, Canada T1L 1H5

Register: Register at the 2017 IEEE SMC Brain Hackathon website

Participants:
- Teams of up to five persons
- Maximum participants: 200 individuals/40 teams
- IEEE members will be given priority

Scope:
- Integration of BCI with the Internet of Things (IoT)
- Collaborative (multi-person) Brain-Computer Interfaces (BCIs)
- BCI integration with games, mobile technologies, and Virtual/Augmented Reality (VR/AR)
- Active BCI control of robotic devices
- Design 3D printed headsets; combine BCIs with fashion technology and artistic application (in partnership with BR41N.IO)

Hardware/Software:
- A list of available hardware and software (as per the Scope section above) will soon be posted on the 2017 IEEE SMC Brain Hackathon website. Participants are also encouraged to bring their own hardware.
- Attached at the end of this document is a list of additional Hackathon projects that will be offered only by BR41N.IO.

Awards: $4,000 in cash and hardware prizes: a $1,000 IEEE Brain Initiative Brain Hackathon Prize, a $1,000 IEEE SMC Brain Hackathon Prize, a $1,000 Qusp Prize, and a $1,000 BR41N.IO Prize.

Sponsors:
Institutions:
- IEEE, IEEE SMC, IEEE Brain Initiative, IEEE Computational Intelligence Society, IEEE Magnetics, IEEE Consumer Electronics Society, IEEE Systems Council

Partners:

- BR41N.IO Brain-Computer Interface designer Hackathon series

Industry Volunteers:

- g.tec medical engineering GmbH
- Qusp Labs

ACTIVITY DESCRIPTION

The Hackathon will begin with a summary talk about various BCI platforms (several are open source) and will help participants gain additional knowledge and familiarity with software tools and hardware. Teams of up to five members will confirm their project title and hardware and software platform on the morning of the first day. Participants are encouraged to form teams, define their projects, and select their hardware and software platforms in advance of the Hackathon (additional information will be provided on the website). High-speed Internet access will be provided at the Hackathon.

Professional mentors and experts will be on hand throughout the Hackathon to provide fundamental application development know-how and tips, and to demonstrate the utility of some of the sponsored hardware/software.

The evening of the first day will feature discussions of progress and obstacles encountered. Participants can continue to develop their project or further brainstorm ideas through social interactions with peers, instructors, and manufacturer representatives throughout the evening. Food and beverages will be available.

The second day will continue with more hacking. The submission of final prototype/product/analysis/proof will be expected by 2:00 pm on the second day. Following short presentations and demonstrations by participants, Expert Panel will conduct evaluations to determine the winners. Evaluation criteria will be posted on the Hackathon website.

Partnerships:

Participants can additionally select from a range of pre-defined Hackathon projects supported by the BR41N.IO Brain-Computer Interface designer Hackathon series. Designers will be able to 3D-print their own headsets and design BCI systems, and—together with programmers—create new BCI systems.

ADDITIONAL INFORMATION

We highly encourage Brain Hackathon participants to register for the [2017 IEEE SMC BMI Workshop](#) at [SMC2017](#)—where the Brain Hackathon is held—to learn more about Brain-Machine and Brain-Computer Interfaces.

- Meet and talk with experts from around the world
- Listen to papers presented by experts, attend receptions, etc.
- Discuss potential master and doctoral projects with academic, governmental and industrial experts

(NOTE: While participation in the Brain Hackathon is free, registration for the BMI Workshop at SMC will require a fee)

For additional information or questions about the hackathon, please contact:

Michael H. Smith, PhD
Senior Advisor, IEEE Brain Initiative
Past President, IEEE Systems, Man, and Cybernetics Society
Chair, 2017 IEEE SMC BMI Workshop
m.h.smith@ieee.org

Tim Mullen
Chair, 2017 IEEE SMC Brain Hackathon
Qusp, USA
tim.mullen@qusp.io

Christoph Guger, PhD
Co-Chair, 2017 IEEE SMC Brain Hackathon
BR41N.io series organizer
CEO g.tec medical engineering GmbH | Austria
guger@gtec.at

HACKATHON
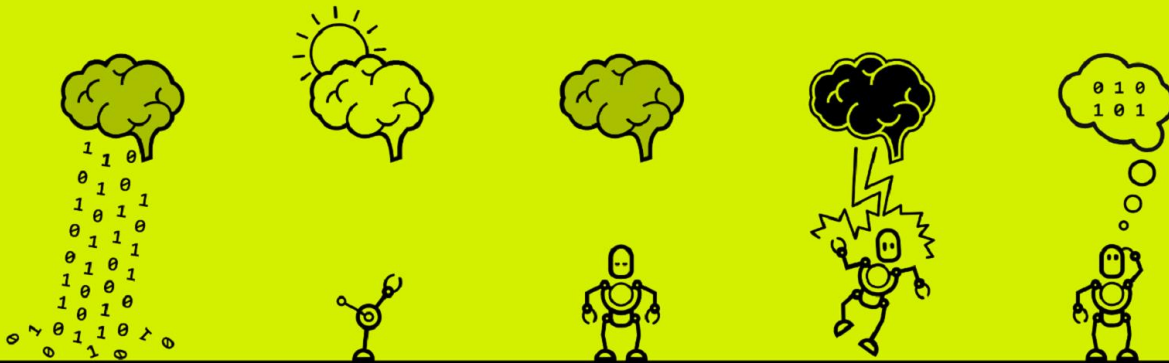
BR41N.IO

IEEE SMC 2017 BRAIN HACKATHON
BR41N.IO BRAIN-COMPUTER INTERFACE DESIGNERS HACKATHON PROJECTS

Note: BR41N.IO Hackathon Projects require advance registration so that appropriate equipment can be provided at the IEEE SMC 2017 Brain Hackathon

INTENTION

Inspired by the unique "Agent Unicorn" headpiece from Fashion-Technology-Artist **Anouk Wipprecht** (NL), this hackathon challenges young geeks to design and buid a unique, playful and wearable headpiece which is able to measure useful EEG signals in real-time to create any sort of interaction. With the intended purpose in mind, the teams plan and produce their own fully functional headpiece. 3D printers are on-site, so the teams will be able to give their headpieces an individual design that fits on participants' head.

The goal of this hackathon is to bring people of different professions together, such as engineers, programmers, physicians, or graphic designers. As an interdisciplinary team, they learn from each other and merge well established hardware and software in order to create a new, innovative and exceptional idea. The participation only requires basic knowledge in Brain-Computer Interfaces, machine learning, programming, signal processing or designing.

2017/10/7-8
IEEE SMC Conference 2017
Centre for Arts and Creativity in Banff, Canada

HACKATHON

Unity Games
Control a Unity based game by using your thoughts only.
* g.Nautilus

Flight Control
It is possible to control a drone with motor imagery. It is possible to move a drone by thinking about left or right hand motion.
* g.Nautilus, drone

BR41N.IO
PROJECTS
2 groups for each project
3-5 people per group
basic programming skills needed

BR41N.IO is organized by

g·tec

g.tec medical engineering GmbH

intendiX/extendiX Smart Home
The unicorn is supported by the P300 based spelling application intendiX. It is possible to control home devices such as lamps, radios or television.
* Unicorn, everyday objects

www.BR41N.io

FES Control
It is possible to control a FES using a unicorn amplifier with motor imagery. It is possible to move a FES by thinking about left or right hand motion.
* Unicorn, FES

Connect intendiX w/ Social Media
The unicorn is supported by the P300 based spelling application intendiX. When connected to Twitter or Facebook status updates can be written.
* Unicorn

Camera
It is possible to record videos while recording EEG with a unicorn amplifier.
* Unicorn, cameras

intendiX Painting
Create images according to your EEG signals.
* Unicorn

e-puck Control
It is possible to control an e-puck with motor imagery by thinking of left or right hand movement.
* g.Nautilus, e-puck

Orthosis Control
The team can 3D print an orthosis and use a unicorn amplifier with motor imagery to move it by thinking of left or right hand motion.
* g.Nautilus, e-puck

Sphero SPRK Control
It is possible to control a Sphero with motor imagery by thinking of left or right hand motion.
* g.Nautilus, Sphero

Dream Painting
To use the dream painting app, the user is wearing a unicorn headset while sleeping. When he wakes up, he will get an image created according to his EEG signals.
* Unicorn

Use intendiX for Social Media
Use the P300 based spelling application intendiX to update your status on Twitter or Facebook.
* Unicorn

Headset Design by Sewing
Expand your EEG Headset with a hat designed to keep all electrodes in their intended position.
* sewing machines, handicraft material

Headset Design by 3D Printing
Expand your EEG Headset with your own 3d printed parts. Let them move, light, hold things or simply look nice.
* 3D printer, 3D freeware
** basic CAD skills are benefits

Little BITs of Fun
Kids can join anytime and stay as long as they want to and handicraft their own headsets based on their imagination.