PLEXON®

Neurotechnology Research Systems

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WORKSHOP SCORES 9.7, PLEXSTIM V2.3, FREE PLEXSTIM UPGRADES AND MORE

WORKSHOP SCORES RECORD-BREAKING 9.7!

We are elated to announce that the 6th Annual Neurophysiology & Behavior Workshop (Plexon Workshop) was awarded the highest score to date - a record-breaking 9.7 - by the attendees following the event held in Dallas, Texas, USA at the DoubleTree Campbell Centre from April 27-30.

Four years ago, the Plexon Workshop was completely revamped, intensifying the training experience, converting to exercise-based learning, significantly increasing access to equipment, enabling one-on-one coaching, embedding an ice breaker to enhance learning, expanding the instructor base and improving the take-home materials. Plexon further began gathering input from attendees via anonymous surveys, then we used the feedback to improve future events – and it has really helped!

The first year in the new format, the Workshop was rated an 8.9, followed by a 9.4 for the 2013 program, then a 9.5 last year. This year, we are thrilled to share that attendees scored the program an amazing 9.7! This is a significant metric, as it quantifies the value of the training from the perspective of the most important constituent – the researcher.

Understandably, many people might perceive this program to have a significant sales focus; however, the score above represents the researchers quantification of the program merits wholly as a hard-core training event.

Read further in this newsletter for what Workshop attendee George Voren from the Pharmacology and Systems Therapeutics Department at the Icahn School of Medicine at Mount Sinai has this to say about this year's event.

Not sure how, but we plan to beat even that score next year!

2015 WORKSHOP STATS . . . .

This year was a near sell out with attendees filling 39 of the possible 40 seats. Participants flew in from 11 countries on four continents making the group an ideal mix of geographic diversity. Equipment experience ranged from beginner to advanced, with from one to three people originating from a single lab.

This unique event has historically been the only one of its kind in the industry, likely due to the unprecedented effort and resources – both equipment and personnel – necessary to execute such a comprehensive program. In fact, hosting this intense training event is far more work than any conference or sales related event we participate in all year. Maybe the following numbers will help convey just how much importance Plexon places on training.

To support the Plexon Workshop this year, we manufactured, authored, or made available:

- $1,000,000+ in equipment for training and one-on-one coaching,
- 733 packed slides of content, exercises and examples,
- 30 intense hours of dedicated instruction,
- 21 hands-on, interactive training sessions,
- 17 comprehensive equipment workstations,
- 12 engineers, developers and subject matter experts as instructors,
- 4 unique neural data acquisition platforms spanning Plexon's product line history,
- 4 accomplished, honored guest speakers from internationally well-known labs to tie it together from a practical perspective, and
- 1 unparalled learning experience!

Plexon thanks all attendees and honored guest speakers - Anders Asp from the University of Minnesota, Christian Bravo-Rivera from the University of Puerto Rico School of Medicine, Chandramouli Chandrasekaran from Stanford University and Jonas Thelin from Lund University - for making this the best Plexon Workshop yet!

PLEXSTIM™ V2.3 FOR 64 STIMULATION CHANNELS RELEASED TODAY

PlexStim™ Electrical Stimulation System software version 2.3 offers researchers improved reliability, a better and more convenient power scheme and enhanced electrical isolation over the previous system. Among other advancements, the new release also now enables the individual control of up to 64 independent stimulation channels (via four 16 channel devices) with the use of the new, accompanying PlexStim software development kit (SDK).

PlexStim can generate arbitrary waveform patterns initiated from either the software interface or from externally triggered digital inputs. The graphical user interface (GUI) makes it easy to generate bi-phasic rectangular pulses and bursts of pulses repeated at specific rates. More complicated rectangular waveforms and non-rectangular arbitrary waveforms may be defined in and loaded from a simple text file.

Every stimulation pattern can be started and stopped either manually within the GUI, or with an external digital trigger (TTL). Complex stimulation patterns can be delivered in this way with precise timing based on different triggers. Each channel has a dedicated digital input that may be used in an edge triggered or level triggered (gated) mode to initiate stimulation with microsecond latency. Each channel also has a dedicated digital output signal to third party devices when stimulation is occurring. The actual current and voltage delivered to each electrode can be conveniently monitored on a per-channel basis with stimulation currents defined with 16-bit precision up to ±1mA and delivered with ±10V compliance.

For labs with an existing PlexStim Stimulator, it is important to note that the software version 2.3 requires a FREE firmware upgrade *(see the next section for more information.)*

PlexStim software v2.3 is available for Windows 7 and can be downloaded from the Software Downloads page under the Support section of the website. Additional documentation supporting v2.3 is found on the Documentation webpage including the revised *PlexStim Electrical Stimulator User Guide* and *PlexStim Electrical Stimulator Data Sheet* along with other documents listed in the "New PlexStim SDK" section below.

For more information, contact info@plexon.com.

FREE PLEXSTIM FIRMWARE AND POWER UPGRADES

To access the new functionality, as well as the improved reliability and enhanced electrical isolation, PlexStim Software v2.3 requires the newest PlexStim firmware. As a demonstration of Plexon's customer appreciation and commitment to excellent technical service, Plexon is offering a complimentary firmware and power supply upgrade to all customers with existing PlexStim Stimulators!

To determine if you will require an upgrade, check the underside of the stimulator for the firmware number. If it reads anything other than "Firmware 14-20-A-07-A", then you need an upgrade. Be careful not to confuse the firmware number with either the serial number or the hardware number.

Customers wishing to take us up on our FREE PlexStim upgrades should email support@plexon.com for instructions.

NEW PLEXSTIM SDK

To further expand of how researchers are able to leverage PlexStim, Plexon has developed enhanced 32- and 64-bit SDKs for use with C/C++ or MATLAB®, as well as instructions for use with LabVIEW®. The newest SDKs enable the programming of additional channels up to 64 channels (in the presence of the appropriate number of PlexStim devices), and include several new functions. The SDKs are included in the installers and automatically available following the installation of the software.

To support the use of the PlexStim SDKs, Plexon has developed and/or revised the following documents: *PlexStim Electrical Stimulator DLL Guide* and the *PlexStim Electrical Stimulator MATLAB API Definitions*. Both documents can be found on the Documentation page under the Support section of the website.

DID YOU KNOW . . . NEUROEXPLORER® V5 ACQUIRES CONTINUOUS DATA?

Last year, NeuroExplorer® v5 was launched with heaps of new functionality. To help you become more familiar with some of it, we will discuss a new feature from time to time. One such feature that you might not know is that version 5 of NeuroExplorer now enables the acquisition of continuous data from an OmniPlex® or MAP Neural Data Acquisition System online.

NeuroExplorer v5 has the ability to connect as an online client to Plexon data acquisition systems and acquire continuous data, such as LFP and Auxiliary I/O signals. This new feature adds to the existing capability of gathering spike and event timestamps online. The new continuous data analyses in NeuroExplorer v5 can be run on the data acquired online.

To enable online continuous data acquisition in NeuroExplorer v5, go to the Online->Plexon Online Options menu, and select the "Acquire continuous channels with sampling rate less than or equal to (Hz):" option. By default, the sampling rate value is set to 1000Hz. This is the default sampling rate of LFP signals in and Auxiliary I/O in OmniPlex. It's possible to set this higher to capture data sampled at higher rates, but there is a data transfer rate limit of 5MB per second, which NeuroExplorer will warn you about, if exceeded. Once this is set, go to Online->Connect to Plexon Server to begin acquisition.

Contact support@plexon.com with any questions.

PLEXON WORKSHOP ALUMNI SPEAK OUT: GEORGE VOREN

"The Plexon workshop is absolutely essential for anyone who wants to make the most out of their electrophysiology data. I really appreciated being able to spend 1 on 1 time with the creators of the programs I use every day and network with a community of other scientists who utilize the same techniques."

George Voren
Pharmacology and Systems Therapeutics Department
Icahn School of Medicine at Mount Sinai

CONGRATULATIONS WORKSHOP BOWLING WINNERS

On the second evening of the Workshop, researchers have the opportunity to break the ice with fellow attendees over a dinner and networking at a local, upscale bowling alley. We would like to congratulate the top two scoring teams and their high scores:

Team Red – 1st Place, 686
Captain Chris Heydrick
Greg Prescott
Norman Taylor
Maggie Wang
David Wrighton
Catherine Wu

Team Blue – 2nd Place, 640
Captain Stacie Hyatt
Anders Asp
Christian Bravo-Rivera
Felice Echard
Terry Echard
Fred Garcia

The 1st Place team walked away with custom Plexon Hawaiian shirts! In total, 49 prizes were won by high scores, most strikes, most spares, most turkeys (three strikes in a row) and to all those scoring more than 100 in a single game. Nice job to all bowlers!

FREE OFS V4 UPGRADES FOR 2015 V3

Just a reminder to those labs who purchased new licenses of OFS v3 in 2015 prior to April 23 - you are entitled to a FREE upgrade to OFS v4. Email info@plexon.com for more information. Offer expires on December 21, 2015.

70% OFS V4 UPGRADE DISCOUNTS FOR Q4, 2014 V3 ORDERS

Just a reminder to those labs who purchased new licenses of OFS v3 between Oct. 1 and Dec. 31, 2014 - you are entitled to 70% off of the standard OFS v4 upgrade. Email info@plexon.com for more information and/or a quote. Offer expires on December 21, 2015.

REVISED CHINA WORKSHOP DATES

The dates for the China Regional Neurophysiology Workshop sponsored by Hong Kong Plexon have been slightly modified to now take place July 21-23, 2015.

Contact jerry@plexon.com.hk for more information.

PLEXON KEEPS HIRING!

We keep growing and are constantly seeking outstanding, neuroscience-loving candidates for the following roles:

- Electrophysiology Sales
- Behavioral Neuroscience Sales
- Inside Sales for Neuroscience
- Senior Windows Software Engineer for Neuroscience

We especially encourage students and lab technicians from neuroscience and behavior research labs to apply. If you are interested, send your resume to jobs@plexon.com.

OFFICE CLOSURES

In observation of Independence Day in the United States, Plexon's world headquarters will be closed Friday, July 3rd, with standard operations resuming on Monday, July 6th.

UPCOMING EVENTS

- **9th International Brain Research Organization (IBRO) World Congress of Neuroscience**, July 7-11; Rio de Janeiro, Brazil
- **3rd Annual HK Plexon China Regional Neurophysiology Workshop**, July 21-23; Beijing, China
- **38th Annual Meeting of the Japan Neuroscience Society,** July 28-31; Kobe, Japan

RESEARCH SPOTLIGHT

Let us know about your 2015 publication citing Plexon and our equipment and we will send you a thank you award with a mug and a T-shirt! Send notices, address and T-shirt size to publications@plexon.com.

All articles listed are alphabetical based on first author within two categories: articles published online in electronic-only journals or ahead of print, and articles published in full print.

Recent articles published online in electronic-only journals or ahead of print:

- Anastassiou, Costas A., Rodrigo Perin, Gyorgy Buzsaki, Henry Markram, and Christof Koch. "Cell-type-and activity-dependent extracellular correlates of intracellular spiking." *Journal of Neurophysiology* (2015): jn-00628.
- Barry, Jeremy M., ManKin Choy, Celine Dube, Ashlee Robbins, Andre Obenaus, Pierre Pascal Lenck-Santini, Rod C. Scott, Tallie Z. Baram, and Gregory L. Holmes. "T2 relaxation time post febrile status epilepticus predicts cognitive outcome." *Experimental Neurology* (2015).
- Byers, Blake, Hyun Joo Lee, Jia Liu, Andrew J. Weitz, Peter Lin, Pengbo Zhang, Aleksandr Shcheglovitov, Ricardo Dolmetsch, Renee Reijo Pera, and Jin Hyung Lee. "Direct in vivo assessment of human stem cell graft–host neural circuits." *NeuroImage* (2015).
- Chen, Naiyan, Hiroki Sugihara, and Mriganka Sur. "An acetylcholine-activated microcircuit drives temporal dynamics of cortical activity." *Nature Neuroscience* (2015).
- Elias, David, Sidney A. Simon, and Ranier Gutierrez. "D1 and D2 antagonists reverse the effects of appetite suppressants on weight loss, food intake, locomotion and rebalance spiking inhibition in the rat NAc shell." *J Neurophysiology,* May 13, 2015.
- Faber, Nathaniel J., Filippo Agnesi, and Matthew D. Johnson. "Recording Neuronal Spike Activity During Transcranial Direct Current Stimulation." *Journal of Medical Devices* 9, no. 2 (2015): 020948.
- Genovesio, Aldo, Rossella Cirillo, Satoshi Tsujimoto, Sara Mohammad Abdellatif, and Steven P. Wise. "Automatic comparison of stimulus durations in the primate prefrontal cortex: the neural basis of across-task interference." *Journal of Neurophysiology* (2015): jn-00057.
- Kozai, Takashi DY, and Alberto L. Vazquez. "Photoelectric artefact from optogenetics and imaging on microelectrodes and bioelectronics: new challenges and opportunities." *Journal of Materials Chemistry* B (2015).
- Li, Jingfeng M., William J. Bentley, Abraham Z. Snyder, Marcus E. Raichle, and Lawrence H. Snyder. "Functional connectivity arises from a slow rhythmic mechanism." *Proceedings of the National Academy of Sciences* (2015): 201419837.
- Liu, Cheng-Hang, Jason E. Coleman, Heydar Davoudi, Kechen Zhang, and Marshall G. Hussain Shuler. "Selective Activation of a Putative Reinforcement Signal Conditions Cued Interval Timing in Primary Visual Cortex." *Current Biology* (2015).
- McAlinden, Niall, Erdan Gu, Martin D. Dawson, Shuzo Sakata, and Keith Mathieson. "Optogenetic activation of neocortical neurons in vivo with a sapphire-based micro-scale LED probe." *Frontiers in Neural Circuits* 9 (2015): 25.
- Mu, Li, Jun Wang, Bing Cao, Beth Jelfs, Rosa HM Chan, Xiaoxiang Xu, Mahadi Hasan, Xu Zhang, and Ying Li. "Impairment of cognitive function by chemotherapy: association with the disruption of phase-locking and synchronization in anterior cingulate cortex." *Molecular Brain* 8, no. 1 (2015): 32.
- Ohmae, Shogo, Toshimitsu Takahashi, Xiaofeng Lu, Yasunori Nishimori, Yasushi Kodaka, Ichiro Takashima, and Shigeru Kitazawa. "Decoding the timing and target locations of saccadic eye movements from neuronal activity in macaque oculomotor areas." *Journal of Neural Engineering* 12, no. 3 (2015): 036014.

•• Okuyama, Sumito, Toshinobu Kuki, and Hajime Mushiake. "Representation of the Numerosity 'zero' in the Parietal Cortex of the Monkey." *Scientific Reports* 5 (2015).

•• Opris, Ioan, Greg A. Gerhardt, Robert E. Hampson, and Sam A. Deadwyler. "Disruption of columnar and laminar cognitive processing in primate prefrontal cortex following cocaine exposure." *Frontiers in Systems Neuroscience* 9 (2015): 79.

•• Siuda, Edward R., Bryan A. Copits, Martin J. Schmidt, Madison A. Baird, Ream Al-Hasani, William J. Planer, Samuel C. Funderburk, Jordan G. McCall, Robert W. Gereau, and Michael R. Bruchas. "Spatiotemporal Control of Opioid Signaling and Behavior." *Neuron* (2015).

•• Slomowitz, Edden, Boaz Styr, Irena Vertkin, Hila Milshtein-Parush, Israel Nelken, Michael Slutsky, and Inna Slutsky. "Interplay between population firing stability and single neuron dynamics in hippocampal networks." *eLife* 4 (2015); E04378.

•• Takahashi, Kazutaka, Sanggyun Kim, Todd P. Coleman, Kevin A. Brown, Aaron J. Suminski, Matthew D. Best, and Nicholas G. Hatsopoulos. "Large-scale spatiotemporal spike patterning consistent with wave propagation in motor cortex." *Nature Communications* 6 (2015).

•• Takeda, Masaki, Kenji W. Koyano, Toshiyuki Hirabayashi, Yusuke Adachi, and Yasushi Miyashita. "Top-Down Regulation of Laminar Circuit via Inter-Area Signal for Successful Object Memory Recall in Monkey Temporal Cortex." *Neuron* (2015).

•• Touryan, Jonathan O., and James A. Mazer. "Linear and Nonlinear Properties of Feature Selectivity in V4 Neurons." *Frontiers in Systems Neuroscience* 9 (2015): 82.

•• Walmsley, Lauren, Lydia Hanna, Josh Mouland, Franck Martial, Alexander West, Andrew R. Smedley, David A. Bechtold, Ann R. Webb, Robert J. Lucas, and Timothy M. Brown. "Colour As a Signal for Entraining the Mammalian Circadian Clock." (2015). *PLoS Biol* 13(4): e1002127.

•• Wang, Jun, Bing Cao, Tian-ran Yu, Beth Jelfs, Jin Yan, Rosa HM Chan, and Ying Li. "Theta-frequency phase-locking of single anterior cingulate cortex neurons and the synchronization with the medial thalamus are modulated by visceral noxious stimulation in rats." *Neuroscience* (2015).

Recent articles published in full print:

•• Cai, Rui, and Donald M. Caspary. "GABAergic Inhibition Shapes SAM Responses in Rat Auditory Thalamus." *Neuroscience* (2015). Vol. 299, July 2015, Pages 146-155.

•• Delaville, Claire, Alex J. McCoy, Colin M. Gerber, Ana V. Cruz, and Judith R. Walters. "Subthalamic Nucleus Activity in the Awake Hemiparkinsonian Rat: Relationships with Motor and Cognitive Networks." *The Journal of Neuroscience* 35, no. 17 (2015): 6918-6930.

•• Escanilla, Olga D., Jonathan D. Victor, and Patricia M. Di Lorenzo. "Odor-Taste Convergence in the Nucleus of the Solitary Tract of the Awake Freely Licking Rat." *The Journal of Neuroscience* 35, no. 16 (2015): 6284-6297.

•• Hage, Steffen R., and Andreas Nieder. "Audio-Vocal Interaction in Single Neurons of the Monkey Ventrolateral Prefrontal Cortex." *The Journal of Neuroscience* 35, no. 18 (2015): 7030-7040.

•• Hernandez, Alex, Amanda C. Burton, Patricio O'Donnell, Geoffrey Schoenbaum, and Matthew R. Roesch. "Altered Basolateral Amygdala Encoding in an Animal Model of Schizophrenia." *The Journal of Neuroscience* 35, no. 16 (2015): 6394-6400.

•• Kayser, Christoph, Caroline Wilson, Houman Safaai, Shuzo Sakata, and Stefano Panzeri. "Rhythmic Auditory Cortex Activity at Multiple Timescales Shapes Stimulus–Response Gain and Background Firing." *The Journal of Neuroscience* 35, no. 20 (2015): 7750-7762.

•• Kira, Shinichiro, Tianming Yang, and Michael N. Shadlen. "A Neural Implementation of Wald's Sequential Probability Ratio Test." *Neuron* 85, no. 4 (2015): 861-873.

•• Marsh, Brandi T., Venkata S. Aditya Tarigoppula, Chen Chen, and Joseph T. Francis. "Toward an Autonomous Brain Machine Interface: Integrating Sensorimotor Reward Modulation and Reinforcement Learning." *The Journal of Neuroscience* 35, no. 19 (2015): 7374-7387.

•• Marshall, Kara L., Mohit Chadha, Susanne J. Sterbing-D'Angelo, Cynthia F. Moss, and Ellen A. Lumpkin. "Somatosensory Substrates of Flight Control in Bats." *Cell Reports* 11, no. 6 (2015): 851-858.

•• Varazzani, Chiara, Aurore San-Galli, Sophie Gilardeau, and Sebastien Bouret. "Noradrenaline and Dopamine Neurons in the Reward/Effort Trade-Off: A Direct Electrophysiological Comparison in Behaving Monkeys." *The Journal of Neuroscience* 35, no. 20 (2015): 7866-7877.

•• Wheeler, Daniel S., Mykel A. Robble, Emily M. Hebron, Matthew J. Dupont, Amanda L. Ebben, and Robert A. Wheeler. "Drug Predictive Cues Activate Aversion-Sensitive Striatal Neurons That Encode Drug Seeking." *The Journal of Neuroscience* 35, no. 18 (2015): 7215-7225.