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DIGITAL REFERENCING, CHANNEL MAPPING AND 2014 ANNUAL WORKSHOP DATES

DIGITAL REFERENCING AND CHANNEL MAPPING IN OMNIPLEX® V1.10

Plexon announces the newest software release for its flagship OmniPlex® Neural Data Acquisition System – OmniPlex Software v1.10 – containing the significant addition of sophisticated digital referencing and electrode channel mapping functionality among other improvements.

OmniPlex's new digital referencing feature avoids many of the limitations of analog referencing. In digital referencing, the subtraction is performed by subtracting corresponding sample values in software, and there are no inherent limitations on the number of references or the number of channels that use them. Also, spike channels can be referenced independently of field potential channels without any reduction in channel count. Moreover, performing the referencing in software is a more flexible and extensible approach that allows more advanced methods to be implemented without incurring the cost and complexity of the equivalent analog circuitry.

Not only is standard digital referencing available, but OmniPlex Software v1.10 further supports two advanced methods: common average referencing (CAR) and common median referencing (CMR) performed at the full 40kHz wideband sampling rate for maximum precision. The OmniPlex Systems using analog amplifiers and the OmniPlex D Systems with DigiAmp™ digitizing amplifiers will benefit from digital referencing if running the new OmniPlex Software v1.10.

Channel mapping allows users of electrodes with nonstandard or inconvenient physical channel numbering, such as with silicon probes, to map (renumber) the channels without the use of custom adaptors or cables which were previously required. Researchers utilizing electrodes with complex geometries such as stereotrodes or tetrodes will appreciate the convenience.

The OmniPlex Software v1.10 download is available for Windows® 7 and XP, and can be found on the OmniPlex Software webpage, or at www.plexon.com/software-downloads. We recommend you read the *Release Notes* contained within the install package to learn more regarding these and other improvements.

For more information on analog vs. digital referencing, check out the *Plexon Inc Releases OmniPlex® Software v1.10 with New Digital Referencing and Channel Mapping* news release. For more information regarding CAR and CMR referencing, this article can be helpful: Rolston, John D., Robert E. Gross, and Steve M. Potter. "Common median referencing for improved action potential detection with multielectrode arrays." *In Engineering in Medicine and Biology Society*, 2009. EMBC 2009. *Annual International Conference of the IEEE*, pp. 1604-1607. IEEE, 2009.

OFFLINE SORTER™ V3.3.1 NOW AVAILABLE

Offline Sorter™ is the most recognized and trusted offline neural spike sorting software in the industry today, with more than 1,200 publications specifically citing its use. In addition to reading Plexon files - PLX and PL2™ - Offline Sorter reads file types from many data acquisition companies and software programs across the industry.

We just released the latest upgrade – Offline Sorter v3.3.1 – with added PL2 functionality among other improvements. Most significantly, PL2 files that are read into Offline Sorter may now also be Exported in the PL2 format in addition to being Saved as a PL2 file. The Export function is typically used for files where spikes have been extracted from continuous data.

It is important to note that neither PLX files nor non-Plexon file types can be saved as PL2 files in Offline Sorter. Rather, the conversion from one format to another must be performed using PlexUtil 4.0 with an OmniPlex or a MAP System license key. One other improvement related to PLX files is that version 3.3.1 now sets the initial spike channel gain to be the same as continuous gain. This enhancement makes future spike extraction much easier.

For more information on improvements, or to simply download the newest release, visit the Offline Sorter webpage, or www.plexon.com/software-downloads. The update is free of charge for those with Offline Sorter version 3 license keys. For all others, check out Plexon's 30th Anniversary promotion offering a free license key or a discount with purchase.

PLEXUTIL V4.0.1 JUST RELEASED

PlexUtil utility program version 4.0.1 has been released enhancing the manipulation of neural data files utilizing Plexon's proprietary and game-changing PL2 file format.

Plexon's data acquisition systems generate two types of data files: PLX and PL2 files. PLX files are data files that contain action potential (spike) timestamps and waveforms, event timestamps, and continuous variable data. PL2 is Plexon's next generation format containing all of the data within a PLX file, only further developed to significantly decrease the time it takes to read the data (single channel or block level) into a sorting or analysis program. PlexUtil is then Plexon's file utility program that permits the manipulation of these neural data files such as creating subsets of data, merging data or converting between file formats regardless of whether the files were recorded on the flagship OmniPlex Neural Data Acquisition (OmniPlex or OmniPlex D) System or the original Multichannel Application Processor (MAP) Data Acquisition System.

This latest release offers new features and improvements primarily related to the PLX to PL2 converter. PlexUtil v4.0.1 will now convert PLX files containing channels with different digitizing rates recorded by the MAP System. Moreover, the functionality associated with splitting PLX or PL2 files has been significantly enhanced providing a more seamless process.

The latest download is available for both Windows 7 and XP operating systems, and can be found at www.plexon.com on the PlexUtil webpage, or at www.plexon.com/software-downloads. Additional details regarding improvements and other modifications are listed on the change log within the install package.

NEW C/C++ ONLINE CLIENT DEVELOPMENT KIT

Plexon's C/C++ Online Client Development Kit has recently been updated and is now available online. The primary modification regards the PlexDO client API now supporting 75% more devices. PlexDO, available in both C/C++ and MATLAB versions, allows a client program to control one or more National Instruments (NI) cards to perform basic digital output functions, such as setting individual bits high or low, outputting pulses, and generating clock signals. It supports several NIDAQ cards and USB devices which are included with OmniPlex and MAP systems.

For a detailed list of devices supported and related instructions, please explore the Read Me file named PlexDOReadme.docx located within the C/C++ Online Client Development Kit zip file. This client software development kit (SDK) can be downloaded from the SDK tab at www.plexon.com/software-downloads.

SAVE THE DATE: 2014 PLEXON NEUROPHYSIOLOGY AND BEHAVIOR WORKSHOP**March 17-20, 2014**

2014 marks the fifth year of this amazing event when researchers from all over the globe descend on Dallas for three full days packed with instructions, demonstrations and hands-on exercises presented by renowned researchers and Plexon subject matter experts. Each year, the event becomes stronger with last year earning a new high score of 9.4 out of 10 for the overall question "How likely are you to recommend this workshop to a colleague?"

The Workshop is limited to no more than 40 attendees to ensure maximum hands-on experience. In the primary training hall, ten complete workstations will be set-up with four attendees per station plus a secondary training room with another five complete workstations for one-on-one instruction.

Each attendee receives:

- three days of intense training,
- a robust materials and exercises packet,
- admission to the Welcome Reception to foster a more relaxed learning environment,
- a ticket to the exceptionally popular social event to encourage networking,
- two \$150.00 gift certificates for the 2015 Workshop (one for themselves and the other for a colleague),
- a certificate of completion,
- breakfast and lunch all three days, and a
- Plexon T-shirt and mug.

Registration fees have been not increased since 2012, AND this year there is an added discount with a system purchase:

- **\$850.00: Early Registration with the purchase of an OmniPlex, MAP or CinePlex® Systems (Registration/hotel rooms must be line items on the system quote and paid or PO submitted by February 14, 2014)**
- \$900.00: Early Registration (without a system purchase)
- \$1,100.00: After February 14, 2014

Early registration pricing applies to those who register and make payment by February 14, 2014. Additionally, special hotel room pricing has been secured through Plexon at \$135.00 per night with up to two people per room.

Registration is not open yet, but will be shortly. For more information on topics covered and other details, visit <http://www.plexon.com/workshops> or email workshop@plexon.com.

PLEXON RECOGNIZED WITH 2013 FAST TECH AWARD

Plexon is thrilled to be recognized with the coveted Tech Titan Fast Tech Award for the fastest growing technology companies in North Texas. This represents the fifth time Plexon has been fortunate enough to receive this honor. Winners represent the thirty five North Texas companies in the technology, media, telecommunications, life sciences, and clean technology sectors that demonstrated the most impressive fiscal year revenue growth from 2010 to 2012.

According to President Harvey W. Wiggins, "This acknowledgement is confirmation that as an industry leader celebrating its 30th year in business, Plexon still understands what it takes to stay on top for the long haul! We thank our customers and friends for this honor once again."

PLEXON HQ CLOSED SEPTEMBER 2, LABOR DAY

In observation of Labor Day, Plexon's world headquarters will be closed September 2nd, 2013, with standard operations resuming the next day on September 3rd. Plexon Europe will remain open that day.

OFFLINE SORTER™ PROMOTION

Get in on our 30th Anniversary specials for Offline Sorter (OFS) version 3! When you purchase OFS v3, choose either a special pricing (~\$1,000 savings) or an extra license (\$2,000+ savings). Email info@plexon.com to request a quote or place an order.

This promotion expires December 20, 2013.

NEW DOCUMENTATION

Check out a couple new/revised documents now available online:

- V-Probe Technical Guide
- FPAAlign 2.0 Utility Guide

UPCOMING EVENTS

- 4th Congress of the GDR Microelectrode Systems and Signal Processing for Neuroscience Meeting, October 17-18; Bordeaux, France

INNOVATION FOR THE NEXT 30 YEARS

Plexon continues to celebrate its 30th year serving researchers around the globe!

RESEARCH SPOTLIGHT

Let us know about your 2013 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:

- Burton, Amanda C., Vadim Kashtelyan, Daniel W. Bryden, and Matthew R. Roesch. "Increased Firing to Cues That Predict Low-Value Reward in the Medial Orbitofrontal Cortex." *Cerebral Cortex* (2013).
- Caixeta, Fábio V., Alianda M. Cornélio, Robson Scheffer-Teixeira, Sidarta Ribeiro, and Adriano BL Tort. "Ketamine alters oscillatory coupling in the hippocampus." *Scientific Reports* 3 (2013).
- Dejean, C., T. Boraud, and C. Le Moine. "Opiate dependence induces network state shifts in the limbic system." *Neurobiology of Disease* (2013).
- Flint, Robert D., Zachary A. Wright, Michael R. Scheid, and Marc W. Slutzky. "Long term, stable brain machine interface performance using local field potentials and multiunit spikes." *Journal of Neural Engineering* 10, no. 5 (2013): 056005.
- Hao, YaoYao, QiaoSheng Zhang, ShaoMin Zhang, Ting Zhao, YiWen Wang, WeiDong Chen, and XiaoXiang Zheng. "Decoding grasp movement from monkey premotor cortex for real-time prosthetic hand control." *Chinese Science Bulletin* 58, no. 20 (2013): 2512-2520.
- Jutras, Michael J., Pascal Fries, and Elizabeth A. Buffalo. "Oscillatory activity in the monkey hippocampus during visual exploration and memory formation." *Proceedings of the National Academy of Sciences* (2013).
- Karumbaiah, Lohitash, Tarun Saxena, David Carlson, Ketki Patil, Radhika Patkar, Eric A. Gaupp, Martha Betancur, Garrett B. Stanley, Lawrence Carin, and Ravi V. Bellamkonda. "Relationship between intracortical electrode design and chronic recording function." *Biomaterials* (2013).
- Kornblith, Simon, Xueqi Cheng, Shay Ohayon, and Doris Y. Tsao. "A Network for Scene Processing in the Macaque Temporal Lobe." *Neuron* (2013).
- Krekelberg, Bart, and Richard JA van Wezel. "Neural Mechanisms of Speed Perception: transparent motion." *Journal of Neurophysiology* (2013).

- Larremore, Daniel B., Woodrow L. Shew, Shan Yu, Dietmar Plenz, Edward Ott, Francesco Sorrentino, and Juan G. Restrepo. "Inhibition guarantees ceaseless cortex network dynamics." *arXiv preprint arXiv:1307.7658* (2013).
- Li, Ling-yun, Ya-tang Li, Mu Zhou, Huizhong W. Tao, and Li I. Zhang. "Intracortical multiplication of thalamocortical signals in mouse auditory cortex." *Nature Neuroscience* (2013).
- Nisimaru, Naoko, Chetan Mittal, Yoshinori Shirai, Thongchai Sooksawate, Prabu Anandaraj, Tsutomu Hashikawa, Soichi Nagao et al. "Orexin-neuromodulated cerebellar circuit controls redistribution of arterial blood flows for defense behavior in rabbits." *Proceedings of the National Academy of Sciences* (2013).
- Park, Jae Hong, Chang-Eop Kim, Jaewoo Shin, Changkyun Im, Chin Su Koh, In Seok Seo, Sang Jeong Kim, and Hyung-Cheul Shin. "Detecting bladder fullness through the ensemble activity patterns of the spinal cord unit population in a somatovisceral convergence environment." *Journal of Neural Engineering* 10, no. 5 (2013): 056009.
- Retailliau, Aude, Cyril Dejean, Benjamin Fourneaux, Xavier Leinekugel, and Thomas Boraud. "Why am I lost without dopamine? Effects of 6-OHDA lesion on the encoding of reward and decision process in CA3." *Neurobiology of Disease* (2013).
- Richardson, Ben David, Kenneth E. Hancock, and Donald M. Caspary. "Stimulus-specific adaptation in auditory thalamus of young and aged awake." *Journal of Neurophysiology* (2013).
- Rossi, Mark A., David Fan, Joseph W. Barter, and Henry H. Yin. "Bidirectional Modulation of Substantia Nigra Activity by Motivational State." *PLOS ONE* 8, no. 8 (2013): e71598.
- Sankaranarayani, R., Mohan Raghavan, A. Nalini, T. R. Laxmi, and T. R. Raju. "Reach task-associated excitatory overdrive of motor cortical neurons following infusion with ALS-CSF." *Journal of Neural Transmission* (2013): 1-10.
- Völgyi, Béla, Feng Pan, David L. Paul, Jack T. Wang, Andrew D. Huberman, and Stewart A. Bloomfield. "Gap Junctions Are Essential for Generating the Correlated Spike Activity of Neighboring Retinal Ganglion Cells." *PLOS ONE* 8, no. 7 (2013): e69426.
- Wanger, Tim, Kentaroh Takagaki, Michael T. Lippert, Jürgen Goldschmidt, and Frank W. Ohl. "Wave propagation of cortical population activity under urethane anesthesia is state dependent." *BMC Neuroscience* 14, no. 1 (2013): 78.
- Zhang, Ying-Ying, Ru-Bin Wang, Xiao-Chuan Pan, Hai-Qing Gong, and Pei-Ji Liang. "Visual pattern discrimination by population retinal ganglion cells' activities during natural movie stimulation." *Cognitive Neurodynamics*: 1-9.

Recent articles published in full print:

- Bugaysen, Jenia, Izhar Bar-Gad, and Alon Korngreen. "Continuous Modulation of Action Potential Firing by a Unitary GABAergic Connection in the Globus Pallidus In Vitro." *The Journal of Neuroscience* 33, no. 31 (2013): 12805-12809.
- Ghane-Motlagh, Bahareh, and Mohamad Sawan. "Design and Implementation Challenges of Microelectrode Arrays: A Review." *Materials Sciences and Applications*, 2013, 4, 483-495.
- Li, Will XY, Ray CC Cheung, Rosa HM Chan, Dong Song, and Theodore W. Berger. "Real-Time Prediction of Neuronal Population Spiking Activity Using FPGA." *IEEE Trans Biomed Circuits Syst.* 2013 Aug;7(4):489-98.
- Swaminathan, Sruthi K., Nicolas Y. Masse, and David J. Freedman. "A Comparison of Lateral and Medial Intraparietal Areas during a Visual Categorization Task." *The Journal of Neuroscience* 33, no. 32 (2013): 13157-13170.
- Tolkacheva, L. N., and V. M. Nikol'skii. "Formation constants and composition of Ga3+ and In3+ complexes with iminodisuccinic acid in aqueous solutions according to potentiometric data." *Russian Journal of Physical Chemistry A* 87, no. 9 (2013): 1498-1501.
- Zhao, Xinyu, Hui Chen, Xiaorong Liu, and Jianhua Cang. "Orientation-selective responses in the mouse lateral geniculate nucleus." *The Journal of Neuroscience* 33, no. 31 (2013): 12751-12763.