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Presentation Abstract

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Presentation Title: A bluetooth wireless brain-machine interface for general purpose computer use

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Topic: ++D.18.c. Neuroprosthetics: Control of real and artificial arm, hand, other grasping devices

Authors: ***P. NUYUJUKIAN**^{1,2,3}, **C. PANDARINATH**^{1,2,3}, **C. BLABE**¹, **L. HOCHBERG**^{7,8,10,11,9}, **K. SHENOY**^{2,3,4,5,6}, **J. HENDERSON**^{1,3};
¹Neurosurg., ²Electrical Engin., ³Stanford Neurosciences Inst., ⁴Neurosciences Program, ⁵Dept. of Neurobio., ⁶Bioengineering, Stanford Univ., Stanford, CA; ⁷Ctr. for Neurorestoration and Neurotechnology, Rehab. R&D Service, Veterans Administration, Providence, RI; ⁸Sch. of Engin., ⁹Inst. for Brain Sci., Brown Univ., Providence, RI; ¹⁰Neurol., Massachusetts Gen. Hosp., Boston, MA; ¹¹Neurol., Harvard Med. Sch., Boston, MA

Abstract: Advances in brain-machine interfaces (BMIs) have demonstrated the potential of these systems to serve as important communication avenues. We recently demonstrated the highest performing BMIs for communication in clinical trial participants (Nuyujukian*, Pandarinath*, et al., SfN 2014 & Pandarinath*, Nuyujukian*, et al., SfN 2014). As is the case with most BMIs to date, this system was comprised of custom software packages and the interface was not user-updatable. The next step in the design of practical BMIs for communication would be to create a system that is broadly usable, similar to how computer peripherals can interface to a variety of computers through common interfaces (e.g., USB). Additionally, wireless transmission of control signals would simplify the interface, facilitating portability and ease of use. We addressed both of these issues by developing a general purpose BMI interface for communication which outputs signals using the Bluetooth (mouse) standard. In this fashion, the wireless BMI

could pair with many types of standard computing hardware, ranging from computers to tablets. We tested this general purpose interface with participant T6 of the BrainGate2 pilot clinical trial. T6 is a 52 year old woman diagnosed with ALS who was implanted with a multielectrode array in motor cortex. After training a two-dimensional cursor and click decoder as reported last year, she used the wireless BMI to control an unmodified Android tablet. We conducted an experimental session with this system and she navigated the Android operating system interface, browsed the web, searched for and played online videos, searched for and played music, and composed three emails to researchers. This proof-of-concept demonstration illustrates one potential use for communication BMIs that uses wireless signal transmission to control off-the-shelf consumer hardware.

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