Using Synthetic Data from Generative Approaches to Assist Behavior and Brain Activity Analysis

February 11

Tuesday, 12:30 pm

Billings Building—Rosedale Room

SPEAKER:

Timothy H. Murphy Ph.D.

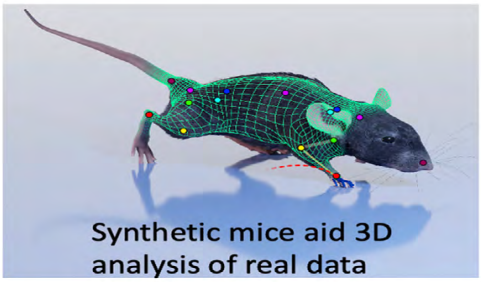
Professor,Department of Psychiatry
Division of Neuroscience and
Translational Psychiatry
The University of British Columbia

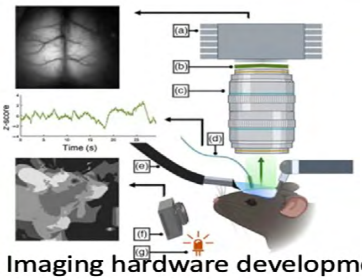
Host: Rajiv R. Ratan, M.D., Ph.D.

For more information contact
Darlene White
daw9085@med.cornell.edu

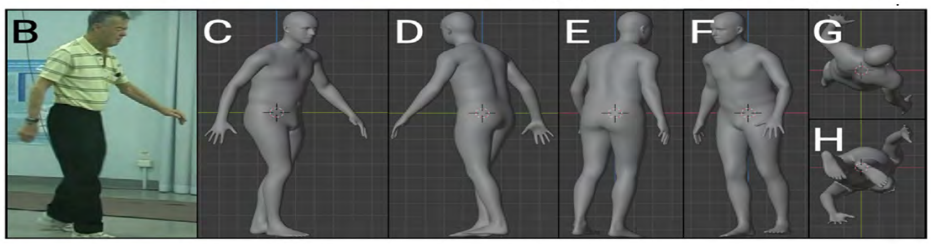
Abstract

The central focus of the lab is in understanding how cortical activity flow impacts normal brain function and diseases of the nervous system. To address these questions, we develop tools that permit accurate linkage of brain activity to body movement in 3D. In many cases training these tools requires large quantities of data that can be difficult to obtain. Accordingly, we have developed the use of synthetic video and brain activity data as a means of predicting and visualizing such events and serving as high-quality training data that can be adapted to varied experimental settings. In the case of human movement data this approach provides a robust means of subject de-identification ensuring privacy in video data without compromising data integrity. By enabling the precise characterization of complex behavioral phenotypes, this approach facilitates linking brain activity to behavior, offering new insights into neurodegenerative diseases such as stroke, Huntington's and Parkinson's.





Imaging hardware development



Human 3D movement analysis and anonymization

Publications

1. Luis A. Bolanos, Dongsheng Xiao, Nancy L. Ford, Jeff M. LeDue, Pankaj K. Gupta, Carlos Doebeli, Hao Hu, Helge Rhodin, Timothy H. Murphy. *A 3D virtual mouse generates synthetic training data for behavioral analysis.* Nat Methods. 2021 April; 18(4): 378-381.doi:10.1038/s41592-021-01103-9.

2. Hao Hu, Dongsheng Xiao, Helge Rhodin, Timothy H. Murphy. *Towards a Visualizable, De-identified Synthetic Biomarker of Human Movement Disorders.* Journal of Parkinson's Disease 12 (2022) 2085-2096, DOI 10.3233/JPD-223351 IOS Press.

3. Dongsheng Xiao, Brandon J. Forys, Matthieu P. Vanni, Timothy H. Murphy. *MesoNet allows automated scaling and segmentation of mouse mesoscale cortical maps using machine learning.* Nature Communications (2021)12:5992. Doi.org/10.1038/s41467-021-26255-2.