Overview: The Pipeline, TRDs, and DBPs
Center Organization

Overview

CIBC Research and Software Pipeline

IBM
SIM
EST
VIS

Driving Biological Projects

Small-Animal Phenotyping
Atrial Fibrillation
Analysis of Hip Dysplasia
Stimulation for Bone Growth
Cardiac Defibrillation
Deep Brain Stimulation
Pediatric Epilepsy
EEG Source Imaging

Biomedical Researchers and Clinicians
Center Software Infrastructure

Overview

**SCIRun (Prototype testing)**

**Seg3D (segmentation)**

**BioMesh3D (Meshing)**

**ImageVis3D (Visualization)**

**map3D (Visualization)**

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**Flexible, Extensible Environment**

Open Source Software (MIT Public License)

Problem Solving Environment (BioPSE)

PowerApps (Seg3D, ImageVis3D, BioMesh3D, Shapeworks)

Linux, Mac OSX, Windows

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**SCIRun Infrastructure**

Core Layer

Algorithm Layer

Control Layer

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**Command line tools**

**Matlab/Python**
Highlighted DBP: Don Tucker
“Faradization”

Duchenne de Boulogne (1806-1875)
Transcranial Stimulation: Beginnings

Sylvanus P. Thompson, 1910
Transcranial Stimulation: Modern Era

Anthony Barker, 1985
Stimulation Approaches

a. TMS

- Time-varying current in coil
- Time-varying magnetic field
- Induced current in conductor

b. tDCS

- DC current applied via pair of electrodes; current induced in conductor
Parameter Selection

Simulation to optimize the system
tDCS Current Status

Optimized multi-electrode stimulation increases focality and intensity at target

Jacek P Dmochowski, Abhishek Datta, Marom Bikson, Yuzhuo Su¹ and Lucas C Parra

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“I attach a recent paper on multichannel stimulation modeling by Lucas Parra's group. We should consider that group to be our competitors. Let's coordinate our resources to prove we can do better.” ... Don Tucker