Modelling the brain, together

Open Source Brain is a resource for sharing and collaboratively developing computational models of neural systems.

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Join us at the OSB 2014 Workshop: Building and sharing models of the cortex in Sardinia in May!
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About OSB
Find out what motivates us to develop OpenSourceBrain.org.

Frequently Asked Questions
These FAQs are designed to provide a better understanding of the Open Source Brain initiative.

Meetings
We regularly hold open meetings to further the development of OSB.

Latest meetings
- **OSB2014**: the main OSB meeting in Sardinia in May 2014, focusing on cortical modelling

Past meetings
- **Hackathon2013**: the inaugural OSB Hackathon in London in November 2013
- **OSB2013**: the OSB kickoff meeting in Sardinia in May 2013, focusing on cerebellar modelling

Guides
Guides are short introductions to various aspects of the functionality of Open Source Brain and related tools.

Getting started
A quick guide to getting started with the Open Source Brain Repository.

Getting started with Git & Git-Hub
This provides a brief overview for new users of Git and Git-Hub.

Give feedback, report a bug, request a feature
Information on how to get in contact to provide feedback, to report an issue/bug or to request new features for the site.

Interactions with other Neuroinformatics resources
Information on how the Open Source Brain repository interacts with other resources in the neuroinformatics and wider computational biology fields.
A model of *C. elegans* locomotion described in Boyle, Berri and Cohen, Gait modulation in *C. elegans*: an integrated neuromechanical model, Front. Comput. Neurosci., 2012...
Synaptic integration in L5 Pyramidal cell - Larkum et al. 2009

Conversion to neuroConstruct/NeuroML of Layer 5 Pyramidal cell model from:
Repository for an OSB project to show the interaction between neural mass models implemented in The Virtual Brain and how they can make use of model-based description languages like NeuroML...
Blue Brain Project

Principal investigator: Henry Markram

EPFL, Lausanne

- Elif Muller
- Werner Van Geit
- Giuseppe Chindemi
Padraig Gleeson

Email: p.gleeson@ucl.ac.uk

Member since 21 Mar 2011

Projects

- Balanced network with inhibitory plasticity - Vogels et al. 2011
  (Developer, 24 Jun 2013)
- Basal ganglia modelling
  (Developer, 21 May 2012)
- Blender to NeuroML for C. elegans connectome
  (Developer, 07 Jan 2014)
- Bluehive Showcase
  (Developer, Scientific Coordinator, 26 May 2013)
- Brian Showcase
  (Developer, 12 Apr 2013)
- CA1 Local Network - Bezaire and Soltesz 2013
  (Developer, 03 Oct 2013)
- CA1 Pyramidal Cell - Migliore et al. 2005
  (Developer, 09 Jun 2011)
- CA1 Pyramidal Sublayer Microcircuit - Lee et al. 2014
  (Developer, 21 Mar 2014)
- CATMAID Showcase
  (Developer, Scientific Coordinator, 04 Jun 2013)
Padraig Gleeson

Email: p.gleeson@ucl.ac.uk
http://www.neuroconstruct.org/
INCF Profile
GitHub user
Bitbucket user
ORCID ID: 0000-0001-5963-8576
Registered on: 21 Mar 2011

User projects

- **Balanced network with inhibitory plasticity - Vogels et al. 2011**
  Developer, 24 Jun 2013

- **Basal ganglia modelling**
  Developer, 21 May 2012

- **Blender to NeuroML for C elegans connectome**
  Developer, 07 Jan 2014

- **Bluehive Showcase**
  Developer, Scientific Coordinator, 26 May 2013

- **Brian Showcase**
  Developer, 12 Apr 2013

- **CA1 Local Network - Bezaire and Soltesz 2013**
  Developer, 03 Oct 2013

- **CA1 Pyramidal Cell - Migliore et al. 2005**
  Developer, 06 Jun 2011

- **CA1 Pyramidal Sublayer Microcircuit - Lee et al 2014**
  Developer, 21 Mar 2014

- **CATMAID Showcase**
  Developer, Scientific Coordinator, 04 Jun 2013

- **C.elegans Neuromechanical Gait Modulation - Boyle Berri Cohen 2012**
  Developer, 16 Oct 2012

- **Cerebellar Golgi Cell - Solinas et al. 2007**
  Developer, 06 Jun 2011
Announcements related to the Open Source Brain Initiative.

This is a low volume mailing list for the main announcements about the Open Source Brain repository.

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<td>Agenda for NeuroML Editorial Board meeting 13/5/2014</td>
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<td>7 may</td>
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<tr>
<td>Registration deadline for Open Source Brain workshop fast approaching</td>
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<tr>
<td>NeuroML v2beta2 release</td>
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<td>Open Source Cross Simulator Cortical Neuron Models</td>
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<td>Open Source Brain workshop 2014: Building and sharing models of the cortex</td>
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<td>17 feb</td>
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<td>Granulo cell modelling</td>
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<td>28/06/13</td>
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Search

ax1 pyramidal cell

All words 

Search titles only

Issues 

News 

Documents 

Changesets 

Wiki pages 

Messages 

Projects

Search

• Wiki pages (5)
• Projects (3)
• Changesets (2)
• News (1)

Results (11)

The Open Source Brain repository Wiki: Symposium2014

Symposium =========== Oscillation and reson ... rs intrinsically present in synapses, single cells and network structures. This symposium aims ... cirsic fields from power lines on hippocampal CA1 pyramidal neurons. | | | "Coffee break" | 11:00 | | ... chments/download/187/colore_positivo_RGB.png)

Project description:
For a quick guide to using the Open Source Brain repository, see: Getting started.

For info on the background to the project see About.

NeuroML v2.x support NeuroML v1.x support PyNN support NEURON support GENESIS 2 support MOOSE support PSICS support NEST support

Last updated: 28 Mar 2014 11:59

CA1 Pyramidal Sublayer Microcircuit - Lee et al 2014 Project: CA1 Pyramidal Sublayer Microcircuit - Lee et al 2014

This model examines the interactions between the pyramidal cells of the superficial and deep layers of CA1. It is featured in: Lee et al., (under review). Napdog strength and number between PV+ basket cells and either superficial and deep pyramidal cells could have significant effects at the network level.

Project description:
This model examines the interactions between the pyramidal cells of the superficial and deep layers of CA1. It is featured in: Lee et al., (under review). Specifically, this model shows how the experimentally observed differences in synapse strength and number between PV+ basket cells and either superficial and deep pyramidal cells could have significant effects at the network level.

User project

NeuroML v2.x support NeuroML v1.x support NEURON support GENESIS 2 support MOOSE support

Last updated: 21 Mar 2014 09:02
Description

Conversion of hippocampal CA1 pyramidal cell from Migliore et al 2005:

More...
Status

This model has been fully converted to *NeuroML version 1.8.1*. This process was described in "Gleeson et al. 2010":http://www.ploscompbiol.org/article/info%3Adoi%2F10.1371%2Fjournal.pcbi.1000815.

This model can currently be executed in *NEURON*, *GENESIS*, *MOOSE* and *PSICS*.

Members

Developer: Padraig Gleeson
Scientific Advisor: Angus Silver

References

The original published version of this model is available on ModelDB.

This model was originally developed in: NEURON

The code for this model is hosted on GitHub: https://github.com/OpenSourceBrain/CA1PyramidalCell
CA1 Pyramidal Cell - Migliore et al. 2005

Cerebellar Nucleus Neuron - Steuber et al. 2011

L5 Pyramidal Cell - Mainen et al. 1995
Self Sustained Network Activity - Destexhe 2009
Network simulations of self-sustained activity in networks of adaptive exponential integrate and fire neurons.
From: Self-sustained asynchronous irregular states and Up-Down states in thalamic, cortical and thalamocortical networks of nonlinear integrate-and-fire neurons, Alain Destexhe, J Comp Neuroscience 2009

Izhikevich Spiking Neuron Model
Implementation of model from http://izhikevich.org/publications/whichmod.htm in NeuroML and PyNN.
For more details see the Wiki.

L5 Pyramidal Cell - Mainen et al. 1995
L5 Pyramidal Cell - Mainen et al. 1995

OSB endorsed project | Curation against published models: Medium ★★
---|---
NeuroML v2.x support | NeuroML v1.x support ★★ | NEURON support ★★★ | GENESIS 2 support ★ | MOOSE support ★ | PSICS support ★

Last updated: 30 Apr 2014 14:56

L5 Pyramidal cell - Rothman et al. 2009
A project which was used in Rothman et al. “Synaptic depression enables neuronal gain control” Nature 2009 to demonstrate gain control in realistic cell models. Based on cell model from Kole et al. 2008 (obtained from http://senselab.med.yale.edu/modeldb/ShowModel.asp?model=114394).

OSB endorsed project | Curation against published models: Medium ★★
---|---
NeuroML v2.x support | NeuroML v1.x support ★★ | NEURON support ★★★ | GENESIS 2 support ★ | MOOSE support ★

Last updated: 30 Apr 2014 14:56

Thalamocortical network - Traub et al. 2005
This is a project implementing cells from the thalamocortical network model of Traub et al 2005 in NeuroML. Based on the NEURON implementation from: http://senselab.med.yale.edu/ModelDB/ShowModel.asp?model=45539.

The Wiki gives details of running this project with neuroConstruct.

OSB endorsed project | Curation against published models: Medium ★★
---|---
NeuroML v2.x support | NeuroML v1.x support ★★ | NEURON support ★★★ | GENESIS 2 support ★★★ | MOOSE support ★★★

Last updated: 30 Apr 2014 14:56

Minimal HH models - Pospischil et al. 2008
Conversion to NeuroML of cell models from: Minimal Hodgkin-Huxley type models for different classes of cortical and thalamic neurons, Martin Pospischil, Maria Toledo-Rodriguez, Cyril Monier, Zuzanna Piwowarska, Thierry Bal, Yves Frégnac, Henry Markram and Alain Destexhe, Biological Cybernetics, 2008

OSB endorsed project | Curation against published models: Low ★
---|---
NeuroML v2.x support | NeuroML v1.x support ★★ | PyNN support | NEURON support ★★★ | GENESIS 2 support | MOOSE support | PSICS support | NEST support

Last updated: 30 Apr 2014 14:56
### Latest revisions

<table>
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<td>Padraig Gleeson</td>
<td>Updating NeuroML 2 files to ensure validity. Note no channel densities on cells yet!</td>
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<td>2c67b8ee</td>
<td>22 Nov 2013 12:50</td>
<td>Padraig Gleeson</td>
<td>Ignoring object files</td>
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</table>
Introduction to using the Traub et al 2005 model

First, and most importantly, please remember that this is a work in progress! If you would like to help make this model more useful for the community, please get in contact via the *OSB Discuss mailing list*(https://groups.google.com/forum/#!forum/oss-discuss).

The original Traub et al model was developed in FORTRAN, this was converted to NEURON by Tom Morse and Michael Hines, and this has now been converted to NeuroML & neuroConstruct.

*Please make sure to read about the Known issues with this model.*

Important details of the process of conversion of the cell models to NeuroML, and matching cell behaviour across simulators is present in the 2010 NeuroML paper.

Install neuroConstruct & get latest project

See the instructions here regarding obtaining the latest version of neuroConstruct.

Install NEURON, GENESIS and/or MOOSE (see Neuronal simulators for OSB models).

To get a local copy of the Thalamocortical project, Install Git and type:

git clone https://github.com/OpenSourceBrain/Thalamocortical.git

View a cell in 3D
Name *: Thalamocortical network - Traub et al. 2005

Identifier: thalamocortical

Description:
This is a project implementing cells from the thalamocortical network model of Traub et al 2005 in NeuroML. Based on the NEURON implementation from: http://senselab.med.yale.edu/ModelDB/ShowModel.asp?model=45539.
The wiki gives details of running this project with neuroConstruct.

Original format: FORTRAN

NeuroML version: v1.x

ModelDB reference: 45539

Category *: Project

GitHub repository: https://github.com/OpenSource

NeuroML v1.x support: 3

NEURON support: 3

GENESIS 2 support: 3

MOOSE support: 3
Thalamocortical network Traub et al. 2005

Networks: neuroConstruct/generatedNeuroML2/Thalamocortical.net.nlml
Cells: neuroConstruct/generatedNeuroML2/Thalamocortical_large.net.nlml
## GHK & Nernst examples

**OSB endorsed project**

**Curated against published models: Medium ★★★**

### Ion Channel ca_chan_nml2

<table>
<thead>
<tr>
<th>Parameter</th>
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<td>Forward rate</td>
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</tr>
<tr>
<td>Reverse rate</td>
<td>$4000 \times \exp(V - (-0.06))/0.02$</td>
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<tr>
<td>Reverse rate plot</td>
<td></td>
</tr>
<tr>
<td>Forward rate plot</td>
<td></td>
</tr>
</tbody>
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**Close Controls**
- forward rate

\[ \text{forward rate} = \frac{1000 \times (v - (-0.04))}{0.01} \times \left( 1 - \exp\left(-\frac{v - (-0.04)}{0.01}\right) \right) \]

- reverse rate

\[ \text{reverse rate} = 4000 \times \exp\left(-\frac{v - (-0.06)}{0.02}\right) \]

- reverse rate plot

- forward rate plot
254 Members  42 Research groups  79 Projects

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SHEVAB LAB
SLEDGIAN PROJECT
SILVER LAB
SOLTESZ LAB
STUEBER LAB
TEXTENSOR LIMITED
THE VIRTUAL BRAIN
URBAN LAB
VERMAAKE LAB
WÖJCIEK GROUP
YAMAZAKI LAB
BHALLA LAB

More questions? See our Open Source Brain FAQs.

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- Send us a mail on info@opensourcebrain.org to contact the OSB team directly.

Join our mailing lists

- Sign up to the OSB Announce mailing list to be kept up to date with major announcements from the OSB Initiative
- Join the OSB Discuss mailing list for more detailed discussions on the various projects on OSB

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