

Modelling the brain, together

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

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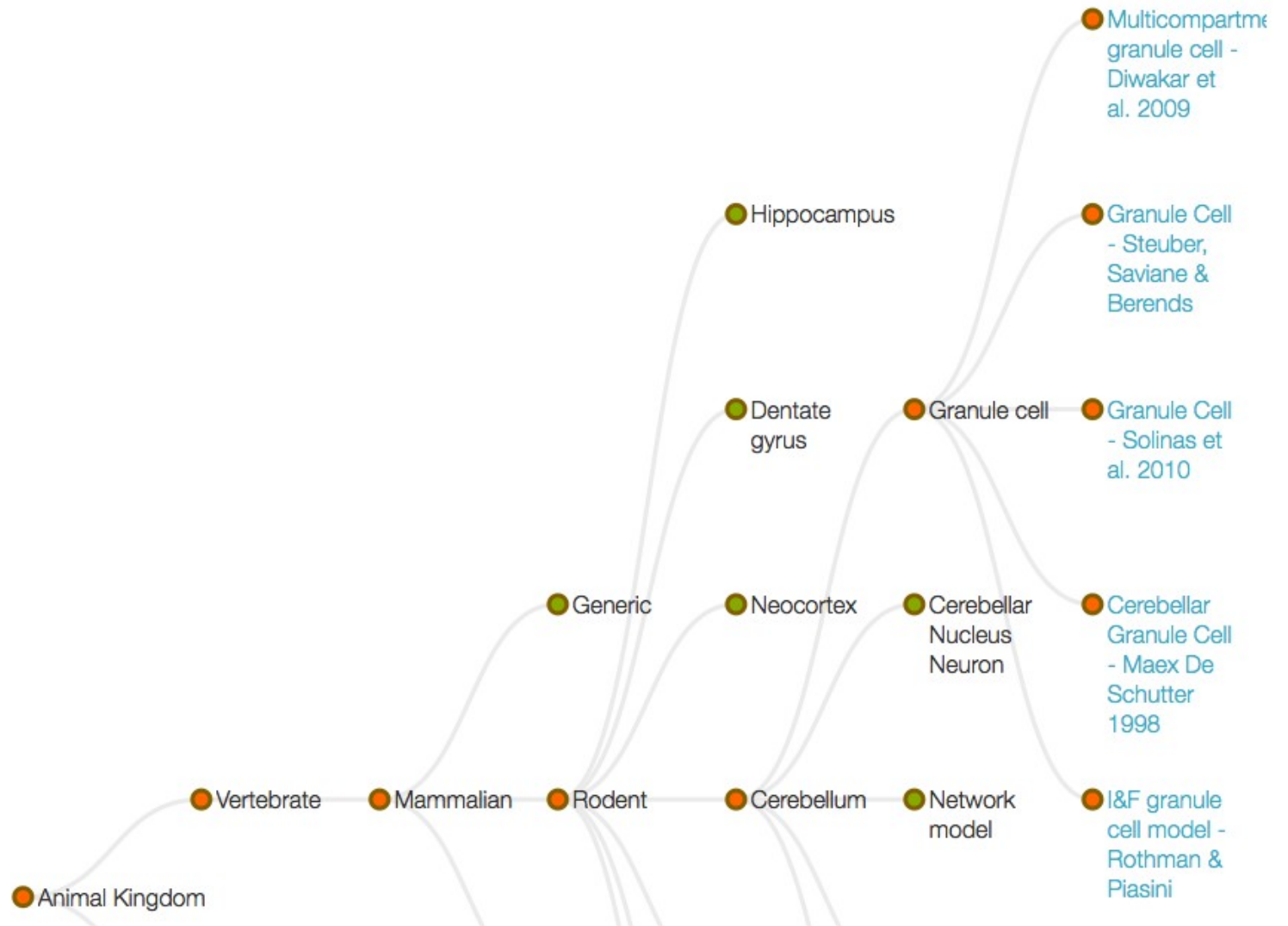
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About OSB

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 & GitHub](#)

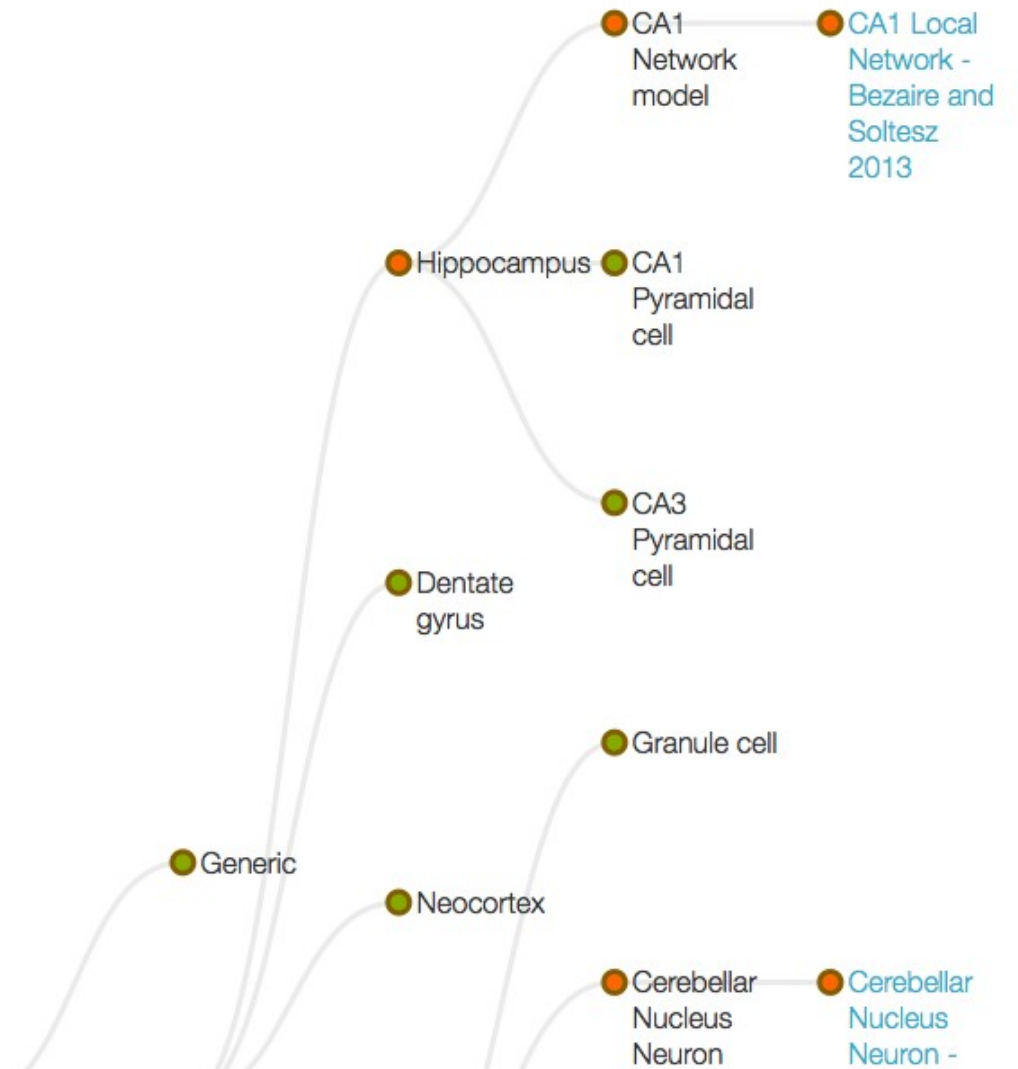
This provides a brief overview for new users of Git and GitHub.

[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.



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neuro

Blender To NeuroML For C
Elegans Connectome

L5 Pyramidal Neuron -
Almog And Korngreen 2014

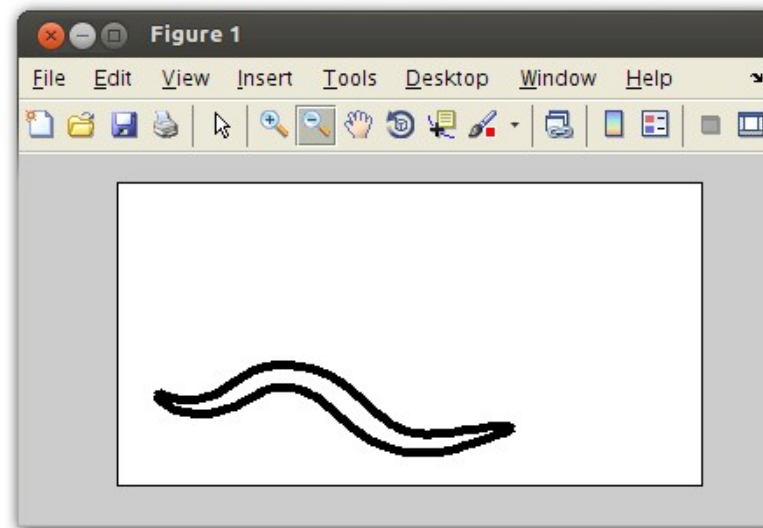
Multiscale Medium Spiny
Neuron - Mattioni And Le
Novere 2013

Celegans Neuromechanical
Gait Modulation - Boyle
Berri Cohen 2012

Drosophila Projection
Neuron - Gouwens And
Wilson, 2009

Cerebellar Nucleus Neuron -
Steuber Et Al. 2011

 Open project



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....

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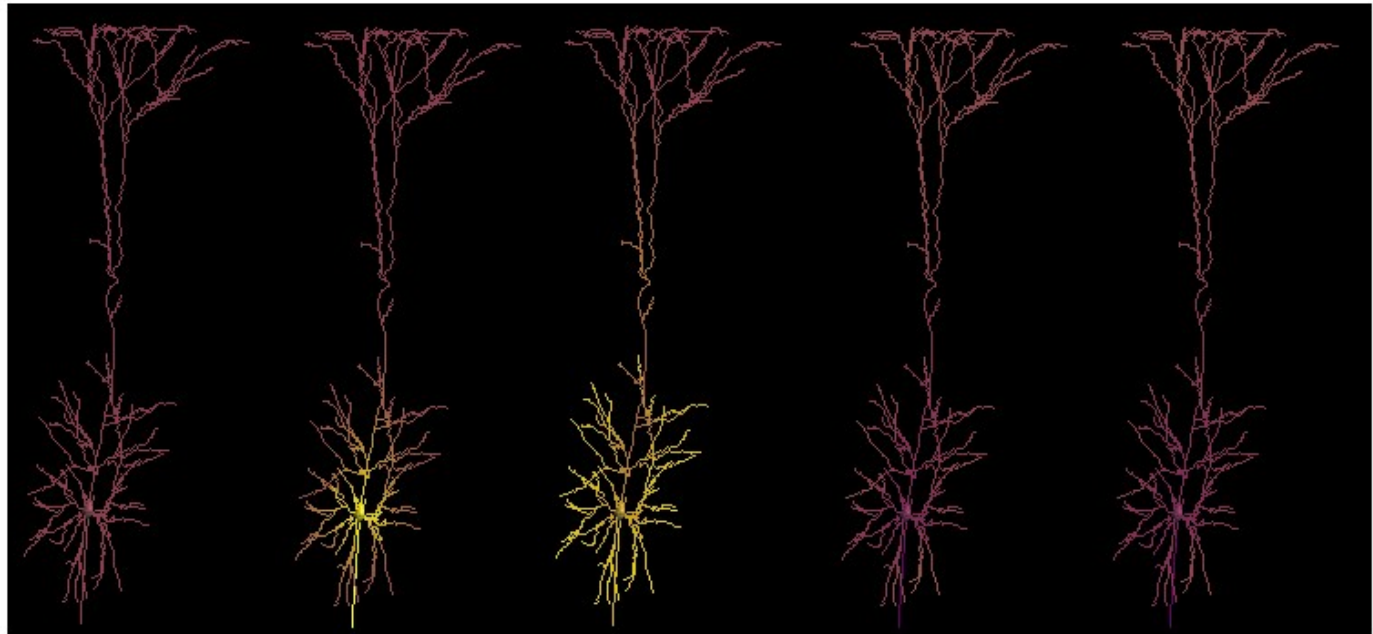
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Synaptic integration in L5 Pyramidal cell - Larkum et al. 2009

Conversion to neuroConstruct/NeuroML of Layer 5 Pyramidal cell model from:

Larkum ME, Nevian T, Sandler M, Polsky A, Schiller J (2009) Synaptic integration in tuft dendrites of layer 5 pyramidal neurons: a new unifying principle. Science 325:756-60

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THEVIRTUALBRAIN.

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...

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Principal investigator: Henry Markram

EPFL, Lausanne

-  Eilif Muller
-  Werner Van Geit
-  Giuseppe Chindemi

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Douglas Armstrong

Yoshiyuki Asai

Benjamin Auffarth

Hrvoje Augustin

Cristian Avonio

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](#)

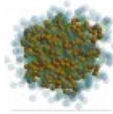
(Developer, 09 Jun 2011)

[CA1 Pyramidal Sublayer Microcircuit - Lee et al 2014](#)

(Developer, 21 Mar 2014)

[CATMAID Showcase](#)

(Developer, Scientific Coordinator, 04 Jun 2013)



Padraig Gleeson

[Edit](#)

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

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Developer, 24 Jun 2013

 [Basal ganglia modelling](#)

Developer, 21 May 2012

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 [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

 [C elegans Neuromechanical Gait Modulation - Boyle Berri Cohen 2012](#)

Developer, 16 Oct 2012

 [Cerebellar Golgi Cell - Solinas et al. 2007](#)

Developer, 09 Jun 2011

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OPEN SOURCE BRAIN

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.

[Editar mensaje de bienvenida](#) [Borrar mensaje de bienvenida](#)

<input type="checkbox"/>		Updated to OSB website (1) De yo - 1 publicación - 5 vistas	10 abr
<input type="checkbox"/>		Updated OSB website (1) De yo - 1 publicación - 0 vistas	12 may
<input type="checkbox"/>		Agenda for NeuroML Editorial Board meeting 13/5/2014 De Padraig Gleeson - 1 publicación - 13 vistas	7 may
<input type="checkbox"/>		Registration deadline for Open Source Brain workshop fast approaching De Padraig Gleeson - 1 publicación - 5 vistas	9 abr
<input type="checkbox"/>		NeuroML v2beta2 release De Padraig Gleeson - 1 publicación - 6 vistas	11 mar
<input type="checkbox"/>		Open Source Cross Simulator Cortical Neuron Models De Himanshu Gangal - 1 publicación - 3 vistas	5 mar
<input type="checkbox"/>		Open Source Brain workshop 2014: Building and sharing models of the cortex De Padraig Gleeson - 1 publicación - 3 vistas	17 feb
<input type="checkbox"/>		Granule cell modelling De Padraig Gleeson - 1 publicación - 4 vistas	28/06/13

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The Open Source Brain repository [Wiki: Symposium2014](#)

Symposium ===== Oscillation and reson ... ms intrinsically present in synapses, single cells and network structures. This symposium aims ... ctric 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 ?](#)[Brian 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) ... napse 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

CA1 Pyramidal Cell Migliore et al. 2005

OSB endorsed project

Curation against published models: Medium ★★

[Vertebrate](#) / [Mammalian](#) / [Rodent](#) / [Hippocampus](#) / [CA1 Pyramidal cell](#) / CA1 Pyramidal Cell - Migliore et al. 2005

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Description



Conversion of [hippocampal CA1 pyramidal cell](#) from Migliore et al 2005:
<http://senselab.med.yale.edu/ModelDB/ShowModel.asp?model=55035>.

[More...](#)

Description	>
Status	>
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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*.

NeuroML v2.x support ★

NeuroML v1.x support ★★★

NEURON support ★★★

GENESIS 2 support ★★★

MOOSE support ★★★

PSICS support ★★★

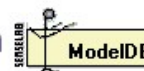
Members

Developer: [Padraig Gleeson](#)

Scientific Advisor: [Angus Silver](#)

References

The original published version of this model is available on



This model was originally developed in: **NEURON**

The code for this model is hosted on GitHub: <https://github.com/OpenSourceBrain/CA1PyramidalCell>

Search by custom field

<input checked="" type="checkbox"/> NeuroML v2.x support	is	1	
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Submit

CA1 Pyramidal Cell - Migliore et al. 2005

Conversion of [hippocampal CA1 pyramidal cell](http://senselab.med.yale.edu/ModelDB/ShowModel.asp?model=55035) from Migliore et al 2005: <http://senselab.med.yale.edu/ModelDB/ShowModel.asp?model=55035>.

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

Cerebellar Nucleus Neuron - Steuber et al. 2011

[Deep cerebellar nucleus neuron](#) model from: Determinants of synaptic integration and heterogeneity in rebound firing explored with data-driven models of deep cerebellar nucleus cells. Steuber V, Schultheiss NW, Silver RA, De Schutter E, Jaeger D. J Comput Neurosci. 2011 Jun;30(3):633-58

OSB endorsed project

Curation against published models: Low ★

NeuroML v2.x support ★

NEURON support ★

GENESIS 2 support ★

MOOSE support ★

Last updated: 30 Apr 2014 14:56

L5 Pyramidal Cell - Mainen et al. 1995

Implementation of the Mainen et al. pyramidal cell model from: Mainen ZF, Joerges J, Huguenard JR, Sejnowski TJ (1995) A model of spike initiation in neocortical pyramidal neurons. Neuron 15:1427-39. This project is based on scripts obtained from: <http://senselab.med.yale.edu/senselab/modeldb/ShowModel.asp?model=8210>

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

Search by custom field

<input checked="" type="checkbox"/> Brain region	is	Neocortex	
<input type="button" value="Submit"/>			

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](#)

OSB endorsed project

Curation against published models: Medium ★★

NeuroML v2.x support ★

PyNN support ★★★

NEURON support ★★

NEST support ★★

Brian support ★

Last updated: 30 Apr 2014 14:56

Izhikevich Spiking Neuron Model

Implementation of model from <http://izhikevich.org/publications/whichmod.htm> in NeuroML and PyNN.

For more details see the [Wiki](#).

OSB endorsed project

Curation against published models: Good ★★★

NeuroML v2.x support ★★

PyNN support ★

NEURON support ★★

MOOSE support ?

NEST support ?

Brian support ?

Last updated: 30 Apr 2014 14:56

L5 Pyramidal Cell - Mainen et al. 1995

Implementation of the Mainen et al. pyramidal cell model from: Mainen ZF, Joerges J, Huguenard JR, Sejnowski TJ (1995) A model of spike initiation in neocortical pyramidal neurons. Neuron 15:1427-39. This project is based on scripts obtained from: <http://senselab.med.yale.edu/senselab/modeldb/ShowModel.asp?model=8210>

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 - Mainen et al. 1995

Implementation of the Mainen et al. pyramidal cell model from: Mainen ZF, Joerges J, Huguenard JR, Sejnowski TJ (1995) A model of spike initiation in neocortical pyramidal neurons. Neuron 15:1427-39. This project is based on scripts obtained from: <http://senselab.med.yale.edu/senselab/modeldb/ShowModel.asp?model=8210>

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 Piwkowska, 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 ⓘ

Brian support ⓘ

Last updated: 30 Apr 2014 14:56

Thalamocortical network Traub et al. 2005

OSB endorsed project

Curation against published models: Medium ★★

[Vertebrate](#) / [Mammalian](#) / [Rodent](#) / [Neocortex](#) / [Network model](#) / Thalamocortical network - Traub et al. 2005

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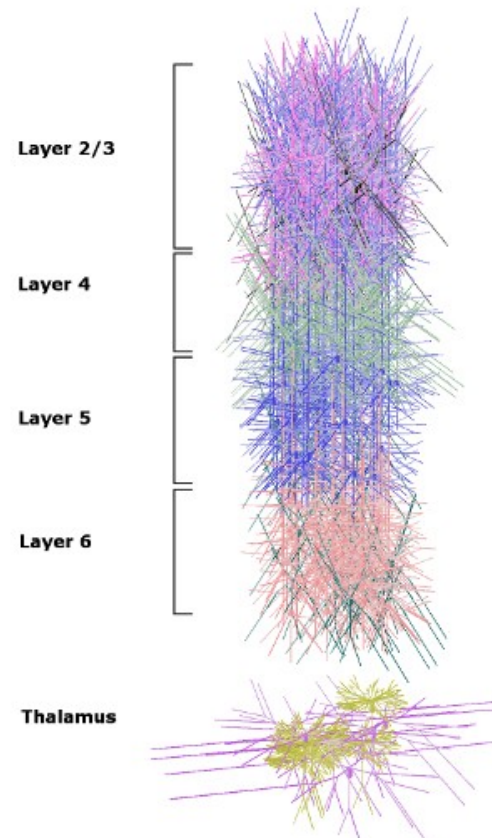
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Status >

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Description



Note The source for this project is hosted on [GitHub](#) 

root @ master

 Branch ▾

 Graphs

 News feed

Name	Size	Revision	Age	Author	Comment
+  Fortran_g77		459db01b	11 months	Helena Głąbska	Original Fortran g77 code
+  Fortran_ifc		4a13bbbb	7 months	Helena Głąbska	Fortran version which work
+  MOOSE		4ffa86a2	6 months	Padraig Gleeson	Adding MOOSE version of Traub model from: https...
+  Neuron		9baa0a66	11 months	Helena Głąbska	original neuron version
+  neuroConstruct		640ba4de	2 months	Padraig Gleeson	Updating NeuroML 2 files to ensure validity. No...
 .gitignore	436 Bytes	2c67b8ee	6 months	Padraig Gleeson	Ignoring object files
 README	294 Bytes	eb43815c	almost 2 years	Padraig Gleeson	Update README.

Latest revisions

#		Date	Author	Comment
 640ba4de 		05 Mar 2014 15:03	Padraig Gleeson	Updating NeuroML 2 files to ensure validity. Note no channel densities on cells yet!
 2c67b8ee 		22 Nov 2013 12:50	Padraig Gleeson	Ignoring object files

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/osb-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

Contributors

padraig@padraig7.ucl.ac.uk (wiki & code contributor)
[Helena Glabska](#) (code contributor)
Helena Głabska (code contributor)
[Yates Buckley](#) (code contributor)
[Eugenio Piasini](#) (code contributor)

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/OpenSourceE>

NeuroML v1.x support 3



NEURON support 3



GENESIS 2 support 3



MOOSE support 3



Thalamocortical network Traub et al. 2005

OSB endorsed project

Curation against published models: Medium ★★

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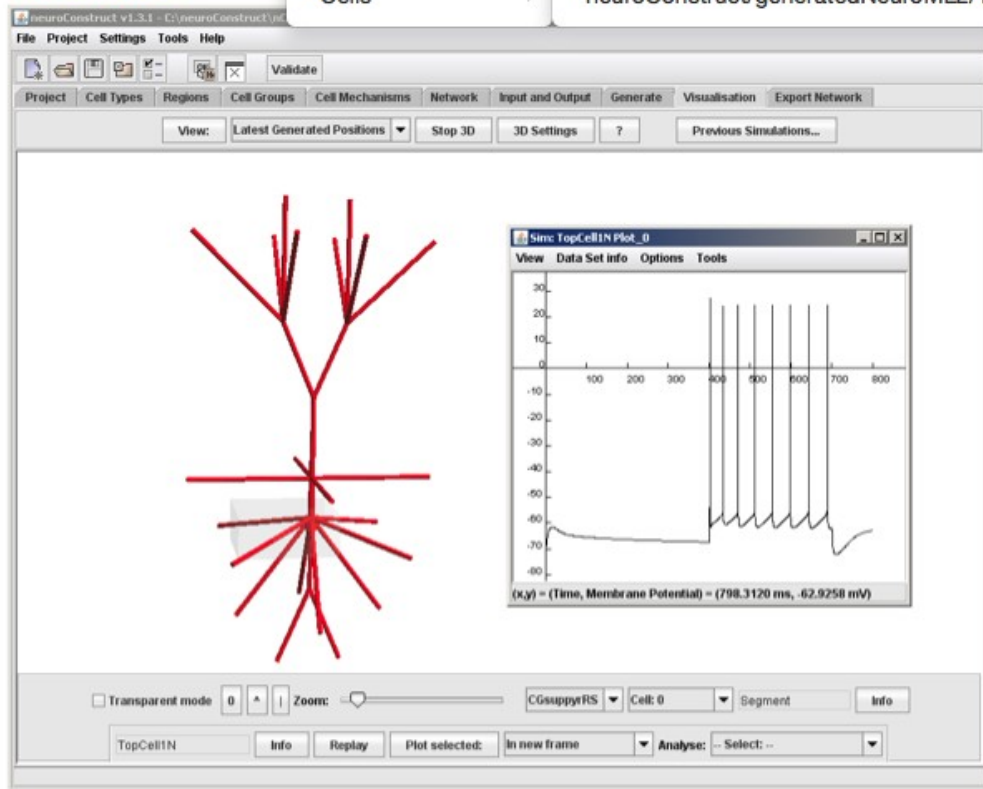
Networks ▸

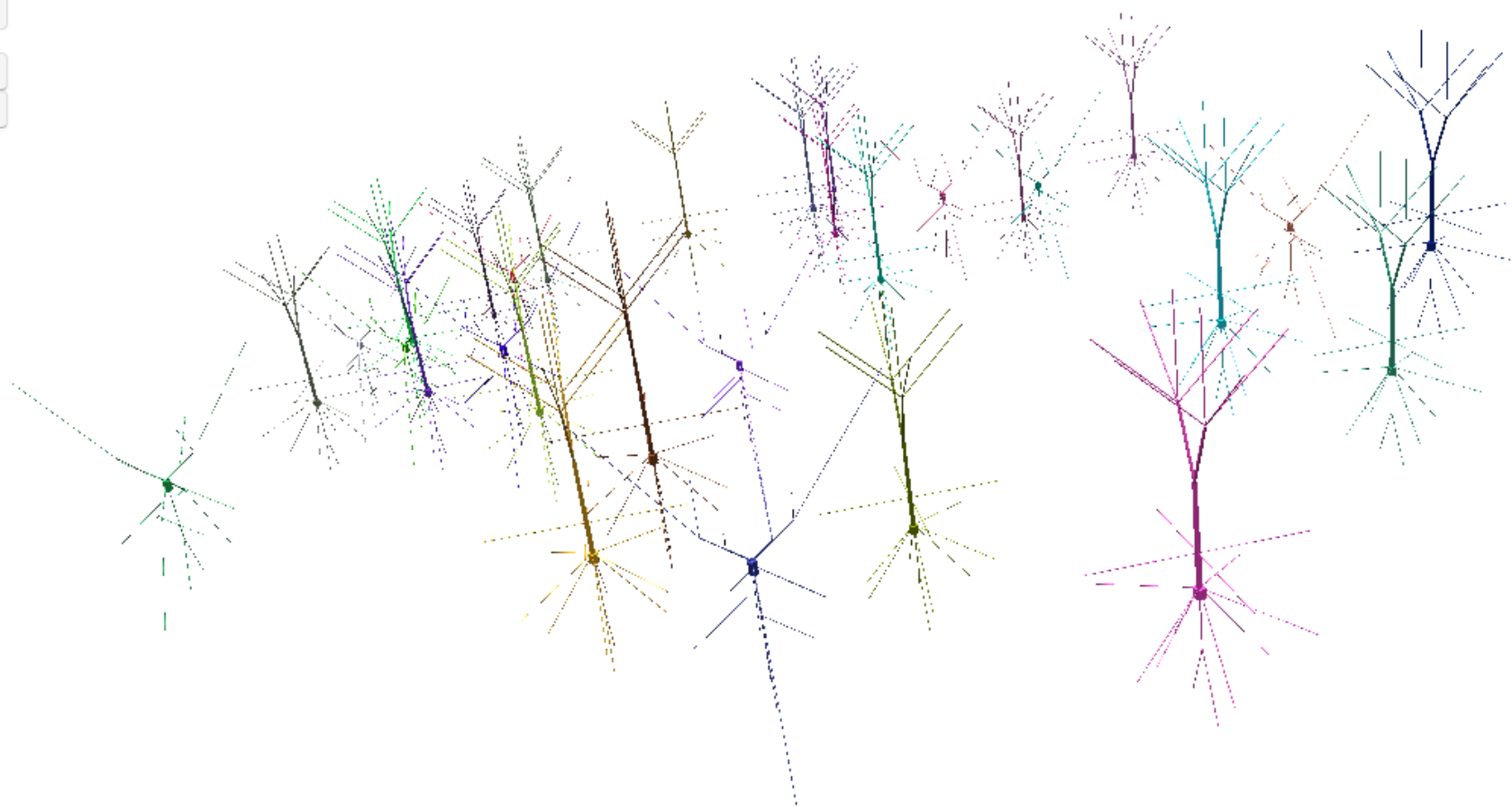
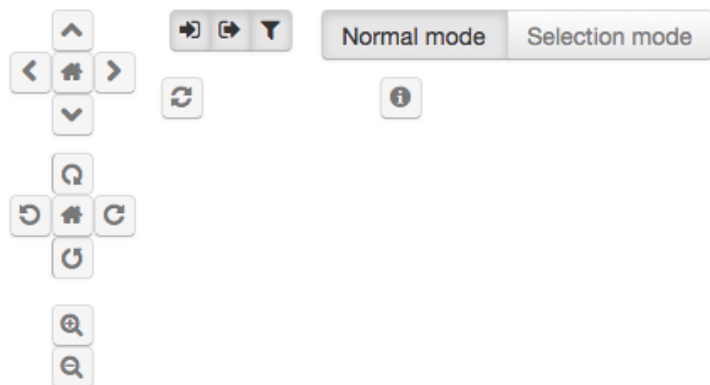
neuroConstruct/generatedNeuroML2/Thalamocortical.net.nml

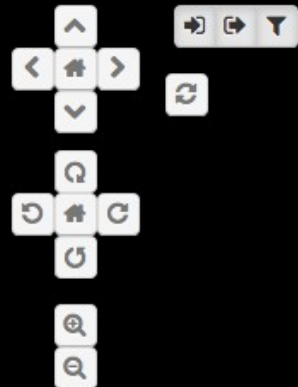
Cells ▸

neuroConstruct/generatedNeuroML2/Thalamocortical_large.net.nml

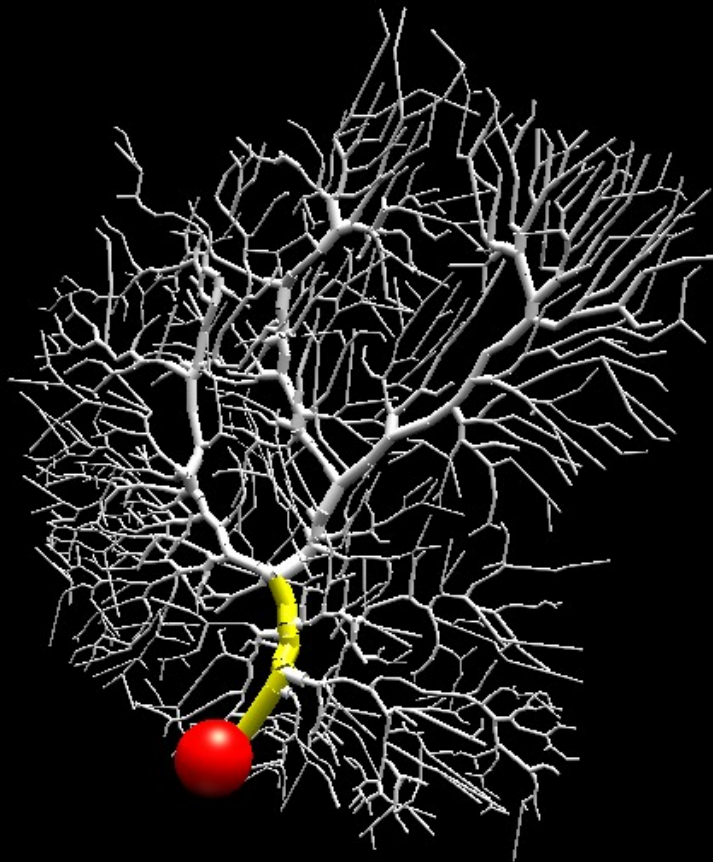
Thalamocortical







Normal mode Selection mode



ID	purk2
Intracellular properties	
Resistivity	0.25 k Ω cm
Membrane properties	
Ion channels	
KA	
Remove density highlight 15 2 mS cm ⁻²	
KA_ModelViewParmSubset_85	
Highlight	
Location	ModelViewParmSubset_85
Conductance density	2.0 mS cm ⁻²
Reversal potential	-85.0 mV
KA_OneSecGrp_SectionRef_1	
Highlight	
Location	OneSecGrp_SectionRef_1
Conductance density	15.0 mS cm ⁻²
K2	
CaT	
NaP	
CaP	
Kdr	
KMnew2	
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NaF	
Kh1	

GHK & Nernst examples

OSB endorsed project

Curation against published models: Medium ★★

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ID /OpenSourceBrain/ghk-nernst/master/neuroConstruct/cellMechanisms/ca_chan_nml2/ca_chan_nml2.nml

▾ Ion Channel ca_chan_nml2

ID ca_chan_nml2

▾ Gates

▾ gate p

forward rate $1000 * (v - (-0.04)) / 0.01 / (1 - \exp(-(v - (-0.04)) / 0.01))$

reverse rate $4000 * \exp((v - (-0.06)) / -0.02)$

▸ reverse rate plot

▸ forward rate plot

Close Controls

gate p

forward rate

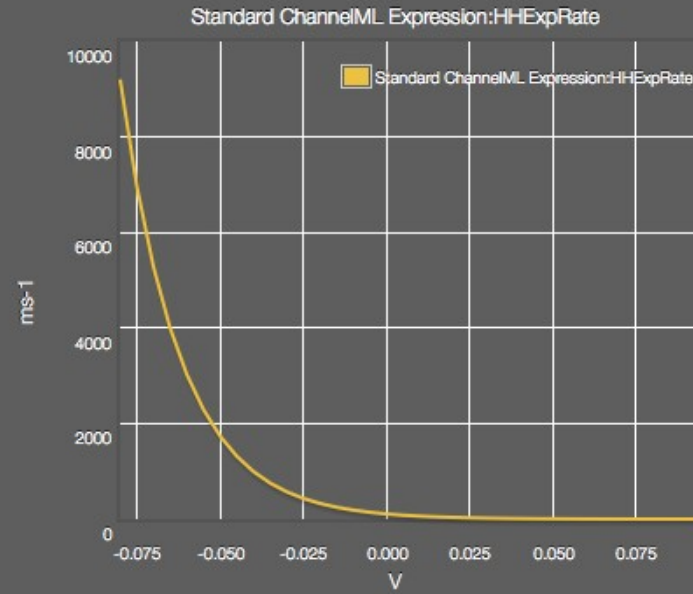
$$1000 * (v - (-0.04)) / 0.01 / (1 - \exp(-(v - (-0.04)) / 0.01))$$

reverse rate

$$4000 * \exp((v - (-0.06)) / -0.02)$$

reverse rate plot

Plot



forward rate plot

Plot

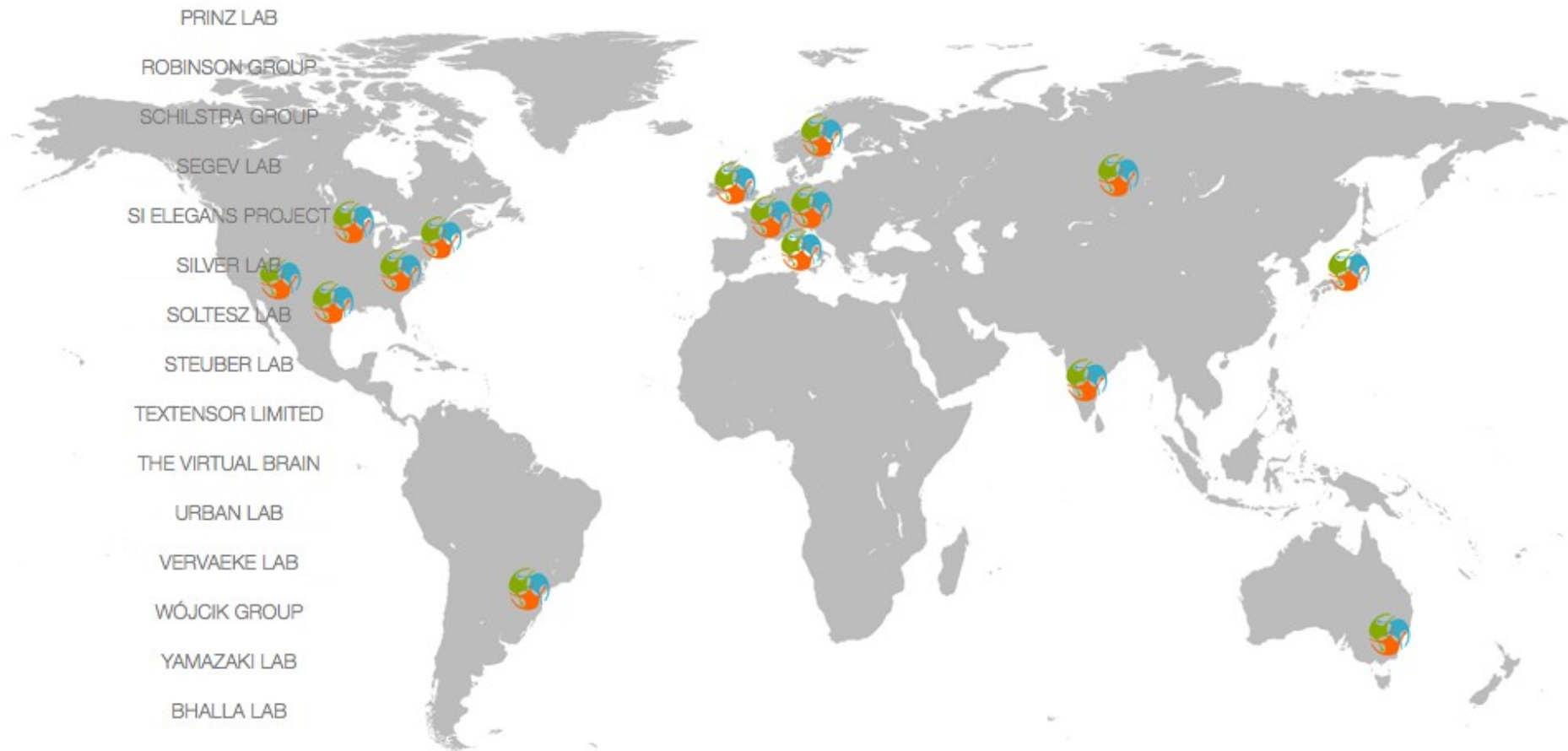


Close Controls

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Milestone: Release 7

7 open issues · Due by June 2, 2014

- Labels
- Low priority 1
- Major enhancement 2
- enhancement 1

Manage labels

New label

New label name

Clear milestone and label filters

7 Open 0 Closed

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<input type="checkbox"/>	Close	Label	Assignee	Milestone	
<input type="checkbox"/>					Hide most of custom fields when creating a new project #100 Opened by adrianq 13 days ago
<input type="checkbox"/>					Export function #96 Opened by adrianq 19 days ago 2 comments
<input type="checkbox"/>					General improvements in OSB Explore page Low priority #86 Opened by adrianq 2 months ago
<input type="checkbox"/>					Improve carousel on OSB Explore page enhancement #85 Opened by adrianq 2 months ago
<input type="checkbox"/>					Enhanced PubMed link for publications Major enhancement #78 Opened by pgleeson 2 months ago
<input type="checkbox"/>					Add "View File Contents" link on error page of 3D Explorer when no morphology found in file #50 Opened by pgleeson a year ago 2 comments
<input type="checkbox"/>					Tags Major enhancement #49 Opened by pgleeson a year ago