CAJAL BLUE BRAIN PROJECT

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Cajal Blue Brain Project

Dissemination and Scientific Communication: Cortical Journal Club (CJC)

One of the most interesting activities carried out in the CBBP context is based on dissemination and scientific communication. The young predoctoral researchers group launched a bimonthly activity called the Cortical Journal Club (CJC) at the end of the past year. The main objective is the presentation and discussion of articles with scientific interest among the different young members of the laboratory. Each CJC encompass debates of hot topics in Neuroscience, either related to their own research and results or interesting issues in science, such as new microscopy techniques or relevant articles in our sphere of study.

Additionally, to encourage dissemination in Neuroscience between researchers and to maintain a constant update of the scientific news, the same CJC group created a Twitter account (https://twitter.com/CorticalLab). The aim is to reflect our activities during congresses and different meetings, as well as the mere publication of relevant scientific developments.

Other dissemination activities:

Type of Activity	Title	Date	Event	Place	Type of Audience	Size of Audience	Country Addressed
Acto clausura Proyecto From Bubble	"Metamorfosis del Yo",	22/01/2016	Acto clausura Proyecto From Bubble	Fundación Reina Sofia (Madrid)	Scientific Community and Civil Society	>50	Spain
TV Interview		16/02/2016	Programa Conciencia de TeleMadrid. Planeta Cerebro	Madrid	Scientific Community and Civil Society	>100	Spain
Conference	Sobre lo Bello, el Arte y el Cerebro	19/02/2016	Fronteras sobre la neurociencia (I)	Facultad de Matemáticas (Univ de Sevilla)	Scientific Community and Civil Society	>50	Spain
Conference	Reconstrucciones digitales de circuitos corticales y su aplicación al estudio de las enfermedades neurologicas	20/02/2016	XIII Curso de Invierno de Epilepsia	Segovia	Scientific Community and Civil Society	>100	Spain
TV Interview	Sobre Alzheimer y HBP	28/03/2016	RTV Castilla La Mancha	León	Scientific Community and Civil Society	>100	Spain
Radio Interview	Cologio abierto sobre cerebro, nuevas tecnologias etc	06/04/2016	RNE	Madid	Scientific Community and Civil Society	>100	Spain
Conference	Nuevas Tecnologías para el estudio del cerebro	12/04/2016	Universidad Europea de Madrid	Madrid	Scientific Community and Civil Society	>50	Spain
Conference	Nuevas tecnologías para el estudio microscópico del cerebro	20/04/2016	Hospital de la Princesa	Madrid	Scientific Community and Civil Society	>50	Spain
Conference	Nuevas tecnologías para el estudio de la enfermedad de Alzheimer	27/04/2016	Facultad Medicina (UAM)	Madrid	Scientific Community and Civil Society	>100	Spain
Conference	Conferencia Clausura de Master en Neurociencia	11/05/2016	I Jornadas en Neurociencia	UAM Madrid	Scientific Community	>50	Spain
Conference	Nuevas estrategias pero el estudio de enfermedades del cerebro	10/06/2016	EM Forum	Biogen (Madrid)	Scientific Community and Civil Society	>100	Spain

2016 Cajal Blue Brain Project

IT Tools in Progress

IT Tools in Progress

1. (https://computationalintelligencegroup.github.io/obj_detection_toolset/). This software is a toolset extension for ImageJ that implements a workflow for automatic segmentation and counting of objects in stacks of confocal microscopy images.
2. **MaxLoGs filter plugin** (https://gherardovarando.github.io/MaxLoGs/). MaxLoGs is a plugin for ImageJ that implements the maximum of Laplacian of Gaussians, and can be used for blob detection in images.
3. **ObjCounter plugin** (http://gherardovarando.github.io/ObjCounter/). ObjCounter is an ImageJ plugin to segment connected objects in stack of images. The plugin detects the objects, and it can create stacks with the labelled objects, stacks with the centroid or center of masses of the detected objects, and export the results to csv format. Moreover, if an overlay (with single dots labelling every object) is present then it is possible to evaluate the segmentation.
4. **Atlas** (provisional name), **v0.1.2** (https://github.com/gherardovarando/Atlas/releases). Atlas is a multi-platform desktop application for visualizing and analyzing spatial data.
5. **3DSynapsesSA v1.2** (http://vps136.cesvima.upm.es:3838/hbp/synapsesSA/). Improved version of this software (created in 2014) for RSA fitting of replicated synapse point process, publicly accessible via a web interface and registered in HBP's Collaboratory software catalog.
6. **InToolExplorer**: This tool potentiates human ability to understand complex data through the exploitation of visualization and interaction techniques, facilitating tasks such as searching for relationships among variables, detecting errors and posing hypothesis. Basic functionality of InToolExplorer includes the generation of data subsets by filtering operations and the visualization of complex sets through techniques such as parallel coordinates, parallel sets, box plots, scatter plots, etc., as selected by the user. The tool is available on-line, allowing users to register, perform analysis operations, save data and make it available to other users, etc. https://cajalbbp.es/intoolexplorer
7. **ViSimpl**, which integrates a set of visualization and interaction tools that allow multi-view visual analysis of brain simulation data, providing at the same time morphological and temporal information. Used jointly with NeuroScheme, the user can perform selection and filtering operations, navigating at different levels of abstraction. Regarding analysis, ViSimpl also provides abstract representations of the time-varying magnitudes supporting different data aggregation and disaggregation operations and giving also focus and context clues. In addition, ViSimpl provide synchronized playback control of the simulation being analyzed. All these views are loosely coupled and can be used independently, but they can also work together as linked views, both in centralized and distributed computing environments, enhancing the data exploration and analysis procedures. The importance of ViSimpl is that it is an excellent testbed for the integration of navigation and selection tools for morphological, spatial, temporal and functional data. The experience gathered with it will facilitate the development of similar solutions for other ranges of problems (in particular, in the morphology and connectivity areas)
8. **SynVis**, which allows the visualization of synapses and connectivity paths involving specific neurons, selected by the user. The tool can show connectivity both statically and dynamically (in this case, including temporal signal evolution)
9. **NeuroScheme**: This is a tool that allows users to navigate through neuroscience data at different levels of abstraction using schematic representations for a fast and precise interpretation of data origin and scope. It also allows filtering, sorting and performing selections at any level of abstraction. Finally, NeuroScheme can be coupled with realistic visualization modules or other analysis applications, such as ViSimpl.
10. **NeuroLOTs** is a set of tools and libraries that allows creating neuronal meshes from minimal skeletal descriptions such as those used customarily in neuroscience. NeuroLOTs recovers soma shapes and generates their meshes using a FEM deformation method, providing plausible reconstructions of somas even though their tracings were not accurately extracted. The created meshes can be interactively refined, allowing the final tessellation to be adapted according to different criteria (user-defined, relevance for a specific purpose, etc.). Last, NeuroLOTs facilitates the visualization of detailed morphologies of large cell populations through the use of non-uniform, adaptive tesellations which accelerate rendering complex environments.

2016 Cajal Blue Brain Project

New Equipment Acquired

Equipment acquired

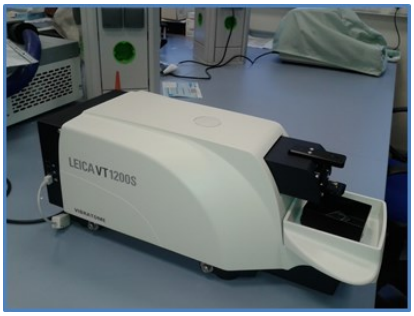
In the course of 2016, new equipment has been acquired such as a data back-up system and other minor equipment to implement the experimental tasks.

CBB Data Backup System

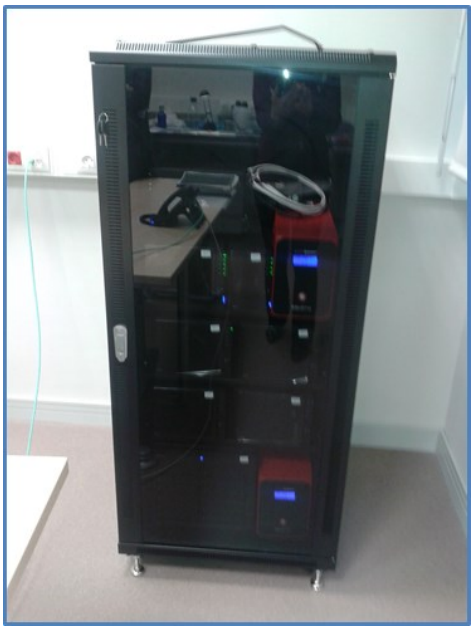
In order to protect data integrity within the CBB project, a data backup system has been acquired. From the physical point of view, the system is composed by a rack containing several NAS (Network Attached Storage), network-connected, with its corresponding UPS (uninterruptible power supply). These devices allow copying the most relevant data from the different researchers, guaranteeing the integrity and availability of the data considered as essential. The NAS systems are connected to the user's computers through the network. A commercial software, Acronis Backup, is in charge of performing either complete backups or differential or incremental copies. These last options allow minimizing network traffic while ensuring still updated backup copies. Regarding data recovery, the system allows restoring the whole copy or specific files. The data Back up System is located at the CCCL

Vibratome LEICA VT 1200S

This vibratome is a microtome that uses a vibrating razor blade to cut through tissue. The vibration amplitude, the speed, and the angle of the blade can all be controlled. Fixed or fresh tissue pieces are embedded in low gelling temperature agarose. The resulting agarose block containing the tissue piece is then glued to a metal block and sectioned while submerged in a water or buffer bath. Individual sections are then collected with a fine brush and transferred to slides or multiwell plates for staining.



Vibratome LEICA VT122S



Data Backup System

The Human Brain Project

The Human Brain Project

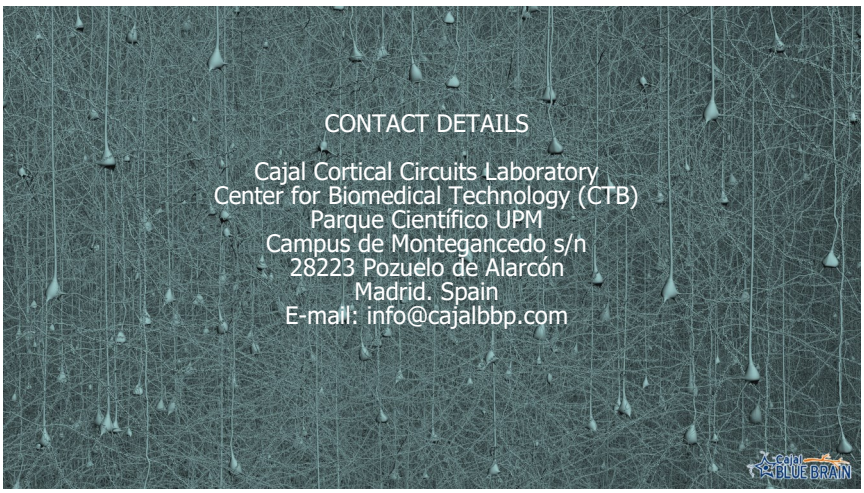
After a preparatory study that run for almost three years, the HBP project was officially launched in October 1st, 2013 and its 1st phase lasted 30 (+6) months. The project second phase, SGA1, started on April 1st 2016 and will last until March 31st 2018. In parallel, the preparation of the next project phase, SGA2, started in Oct. 2016 and is currently underway.

HBP SGA1

During the HBP's first Specific Grant Agreement (SGA1), the HBP Core Project is currently outlining the basis for building and operating a tightly integrated Research Infrastructure, providing HBP researchers and the scientific Community with unique resources and capabilities. Partnering Projects are independent research groups to expand the capabilities of the HBP Platforms, in order to use them to address otherwise intractable problems in neuroscience, computing and medicine in the future. In addition, collaborations with other national, European and international initiatives will create synergies, maximising returns on research investment. The SGA1 proposal describes the HBP's plans for this phase and details what steps will be taken to move the HBP closer to achieving its ambitious Flagship Objectives.
General information about the project can be found at https://www.humanbrainproject.eu/

HBP SGA2 Proposal preparation

Since October 2016, all the CBBP groups of the core project are involved in the drawing up of the SGA2 proposal.



CTB

The Cajal Blue Brain Project is hosted by the Universidad Politécnica de Madrid (UPM) in the Scientific and Technological Park of Montegancedo Campus. Computational needs and support infrastructure required by CajalBBP are provided by two of the Research Centers of the Park, the Centro de Tecnología Biomédica (CTB) and the Centro de Supercomputación y Visualización de Madrid, CeSViMa, which is focused on the massive storage of information, high-performance computing and advanced interactive visualization.

More information: www.ctb.upm.es

Sponsorship