Building interactive neuroscience applications in Python using Geppetto

Geppetto [1] is an open-source platform for building web applications for visualizing neuroscience models and data, as well as managing simulations. Geppetto underpins a number of neuroscience applications available to the research community, including Open Source Brain (OSB) [2], Virtual Fly Brain (VFB) [3], NetPyNE-UI [4] and a new web user interface for the Human Neocortical Neurosolver [5].

While Geppetto was originally created with a JavaScript based front-end for user interactions on a browser and a Java based backend hosted on a server we have now extended it to also use a Python based backend. This means that applications built with Geppetto now also offer their users the ability to interact directly with any underlying Python APIs, while seamlessly keeping the user interface synchronised. Python Geppetto applications can be deployed locally, installed using standard Python packages (accessible from PyPI) or Docker, or they can be deployed remotely on the web using Kubernetes and JupyterHub.

![Figure 1](http://geppetto.org)

**Figure 1.** NetPyNE-UI [4] as an example of an application built with Python Geppetto. In the screenshot the number of cells for a particular population M was programmatically changed via an integrated Jupyter notebook (bottom tabbed panel), causing the Graphical User Interface (GUI) top to automatically update.