

PCEnv: Status Update

Justin Marsh (Auckland Bioengineering Institute)

Major components

- PCEnv code
- CellML API
- Mozilla framework

Mozilla

- Keeping near the head revision
- Unstable and unfrozen APIs
- Rapid new functionality
 - Ability to render most MathML representable mathematics
 - Ability to link to and display web accessible databases
 - Ability to render embedded pathway diagrams

CellML API

- Further componentization into services
 - Validation, Code Generation, Integration, Annotation, CellML querying
- Communication and invocation via XPCOM, IDL or FFI

CellML API

- Use case: services for third party use
 - Extract information on components
 - Instantiate a CellML file into a DOM like model
 - Validate CellML models
 - Generate code from CellML
- Services have minimal dependencies

CeIIML API

- Platform agnostic
 - XPCOM and other platform independent technologies used
- Solver library agnostic
 - CVODE and GSL used as standard libraries
- Generated code language agnostic
 - C and Octave code generated; any language which can be described by the MaLaES service's language description language can be generated

PCEnv 0.3

- Embedded functionality
 - XML editor
 - Linked content display
 - Basic Javascript api for interaction with linked content
- Extending session functionality
 - Linked content

Embedded content

Physiome CellML Environment

File Tools View Help

Type	Value	Units
V	-86.2	millivolt
R	8314.472	joule_per_mole_kelvin
T	310	kelvin
F	96485.3415	coulomb_per_millimole
Cm	0.185	microf
V_c	0.016404	micrometre3
P_kna	0.03	dimensionless
g_K1	5.405	nanoS_per_picoF
g_Kr	0.096	nanoS_per_picoF
X1	0	dimensionless
X2	1	dimensionless
g_Ks	0.062	nanoS_per_picoF
Xs	0	dimensionless
g_Na	14.838	nanoS_per_picoF
m	0	dimensionless
h	0.75	dimensionless
j	0.75	dimensionless
g_bna	0.00029	nanoS_per_picoF
g_CaL	0.000175	litre_per_farad_second
d	0	dimensionless
f	1	dimensionless
fCa	1	dimensionless
g_bca	0.000592	nanoS_per_picoF
g_to	0.294	nanoS_per_picoF
s	1	dimensionless
r	0	dimensionless
P_NaK	1.362	picoA_per_picoF
K_mk	1	millimolar
K_mNa	40	millimolar
K_NaCa	1000	picoA_per_picoF
K_sat	0.1	dimensionless

Start time point: (millisecond)

Point density_{max}: 50000 (points/graph)

End time point: 10000 (millisecond)

Absolute e: 1e-8

Relative e: 1E-6

Variable Scale Factor: 1.0

Rate Scale Factor: 0.0

Maximum step size: 0.1 (millisecond)

Algorithm: BDF 1-5 with solve

Integration Complete

Script Message: No fluxes displayed.

Traces: Channel / Exchanger / Pump Currents (picoA/picoF) vs Time (ms)

Electrophysiological Cell Diagram: click channels to toggle display of graph traces above

PCEnv 0.3

- Graphing improvements
 - Normalization
 - More gesture recognition
 - Gridlines
 - More sensible scaling
- Less verbose output

PCEnv latest updates

- Embedded functionality
 - Display of generated code
- Extending session functionality
 - Metadata standards for representing more arbitrary state
- Slightly wider class of CellML files solved
- More robust model loading

Concluding remarks

- Focus on individually reusable components
- Focus on agnosticism
- Opening up development process
 - Bugtracker at [https://
tracker.physiomeproject.org/](https://tracker.physiomeproject.org/)