BME 503 2018
Braitenbug Final Report
Due Saturday Oct 12: 7:00PM

Final Report Details

In this final written report, you are being asked to pull together the building blocks of computational neuroscience. You have started to develop a biologically inspired "nervous system" for a virtual bug to allow it to navigate in a virtual world to interact with a target. The bug's nervous system is composed of models of spiking neurons connected by models of excitatory and inhibitory synapses. You have built this nervous system element by element. In the report, you should demonstrate your understanding of the models using results from the various explorations completed to date to illustrate how the components work and how you chose to ultimately model the bug to execute a new behavior of your own choosing. You can do this by adding additional neurons or sensors to the virtual bug. Be inventive!

The report

The report should be in the form of a journal article. It will consist of 1) **Introduction** (motivating the development of the bug). Here you may want to include a brief description of the nervous system of an insect or the concept of neuro-robotics. It would be good to read a couple of articles on the topic. 2) A description of the **Methods** used with appropriate equations for the spiking neurons, synapses and the bug. **NOTE:** Because we did not have time to do an exploration with plasticity (STDP), briefly explain STDP (illustrated with a plot or two) in the Methods and Results. You do not have to incorporate STDP in the final bug implementation- but it could serve as an interesting modification. 3) **Results** – here you should show how the individual parts work where you can use elements of the explorations completed to help tell your story 4) A **Discussion**- here you will explain what you learned and give some sense of how you can further develop the bug model, 5) **References** – a list of references used. **Appendices** can be used for additional material and code.

1) Each student must submit a separate report. Students should not share written descriptions or figures. Any work performed as part of a group must be acknowledged.
2) The report should be typed with 1.5 spaces and 12 pt font.
3) You should include all references used.
4) All figures should be of high quality with visible fonts and thick lines. In general, you should make fonts large so when the figure is reduced in size, everything is readable. Figures should include a brief caption.

5) You should explain the methods that you used and discuss your results clearly with full sentences.
6) To demonstrate that your bug is working, you can create a video, show a series of plots or send all the code as separate submissions with instructions on how to use. Do not spend too much time on a video. A camera capture of your screen is fine.
7) Include all code in the final report. Clearly indicate your modifications to any code given to you.

Grading Rubric
for ABET Outcome (g) Ability to Communicate Effectively—WRITTEN

PRESENTATION		
Organization: material organized in logical sequence, correct paragraph content and structure		x/10
Articulation: ideas articulated clearly and concisely, points understood without repeated reading		x/10
Visual aids: figures, table, equations, diagrams support exposition, are appropriate and referenced in text		x/10
Writing style: appropriate for the audience, correct grammar and spelling, no jargon		x/10
Professional quality: prescribed formats followed (length, figures, references), neat and professional appearance		x/10
Total grade for PRESENTATION (this is the grade that assesses ABET Outcome (g))		x/50
Additional comments:		
CONTENT		
Preparation: evidence of preparation; work does not appear to be done at the last minute		x/10
Focus: focused on the assigned topic, without detours and superfluous material		x/10
Completeness: all main points covered in appropriate depth		x/10
Correctness: evident understanding of the material, no technical mistakes		x/10
Details: all new concepts, abbreviations, symbols defined; values of parameters specified		x/10
Total grade for CONTENT (does not assess (g) but can be used for other Outcomes)		x/50
Additional comments:		