Towards a Neural Co-Processor Which Restores Movement After Stroke: Modeling a Proof-of-Concept

Matthew J Bryan[1], Linxing Preston Jiang[1], Rajesh P N Rao[1]

[1] Neural Systems Laboratory, Department of Computer Science and Engineering, University of Washington, Box 352350, Seattle, WA 98105, USA

E-mail: matthew.bryan@dell.com

September 2021

Abstract. Brain co-processors[1] are devices which use artificial intelligence (AI) and closed-loop neurostimulation to shape neural activity and to bridge injured neural circuits for targeted repair and rehabilitation.

1. Introduction

Closed-loop control:

- [2] Inception Loops: driving brain states
- [3] "Closed loop" here refers to when to apply stimulation, always of the same type and at the same site, based on memory performance.
- [4] ACLS

  Simulation:

- [5] Simulation of spiking neural network, learning stimulation regime

2. Method

asdf

3. Results

asdf

4. Discussion

asdf

5. Conclusion

asdf

6. Acknowledgements

asdf

7. Ethical Statement

asdf

8. References

[1] RPN R 2019 *Current Opinion in Neurobiology* **55** 142–151
[2] Walker E e a 2019 *Nature Neuroscience* **22**(12) 2060–2065 URL https://doi.org/10.1038/s41593-019-0517-x
[3] J K M, Wanda P A, Ezzyat Y, Solomon E A, Adamovich-Zeitlin R, Lega B, Jobst B C, Gross R E, Ding K and Diaz-Arrastia R R 2021 *medRxiv* (*Preprint* https://www.medrxiv.org/content/early/2021/05/22/2021.05.18.21256980.full.pdf) URL https://www.medrxiv.org/content/early/2021/05/22/2021.05.18.21256980

[4] Tafazoli S, MacDowell C J, Che Z, Letai K C, Steinhardt C R and Buschman T J 2020 *Journal of Neural Engineering* **17** 056007 URL https://doi.org/10.1088/1741-2552/abb860

[5] S D B, K L, SA N, JT F, JC P and WW L 2016 *Frontiers in Neuroscience* **10** 28 ISSN 1662-453X URL https://www.frontiersin.org/article/10.3389/fnins.2016.00028