- Prospects
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The case for emulating insect brains using anatomical “wiring diagrams” equipped with biophysical models of neuronal activity

- Logan T. Collins ORCID: orcid.org/0000-0003-1239-4310[1]

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Abstract

Developing whole-brain emulation (WBE) technology would provide immense benefits across neuroscience, biomedicine, artificial intelligence, and robotics. At this time, constructing a simulated human brain lacks feasibility due to limited experimental data and limited computational resources. However, I suggest that progress toward this goal might be accelerated by working toward an intermediate objective, namely insect brain emulation (IBE). More specifically, this would entail creating biologically realistic simulations of entire insect nervous systems along with more approximate simulations of non-neuronal insect physiology to make “virtual insects.” I argue that this could be realistically achievable within the next 20 years. I propose that developing emulations of insect brains will galvanize the global community of scientists, businesspeople, and policymakers toward pursuing the loftier goal of emulating the human brain. By demonstrating that WBE is possible via IBE, simulating mammalian brains and eventually the human brain may no longer be viewed as too radically ambitious to deserve substantial funding and resources. Furthermore, IBE will facilitate dramatic advances in cognitive neuroscience, artificial intelligence, and robotics through studies performed using virtual insects.

Fig. 1

Fig. 2

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Author information

Affiliations

1. Department of Psychology and Neuroscience, University of Colorado, Boulder, 2860 Wilderness Place, Boulder, CO, 80301, USA

Logan T. Collins

Authors

1. Logan T. Collins
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Corresponding author

Correspondence to Logan T. Collins.

Ethics declarations

Conflict of interest

The author declares no competing financial interests.

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- **Fig. 1**
 extended data figure 1

- **Fig. 2**
 extended data figure 2

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