

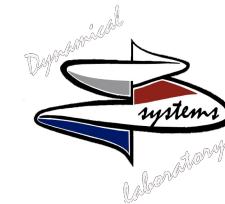
OpenNest

A modular experimental setup for long term
studies of collective behavior in ants

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NYU Dynamical Systems Laboratory, NJIT Swarm Lab

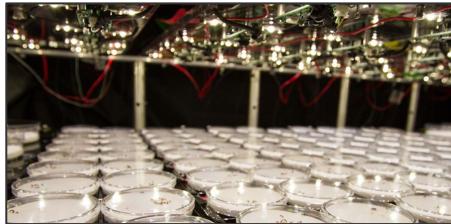
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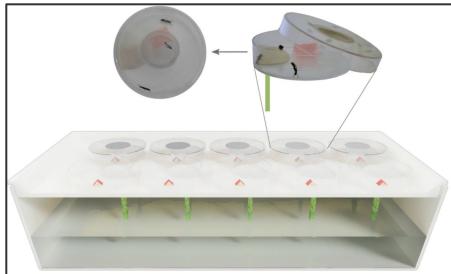
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Existing Experimental Setups

Petri Dish Matrices

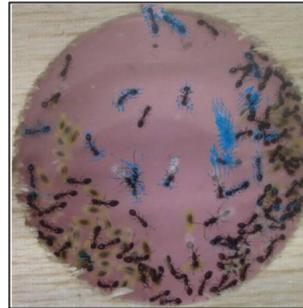


D. Kronauer, *Rockefeller University Laboratory of Social Evolution and Behavior*



L. Pedraza et al., (2023), *Insectes Sociaux*

Glass Sandwiches



G.N. Doering et al., (2023), *Proceedings of the Royal Society B*



G.T. Chism et al., (2024), *Animal Behaviour*

More Intricate Setups



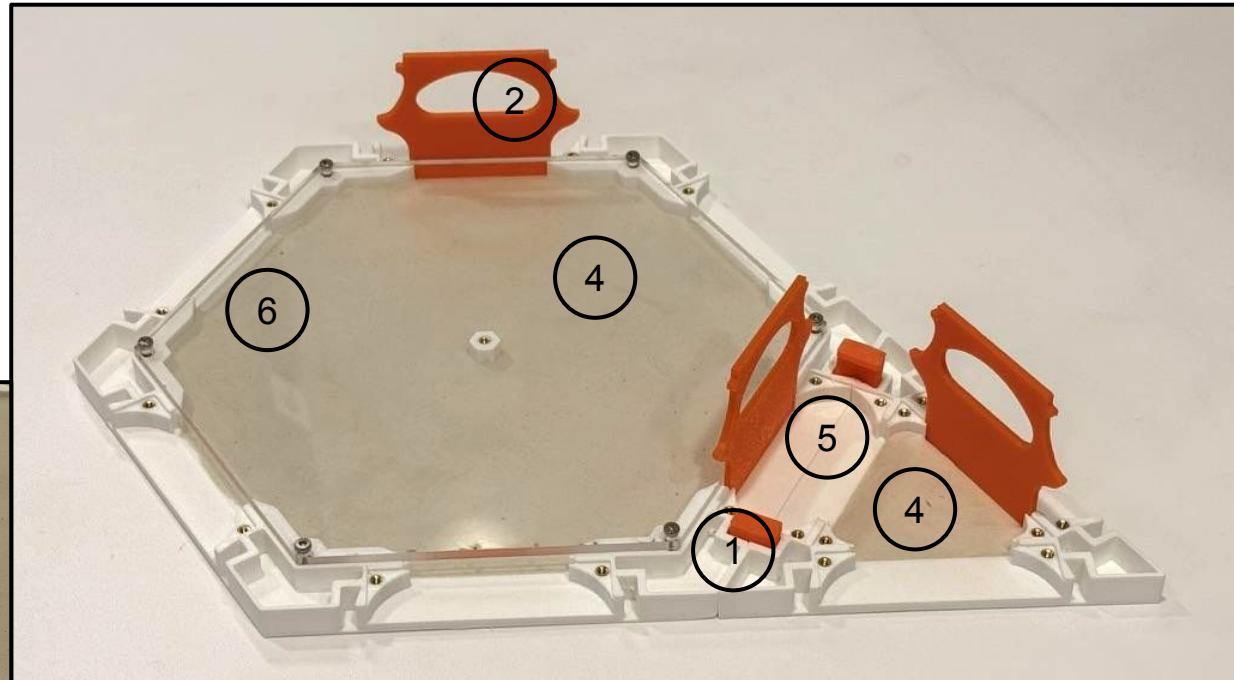
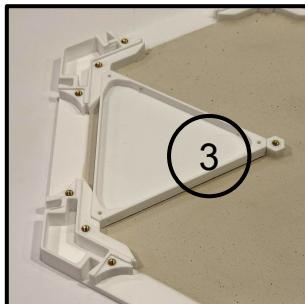
J. Graham et al., (2017), *Theoretical Biology*



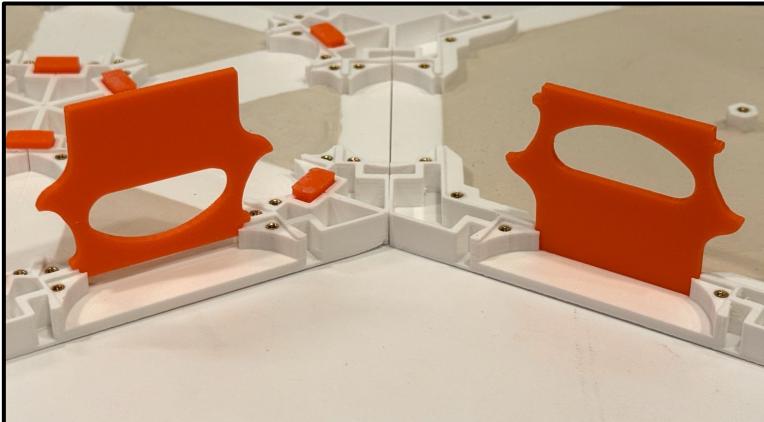
D. Giannetti et al., (2025), *Current Zoology*

OpenNest: A Modular Solution

1. Connector Keys
2. Gates
3. Sub Chambers
4. Plaster Flooring
5. Walkways
6. Acrylic Lids

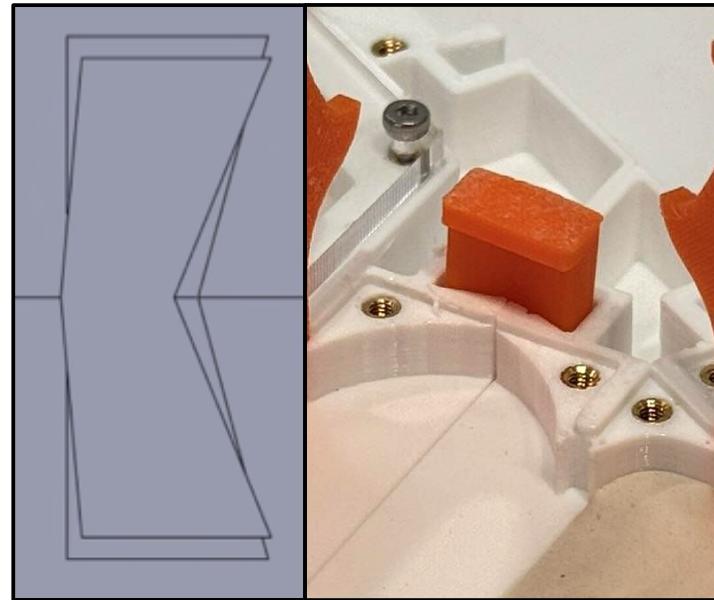


Preventing Jailbreaks

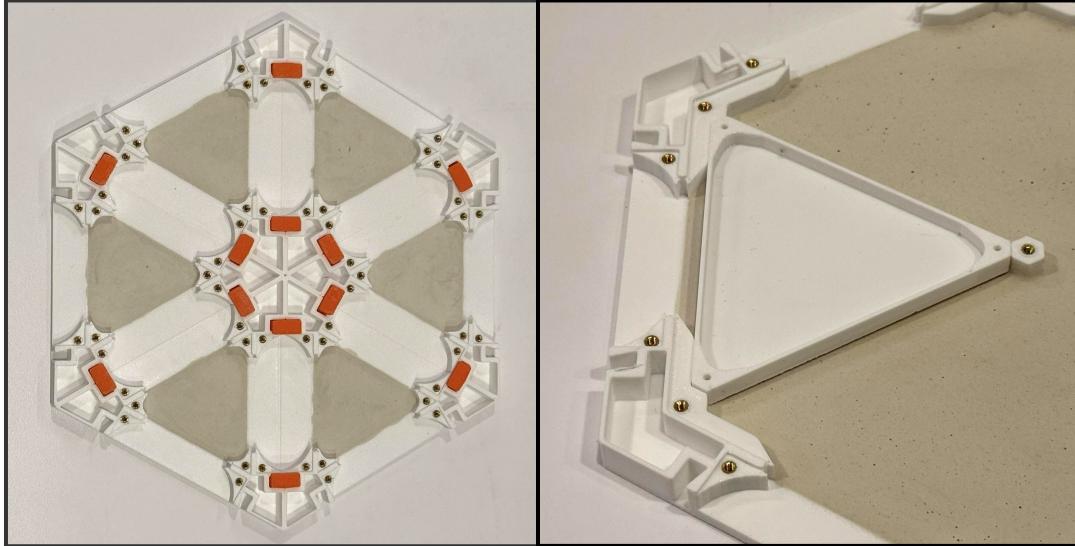
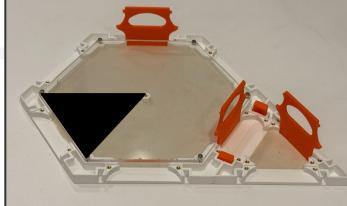


Head profile plugs the ceiling gap when gates are removed.

Internal force in the key bits pull chambers together at all times, closing any gaps.



Symmetry Creates Adaptability

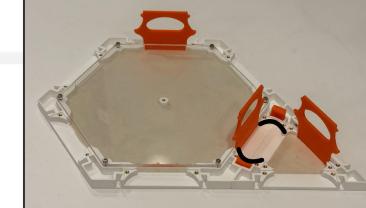
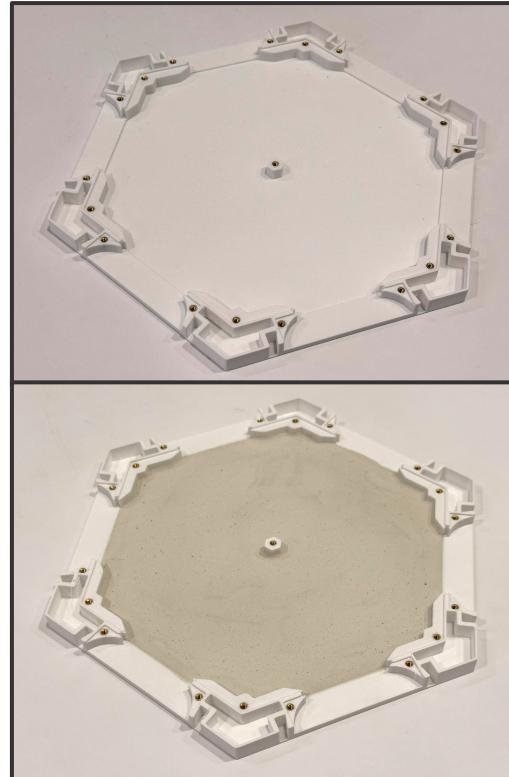


Symmetry allows construction of a modular environment from smaller, simpler shapes: 6 triangles -> 1 hexagon.

Keeping Residents Comfortable



Ants like to corner clump.
Curves prevent this.



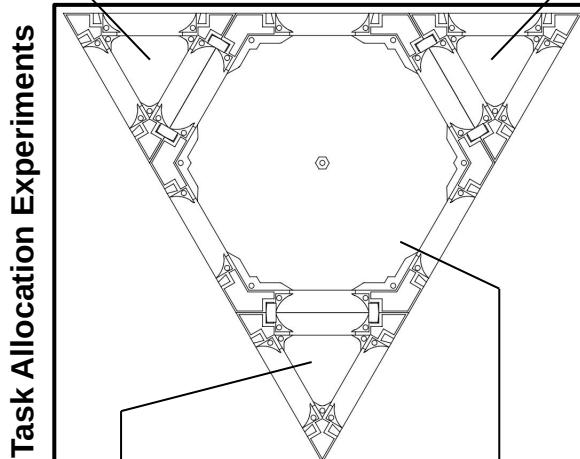
Plaster floors
help control
grip and
humidity.

Future Experiments

Task 1

Task Allocation Experiments

Task 2



Nest Chamber

Exploration Chamber

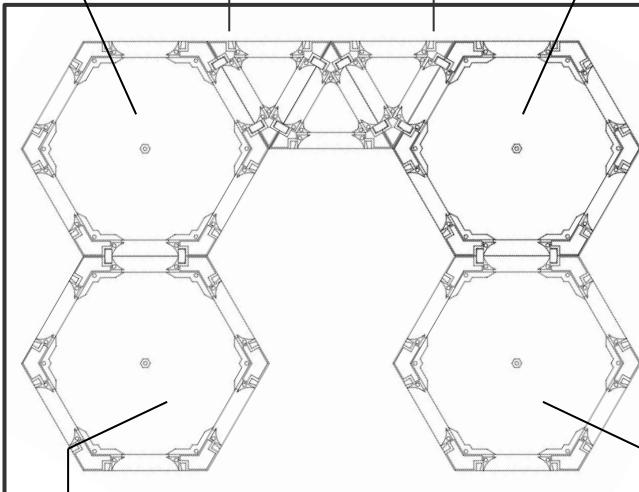


Foraging Area 1

Removable Bridge

Foraging Area 2

Nest Interaction Experiments



Nest Chamber 1

Nest Chamber 2



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Questions?

Github Repository: <https://github.com/dynamicalsystems laboratory/opennest.git>



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