Beedroids: How Luminous Autonomous Swarms of UAVs Can Save the World?

Quentin Bramas,
Stéphane Devismes,
Anaïs Durand,
Pascal Lafourcade,
and Anissa Lamani

University of Strasbourg,
University of Picardie Jules Verne,
University of Clermont Auvergne,
University of Clermont Auvergne,
University of Strasbourg,
FRANCE

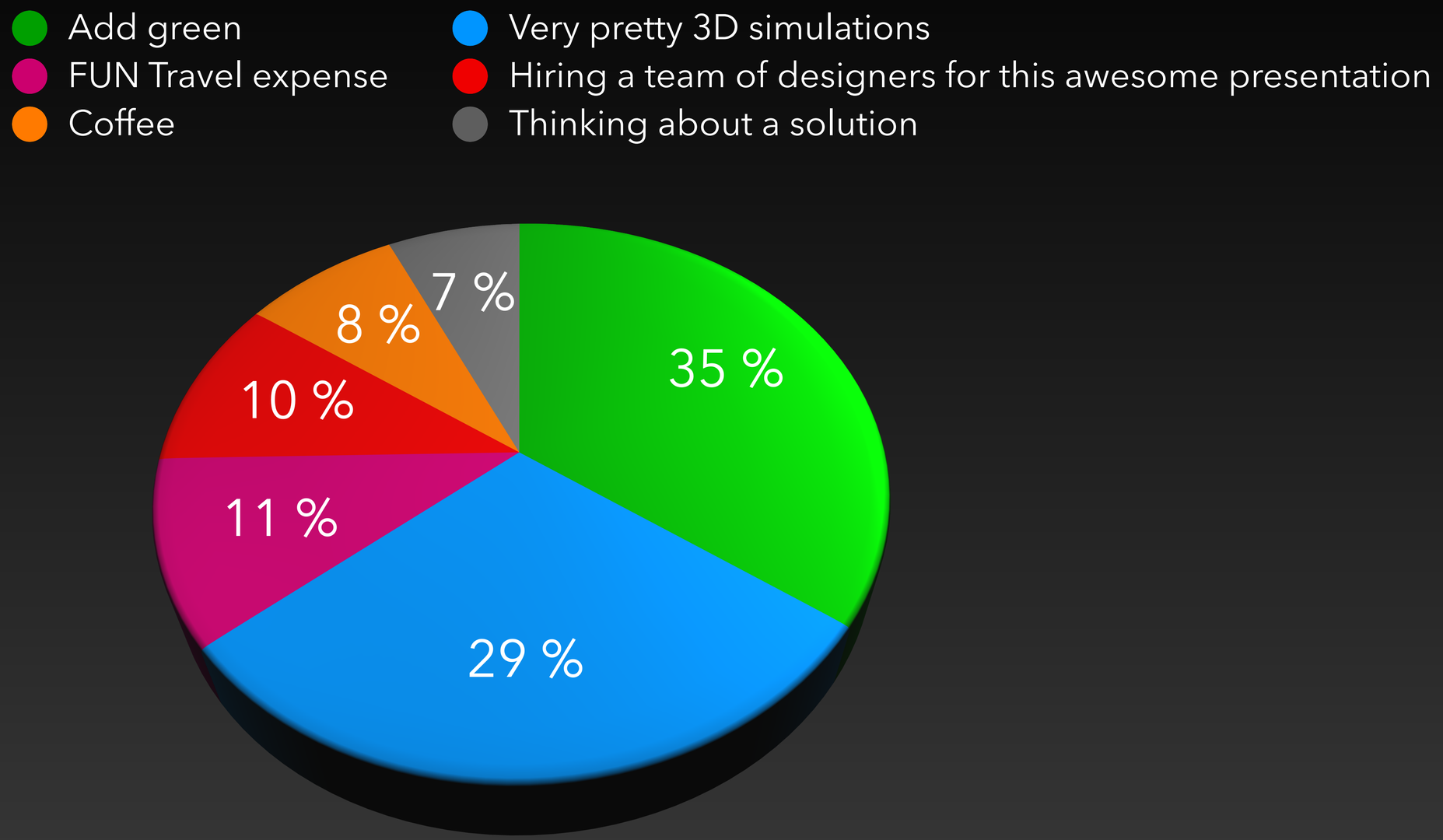
FUN 4042

The world is endanger

Bees are dying!! (and other insects but that are less pretty so we don’t care)

Our team received lots of money to save the world.

How did we manage the budget to save the world ?


Add green
FUN Travel expense
Coffee
Very pretty 3D simulations
Hiring a team of designers for this awesome presentation
Thinking about a solution
35 %
29 %
11 %
10 %
8 %
7 %

Myopic

Oblivious

Autonomous

Luminous

Flying Pollinating Robots

Myopic
Oblivious
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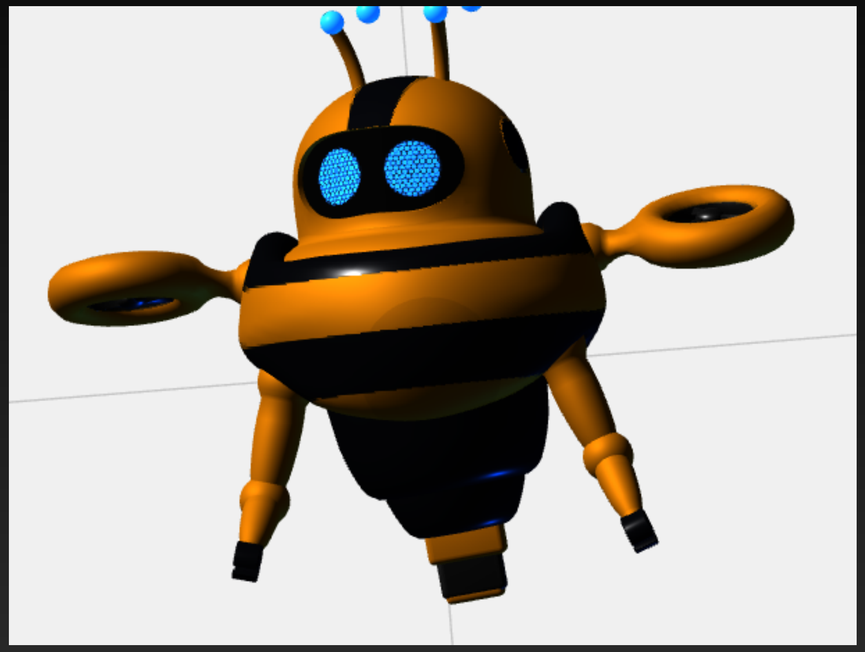
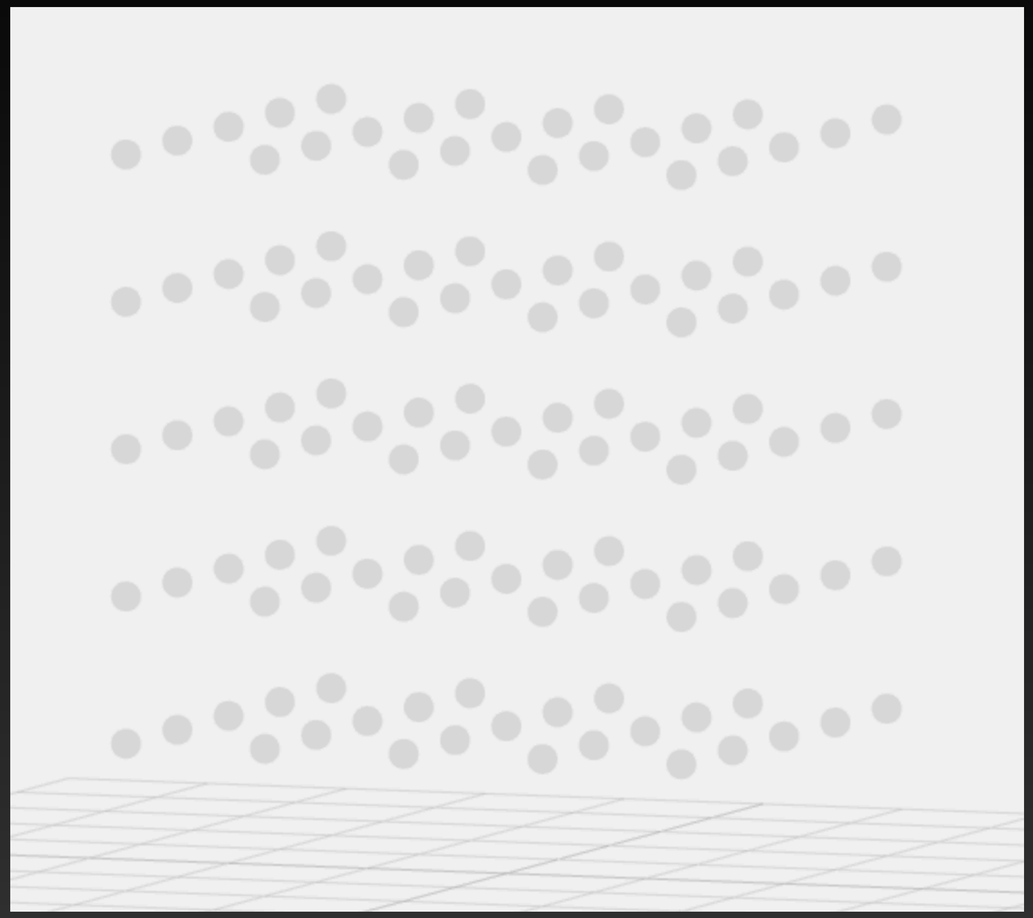
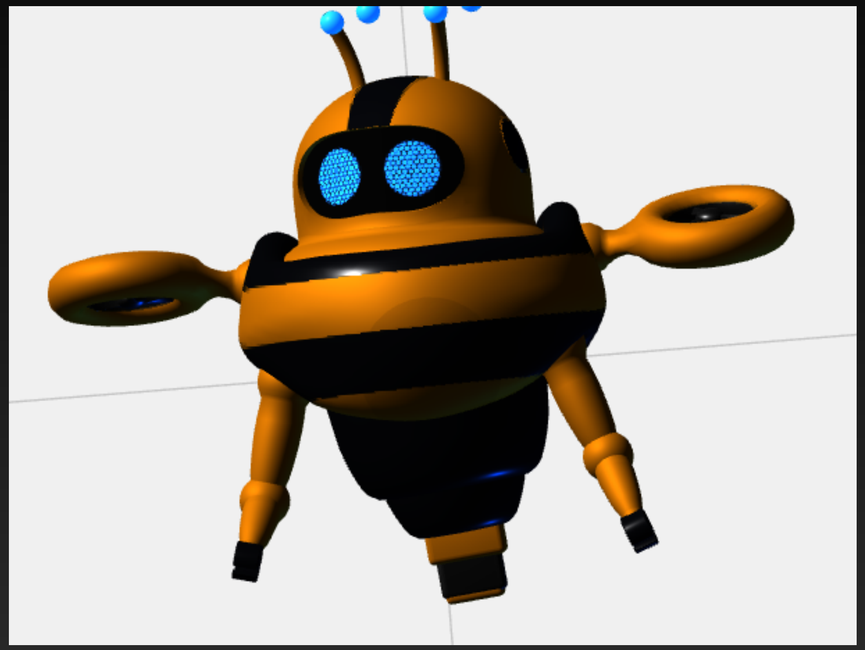
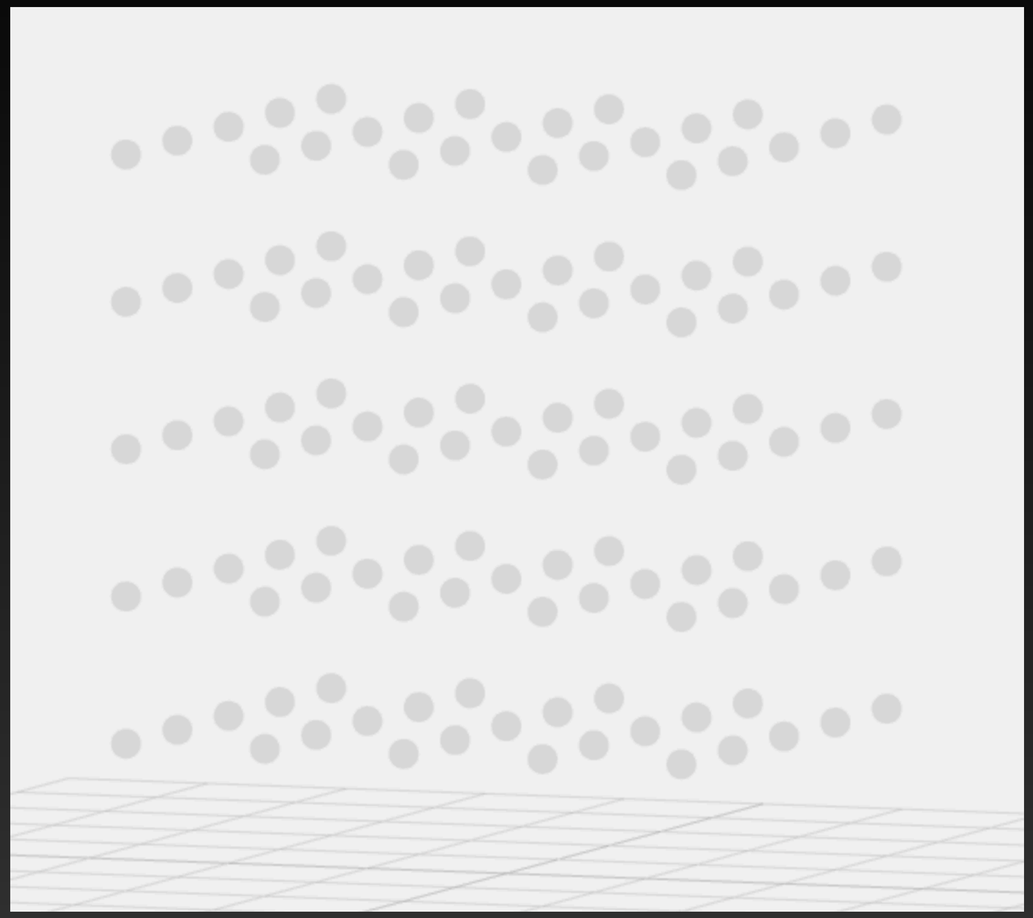
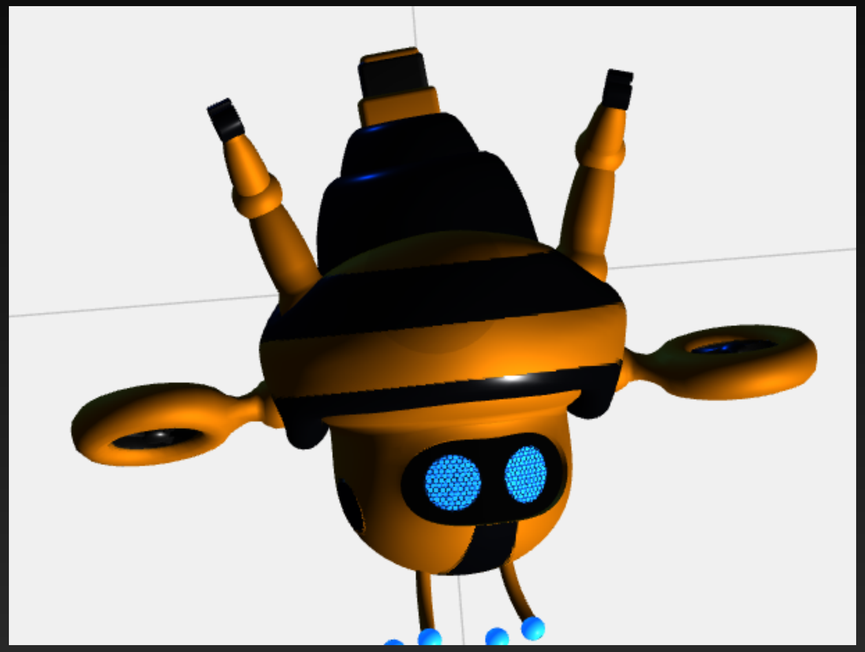


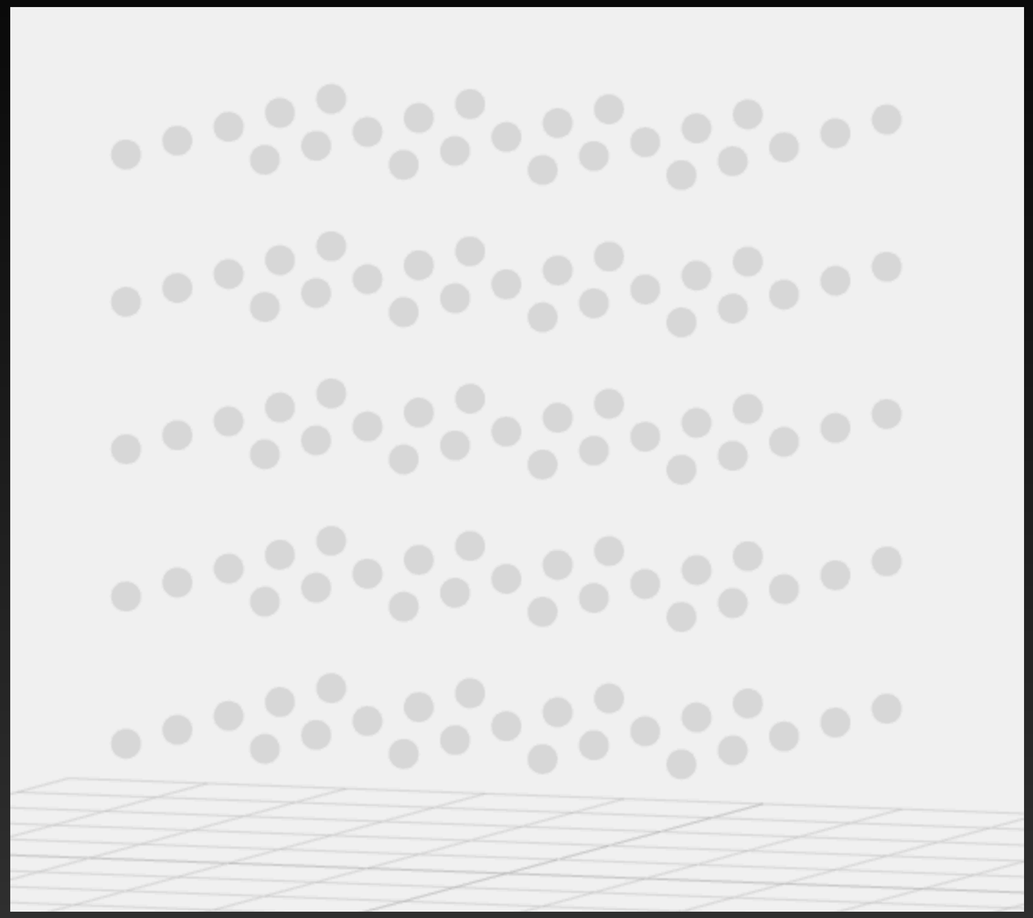
Author: https://sketchfab.com/tehe4ek

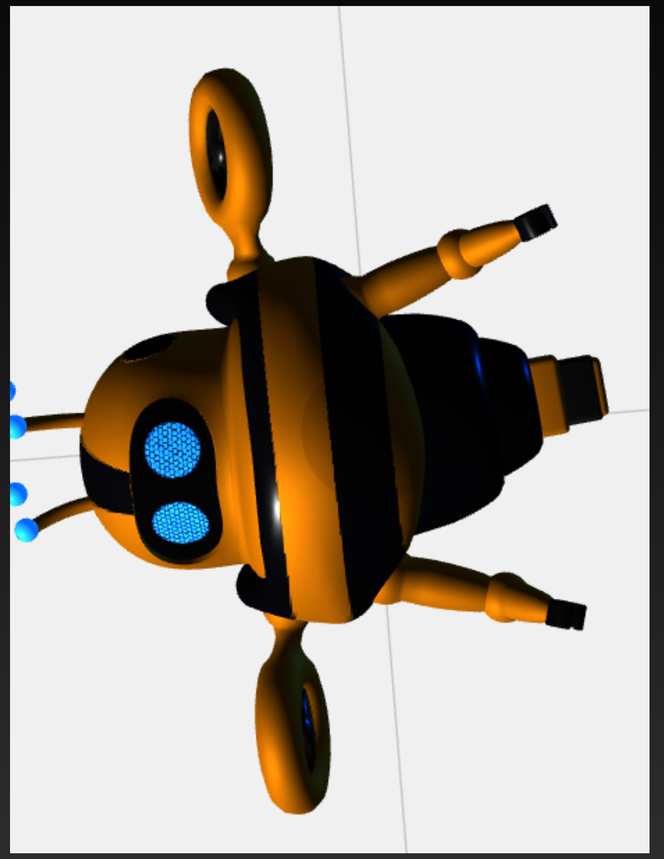












Removing unnecessary Hypothesis

« Hot Shots! » methodology

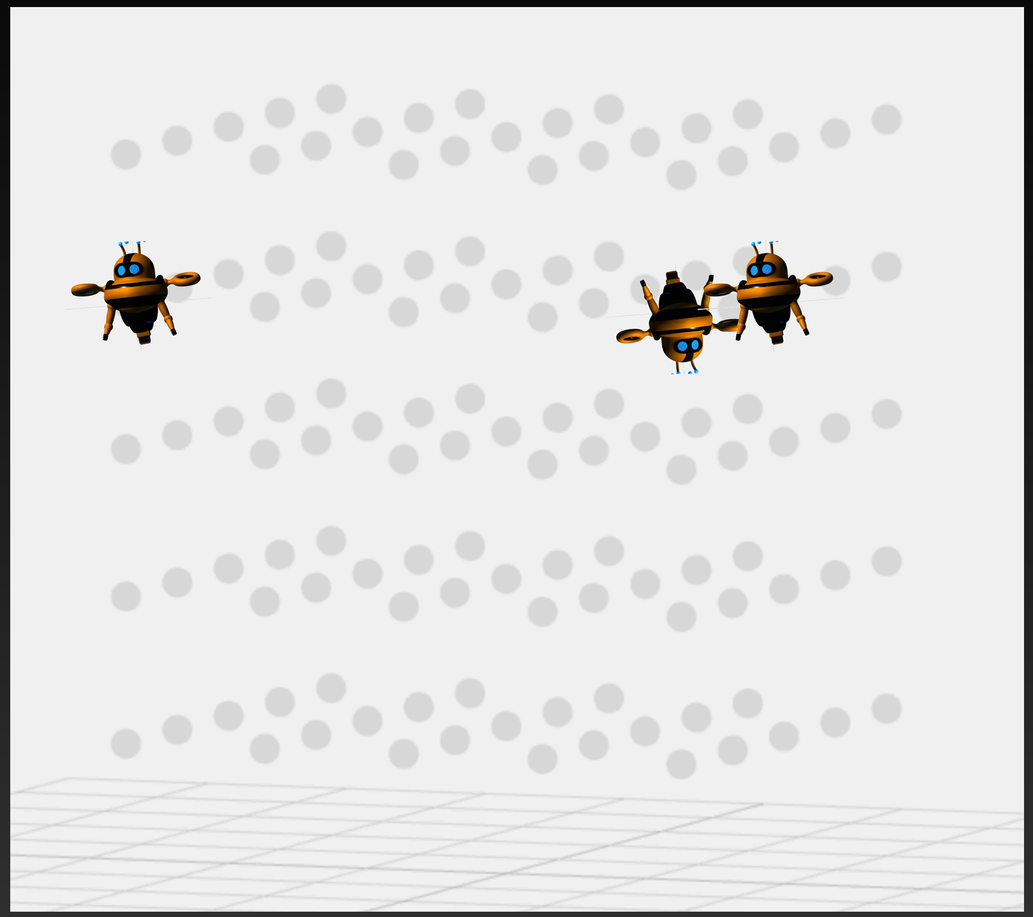
- Landing gear’s frozen
- I lost my radar
- I’m out of fuel
- Lost a wing
- Lost the other one

- looking good
- right for line-up
- doing fine
- Ok you can do it

BEWARE OF JET BLAST
PROPELLERS AND ENGINES

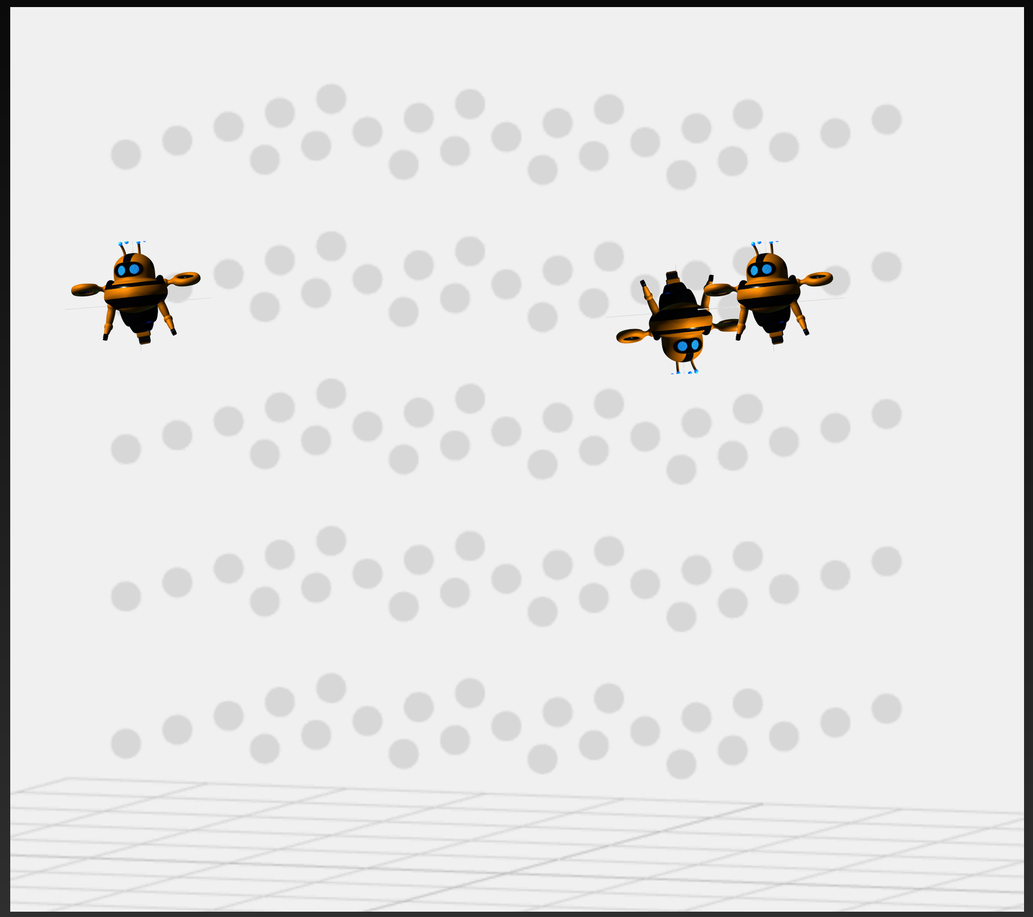
The Beedroid Model

The Beedroid Model



- Limited Visibility
- No memory
- No communication
- No consistent orientation
- Synchronous

The Beedroid Model



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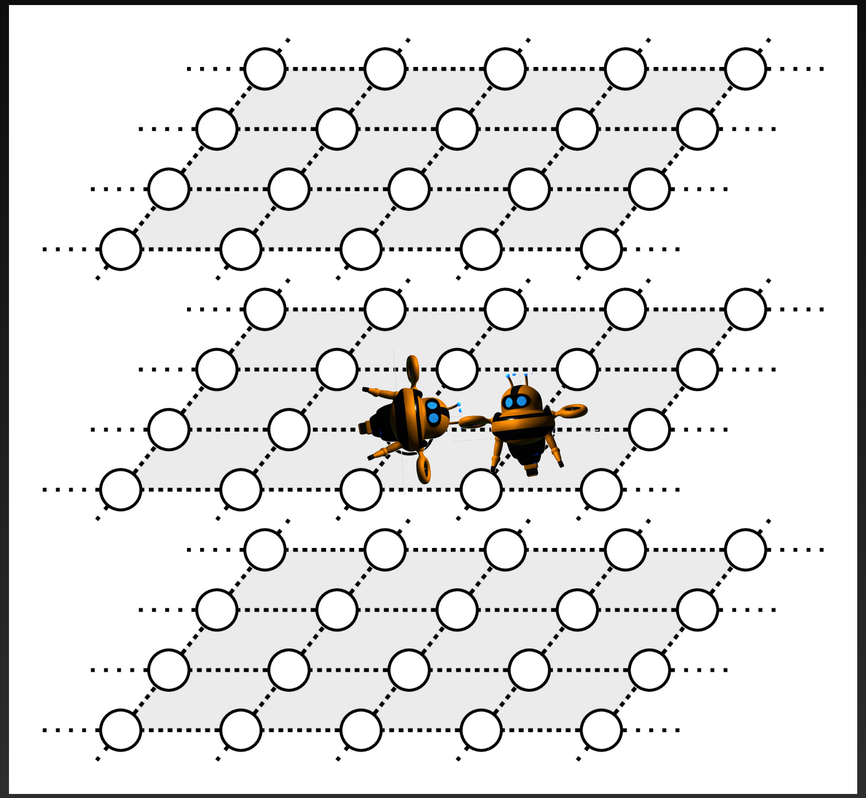
They execute cycles:

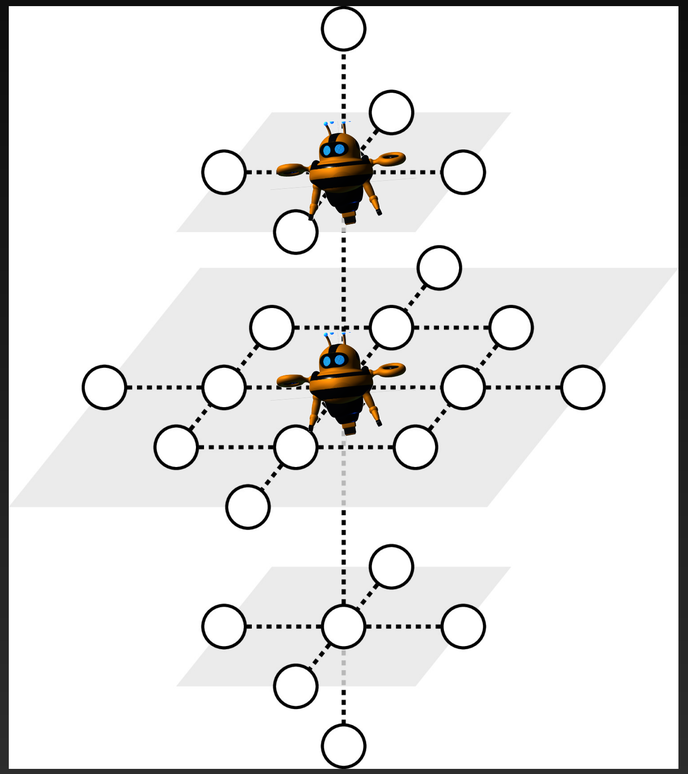
- Look
- Compute
- Move

Goal: Explore the 3D grid

The Beedroid Model

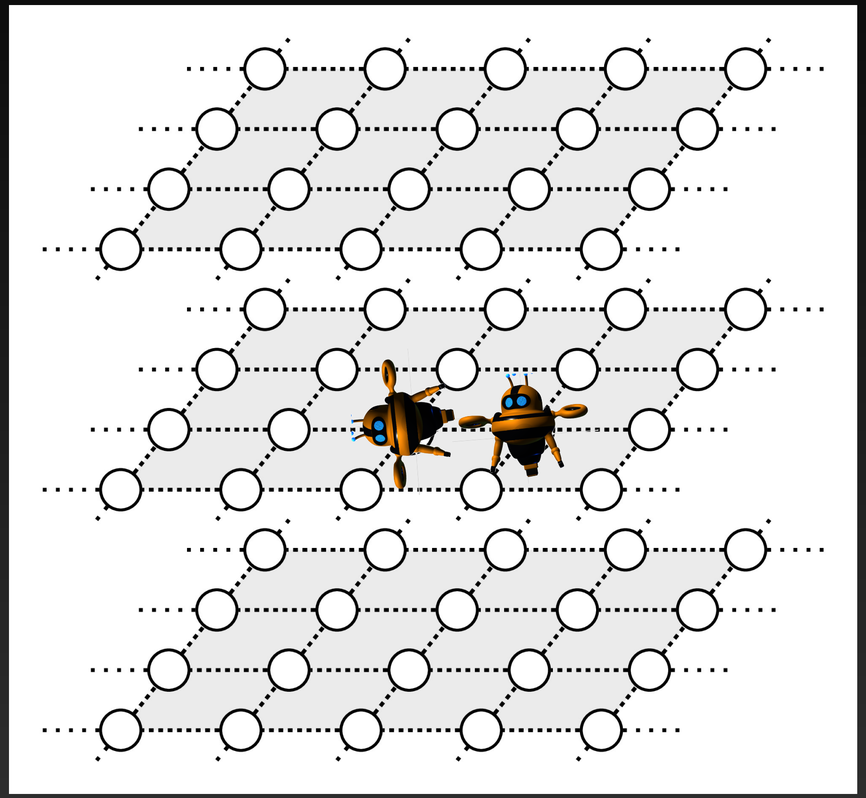
Look phase

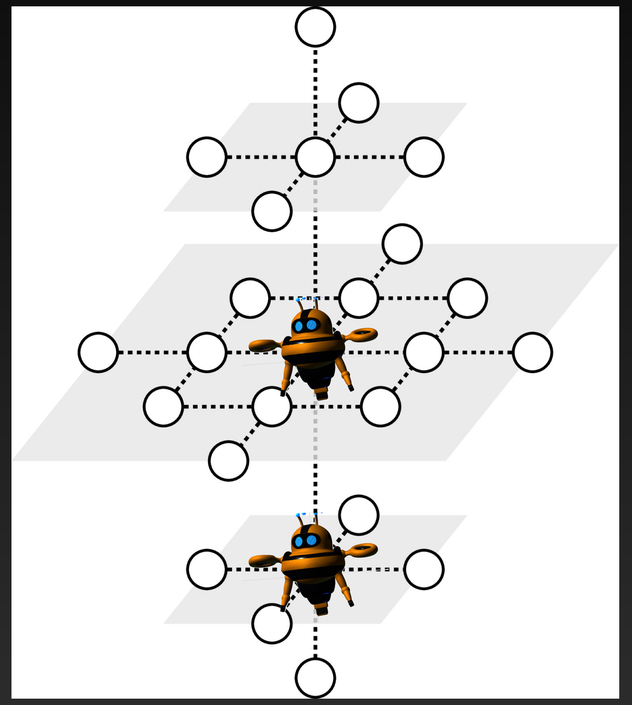




The Beedroid Model

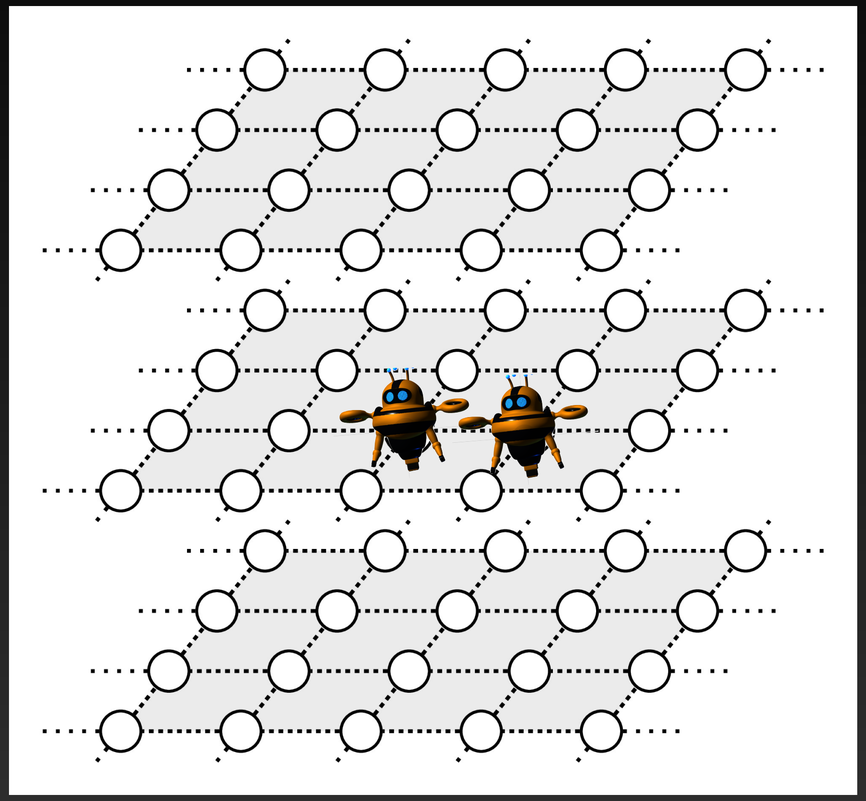
Look phase

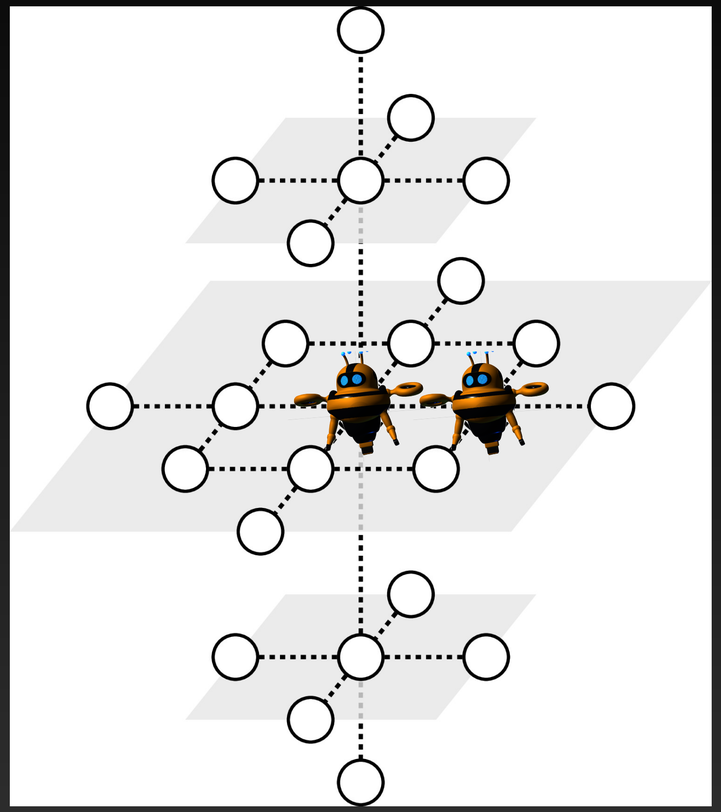




The Beedroid Model

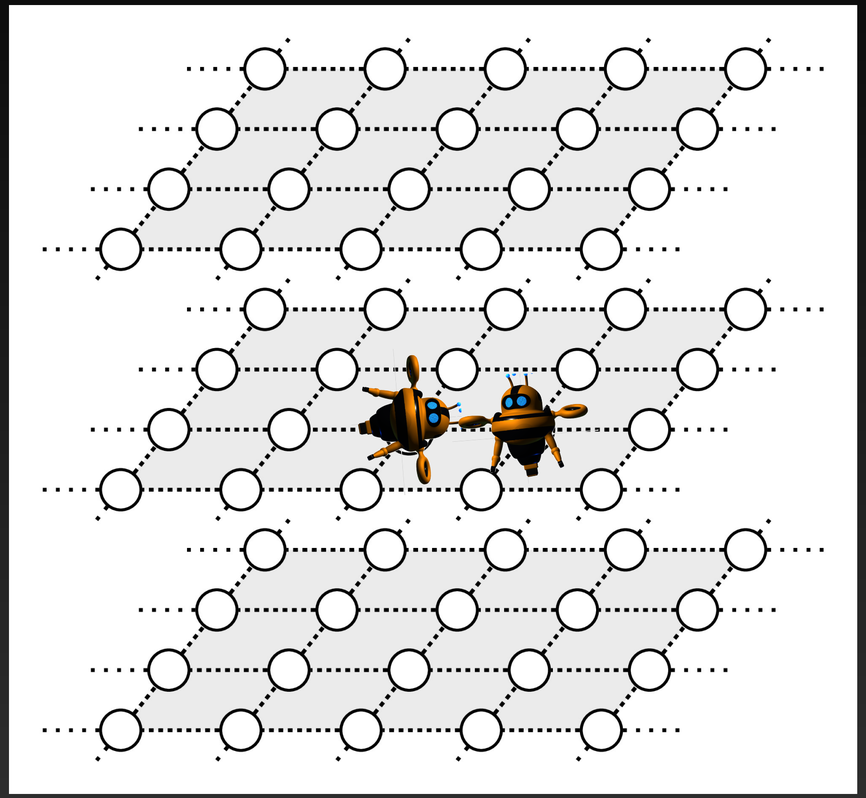
Look phase

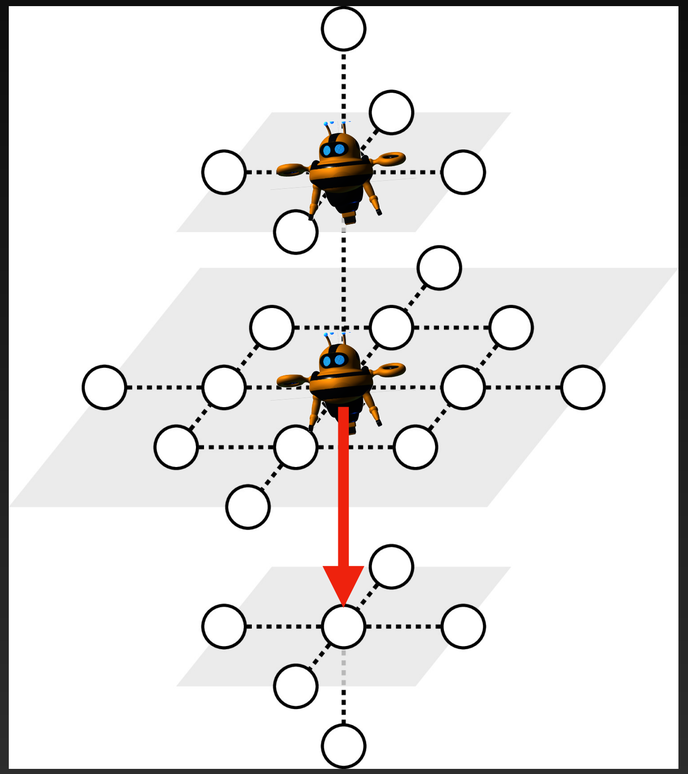




The Beedroid Model

Compute phase





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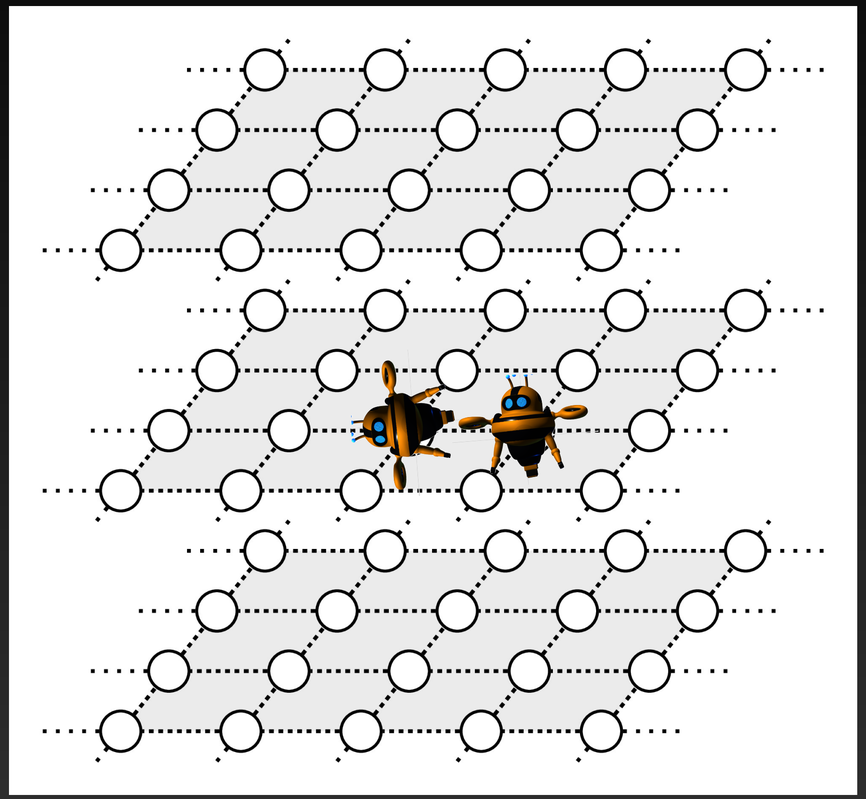

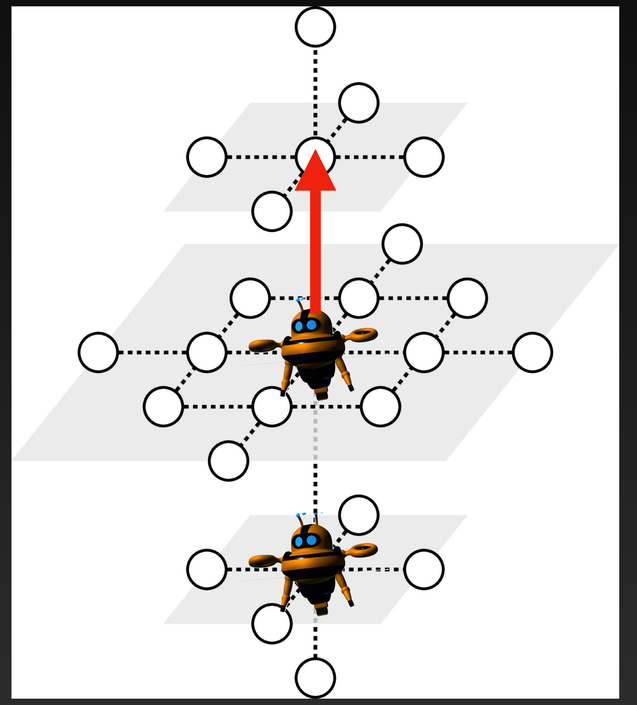

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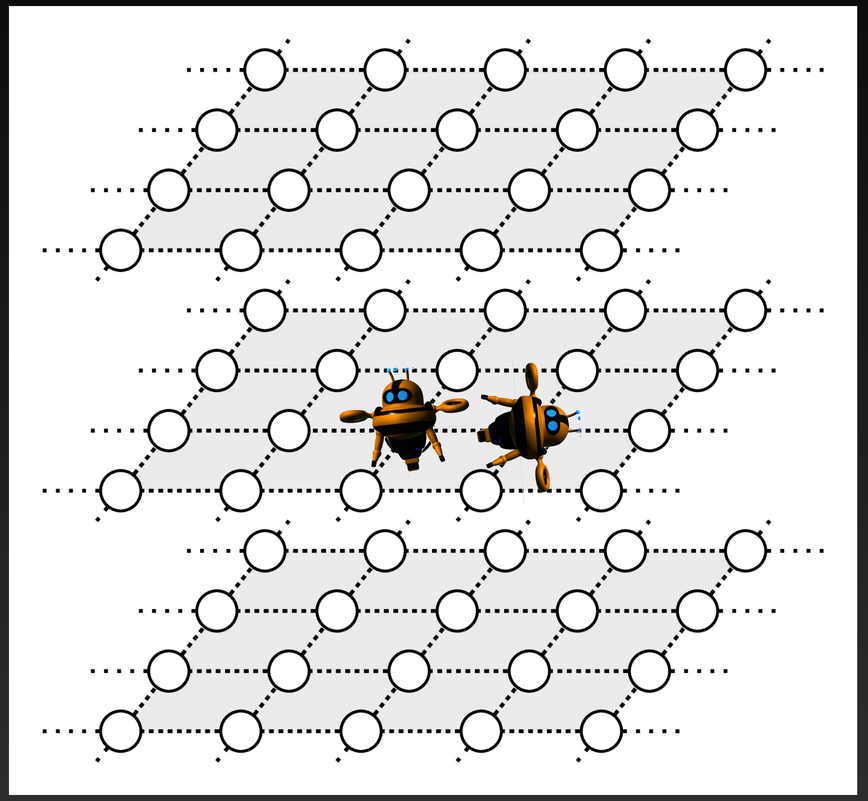
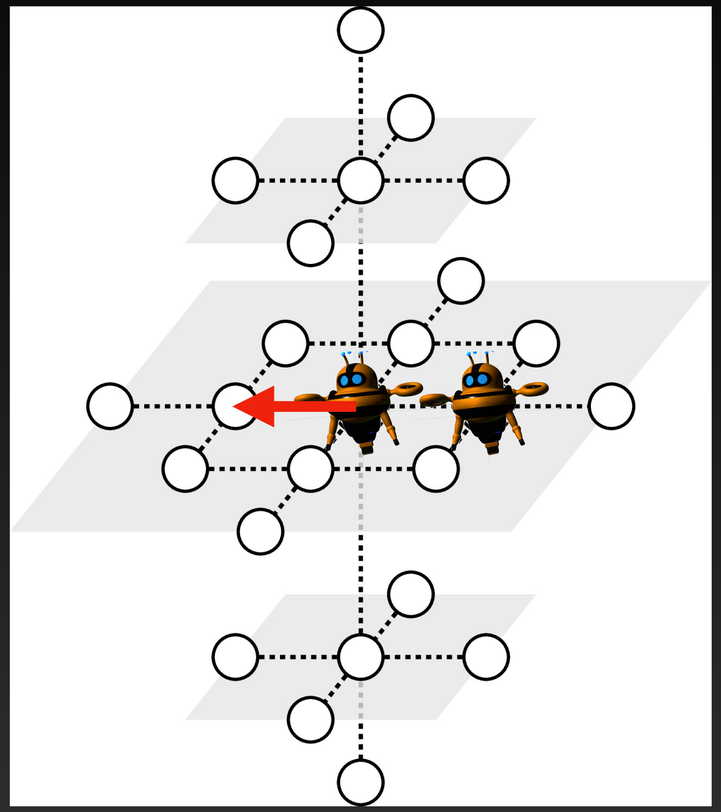
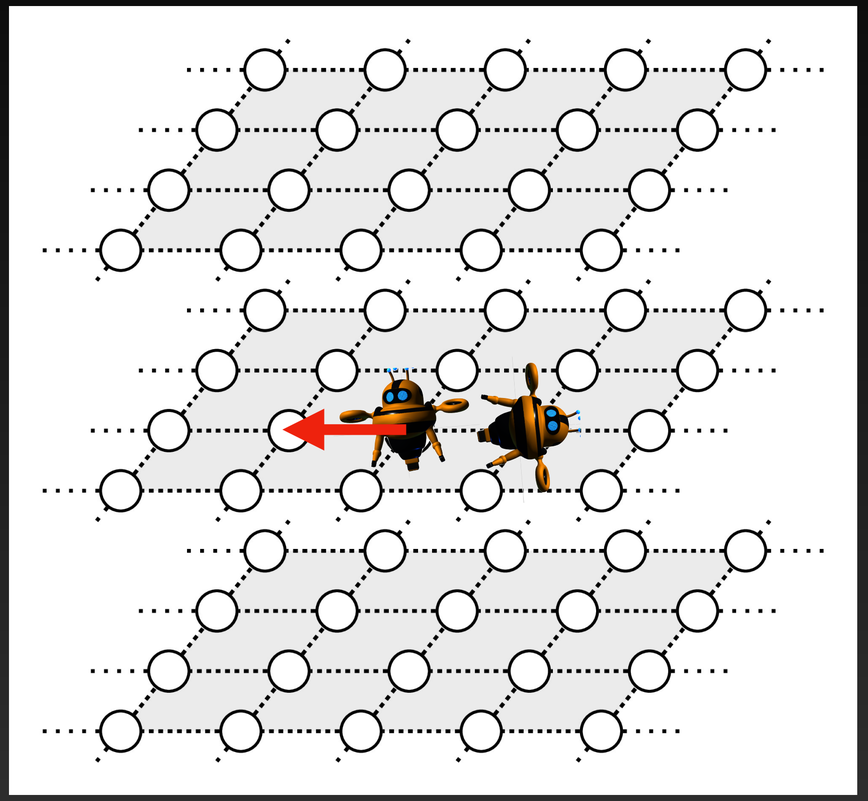
Compute phase

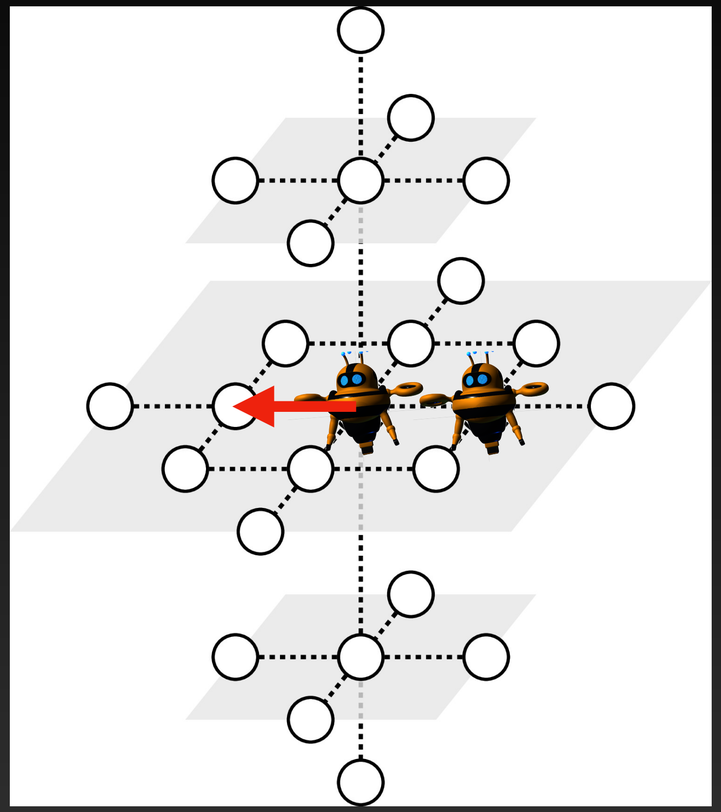




The Beedroid Model

Compute phase





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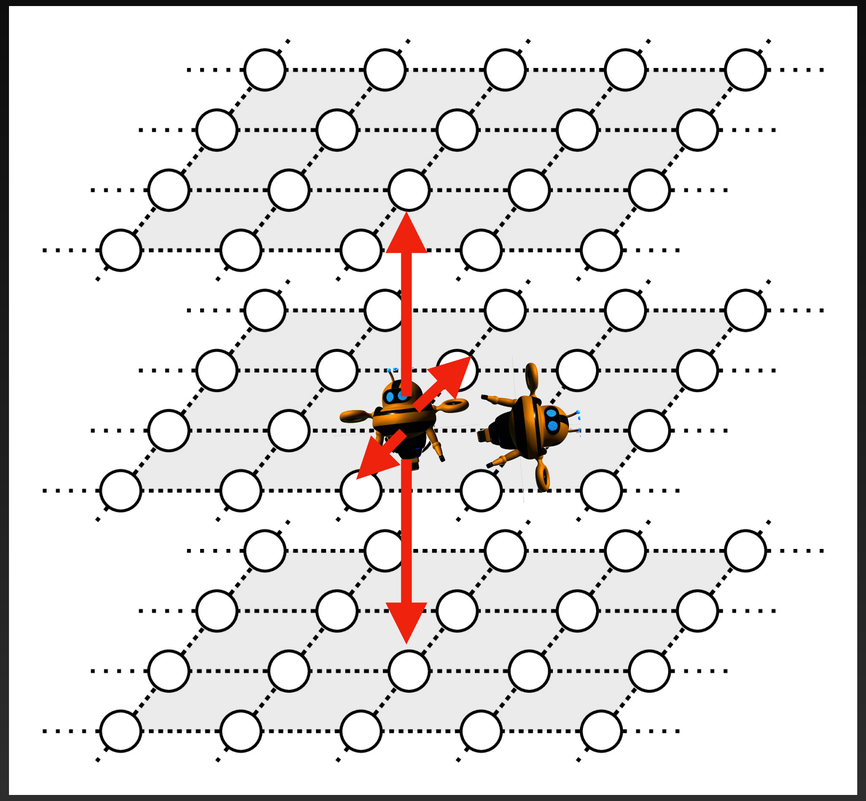
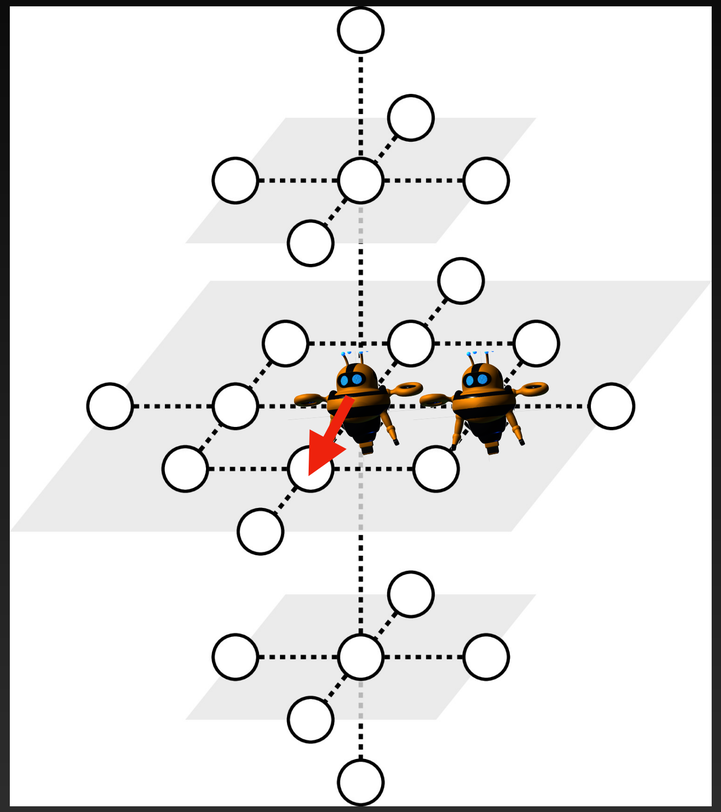
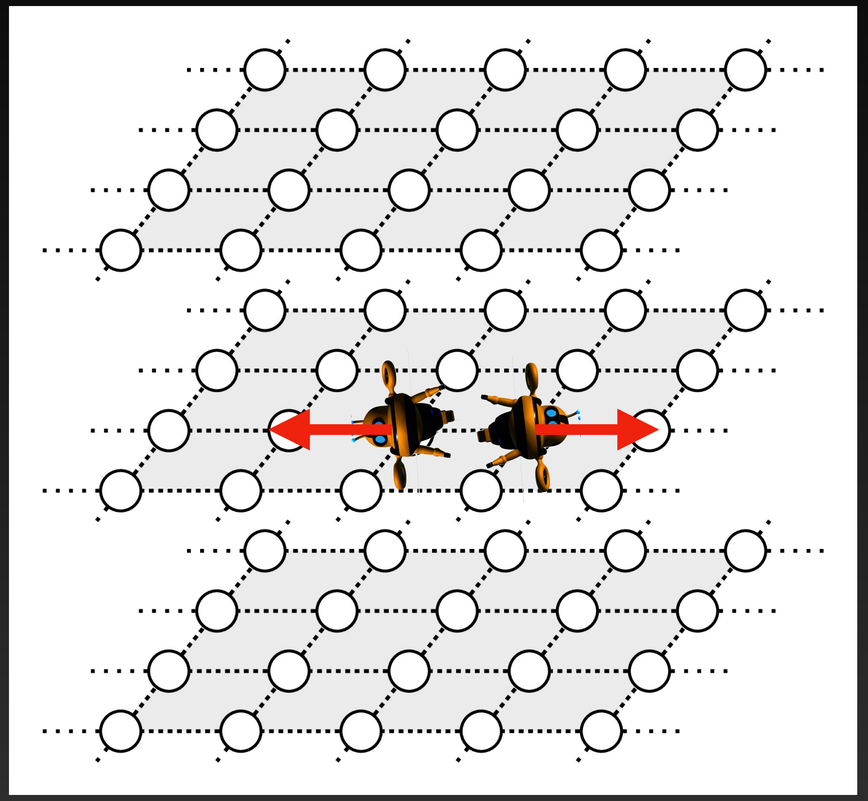
Compute phase

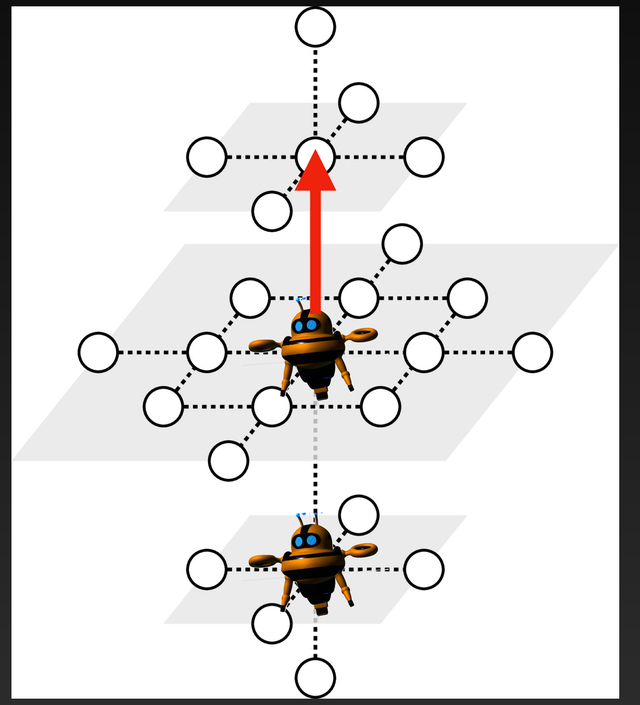




The Beedroid Model

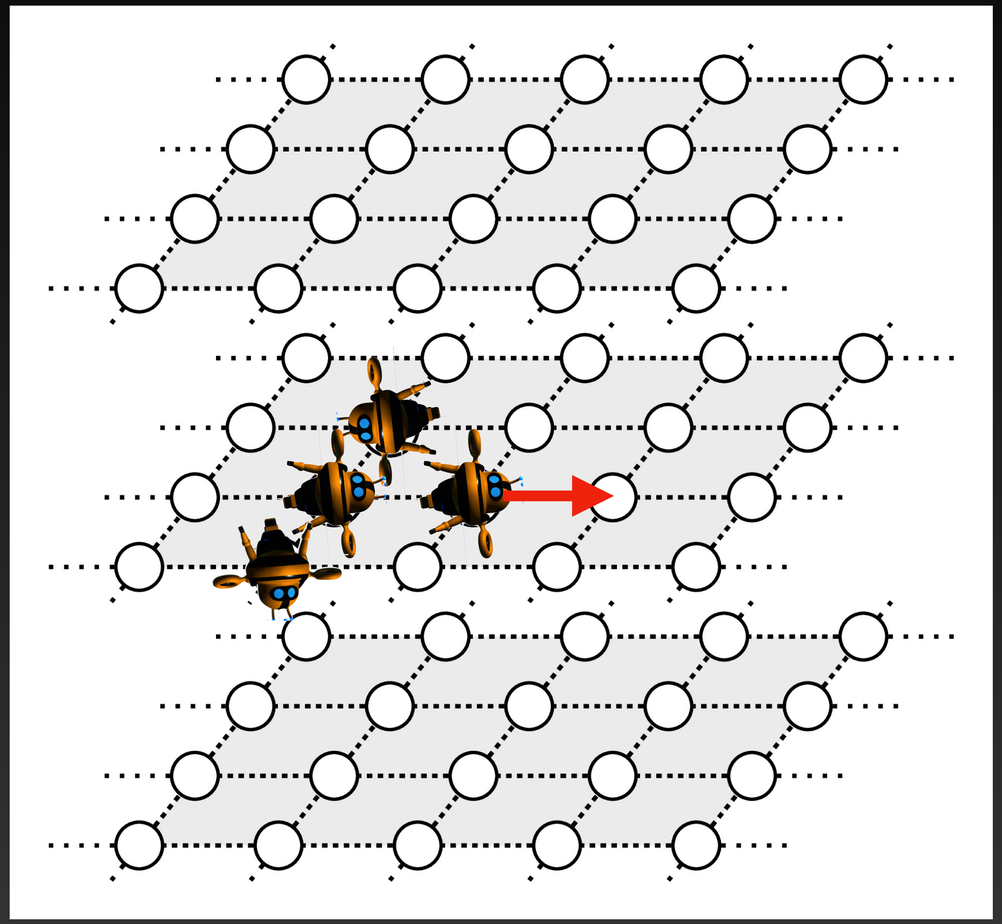
Move phase

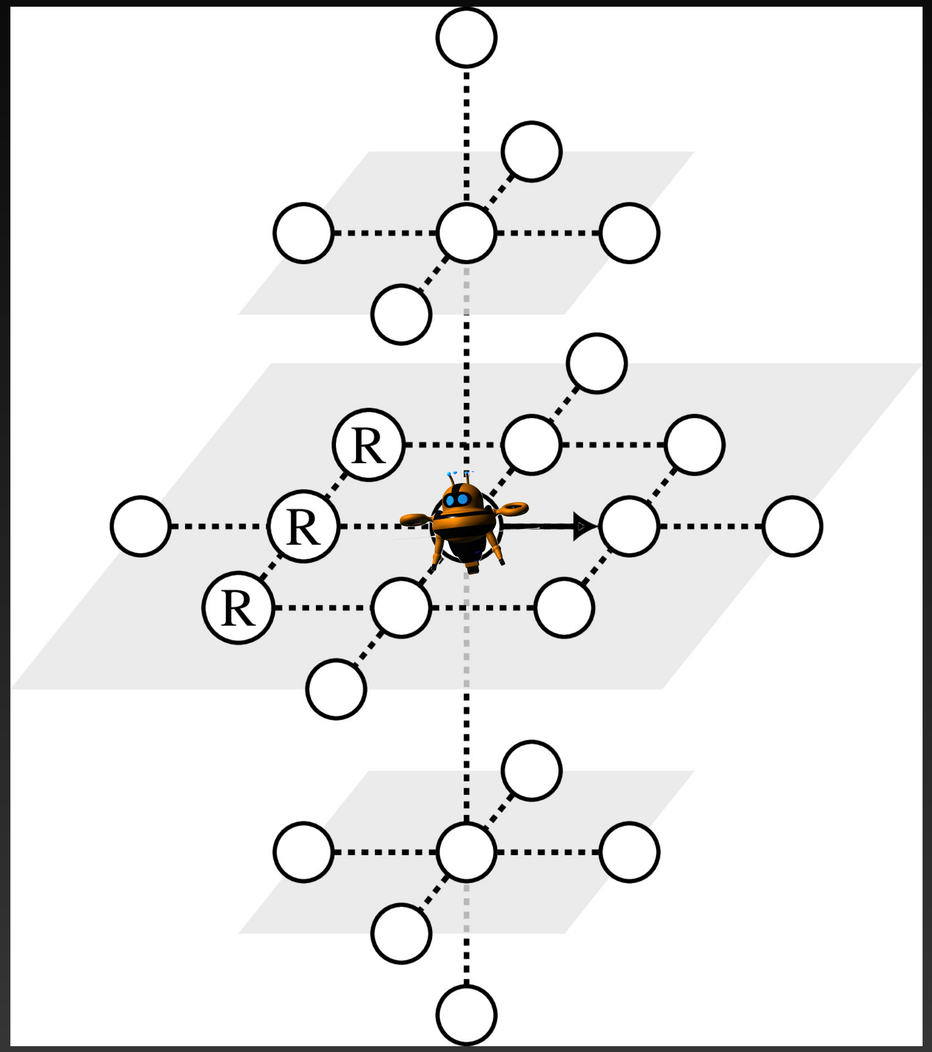




How to move straight

How to move straight





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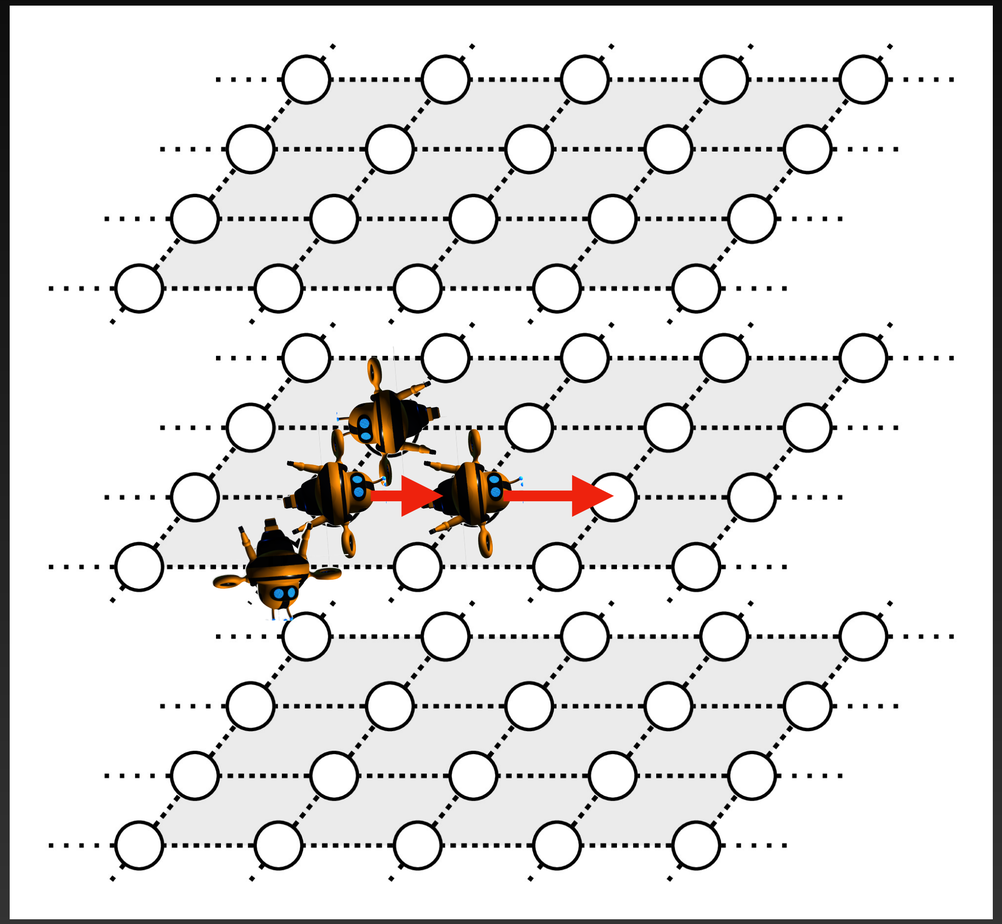

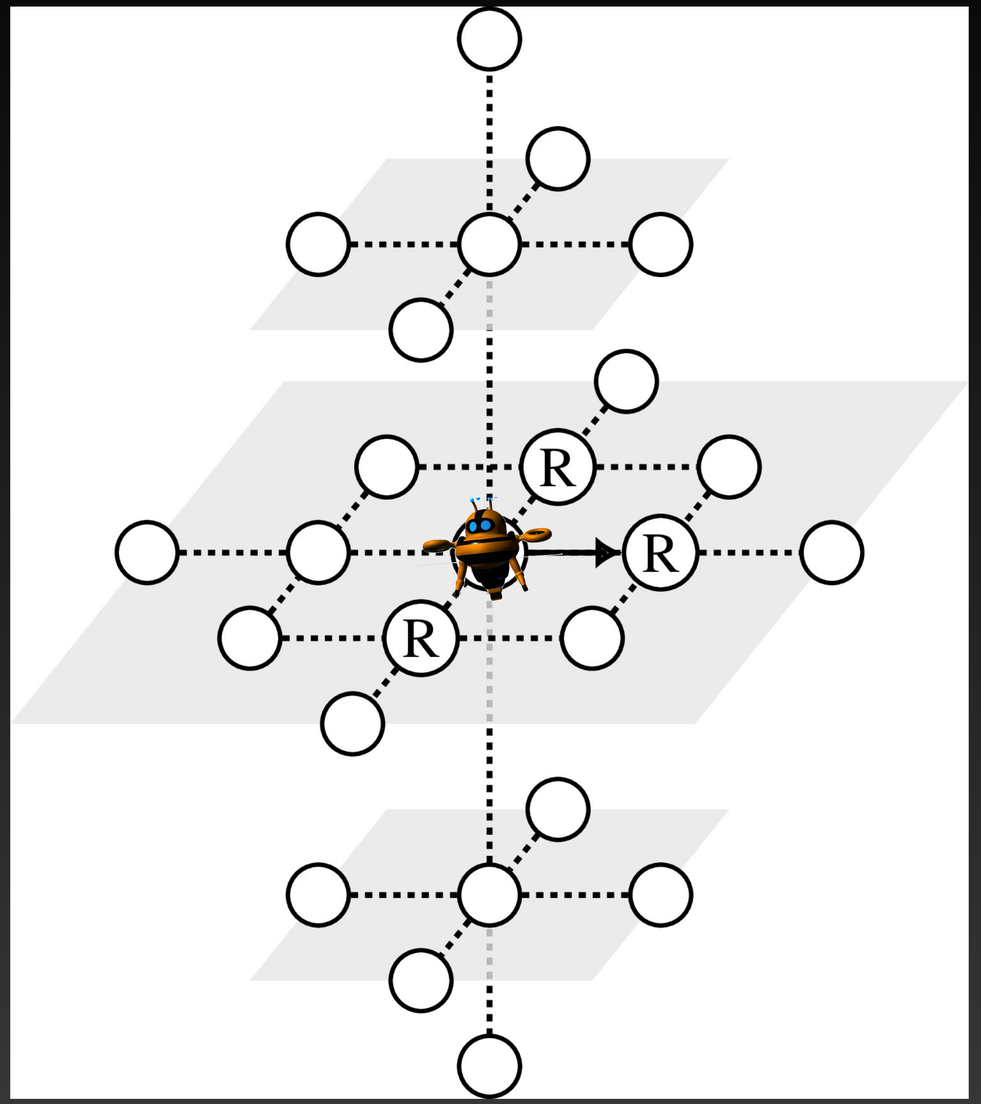

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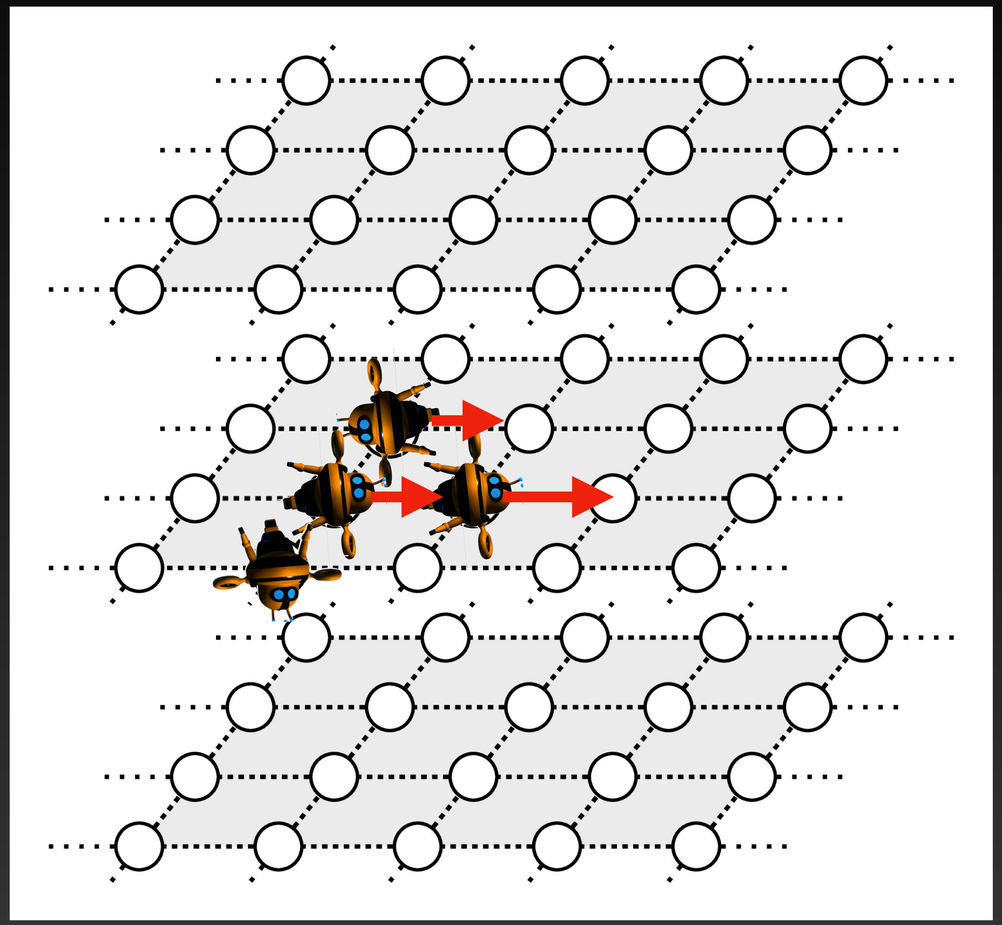
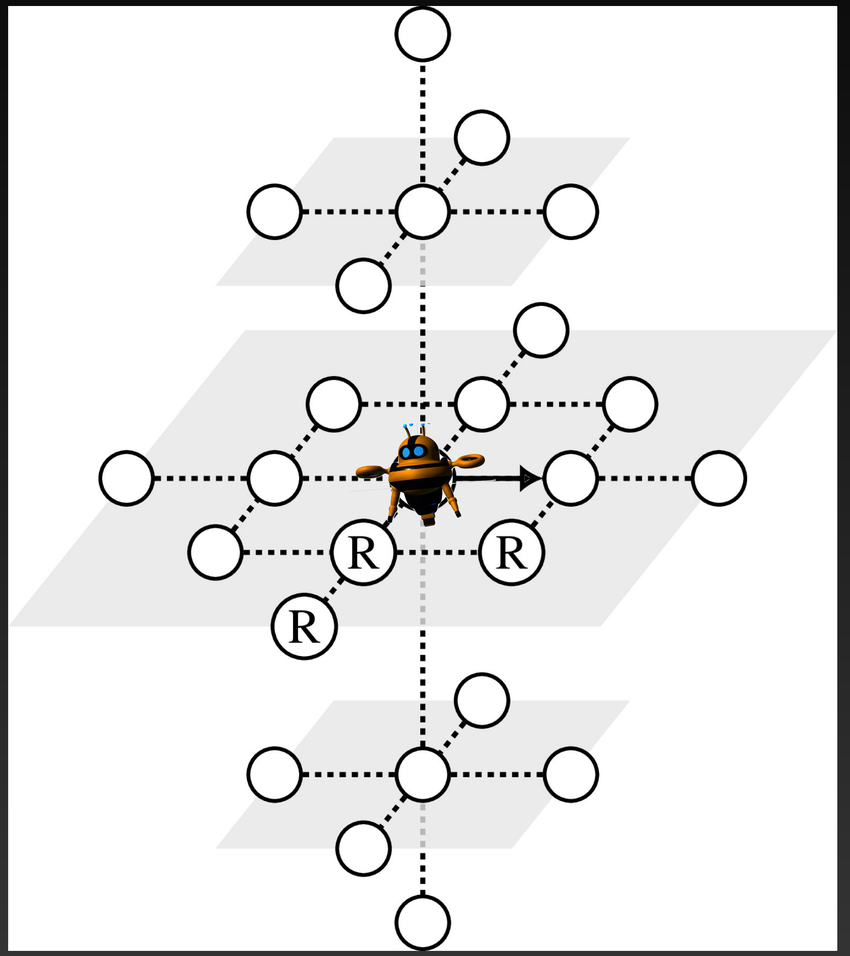
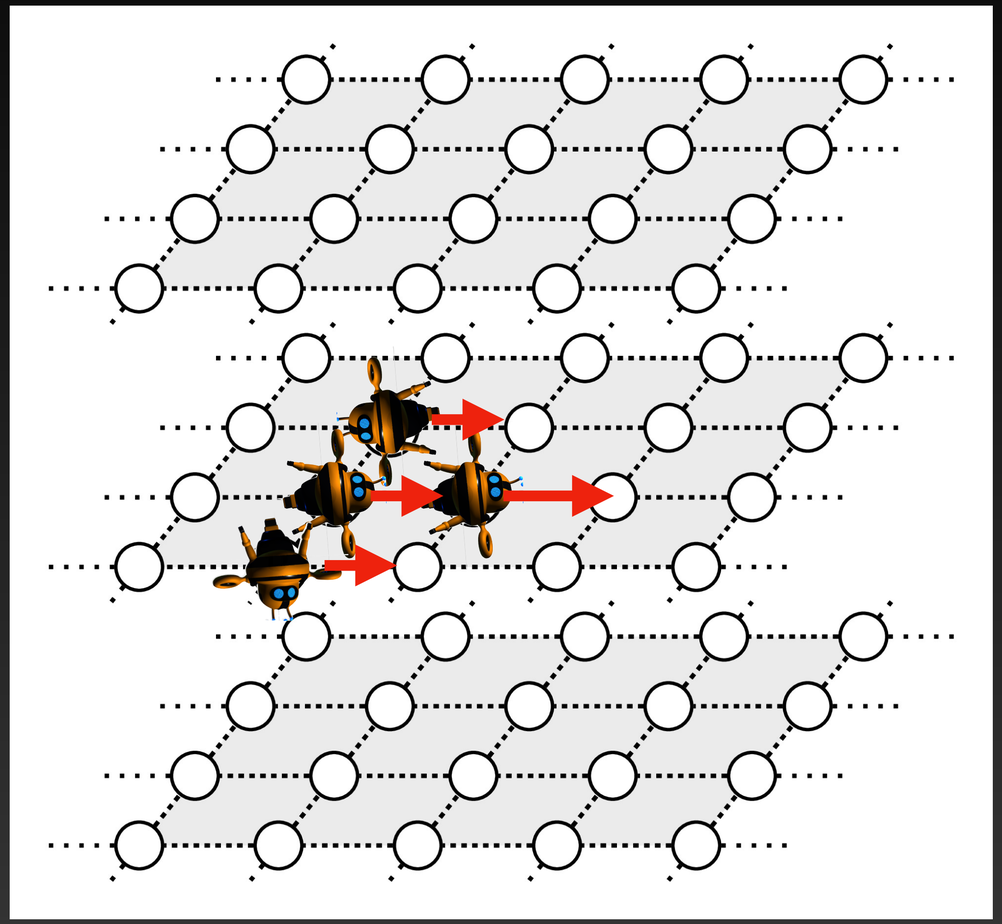
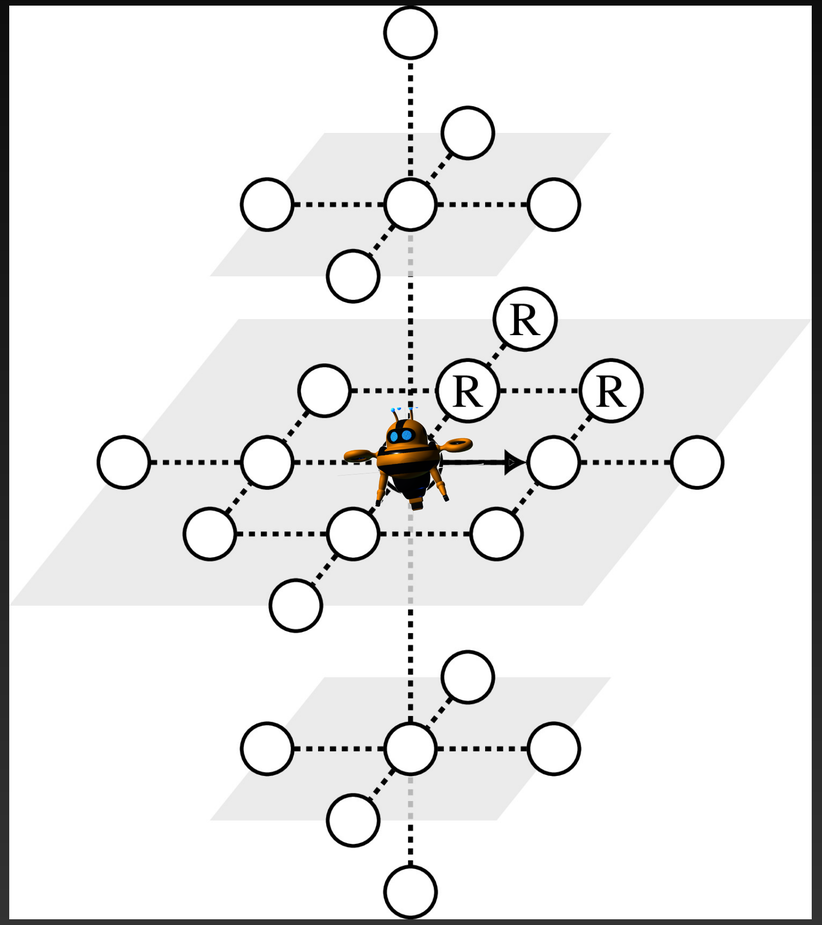




How to move straight

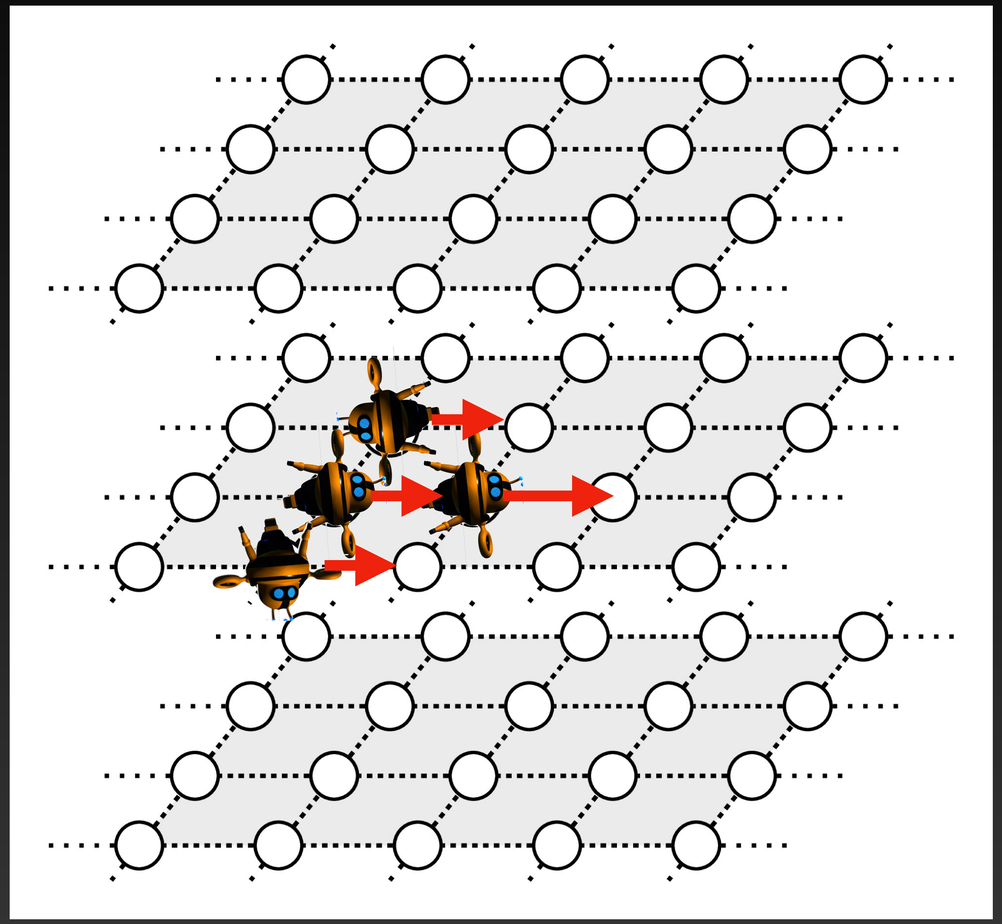
Look and Compute





How to move straight

Move



How to move straight

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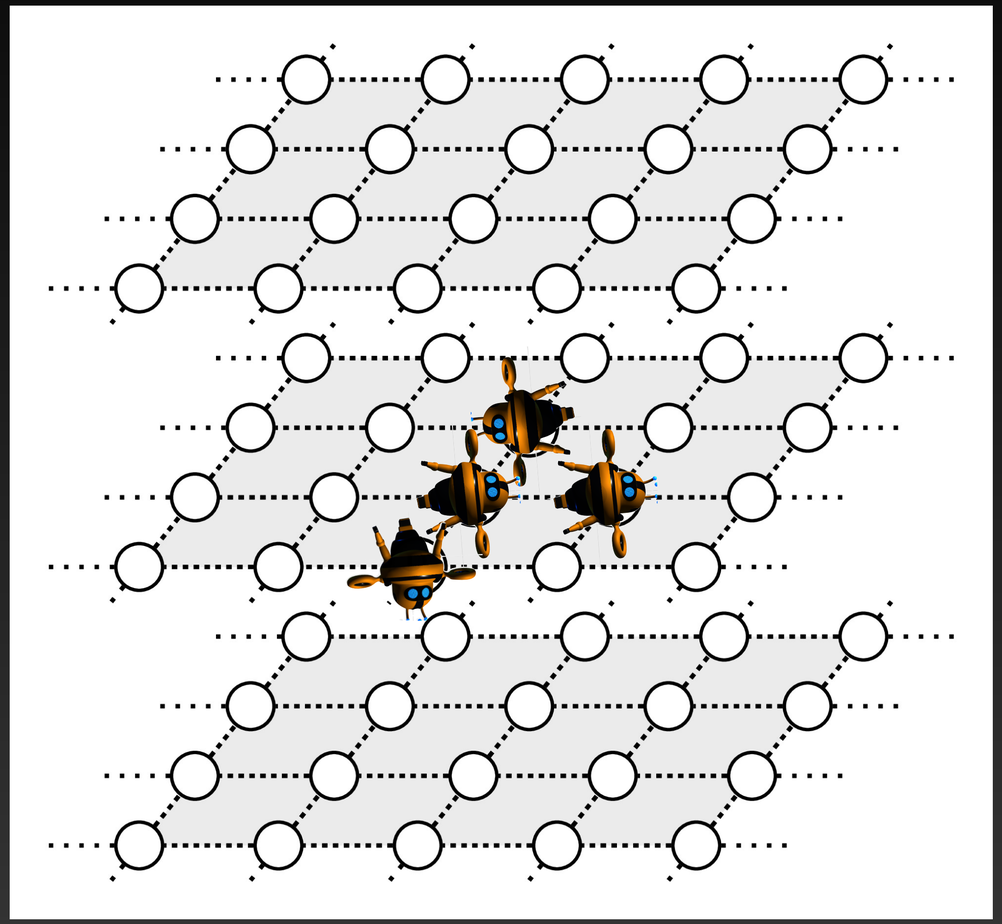
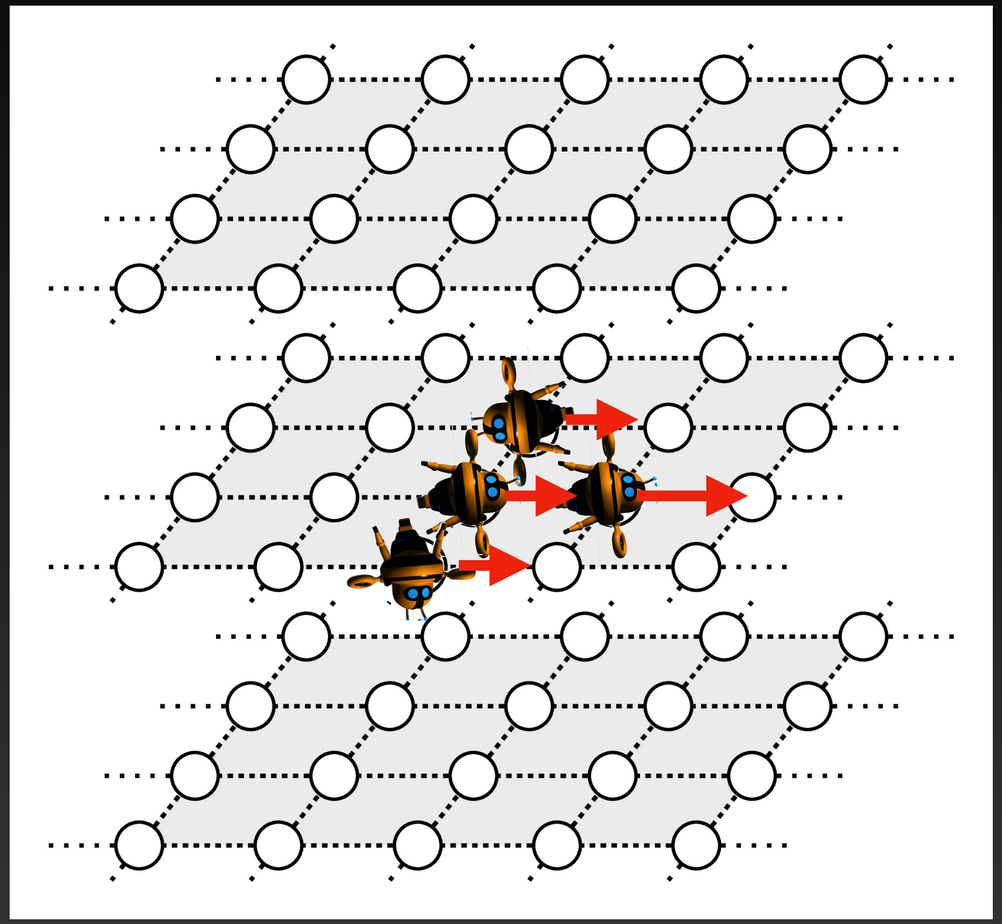


How to move straight

Look and Compute



How to turn ?

https://bramas.pages.unistra.fr/robot-grid-exploration-simulator/?algo1.web-algo
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Is it possible with 2 beedroids with visibility one ?

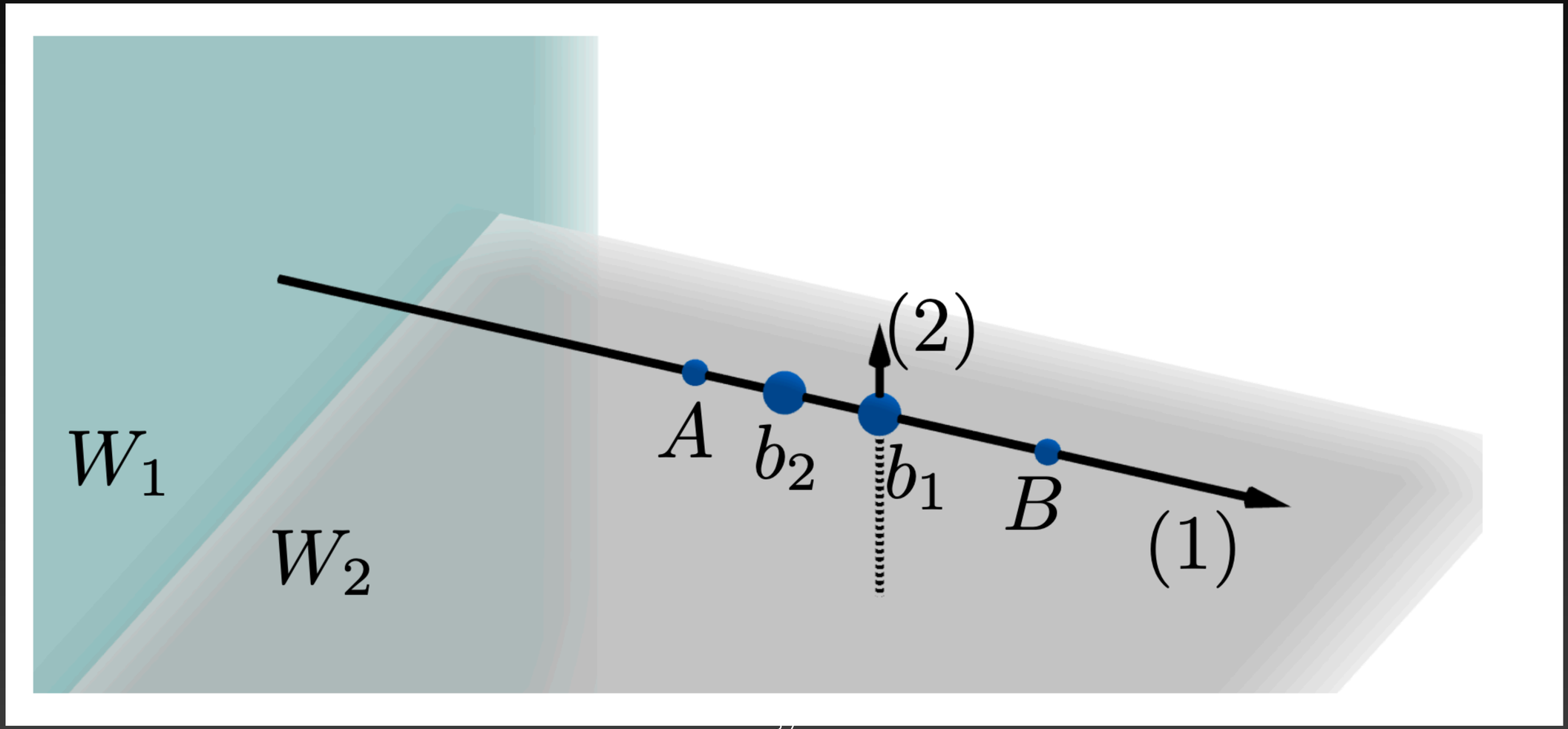
No

Proof: Hilarious

> My favorite part of the proof: basically, if the two beedroids try to move away from the walls, then there exists an execution where they come back quickly close to a wall

Is it possible with 2 beedroids with visibility one ?

No **Proof:** Hilarious



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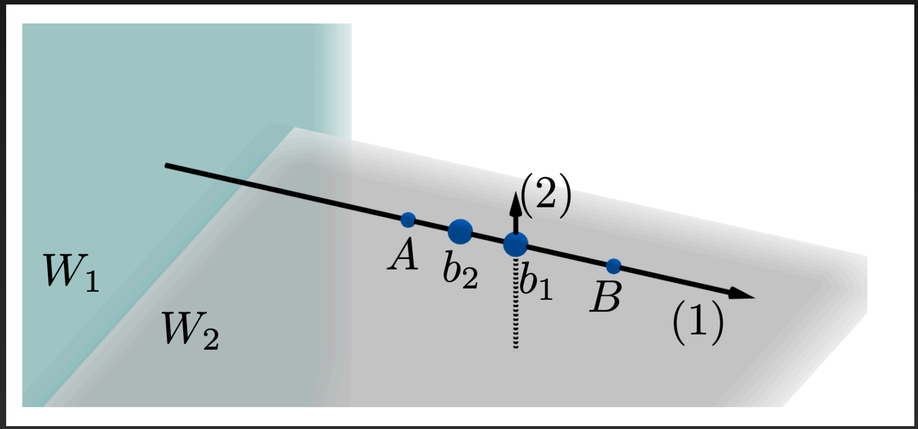

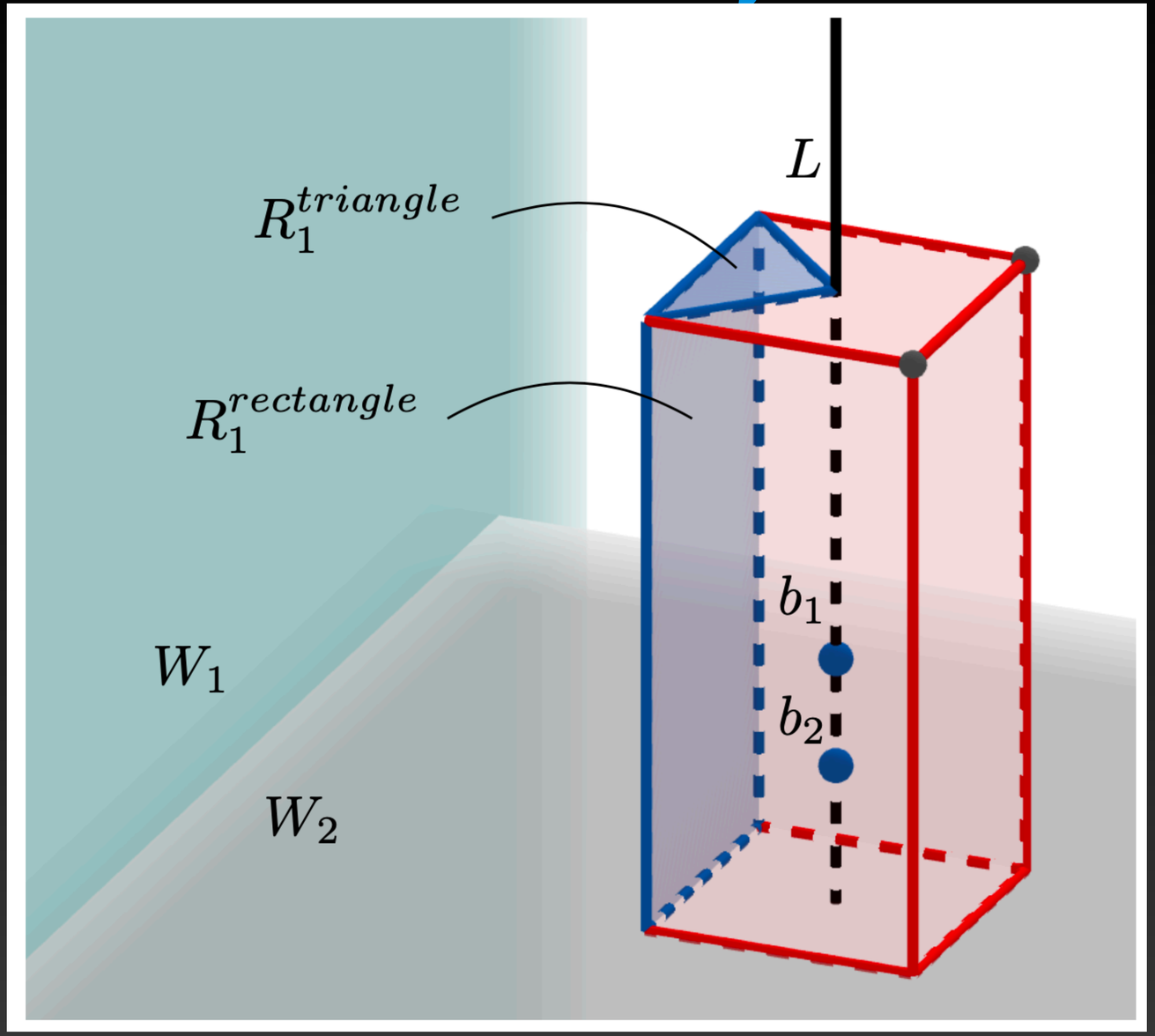

Summary of our contributions

Summary of our contributions

- 2 beedroids with visibility 1 cannot explore the 3D grid, even when equipped with lights
- 3 beedroids with visibility 1 and with lights, are sufficient
- 5 beedroids with visibility 2 and without lights are sufficient

Thank you