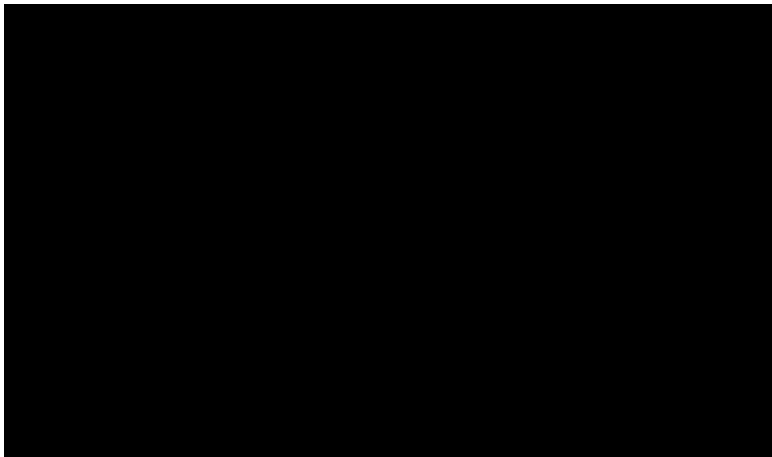
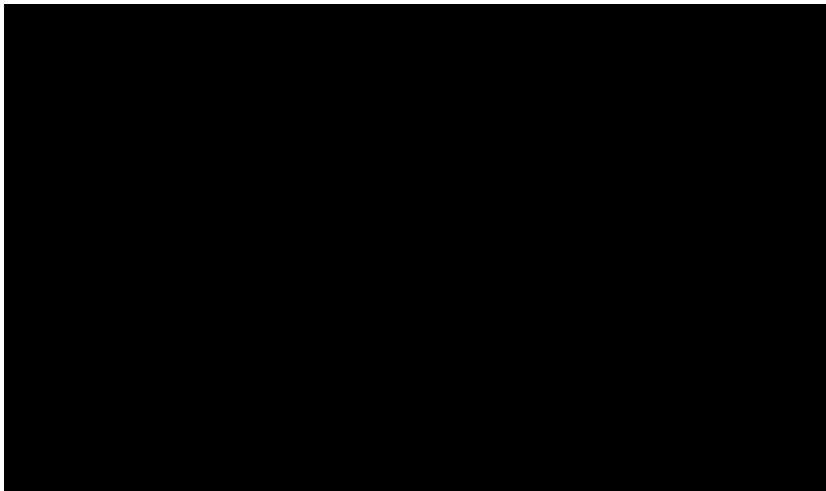


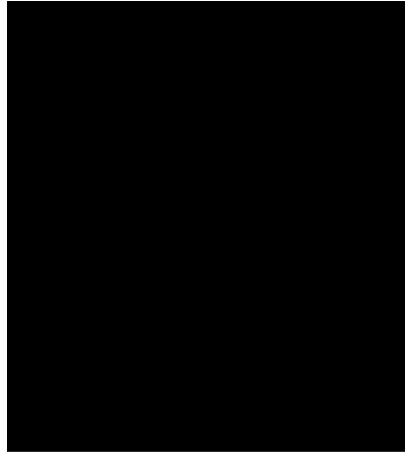
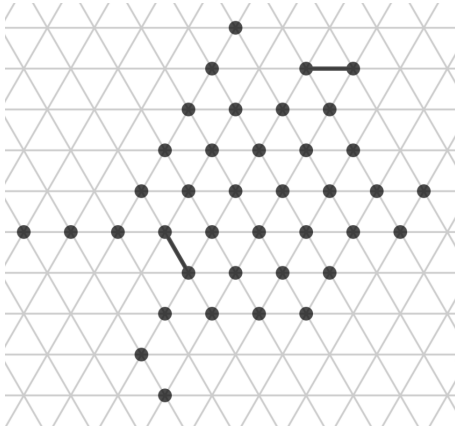

Programmable Matter

Andreas Padalkin, Christian Scheideler, Daniel Warner

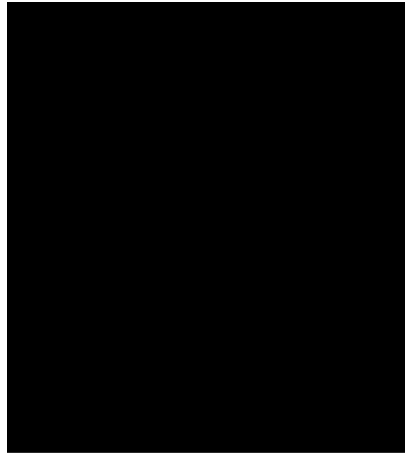
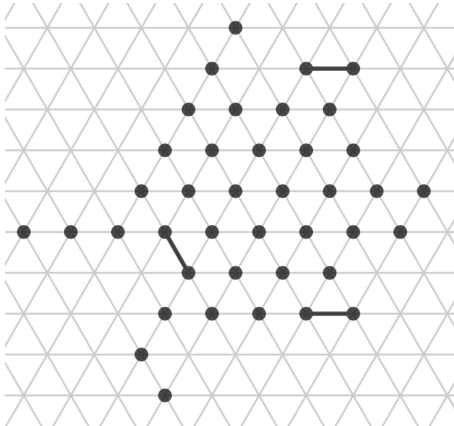




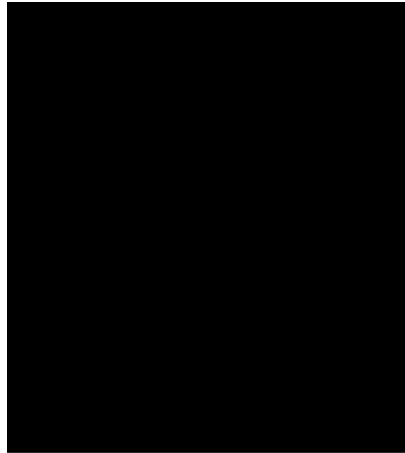
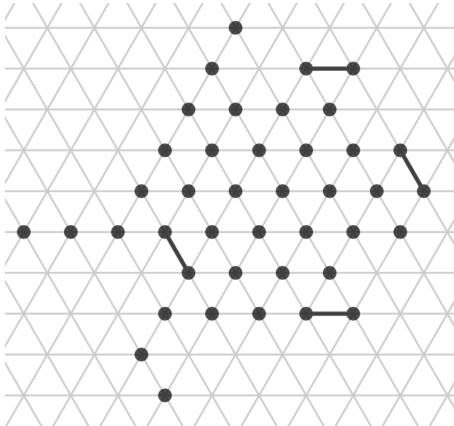
Geometric Amoebot Model



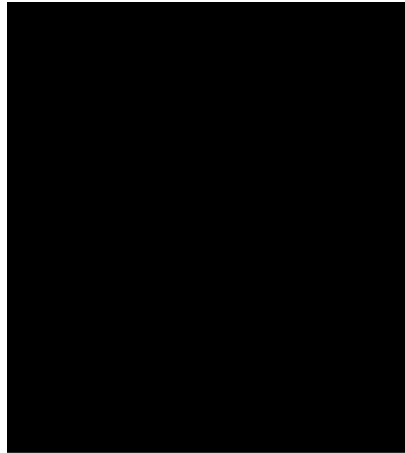
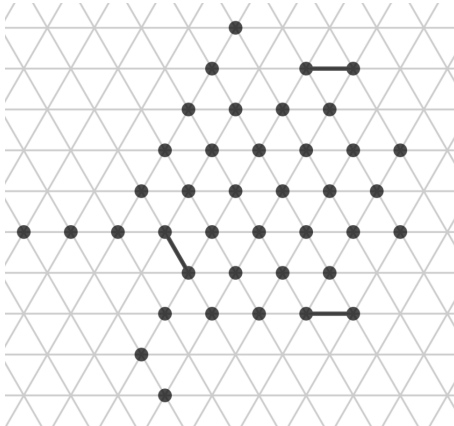
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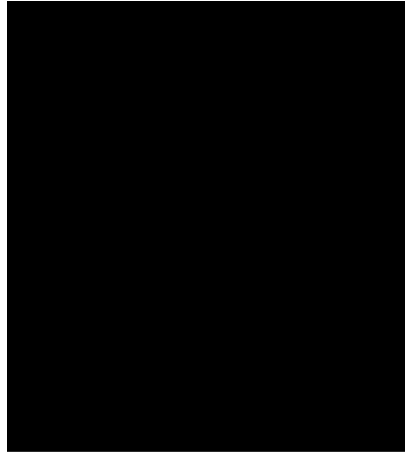
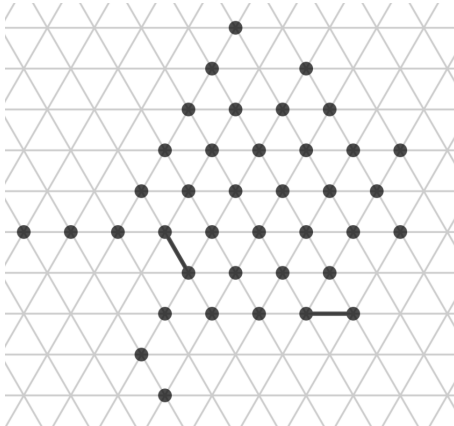
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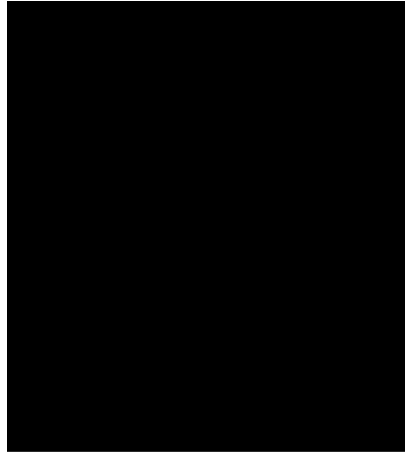
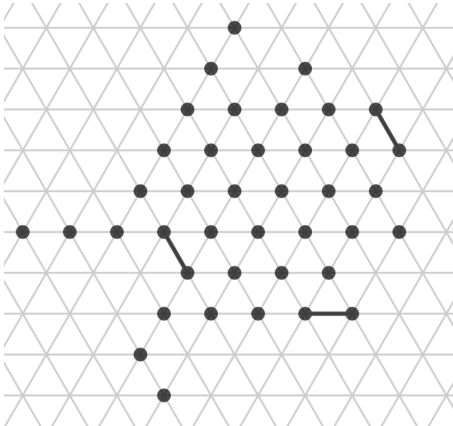
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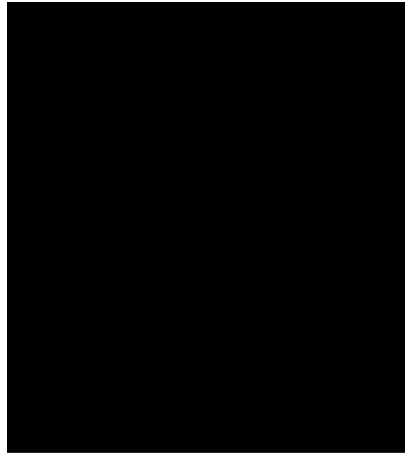
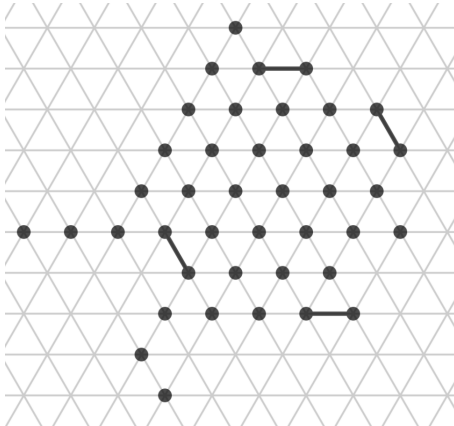
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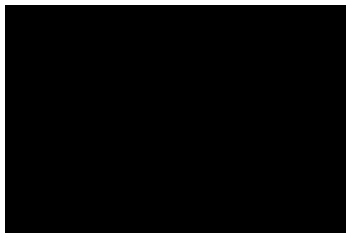
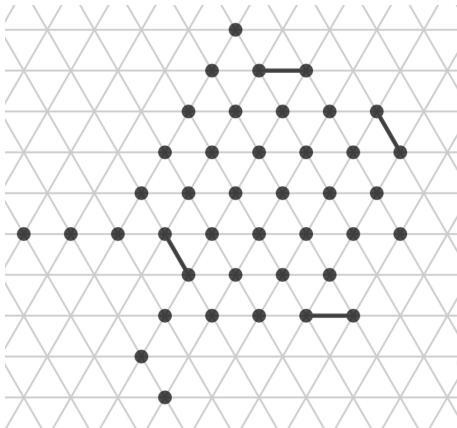


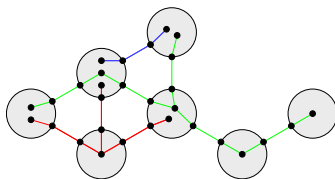
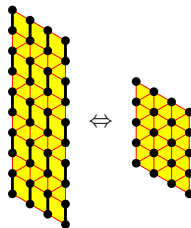
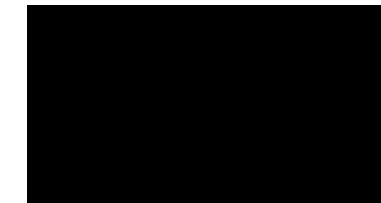
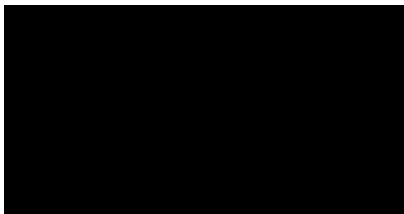
Geometric Amoebot Model



Geometric Amoebot Model







Algorithmic Results

Problem	Common Chirality	Runtime
Leader election	No	$\Theta(\log n)$ w.h.p.
Consensus	No	$O(1)$
Compass alignment	Yes	$O(\log n)$ w.h.p.
Chirality agreement	No	$O(\log n)$ w.h.p.
Shape recognition		
Parallelograms	No	$O(1)$
Parallelograms with linear side ratio	No	$\Theta(\log n)$ w.h.p.
Parallelograms with polynomial side ratio	No	$\Theta(\log n)$ w.h.p.
Universal shape recognition	Yes	$O(1)$
Symmetry detection	No	$O(\log^5 n)$ w.h.p.
Global maxima	No	$O(\log^2 n)$
Spanning tree	No	$O(\log^2 n)$

■ Structure of the Project Group

Goal

- Design, analyze, and simulate algorithms

First phase: Seminar

- Read papers about the amoebot model and the circuit extension

Second phase: Implementation/Design/Analysis

- Implement and test existing algorithms
- Design new algorithms

Prerequisites

- Ability to understand scientific papers
- Basic programming skills
- Ideally, also analytical skills
- High motivation (programmable matter is a cool topic!)



Thank you for your attention

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