

In this starter talk, I will provide an overview of my doctoral research. The main focus are two extensions to the geometric amoebot model - a model for programmable matter. Inspired by the nervous and muscular system, we propose the reconfigurable circuit extension and joint movement extension.

The reconfigurable circuit extension allows the particle structure to interconnect particles by so-called circuits. A circuit permits the instantaneous transmission of signals between the connected amoebots. Among others, we consider problems regarding the coordination of the particles (e.g., leader election, compass alignment) and the aggregation of information about the particle structure (e.g., shape recognition, symmetry detection).

The joint movement extension allows the particle structure to perform expansions and contractions on a larger scale in comparison to the original model. Among others, we consider problems like shape transformation, motion along a surface, and coating.