

Agent-based Modeling for Self-Assembled Robotics

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Firstly, I would like to commend the authors on their interesting approach to robotic self-assembly. However, I also feel that they may have been a bit too quick to discount modeling and simulation in the paper by referring to the rather special case of simplification of mathematical/computer simulation models to avoid intractability. Firstly, modeling and simulation occupy a very important and growing role in Science, as evident from the 2013 Nobel for Chemistry awarded for computational models of Complex Chemical Systems (1). Paradigms such as Agent-based modeling (ABM) have also gained vast acceptance in numerous fields of science (2) with the modeling of self-assembling robotic systems not being an exception (3). Actually, the presented "Kilobots" platform can also be viewed as a "physical simulation" because in essence, the robots are a cheaper version of large-scale more expensive robots. Their motility obviously neither matches the motility rates in real world living systems, with some organisms such as *E. coli* doing 20 and *M. jannaschii* doing upto 500 body lengths per second (4) nor that of more expensive robotic systems. To summarize, the presented system can itself be considered as a "physical simulation" system as it uses simpler robots to evaluate algorithms for more advanced but expensive robots. Therefore, it is also important not to discount modeling and simulation in general, and simulation paradigms such as agent-based modeling, in particular for robotic self-assembly – the more tools we have in our toolbox, the better we will be at understanding, modeling and engineering for science. Anyways, I would like to thank the authors for a nice article.

References

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