# Abstract Title

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ABSTRACT

Abstracts should briefly outline the main features, results and conclusions as well as their general significance, and contain relevant references. The abstract has to be written in English with Times-Roman letters. The number of lines of the abstract body should not exceed 400 words. Up to three references may be included in the abstract and will be counted toward the 400 words. No figures or equations are allowed.

Soft robots are difficult to design, and a large area of the design space remains unexplored. Using genetic algorithms is an effective method to explore the design space [1]⁠. However, the simulation and prediction of the behaviour of soft bodies is computationally expensive due to their physical properties. An efficient method of representing these bodies is desirable. This would allow for faster and more effective design processes to be widely implemented.

Two-dimensional soft-bodied creatures will be evolved virtually using sequential iterations of numerical optimization. Soft bodies will consist of unit cells with defined behaviours and responses to an applied internal pressure. Complete soft bodies will be defined using a generalized recursive encoding such as Lindenmayer systems or CPPN-NEAT [2]⁠. These bodies should behave according to real-world physics and will be modelled with accurate material models. Material models appropriate for non-linear hyper-elastic FEM will be used.

It is expected that soft-bodied models capable of completing the set tasks will be obtained with greatly improved computing times regarding the evolution and modelling of the bodies. The methodology should be easily replicable and adaptable. Some 3D modelling should be done as well and compared to the 2D results. Physical replicas of some well-performing models may be produced as a proof of concept.

In conclusion, L-systems/CPPN-NEAT allow for much faster and more efficient evolution of soft-bodies, due to their inherently compactible nature, and may be used in the future to obtain soft robotic models for a wide range of applications.

REFERENCES

[1] K. Sims, “Evolving virtual creatures,” *ACM*, pp. 15–22, 1994.

[2] J. D. Hiller and H. Lipson, “Evolving amorphous robots,” *Artif. Life XII Proc. 12th Int. Conf. Synth. Simul. Living Syst. ALIFE 2010*, pp. 717–724, 2010.