Lifelike Computing Systems Workshops (LIFELIKE 2020 & 2021)

Jean Botev[1], Peter R. Lewis[2], Anthony Stein[3] and Sven Tomforde[4]

[1]University of Luxembourg, Luxembourg
[2]Ontario Tech University, Canada
[3]University of Hohenheim, Germany
[4]University of Kiel, Germany

Technological systems have been a part of the human way of life since prehistory. While initially taking the form of passive tools, such as axes and spoons, the industrial revolution saw the advent of powered, mechanised technology, operating "under their own steam" without direct human control over every action. By integrating more complex information processing machinery, automation evolved into autonomy, as decision-making and self-regulation became features of modern technology. Now, so-called "intelligent systems", embodying techniques from the field of Artificial Intelligence (AI), are designed with the explicit intention of replicating behaviours and the sorts of things that minds do inside technological systems.

At the same time, the study of artificial life has explored the properties of living systems, both as they are found in nature, as they might be, and as they can be built by humans. This has exposed a large variety of mechanisms that produce qualities typically associated with life. Examples include self-organisation, homeostasis, self-replication, evolution, learning, self-awareness, and many others besides. The aim of the Lifelike Computing Systems workshop is to learn from the study of life and living systems in order to develop new, useful, 'lifelike' systems; a further aim is to identify when such features are of value. The workshop's focus is primarily on engineered, technological systems broadly within the domain of computing.

This new agenda builds on a long and highly successful tradition in biologically-inspired computing, yet not only seeking inspiration in the living world, but also seeking to replicate its qualities explicitly. The agenda also goes beyond pure ALife research, since it has a focus explicitly on building useful, valuable, technological systems for humans, based on ALife principles. The *Lifelike Computing Systems* Workshop evolved from the workshop series on Autonomously Learning and Optimising Systems (SAOS), which grew from the Organic Computing initiative and ran for seven consecutive years at the International Conference on Architecture of Computing Systems (ARCS).

LIFELIKE 2020

The first LIFELIKE workshop was held in 2020 in conjunction with the 18th International Conference on Artificial Life (ALIFE 2020). Following a thorough peer review process with at least three independent expert reviews, three submissions were accepted for publication. Also the invited paper Motivating Interactive Self-Organisation by Sebastian von Mammen (University of Würzburg, Germany) underwent a full peer-review process. The contributions cover diverse topics ranging from humanoid robots and embodied AI, over artificial immune systems for software testing, to general system design methodologies. The opening keynote talk on Designing Robot Swarms and Bio-hybrid Systems for Robustness and Adaptivity by Heiko Hamann (University of Lübeck, Germany) completed the workshop programme.

LIFELIKE 2021

The second LIFELIKE workshop was held in 2021, again in conjunction with the 19th International Conference on Artificial Life (ALIFE 2021). Following the same thorough review process with at least three independent expert reviews, five submissions were accepted for publication, including our foundational paper on Lifelike Computing Systems. The contributions cover topics from meta-heuristics and learning classifier systems, over general deployment considerations to self-explanation of macro-level behaviors. The keynote was held by Felipe Campelo (Aston University, UK), who in his thought-provoking, peer-reviewed contribution titled "Sharks, Zombies and Volleyball - (Super)Natural Computation Gone Wild" discussed the uncontrolled growth of natural metaphors in meta-heuristic search algorithms.