

## Call for Special Session Papers on Evolutionary Computing Application in Hardware Part of IEEE Congress on Evolutionary Computation (CEC)

Evolvable systems encompass understanding, modelling and applying biologically inspired mechanisms to physical systems. Application areas for bio-inspired algorithms include the creation of novel physical devices/systems, novel or optimised designs for physical systems and for the achievement of adaptive physical systems. Having showcased examples from analogue and digital electronics, antennas, MEMS chips, optical systems, carbon nanotubes as well as quantum circuits in the past, we are looking for papers that apply techniques and applications of evolvable systems to these hardware systems.

IEEE CEC 2021 @ <https://cec2021.mini.pw.edu.pl>

IEEE Task Force on EHW @ <http://www-users.york.ac.uk/~mt540/ieece-tf-ehw/>

### Within the scope of this special session are

- Evolutionary Systems for Semiconductor Design, Simulation and Fabrication.
- Evolutionary Robotics and Machine Learning.
- Evolutionary Computing Systems for Artificial Intelligence.
- Evolutionary Substrates for Unconventional Computing.

### Topics include

Evolvable Systems Techniques	Evolvable Systems Applications
<ul style="list-style-type: none"> <li>• Intrinsic/Extrinsic/Mixtrinsic Evolution</li> <li>• On-chip Bio-inspired Approaches</li> <li>• Autonomous Systems</li> <li>• Self-reconfigurable and Adaptive Systems</li> <li>• Novel Evolvable Hardware Architectures (e.g. FPGAs, FPAAs)</li> <li>• Self-repairing, Fault-tolerant Systems</li> <li>• Self-monitoring and Self-testing</li> <li>• Electronic Circuit Synthesis and Optimization</li> <li>• Artificial Immune Systems</li> <li>• Artificial Generative Development</li> <li>• Formal Hardware Models</li> <li>• Bio-inspired Modeling</li> <li>• Many-core Systems</li> <li>• Machine Learning and AI</li> </ul>	<ul style="list-style-type: none"> <li>• Intrinsic Fault-tolerance</li> <li>• Sensor Design</li> <li>• Antenna Design</li> <li>• Hardware System Optimization</li> <li>• Analogue &amp; Digital Electronic Design Optimization (Topology &amp; Parameters)</li> <li>• Evolutionary Robotics</li> <li>• Autonomic and Organic Computing</li> <li>• DNA Computing</li> <li>• MEMS and Nanotechnology</li> <li>• Quantum Computing</li> <li>• Machine Vision</li> <li>• Medical Diagnosis</li> <li>• Mechanical Design Optimization (Bridges, Buildings, Spacecraft, Machines, Lenses, Solar Cells)</li> </ul>

### Special Sessions Chairs

Andy M Tyrrell, University of York, UK  
Martin A Trefzer, University of York, UK

### Paper submission:

Through the normal CEC 2021 paper submission process, selecting 'Evolutionary Computing Applications in Hardware' session as main research topic from the Special Session category.

**Paper submission deadline: January 31, 2021**

## Short Bio's:

**Prof. Andy Tyrrell** joined the Electronic Engineering Department at York in April 1990, and was promoted to the Chair of Digital Electronics in 1998. His main research interests are in the design of biologically-inspired architectures, artificial immune systems, evolvable hardware, FPGA system design and the application of bio-inspired methods for computer engineering. This work has included the creation of the SABRE embryonic processing array, intrinsic evolvable hardware systems, including the RISA and PAnDA chips. Since 1990 he has held external funding of over £10M, including 19 EPSRC grants (10 as PI), including the current Platform Grant Bio-inspired Architectures and Systems and SPANNER.

**Dr. Martin Trefzer** is Senior Lecturer in the Department of Electronic Engineering at York. His research interests include variability-aware analogue and digital hardware design, biologically motivated models of hardware design, evolutionary computation, and autonomous fault-tolerance. He is co-investigator on 3 currently running EPSRC / DSTL projects: Spin Inspired Representations (EP/R032823/1), Platform Grant - Bio-inspired Adaptive Architectures and Systems (EP/K040820/1) and Complex In-materio Computation for Robust Dynamical Control, a KTP on Adaptive Vision Systems, and the previous EPSRC projects PAnDA (EP/I005838/1) and Graceful (EP/L000563/1). He is a senior member of the IEEE, co-chair of the International Conference on Evolvable Systems (ICES), and chair of the IEEE Task Force on Evolvable Hardware.