

# REPORT ON UCNC 2015

## THE 14TH INTERNATIONAL CONFERENCE ON UNCONVENTIONAL COMPUTATION AND NATURAL COMPUTATION

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The 14th International Conference on Unconventional Computation and Natural Computation (UC 2015) took place at the University of Auckland, New Zealand, 31 August – 4 September 2015. It was organised by the Department of Computer Science and was held at the University’s School of Engineering. The conference received support from the Centre for Discrete Mathematics and Theoretical Computer Science, and from the Department of Computer Science, University of Auckland.

The fully international complement of authors and delegates came from across the globe: Australia, Austria, Brazil, Canada, China, Czech Republic, Finland, France, India, Israel, Italy, Japan, Korea South, Latvia, Malaysia, Netherlands, New Zealand, Philippines, Poland, Switzerland, United Kingdom, United States.

The invited keynote speakers and their talks were

- Rūsiņš Freivalds (Faculty of Physics and Mathematics, University of Latvia) “Ultrametric algorithms and automata”, introducing us to  $p$ -adic numbers and their use in probabilistic algorithms.
- Giuseppe Longo and Barbara Bravi (Ecole Normale Supérieure, Paris, France) “The Unconventionality of Nature: Biology from Noise to Morphogenesis”, on a wide variety of examples of noise in biology, and how it can contribute to the formation of the biological phase space.
- Mark Sagar (Laboratory for Animate Technologies, Auckland Bioengineering Institute) “Neurobehavioural Animation”, on real-time computational models of the face that incorporate models of the brain to help express emotions and other states, including a demonstration of a virtual baby interacting with the speaker.
- Yaroslav D. Sergeyev (University of Calabria, Italy) “The Infinity Computer and numerical computations with infinities and infinitesimals”, on the use of a new numeral, grossone, in calculations.

There were two invited tutorials:

- “Textures and Realism: Turing tests for visual computation”, by John P. Lewis (Weta Digital, and Victoria University of Wellington), on new algorithms for rendering (hyper)realistic textures.
- “Quantum Computing Meets the Real World”, Kristen Pudenz (Lockheed Martin) on the D-Wave quantum computer.

The full conference comprised these keynotes and tutorials, together with the scientific programme of technical presentations of the published papers, and a poster session.

Proceedings of UCNC 2015 are published in the Springer series as LNCS volume 9252 (ISBN 978-3-319-21818-2). The volume contains papers from the invited speakers and tutorial presenters, and 16 refereed contributed papers.



Figure 1: Delegates at UCNC enjoying the New Zealand landscape at Lion Rock, Piha. Photo credit: Wai Loong Tham

In association with the main technical conference, there were four associated workshops and special sessions on related unconventional topics:

- Biological Cell Information Processing Workshop

- Workshop on Membrane Computing (WMC)
- Unconventional Computation in Europe: “Books, Films and Roadmaps”
- Physics and Computation

Particular highlights of the conference for me, in addition to some of the excellent keynotes and tutorials, were two presentations on tiling theory, by Matthew Patitz. Tiling theory well-exemplifies unconventional computation: it is *unconventional* both in that it has an implementation in pieces of sticky DNA and in that it focusses on computation as construction; it is *computation* in that it has a well-developed theory that goes hand-in-hand with the implementation substrate.

The conference outing introduced delegates to the utterly beautiful New Zealand landscape. On the Tuesday afternoon it obligingly stopped raining, and we piled into the bus taking us on a precipitous tour of a variety of locations: a cliff top walk, a subtropical rainforest walk, a visit to Piha’s Lion Rock on a black volcanic sand beach, and finally a snack in venue overlooking Auckland in the setting sun. Local organiser and enthusiast Ulrich Speidel provided fascinating information on many aspects of New Zealand botany.

Further information and photographs can be found at the conference website: [ucnc15.wordpress.fos.auckland.ac.nz](http://ucnc15.wordpress.fos.auckland.ac.nz).

Many thanks for a very well organised event go to: Cristian Calude, Elena Calude, Michael Dinneen, Ulrich Speidel (local chair).

Next year’s UCNC is located at the opposite extreme of the globe: 11–15 July 2016 in Manchester, UK.