

Overview of the Lecture

In October 2011, Jonathan Blackledge gave a series of seminars and short courses at the Centre for Advanced Studies (CAS), Warsaw University of Technology (WUT) as part of his position as Distinguished Professorship at WUT. This included a course on *Information and Communications Security* which was used to compose a CAS textbook. The book was published in March 2012 with the title of *Cryptography and Steganography: New Algorithms and Applications*, ISBN: 978-83-61993-05-6 <http://eleceng.dit.ie/papers/195.pdf>. Edited by Professor Stanisław Janeczko who heads the CAS and is Director of the Institute of Mathematics at the Polish Academy of Sciences, the book provides an account of how algorithms can be designed to both encrypt and hide information. Based on research currently being undertaken in the Information and Communication Research Group <http://eleceng.dit.ie/icsrg> this lecture serves two purposes: (i) to formally launch the book (a limited number of copies will be available); (ii) to provide a background to the research being undertaken on the development of new algorithms and applications in the field of *Cryptology*.

By providing a short historical background on how to design and 'break' various ciphers, the lecture introduces an approach to constructing *meta-encryption-engines* using deterministic chaos and evolutionary computing. This approach has led to the creation of a new encryption product called *Crypstic*. Based on a Hothouse 'Technology to License', *Crypstic* is a realisation of the technology coupled with a range of covert access techniques implemented on a USB memory stick. The lecture explains why this approach can help in overcoming the issue of securing data on the 'Cloud' using a demonstration of *Crypstic* and considers the political and economic aspects of Cryptology and the principles upon which homeland security operates with regard to public communications systems.

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Jonathan Blackledge gained a PhD in Theoretical Physics from London University, England in 1984 and a second PhD in Mathematical Information Technology from Jyväskylä University, Finland in 2010. He has published over 200 scientific and engineering research papers, 12 books, 15 patents and has been supervisor to over fifty research (PhD) graduates. He lectures widely to a variety of audiences composed of mathematicians, computer scientists, engineers and technologists in areas that include cryptology, communications technology, the use of artificial intelligence in process engineering, financial analysis and risk management. His current research interests include computational geometry and computer graphics, digital signal/image processing, nonlinear dynamical systems modelling and computer network security, working in both an academic and commercial context. He holds Fellowships with leading scientific and engineering Institutes and Societies in the UK and Ireland including the Institute of Physics, the Institute of Mathematics and its Applications, the Institution of Engineering and Technology, the British Computer Society, the Energy Institute, the Royal Statistical Society, Engineers Ireland and the City and Guilds London Institute. He was made a Freeman of the City of London in 2007 and an Honorary Professor of DIT on 18th February, 2012.