**Proposal for a Workshop on the Ethics and Social Implications**

**of Computational Intelligence**

**(Within the IEEE World Congress on Computational Intelligence, 8-13 July 2018)**

Organizers

All of the organising committee are members of the CIS Task Force on Ethics and Social Implications of Computational Intelligence.

* Primary Point of Contact: Associate Professor Matthew Garratt, UNSW Canberra, Australia, (Chair of the CIS Task Force on the Ethics and Social Implications of CI) m.garratt@adfa.edu.au
* Professor Chuan-Kang Ting, National Chung Cheng University, Taiwan, ckting@cs.ccu.edu.tw
* Dr Keeley Crockett, Manchester Metropolitan University, UK, K.Crockett@mmu.ac.uk
* Associate Professor Clare Bates Congdon, Bowdoin College, USA, congdon@bowdoin.edu
* Dr Mario Pavone, University of Catania, Italy, mpavone@dmi.unict.it
* Professor Robert Reynolds, Wayne State University, USA, reynolds@cs.wayne.edu
* Dr Sean Goltz, Edith Cowan University, Australia, n.goltz@gmail.com
* Professor Christopher Nehaniv, University of Hertfordshire, UK, C.L.Nehaniv@ac.uk
* Professor Sheridan Houghten, Brock University, Canada, shoughten@brocku.ca

Description of the workshop:

Today, Computational Intelligence (CI) techniques are embodied within many technologies. For example, Fuzzy Control is a central piece within most control systems for technologies such as washing machines. Deep Neural Networks are sitting today on most smart phones offering search-by-image capabilities. Evolutionary Computation is creating a leap forward in industry and robotics when coupled with 3D printing that allows evolved robots to come to life quickly and with low cost. CI researchers excel in designing and implementing these technologies to create significant positive impact on the economy and human society as a whole. It is incumbent upon us as socially-responsible CI researchers to understand the ethical and social implications of the technologies we create and champion.

The objective of the proposed workshop is to discuss the ethical and moral principles that govern the behaviour of CI technology, as well as the designer. These principles should cover the following: balancing the ecological footprint of technologies against the economic benefits; managing the impact of automation on the workforce; ensuring privacy is not adversely affected; and dealing with the legal implications of embodying CI technologies in autonomous systems. As the largest technical event in the field of CI, WCCI provides an ideal forum for discussion of these issues. Topics of interest include but are not limited to:

* Potential impact of CI on the human workforce and distribution of wealth
* Potential impact of CI on privacy
* Possible bias in CI systems (e.g. can a deep neural network trained to detect lying from spoken language be more likely to get a false positive results for one racial group more than another)
* Safety of CI systems embedded in autonomous and automated systems (e.g. autonomous vehicles, nuclear power plant control systems)
* Human-machine Trust in CI Systems
* Specific applications of CI and the potential ethical/social benefits and risks (e.g. Marking of student assignments, assessment of legal documents, automated decision making in the stock market, medical research)
* Legal implications of CI (e.g. legal liabilities when things go wrong; how do you certify systems that can ‘learn’ from their environment etc)
* Need and direction for developing formal standards in ethics for CI
* Public perception of CI
* Impact of CI on human cognition and social relatedness

Outcomes for the workshop will include identification of the highest priority areas for future research in this field and potential directions for future activities. Presentations and discussions at this workshop will inform a task force discussion paper following the workshop.

Motivation

An IEEE WCCI workshop on this topic is needed to help identify the main ethical and social issues confronting the widespread implementation of CI. CI can provide great benefits to society but also will introduce some challenges. For example, are CI systems used for marking student assignments capable of bias? Moreover, is the current legal framework capable of dealing with the repercussions of decisions made by CI systems on matters such as finance, medical treatments or autonomous vehicle collision avoidance. The answers to many of these questions are in many cases unknown, and can vary based on global cultural, political and business contexts. We would like to discuss solutions to some of these challenges, what safeguards might be required (both technologically and legally) and how we can better present the benefits of CI to the wider community.

Workshop duration, format, activities, and schedule

Workshop duration: 4 Hours

Format: We would like to allocate one hour to keynote presentation(s), approximately 2.5 hours for presentation of accepted papers and 30 minutes for a panel discussion.

Papers will be limited to 15 minutes each with a 5-minute discussion after each paper.

The final panel discussion will be used to summarise the issues, determine future aims of the related task force and plan future activities in this area. The panel will consist of selected members of the organising committee and keynote speakers.

Program committee members

Matthew Garratt Chuan-Kang Ting Keeley Crockett

Clare Bates Congdon Mario Pavone Robert Reynolds

Garry Greenwood Sean Golz Christopher Nehaniv

Sheridan Houghten Jai Galliot

Organizer Biographies

**Chuan-Kang Ting** received the B.S. degree (1994) from National Chiao Tung University, Taiwan, the M.S. degree (1996) from National Tsing Hua University, Taiwan, and the Dr. rer. nat. degree (2005) from the University of Paderborn, Germany. He is a Professor with the Department of Computer Science and Information Engineering, National Chung Cheng University, Taiwan. His research interests include evolutionary computation, computational intelligence, AI ethics, machine learning, and their applications in music, art, networks, and bioinformatics. Dr. Ting is currently serving as an Associate Editor or Editorial Board Member for five international journals, including the IEEE Computational Intelligence Magazine, IEEE Transactions on Emerging Topics in Computational Intelligence, Soft Computing, and Memetic Computing. He serves as the Editor of IEEE Computational Intelligence Society (CIS) Newsletter, Vice Chair of Intelligent Systems Applications Technical Committee, Chair of Creative Intelligence Task Force, and Vice Chair of Intelligent Network Systems Task Force, all in IEEE CIS. He is also an Executive Board Member of Taiwanese Association for Artificial Intelligence (TAAI). He has been involved in organization of many international conferences, symposiums, workshops, and special sessions. He serves as the Special Session Chair of IEEE WCCI 2016, WCCI 2018, and CEC 2019. He was the Chair of the IEEE Symposium on Computational Intelligence for Creativity and Affective Computing 2013, Program Chair of TAAI 2012 and 2015, and Organizing Chair of AI Forum 2012.

**Robert G. Reynolds** received his Ph.D. degree in Computer Science, specializing in Artificial Intelligence from the University of Michigan, Ann Arbor. He is currently a professor of Computer Science and director of the Artificial Intelligence Laboratory at Wayne State University. He is also an Adjunct Associate Research Scientist with the Museum of Anthropology at the University of Michigan-Ann Arbor. His interests are in the development of computational models of cultural evolution for use in the simulation of complex organizations and in computer gaming applications. Dr. Reynolds produced a framework, Cultural Algorithms, which is a data intensive evolutionary search algorithm based upon principles of social and cultural evolution. He has applied this approach to solving data intensive problems and has received funding from both government and industry to support his work. He has co-authored three books and published over 250 papers on the evolution of social intelligence in journals, book chapters, and conference proceedings. He is currently an associate editor for the IEEE Transactions on Evolutionary Computation. He is a member of the IEEE USA Research and Development Policy Committee. Dr. Reynolds is a senior member of the IEEE.

**Matthew Garratt** received a BE degree in Aeronautical Engineering from Sydney University, Australia, a graduate diploma in applied computer science from Central Queensland University and a PhD in the field of biologically inspired robotics from the Australian National University in 2008. He is an Associate professor with the School of Engineering and Information Technology (SEIT) at the University of New South Wales, Canberra. Matt is currently the Deputy Head of School (Research) in SEIT and is the chair of the CIS task force on the Ethics and Social Implications of CI. His research interests include sensing, guidance and control for autonomous systems with particular emphasis on biologically inspired and CI approaches. He is a member of the IEEE CIS and robotics and automation society and also senior member of the American Institute of Aeronautics and Astronautics and member of the American Helicopter Society.

**Keeley Crockett** is a Reader in Computational Intelligence in the School of Computing, Mathematics and Digital Technology at Manchester Metropolitan University in the UK. She gained a BSc Degree (Hons) in Computation from UMIST in 1993, and a PhD in the field of machine learning from the Manchester Metropolitan University in 1998 entitled "Fuzzy Rule Induction from Data Domains." She is a Senior Fellow of the Higher Education Academy. She leads the Intelligent Systems Group (Computational Intelligence Lab – launch in 2018) that has established a strong international presence in its research into Conversational Agents and Adaptive Psychological Profiling including an international patent on "Silent Talker." She is a knowledge engineer and has worked with companies to provide business rule automation with natural language interfaces using conversational agents. She is Senior Artificial Intelligence Scientist consultant for Silent Talker Ltd. She is currently a member of the IEEE Task Force on Ethical and Social Implications of Computational Intelligence and has a strong focus on ethically aligned design in the context of intelligent systems development. She has 16 PHD completions and externally examined 5 PhDs. Her main research interests include fuzzy decision trees, semantic text based clustering, conversational agents, fuzzy natural language processing, semantic similarity measures, and AI for psychological profiling. Currently the Principal Investigator (MMU) on the H2020 funded project iBorderCtrl – Intelligent Smart Border Control and CI a UK Knowledge Transfer Partnership with Service Power.

**Nachshon (Sean) Goltz** received his BA (Psy.), LLB and LLM (Law & Tech.) from Haifa University (Israel) and his PhD (Law) from York University (Canada). He is a senior lecturer at Edith Cowan University faculty of business & law and and the Co-Founder of Global-Regulation.com, the largest search engine of legislation from around the world. Dr. Goltz has practiced technology law, provided RegTech advice and held academic positions in Israel, Canada, New Zealand and Australia.

**Sheridan Houghten** received her PhD degree in Computer Science from Concordia University, Montreal in 1999. She is currently a Professor in the Department of Computer Science at Brock University, Canada, where she has also served terms as chair and graduate program director. Her research interests encompass bioinformatics, computational intelligence, coding theory and combinatorial optimization. Sheridan has for several years been a member of the IEEE Computational Intelligence Society Bioinformatics Technical Committee, and has filled a number of related roles including general chair of the 2015 IEEE Conference on Computational Intelligence in Bioinformatics and Computational Biology.

**Christopher Nehaniv** received Honours in Mathematics (Univ. of Michigan, Ann Arbor, 1987) and a Ph.D. in Mathematics (Univ. of California, Berkeley, 1992) for work in the algebraic theory of semigroups, groups, and automata. His research interests include interactive systems engineering, theoretical computer science, algebraic engineering, constructive biology, software engineering, cognitive technology and empowering humans via computers. He is director of the UK EPSRC Network on Evolvability in Biological and Software Systems, Associate Editor of the Elsevier journal BioSystems: Journal of Biological and Information Processing Sciences, Associate Editor of Interaction Studies: Social Behaviour and Communication in Biological and Artificial Systems and a member of the Santa Fe Institute Evolvability Working Group.

**Clare Bates Congdon** received a bachelor of mathematics from Wesleyan University in 1985 and a Ph D. in computer science from the University of Michigan in 1995. She is a visiting associate professor at the Department of Computer Science, Bowdoin College, Brunswick, USA. Her research interests include artificial intelligence, machine learning, genetic algorithms and complex adaptive systems. Clare is Associate Editor, IEEE Transactions on Evolutionary Computation; Associate Editor, IEEE Transactions on Computational Intelligence and AI in Games; chair of the IEEE Computational Intelligence Society Bioinformatics and Bioengineering Technical Committee (two one-year terms, 2011 and 2012) ; vice chair of the IEEE Computational Intelligence Society Games Technical Committee (two one-year terms, 2013 and 2014)) and served on the steering committee of the ACM/IEEE Transactions in Computational Biology and Bioinformatics journal.