connected everything.

Newsletter: Issue 14, Summer 2022

Introduction

Welcome to the summer edition of the Connected Everything newsletter. Within this edition, we share our work to progress Equality, Diversity and Inclusion (EDI) within the digital manufacturing community, including the creation of a set of ideation cards to help researchers think about the EDI implications of their research and share the learnings from the 2021 network of networks EDI survey. We also have a summary of our 2022 conference, which took place in person for the first time in three years! We heard from some fascinating talks, many of which are available on our YouTube page, and thoroughly enjoyed the opportunity to discuss the latest digital manufacturing research with old and new friends.

Connected Everything recognises that diverse, happy teams deliver high quality research outcomes and, therefore, we aim to embed EDI considerations across all our activities. Since the last newsletter, our network has contributed to and supported several initiatives toward making both our network and the wider research culture more inclusive. However, we recognise the importance of measuring our diversity to understand the impact of these initiatives. Further, collecting and sharing EDI data can also drive aspirations, provide a target for actions, and allow institutions to consider common issues. **Therefore, we need your help to complete this 10-minute to complete this year's survey so we can all continue to learn**.

Looking forward to the Autumn, Connected Everything will soon be publishing our learnings from our horizon scanning work investigating the challenges and opportunities for digital manufacturing over the next 10, 20 and 30 years. This piece of work, led by Fiona Charnley and Oliver Fisher, has brought together over 45 digital manufacturing leaders from academia, industry and policy to share their vision of what the future of digital manufacturing holds. We are very grateful to all the people who have taken the time to contribute to this work and look forward to sharing the report with you shortly.

Contents

- EDI survey - Call to action!
- Connected Everything Conference 2022
- EDI cards
- BSSA Workshop
- Cambridge Workshop
- Connected Everything Publications
- Members' news

Please click on the links given throughout the newsletter for further details.

Equality, Diversity and Inclusion Survey - Call to action!

Our **Network Community Survey 2022** is now available for all network members to respond to. Please take 10 minutes to complete this year's survey so we can all continually learn. Our 2021 survey has been incredibly helpful in how we have planned network activities, so they are as accessible as possible for everyone. A summary of the last survey can be found here. Together with researchers from UK Acoustics Network, AI4SD Network and the PETRAS Network, Connected Everything will be presenting the learnings from this survey at the Inter.Noise 2022 conference in Glasgow this August.

It would be great to have a loud Connected Everything voice in the 2022 survey, which can be accessed here.

For a summary of the EDI work that Connected Everything has embed into its activities, please have a look on our website.

Connected Everything Conference, Liverpool in May 2022

After the challenges of the pandemic, Connected Everything finally made it to Liverpool! We had a brilliant couple of days reconnecting with network members and enjoying the glorious weather! The focus of the conference was to share learning from our feasibility studies, discuss ECR career support and hear from Industry. Delegates enjoyed hearing from 25 speakers over the 2 days in a packed agenda and some of us enjoyed an evening walking tour of Liverpool.

ECR panel, chaired by Nik Watson, at the Connected Everything Conference 2022

Keynote presentations were given by:

1. Katherine Bennett (*High Value Manufacturing Catapult*)

2. Andrew Keeley (*Pilkington/NSG*), *'World First as 100% Hydrogen Glass Fired at Pilkington UK'. Summarised here*

3. Kate Black (*University of Liverpool and Meta Additive Ltd*), '*Sharing insights on transferring researching into a multi-million pound spinout company'*

4. Chris Courtney (Made Smarter), *'Made Smarter Innovation'*

Conference sessions also covered:

• Presentations from our funded *feasibility studies*

• Digital manufacturing 20250 workshop with Fiona Charnley (University of Exeter) and Oliver Fisher (University of Nottingham)

• Paul Watson *interviewing* Sarah Sharples to understand the Connected Everything story.

• *Overview of the Equality, Diversity and Inclusion Cards* by Peter Craigon (University of Nottingham) with support from Connected Everything and Future Food Beacon, University of Nottingham.

• ECR panel session chaired by Dr Nik Watson with: Anna Chatzimichali (University of West of England), Bernardo Castro Dominguez (University of Bath), Hamidreza Jahangir (University of Warwick), John Oyekan (University of Sheffield), Mohammad Ahangar (University of Huddersfield), Mohammad Aliyu (University of Huddersfield) and Tien Quach (University of Nottingham).

Research Poster Winners

The conference was all brought to a close when Peter Green presented the winners of the best research poster presentation and runner-up awards. All the posters were of the highest quality, which made the voting extremely close. Feedback included:

1. Best Poster Presentation, **Kartikeya Walia** (*Nottingham Trent University*), *'Modular and reusable industrial robotic system utilising additively manufactured components'*

2. Runner-Up for Best Poster Presentation, **Abhinav K. Singh** (*University of Liverpool*), *'Ink jet printing of nontoxic flexible perovskite solar cells'*

All the posters can be viewed here

Equality, Diversity and Inclusion Cards

Dr Peter Craigon, Future Food Beacon of Excellence and Debra Fearnshaw, Connected Everything ran an introductory session to the novel and innovative EDI cards that have been developed over the past 12 months which help users engage with Equality, Diversity, and Inclusion considerations for their research projects.

The cards originated from a Digital Manufacturing technologies context, however, the suits developed, for example, protected characteristics, uncomfortable questions, activity, and context, can easily be applied more widely across research disciplines. This session explained the cards, the insights gained from user testing, and we discussed suggestions for how they may be used in research.

EDI card examples

Attendees felt the cards gave them ideas and practical ways to engage with EDI in their research projects. The research is supported by the Future Food Beacon of Excellence. A recording of the session, which ran as part of UoN's Diversity Festival can be seen on YouTube. The project team is now writing a paper on the findings and experience of users involved in testing, which will lead to recommendations for taking the project forward.

British Stainless Steel Association (BSSA) Workshop, Aston University in April 2022

In April the BSSA and Connected Everything held a workshop at Aston University in Birmingham. The aim of the day was to explore industrial problems how linking academia and industrialists could address some of the key issues for these businesses.

The meeting was co-hosted by Rob Cooper from the BSSA and Susan Reiblein and Dr Oliver Fisher from Connected Everything. The attendees were a broad mix of academics and business leaders with a focus on material finishing.

Following a general introduction to the stainless-steel industry, we went on to discuss the general issues around the stainless steel industry including supply chain resilience, transport costs and net zero. The BSSA members started to explore the issues they face in more detail. This included heat loss / heat recovery, increasing energy costs,

digitisation of legacy machinery, single use plastic coatings, surface imperfections in substrate materials, waste management and best use of investment finances.

The priority issues defined were then short listed to energy reduction and heat capture, plastic coatings and surface imperfections, and this is where Connected Everything can really have some impact. The academics were able to ask detailed questions about the processes and potential solutions to the industry experts, and get industry based answers. The participants were able to rule in or rule out some of the suggestions and this enabled us to focus in on the real issues and define projects that would give real benefits to the businesses.

A number of projects have been defined, and it is now up to the businesses and Connected Everything's to get some real benefits from the day.

For more information on the event go to: https://bssa.org.uk/connected-everything-event/

Resilience workshop, Cambridge University in June 2022

Supported by Connected Everything, Rob Glew and Darius Danaei, who are PhD students at the Institute for Manufacturing at Cambridge University, ran a workshop on measuring and improving industrial resilience. The workshop allowed for a good discussion about industrial resilience from different viewpoints and provided the attendees with ideas for engaging industrial partners in resilience related research. Over three sessions, Rob and Darius addressed the questions: 'What is industrial resilience?', 'What do we need to be resilient against?', and 'How can we improve resilience?'. Attendees participated in breakout groups where they put themselves in the roles of operations managers dealing with challenging disruptions. Rob extended the Connected Everything workshop into a practice-oriented session which he ran for a group of manufacturing CEOs and COOs at FabTech Canada. The industry leaders were excited by the prospects of applying the research on industrial resilience in their organisations and provided valuable feedback which will help shape the future agenda of this work.

For more details, please contact Rob Glew at rg522@cam.ac.uk

Connected Everything Early Career Placement

BSI Support Placements

As part of the Connected Everything Network's engagement with Early Career Researchers and industry, the British Standards Institution, (the UK's National Standards Body) has been hosting two placements through their university partnerships offering. The first project is on enhanced data analytics for the pharmaceutical supply chain, led by Tien Quach from the University of Nottingham. The second project looks at two standards – comparing PAS280 with the ISO 55000/1, to identify future standards opportunities, led by Pavan Addepalli at Cranfield University. Both projects conclude over the summer and are a great example of the value in knowledge exchange between industry and academia. More details on the project outcomes will be shared at an event later in the year.

PepsiCo Placement

This placement supported Kartikeya Walia's (Nottingham Trent University) research and focuses on designing and developing a Modular Robotic System for an industrial end-user with low payload needs and aims to create a sustainable and reusable workflow in all the domains of robot handling and usage. Easy in-house robot manipulator fabrication followed by intuitive assembly is a key aspect of the development. This placement has enabled a better understanding of the synergy of his PhD research linked to the industrial requirements and has helped him gain additional industrial expert feedback. Kartikeya also had the opportunity to visit the PepsiCo premises in person and to understand and experience the various stages of potato and tortilla chips production.

For more details on the placement go to underline our website.

Connected Everything Publications

We've created a new live resource on our website so our members can view Connected Everything supported publications. Here you will be able to find the most up to date list of Connected Everything publications, updated as more are published. Some recent examples include:

- Russo *et al.* (2022) Mechanical Design of Self-Reconfiguring 4D-Printed OrigamiSats: A New Concept for Solar Sailing. *Front. Space Technol.* 3:876585. DOI: 10.3389/frspt.2022.876585

- Fisher *et al.* (2022) Data-driven modelling for resource recovery: Data volume, variability, and visualisation for an industrial bioprocess. *Biochem. Eng. J.* 185:108499 DOI: https://doi.org/10.1016/j.bej.2022.108499

Members News

Network members Bart MacCarthy and Dmitry Ivanov publish 'Digital Supply Chain' book

It is a great pleasure for us to announce that the Digital Supply Chain is now officially published by Elsevier, available here. The pandemic has highlighted the vital importance of Supply Chains for the global economy. This new book, edited by Professor Bart MacCarthy of Nottingham University Business School and Professor Dmitry Ivanov of the Berlin School of Economics and Law, examines how digitalization is impacting the design, management, and control of supply chains. It brings together leading thinking on the enabling technologies, platforms, and systems that facilitate the digital integration of physical supply chains. The book is one of the first to combine research and practice in this emerging field that will define the nature of future supply chains. It showcases examples from retailing, automotive, food, textiles and clothing, logistics and shipping. Major challenges around supply chain cyber security, traceability, transparency, and sustainability are highlighted in an Industry 4.0 context. Topics at the frontiers of research include blockchain applications, digital supply chain surveillance, supply network analysis, and digital supply chain strategy.'

The book contains 24 chapters in 5 parts covering Digital Building Blocks and Enabling Technologies, Managing the Digital Supply Chain, Sectoral Cases, and Research Frontiers. This book is unique in its depth and breadth of coverage. Given the emphasis currently on supply chains and their management at all levels in business and industry, society, and government, the book is very timely and has received endorsements from leading figures in the field.

Dr Peter Green on UK's Governments Approach to Regulating AI

Dr Peter Green, Connected Everything Investigator has taken a look at the UK government's recently released policy statement on their approach to regulating AI.

His key takeaways:

- Particularly challenging as the logic or intent behind AI system output can be hard to explain.

- Two different approaches to regulation can be taken:

    o Approach 1: Directly produce a definition of AI, which all regulators must then use

    o Approach 2: Allow individual regulators to produce their own definitions of AI

- Approach 1 (currently used in the EU) may be too restrictive

- Approach 2 is very flexible but may lead to complex and/or contradictory regulations across sectors

- The proposed approach is a compromise, where core cross-sectorial principles for AI regulation are established by the government; different sectors then use these principles to generate regulation within the context of their individual sectors

- Initial regulation is expected to be "light-touch" e.g. guidance / voluntary measures

Join Connected Everything at connectedeverything.ac.uk

- Visit our website

- Find out about forthcoming events and activities

- Let us know what would be useful to you

- Promote an event through Connected Everything

- Interact with members through our LinkedIn group

- Follow us on LinkedIn and Twitter - @ConnectedII