2nd Textile & Fashion Innovation Congress (TFIC)

Day 1 - 21 April 2022 | Online Event

Programme

GMT = Greenwich Mean Time; BST = British Summer Time

Day 1 - 21 April 2022 : Session 1 - 09:30-10:30 GMT / 10:30-11:30 BST	
Starts - Oklahoma 04:30 / NC State & Toronto 05:30 / Germany 11:30 / Turkey 12:30 / India 15:00 / Bangladesh 15:30 / Singapore & China 17:30	
Chair - Dr. Abu Sadat Muhammad Sayem Manchester Metropolitan University	
P1	**Keynote - *Industry/University Collaborations: The Challenges and Opportunities from a UK Perspective***, Professor Parik Goswami, Head - Fashion and Textiles; Director - Technical Textiles Research Centre, University of Huddersfield
P2	***Polymer Nanocomposite Materials for Smart Textiles***, Dr. Müslüm Kaplan, Department of Textile Engineering, Bartin University, Turkey

Day 1 - 21 April 2022 : Session 2 - 10:45-11:45 GMT / 11:45-12:45 BST	
Starts - Oklahoma 05:45 / NC State & Toronto 06:45 / Germany 12:45 / Turkey 13:45/ India 16:15 / Bangladesh 16:45 / Singapore & China 18:45	
P1	***Dimension and Strength Properties of Denim Fabrics with varying Elastane Contents and Finishing Techniques***, Md Emdad Sarker, Dr. Serin Mezarcıöz, Professor Ramazan Tuğrul OĞULATA, Department of Textile Engineering, Cukurova University, Turkey
P2	***Intelligent Safety Clothing for Cyclists***, Professor Markus Muschkiet and Arina Abel, Center of Textile Logistics, Niederrhein University of Applied Sciences, Germany

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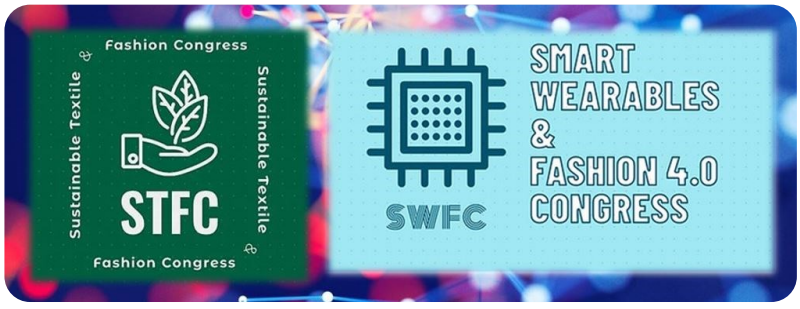
Day 1 - 21 April 2022 : Session 3 - 14:15-15:15 GMT / 15:15-16:15 BST	
Starts - Oklahoma 09:15 / NC State & Toronto 10:15 / Germany 16:15 / India 19:45 / Bangladesh 20:15 / Singapore & China 22:15	
Chair - Dr. Abu Sadat Muhammad Sayem Manchester Metropolitan University	
P1	**Keynote - *Issues in the Design of U.S. Female Bunker Gear***, Professor Lynn Boorady, Head - Department of Design, Housing & Merchandising, Oklahoma State University, USA
P2	***Automatic Defect Detection in Printed Fabric using a Convolutional Neural Network***, Dr. Samit Chakraborty, Dr. Marguerite Moore and Dr. Lisa Parrillo-Chapman, Wilson College of Textiles, North Carolina State University

Other Events from iCongress



2nd Textile & Fashion Innovation Congress (TFIC)

Day 2 - 22 April 2022 | Online Event

Programme

GMT = Greenwich Mean Time; BST = British Summer Time

Day 2 - 22 April 2022: Session 1 - 09:00-10:00 GMT / 10:00-11:00 BST	
Starts - Oklahoma 04:00 / NC State & Toronto 05:00 / Germany 11:00 / India 14:30 / Bangladesh 15:00/ Singapore & China 17:00	
Chair – Dr. Prabhuraj Venkatraman, Manchester Metropolitan University	
P1	***A Circular Economy Review: Conceptualizing Upcycling Post-consumer Textile Waste for 3D Printing Material***, Lingquan Hu and Dr. Lushan Sun, Institute of Textiles and Clothing, The Hong Kong Polytechnic University, China.
P2	***Emerging Trends in Fashion Industry,*** Assoc. Prof. Amisha Mehta and Professor Ajit Kumar Khare, National Institute of Fashion Technology, Gandhinagar, India

Day 2 - 22 April 2022: Session 2 - 10:15-11:45 GMT / 11:15-12:45 BST	
Starts - Oklahoma 05:15 / NC State & Toronto 06:15 / Germany 12:15 / India 15:45 / Bangladesh 16:15 / Singapore & China 18:15	
Chair - Dr. Abu Sadat Muhammad Sayem Manchester Metropolitan University	
P1	**Keynote - *Future of Fashion Education***, Assoc Prof. Anthony Bednall, Head of Department of Fashion, Kingston University, UK
P2	***Development of Bust Morphotypes for Garment Simulation,*** Christian Pirch, Flora Zangue, Anke Klepser and Simone Morlock, Hohenstein Laboratories GmbH & Co. KG, Germany
P3	***Exploring Environmental Sustainability of Fast Fashion production: A Comparative Case Study between Knit and Denim Factory***, Md. Shamsuzzaman[1], Md. Mazedul Islam[2] and Dr. Abu Sadat Muhammad Sayem[3], [1]Department of Textile Engineering, World University of Bangladesh; [2]Department of Materials, The University of Manchester, UK; [3]School of Fashion, Manchester Metropolitan University, Manchester, UK.

2nd Textile & Fashion Innovation Congress (TFIC)

Day 2 - 22 April 2022 | Online Event

Programme

GMT = Greenwich Mean Time; BST = British Summer Time

Day 2 - 22 April 2022: Session 3 - 13:30-15:00 GMT / 14:30-16:00 BST	
Starts - Oklahoma 08:30 / NC State & Toronto 09:30 / Germany 15:30 / India 19:00 / Bangladesh 19:30/ Singapore & China 21:30	
Chair – Dr. Sarif Patwary, University of Houston	
P1	***Developing a Relationship between 3D Body Scanning Data and Knit Technology for Customisation Fashion Application***, Laura-Ann Kavanagh, Dr. Simeon Gill and Dr. Steven Hayes, The University of Manchester, UK
P2	***Use of EMS for the Prevention of Occupational Diseases***, Professor Markus Muschkiet and Arina Abel, Center of Textile Logistics, Niederrhein University of Applied Sciences, Germany
P3	***Anthropometric Data-driven 3D Woven Composites Production Targeting Apparel Appearance and Performance***, Yuyuan Shi[1], Lindsey Waterton Taylor[1], Vien Cheung[1] and Abu Sadat Muhammad Sayem[2], [1]3D Weaving Innovation Centre, School of Design, University of Leeds, UK; [2]Manchester Fashion Institute, Manchester Metropolitan University, UK

Abstracts

[Keynote]

Industry/University Collaborations: The Challenges and Opportunities from a UK Perspective

Parikshit Goswami

Department of Fashion and Textiles, Technical Textiles Research Centre
University of Huddersfield, UK

The prime focus of this presentation will be based on a case study involving fundamental research to develop novel fabrics for a specific application. This presentation will also focus on how an invention could be utilised in multiple applications (innovation) through strategic collaborations and critically using a design/technology interface. The role of designers and design thinking will be discussed in light of practical challenges in cutting-edge applied material research and mitigation. This would lead to discussions on research funding, IP, and models for generating and managing revenue from various streams of research in a university context.

[Keynote]

Issues in the Design of U.S. Female Bunker Gear

Lynn Boorady

Department of Design, Housing & Merchandising,
Oklahoma State University, USA

Issues in the design and fit of U.S. female bunker gear will discuss the availability of protective equipment for the size and shape of the female body. It will also identify design challenges specific to bunker gear and the female firefighter. This presentation is based on specific sizing research, focus groups and visual analysis of firefighters in training.

[Keynote]

Future of Fashion Education

Anthony Bednall

Department of Fashion, Kingston University, UK

The emphasis is on developing new pedagogies, which reflect and are developed against the broader macro and meso environments, which impact on fashion within the Higher education sector.

Polymer Nanocomposite Materials for Smart Textiles

Müslüm Kaplan

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Textile products are an interface that can be of great importance in disseminating newly developing communication devices, flexible electronics, and nanomaterials with the advantages of covering the entire human body and being used all day long by all individuals in society. For this reason, smart textiles research represents a new model for integrating the internet of things and digitalization into large areas and producing creative and original solutions. Thus, studies have shown increasing efforts to provide electrical conductivity to textile fibers. This presentation informs about research activities developing nanocomposite fibers by adding nanoparticles to provide electrical conductivity. The functional textile fibers are usable in many areas, such as electromagnetic interferences (EMI) shielding, sensors, energy harvesting, textile electrode material for charge storage systems, or signal transfer.

Other Events from iCongress

Dimension and Strength Properties of Denim Fabrics with varying Elastane Contents and Finishing Techniques

Md Emdad Sarker[1,2], Serin Mezarcıöz[1] and Ramazan Tuğrul OĞULATA[1]

[1]Department of Textile Engineering, Cukurova University, Turkey
[2]Department of Fabric Engineering, Bangladesh University of Textiles, Bangladesh

Denim is a tightly woven fabric with a twill weave that is a strong and long-lasting traditional wear. Stretch denim is the most popular type of denim among the young people. In this study, two denim fabrics (series-1 and 2) were produced using elastane core spun yarn with two distinct linear densities: 78 dtex and 127 dtex. Fabrics were also washed and mercerized at two different temperatures: 120°C and 190°C. As well, half of the materials were stretched to a 10 cm width, resulting in two width variables. The dimensional parameters of growth & stretch, width, shrinkage, and areal density were assessed by ASTM D3107-07, ASTM D3774-96, ISO 675:2014 and ASTM D3776 accordingly. Furthermore, ASTM D 5034–95 (2001), ASTM D1424-21, and ASTM D4034 were used to evaluate the breaking strength, tearing strength, and seam (slippage) strength, respectively. For statistical analysis, regression analysis, the independent samples T-test, and multiple comparison tests were done. The results revealed that series-2 fabrics featured higher GSM and stretch values but lower width, growth, and shrinkage values than series-1 fabrics. the tearing strength of series-1 cloth is greater than that of series-2 fabric. Additionally, weft way breaking strength is stronger in series-1, whereas warp way breaking strength is higher in series-2. Moreover, denim with 127 dtex elastane has greater seam slippage strength than the denim with 78 dtex at 120 degrees Celsius, whereas denim with 78 dtex has greater seam slippage strength at 190 degrees Celsius.

Intelligent safety clothing for cyclists

Markus Muschkiet and Arina Abel

Niederrhein University of Applied Sciences, Center for Textile Logistics (CTL)
Webschulstr. 31, D-41065 Mönchengladbach, Germany

Research gap and aims

Thousands of accidents occur every year between cyclists and large vehicles (such as trucks and buses) due to the blind spots from the driver's cabin in large vehicles[1-3]. Turning assistants solve a part of this problem from the perspective of the large vehicle drivers. Extended protection from the cyclist's perspective is not available[4].

The aim of this project is to develop a preventive protection against collisions between cyclists and large vehicles with the help of vibrotactile signals (vibration). A pressure-haptic actuator in the cyclist's clothing, would send a vibrotactile signal to the cyclist whenever the truck driver sets the direction indicator to the right. In this way, the cyclist can be warned of a large vehicle turning right from behind.

Methods

The implementation of the vibration warning system requires the elaboration of both the textile-technical and the electro-technical factors. The former includes the successful integration of the electronics within the textile carrier in terms of vibration perception and comfort. The latter includes the signaling from the large vehicles and the optimal signal range.

Figure 1: The cyclist is warned of a right-turning truck by a vibration signal

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4. VerkehrsRundschau: Abbiegeassistenten für Lkw werden ab 2022 EU-weit Pflicht (2019)

Automatic Printed Fabric Defect Detection Using a Convolutional Neural Network

Samit Chakraborty, Marguerite Moore and Lisa Parrillo-Chapman

Wilson College of Textiles, North Carolina State University, USA

The purpose of this research is to develop an automatic defect detection model employing a CNN to facilitate real-time deployment in the textile printing process. Two general objectives are stated to address this purpose including establishing an empirical dataset (RO1) and developing, training and testing the model using a CNN algorithmic approach (RO2). This approach potentially provides several potential advantages over current defect detection processes in printing by identifying problems more effectively and efficiently in real-time. This research extends current state of the art machine learning techniques into the print production context and provides potential directions for ADD in textile quality control. This research proposes a novel methodology that demonstrates the application of convolutional neural network (CNN) to classify printing defects based on the fabric images collected from industries. The research also integrated cross validation and k-Nearest Neighbor (KNN) algorithm-based classification methods to compare model performance. The results show that the CNN model performs better compared to cross validation and k-Nearest Neighbor (KNN) algorithm-based classification methods. Then the research included visual geometric group (VGG), DenseNet-121 (DNS12), InceptionV3 and Xception deep learning networks to compare model performance with proposed CNN model. The results exhibit that the VGG-based models perform better compared to a simple CNN model. However, the custom CNN model showed higher accuracy compared to DNS12, InceptionV3 and Xception networks.

A circular economy review: Conceptualizing upcycling post-consumer textile waste for 3D printing material

Lingquan Hu and Lushan Sun

Institute of Textiles and Clothing, The Hong Kong Polytechnic University, Kowloon, Hong Kong, China

The global consumption of textile products is steadily growing in recent years (Sandin & Peters, 2018). It corresponds to the population boom and excessive consumption. Currently, novel textiles are fabricated with higher performance and favourable design. Consumers are willing to replace their clothing frequently before the lifetime of textile, increasing the storage of textiles. Simultaneously, only has less than 20 % of the clothing waste been recycled (Adrien Beton et al., 2014; Utebay et al., 2019). The low recovery rate with the increasing quantity of textiles directly booms the environmental loading of post-consumer textile waste (PCTW) disposal (Kirsi Laitala & Casper Boks, 2010). Thus, increasing the recovery rate of textile is urgent for reducing environmental loading. Fused deposition modelling (FDM) three-dimensional (3D) printing is the underlying upcycling approach for PCTW recycling, adding high value to the recycled materials (Peeters et al., 2019). Currently, some thermoplastics have been recycled from water bottles (Zander et al., 2018) and meal-ready-to-eat pouches (Hart et al., 2018). It exhibits the potential in recycling thermoplastics from different sources. However, the related research rarely uses 3D printing to recycle the thermoplastic PCTW. It might develop a novel approach and research area for thermoplastic PCTW recycling to increase the recycling rate.

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Emerging Trends in Fashion Industry

Amisha Mehta and Ajit Kumar Khare

National Institute of Fashion Technology, Gandhinagar, India

Fashion industry is unique from all other industries. This industry involves both creative and industrial processes. The products range from timeless classics to fast fashion. Industry plans for obsolescence, through seasons. Fashion has regional as well as global context. It involves crafts. The only constant thing with fashion is change. The industry is fast adapting to the new technological disruptions and there is also visible change in the thought process post-pandemic both at supply and demand end.

This is the review paper of literature published in last seven years in the Web of Science database with the query “fashion Industry” or “Fashion Business”. The analysis is done using science mapping method and the tool used is SciMAT.

The paper identifies four categories of themes from the literature - Motor themes, Basic themes, Specialised themes and Emerging themes through keyword co-occurrence analysis. The thematic network of each of the themes are visualised through Callon’s density.

The value added by this paper is an identification of synergies between the research and emerging trends in fashion industry by mapping the literature and highlighting the new avenues of interest.

Keywords: Fashion industry, Science Mapping, Fashion, Emerging Trends

Development of Bust Morphotypes for Garment Simulation

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3D simulation can be used for visualisation and fit testing. Reliable results can only be achieved with clothing construction and system algorithms knowledge. There are 3 important factors with a major impact on garment fit: avatars, material, and pattern. With regards to avatars size and body measurements as well as shape and morphology are of importance.

The aim of the project was to investigate the impact of bust shape on garment fit results. Therefore, a female avatar with bust girth 90,0 cm was generated with 3 different bust shapes. A t-shirt pattern was simulated on each avatar and each individual fit was visually and within a structure analyse assessed.

The results show clear differences between the 3 avatars. It was also found that the different shapes of the 3 avatars have an influence on the fit and balance of the t-shirt.

The impact of body morphologies on 3D garment simulation fit results are significant. Users should take the impact of the avatars on the virtual garment appearance into account. It is of importance to define company's customer group, their sizes and body measurements as well as their shapes.

Figure 1: Overview of the avatars and the impact on the simulation

Exploring Environmental Sustainability of Fast Fashion production: A Comparative Case Study between Knit and Denim factory

Md. Shamsuzzaman[1], Md. Mazedul Islam[2] and Abu Sadat Muhammad Sayem[3]

[1]*Department of Textile Engineering, World University of Bangladesh*
[2]*Department of Materials, The University of Manchester, UK.*
[3]*Fashion Institute, Manchester Metropolitan University, UK*

This paper investigates the environmental sustainability of denim and knit production facilities engaged in fast fashion as a case study. We applied The Higg Facility tool by the Sustainable Apparel Coalition (SAC) to measure the scores of the factories considering 7 aspects proposed by the Sustainable Apparel Coalition (SAC). The Higg Facility Environmental Module (FEM) contains seven subsections, namely (i) Environmental management system or program, (ii) Energy use and Greenhouse gas emissions, (iii) Water use, (iv) Wastewater/Effluents, (v) Emissions of air, (vi) Waste Management, and (vii) Chemicals Management. Each section provides scores under 100 by asking multiple questions and relevant answers. Results indicate multiple levels of score out of 100 in line with the different environmental dimensions such as environmental management system, waste, energy use and GHG emissions, water use, wastewater, emissions to air and chemicals use. This study reveals the technical and managerial limitations on practicing sustainable production by denim and knit industries. Findings reveal comparatively better scores for the denim factory than the knit in various environmental aspects. This finding will urge stakeholders, including academics and researchers to comprehensively consider various environmental aspects and improve the sustainability performances of production facilities of fast fashion. The findings will inform industry practitioners with more comprehensive information to take a strategic action plan in the knit and denim production facilities in a more sustainable way and benefit the wider stakeholders.

Keywords: Sustainability, Supply Chain, Facility Module, Higg Index, Knit and Denim production

Developing a relationship between 3D body scanning data and knit technology for customisation fashion application

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Within the fashion and textile industry, a significant amount of research has explored pattern drafting to improve the fit of cut and sew garments, but far less research has considered the shape and fit of knitted fashion garments. The industry relies heavily on the natural stretch characteristics of knitted fabric, frequently restricting customers to three standard sizes, small, medium and large, leaving individuals struggling to find the perfect fit.

Although technology available for knitwear has advanced dramatically over the past three decades, its full potential is still not explored within the manufacturing industry for fashion products. Mass customisation (MC) of knitted garments would be beneficial for the customer, industry and the planet. MC of knitwear could result in better fitting garments, styled to the individuals needs and preferences, whilst reducing the current cycle of over producing garments that are hardly worn, or never sold at all, being sent to landfill.

The preliminary stage of this research includes conducting two pilot studies, implementing the use of body scanning technology to capture individuals' measurements, which begins the production cycle of a customised knitted garment for the wearer. The scope of the research project is working towards an operational MC process that brings the person before the product.

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Use of EMS for the prevention of occupational diseases

Markus Muschkiet & Arina Abel

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Research gap and aims

The lack of physical activity at work and the resulting muscle slackening leads to leg vein diseases of logisticians[1] as well as other sedentary professions[2]. Conventional methods such as compression therapy[3] and light exercise session do not sufficiently prevent the health damage[1]. The aim of this project is the preventive protection from leg vein diseases and thrombosis among logisticians with the help of EMS (electrical muscle stimulation) during work time. The health-promoting effect of EMS has been proven in several studies[4-6]. EMS strengthens muscles, relieves pain and prevents thrombosis after surgery. With the help of an EMS- electrodes-integrated textile, the slackening of the leg muscles and slowed blood flow should be avoided and thus the health problems prevented.

Methods

There are so far no studies that refer to the use of EMS for prevention of occupational diseases. This project addresses questions regarding the occupational safety when using EMS, the optimal stimulation parameters for health prevention and the design of the appropriate EMS textile for use in a professional environment. To investigate these aspects, EMS will be tested in a logistic environment and / or virtual simulation. This project will be
extended to the prevention of back pain.

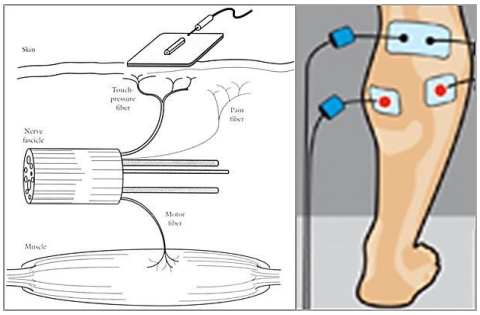

Figure 1: A muscle contraction is triggered by the transmission of electrical energy when the electrodes are placed on the body[7-8]

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Anthropometric Data-driven 3D Woven Composites Production Targeting Apparel Appearance and Performance

Yuyuan Shia[1], Lindsey Waterton Taylor[1], Vien Cheung[1] and Abu Sadat Muhammad Sayem[2]

[1]3D Weaving Innovation Centre, School of Design, University of Leeds, Leeds, UK
[2]Manchester Fashion Institute, Manchester Metropolitan University, Manchester, UK

Majority of females suffer cyclic and noncyclic breast pain caused by the motion of breasts while exercising (Mason, Page, and Fallon, 1999; Hadi, 2003; Zhou, Yu, and Ng, 2011). Without the wearing of a correct sports bra, any contact to the breast area through sporting action can increase breast pain. This can significantly decrease their health and quality of life. The compaction, comfort and ergonomics of the sports bra benefits are known to alleviate post-sporting discomfort and pain. Current sports bras are typically knitted, and manufactured via a cut and sew process resulting in the high volume of post-production material waste (Troynikov and Watson, 2015). Seams derived from this cut and sew process are known to irritate the skin during exercise. This irritant, discomfort seriously affects the dynamic comfort during exercise, hindering limb movement and displacement of the female breast (Zhou, Yu and Ng, 2011; Zhou, Yu and Ng, 2012). It implies a need for an alternative textile manufacturing process for a seamless sportswear-sports bra to combine the surface aesthetics with biomechanics together with anthropometry and ergonomic data. Employing the latest weaving machinery (Mageba multishuttle) paired with advanced weaving jacquard technology (Staubli), cross-platform design and manufacturing (CAD-CAM) systems permits greater scope for three-dimensional (3D) surface and shaped woven forms. Two-dimensional (2D) and three-dimensional (3D) computer-aid design and manufacture (CAD/CAM) are extensively

applied in the fashion industry to increase efficiency, save time and labour cost. Two of the drivers for re-engineering the current manufacturing approach of sportswear-sports bras are to reduce material waste and to improve the comfort of sports bras. This research bridges the 3D anthropometry with technical 3D seamless weaving technique exploiting cross-platform software technology – 3D reverse engineering system, 2D CAD clothing system and textile CAD/CAM system to develop seamless woven sports bra cups. The flattened 2D geometry pattern, obtained with segmentations and artificial boundary lines, was used in the weaving process, and the final woven sample proved the geometric and digital methodological feasibility.

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