DAY 1

Scientific Tracks & Abstracts

Euroscicon Conference on

3D Printing and Wireless Technology

September 17-18, 2018 | Lisbon, Portugal

DAY 1

September 17, 2018

Sessions

3D Printing Innovation and Technical application | Telecommunication | Metal 3D Printing | Wireless communication and technologies | 3D Bio printing | Internet Of Things (IoT) | Future innovation On 3D Printing | Biomedical Circuits and Systems | 3D Printing innovation organization & market |Fifth Generation (5G) of wireless networks

Session Chair
Jinwu Kang
Tsinghua University, China

Session Co-Chair
Edwin-Joffrey Courtial
ICBMS lab, France

Session Introduction

Title: **LiFi for 5G-and-beyond wireless communications networks**
Hoa Le Minh, Northumbria University at Newcastle, United Kingdom

Title: **Beat sensors for long life IoT applications**
Koichiro Ishibashi, University of Electro-Communications, Japan

Title: **Turbo code based physical layer network coding for free space optical channel**
Alaa Al-Rubaie, The Ministry of Higher Education and Scientific Research, Iraq

Title: **Ultimate abilities of 3D printers with laser attachments**
George Fomitchev, Endurance Robots, USA

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Hoa Le Minh, Am J Compt Sci Inform Technol 2018 Volume: 6
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LIFI FOR 5G AND BEYOND WIRELESS COMMUNICATIONS NETWORKS

Hoa Le Minh
Northumbria University, United Kingdom

General lighting sources are currently evolving through the traditional fluorescent and incandescent sources to the modern energy saving light bulbs and now white light emitting diodes (LEDs). This trend has been spurred on through global awareness of the necessity for reducing the size of our carbon footprint. The introduction of solid state led lighting has attracted the attention of communications engineers worldwide, enabling the achievement of the dual functionality of room illumination whilst simultaneously transmitting wireless data via light fidelity (LiFi) or visible light communication (VLC) in optical spectrum regime. Although the existing wireless networks are mainly dominated by radio based technology, the emerging LiFi will play increasingly important role in the future wireless communications landscape. It is anticipated that both radio and optical spectrum will play equal role eventually especially in nanocell and picocell network structures. This talk will outline the growth of optical wireless communications including LiFi and present the challenges, roadmap of the technology for the future generation of wireless networks.

Biography

Hoa Le Minh is a Senior Lecturer at Northumbria University at Newcastle, UK. Prior to joining Northumbria University, he was a Research Fellow at Siemens AG, Munich, Germany and University of Oxford, UK. His research interests include optical communications, visible light communications, sensor network and smartphone technology in which he has published over 150 papers in various journals and conferences. He has participated in a number of European and industrial projects. He has chaired a number of international conferences/workshops and sessions in telecommunications. He is currently the Chairman of IEEE Communications Society (ComSoc) Chapter of UK and Ireland, and the Editor of IEEE Communications letters.

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Koichiro Ishibashi et al., Am J Compt Sci Inform Technol 2018 Volume: 6
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BEAT SENSORS FOR LONG LIFE IOT APPLICATIONS

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University of Electro-Communications, Japan

Long life wireless sensors are necessary to realize trillion sensors universe in IoT era. We have proposed beat sensors, wherein the interval times of ID code transmissions correspond to physical quantity, thereby achieving such advantages as low power consumption, low cost, small size, and high accuracy of data. We have demonstrated the operations of the beat sensors for measuring AC power consumption of electrical appliances, temperature and DC current and long communication distance by data recovery algorithm. In beat sensors, sensor nodes uniformly consume tiny power with time, so that batteries for the sensor nodes last much longer than conventional IoT sensors, using intermittent operations to reduce power consumption. Therefore, beat sensors can be used in applications such as security, aquaculture, agriculture and so on, in which long life of sensors are inevitable.

Biography

Koichiro Ishibashi has received his PhD degree from Tokyo Institute of Technology, Tokyo, Japan in 1985. He joined Central Research Laboratory, Hitachi Ltd in 1985, where he investigated low power technologies for SH microprocessors and high density SRAMs. He worked for Renesas Electronics from 2004 to 2011, where he developed low power IPs, mainly for SOCs used in mobile phones. He has been a Professor at The University of Electro-Communications, Tokyo, Japan since 2011. He has presented more than 150 papers at international conferences and has published papers in numerous journals. He was awarded R&D 100 for the development of SH4 Series Microprocessor in 1999. He is a Member of IEICE and a Fellow of IEEE. His current research interests include IoT technologies including ultra-low power LSI design technology, technologies for energy harvesting sensor networks and applications and bio sensor technology.

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Alaa A Saeed Al Rubaie et al., Am J Compt Sci Inform Technol 2018 Volume: 6
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TURBO CODE BASED PHYSICAL LAYER NETWORK CODING FOR FREE SPACE OPTICAL CHANNEL

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[3]Northumbria University, UK

Physical layer network coding (PNC) for a two-way relay (TWR) channel yields an even greater throughput gain in wireless networks. PNC with a TWR channel is adopted free space optical (FSO) communication link (TWR-FSO) to enhance the link availability under the atmospheric turbulence condition. In this research, we introduce the turbo code in the TWR-FSO PNC system and evaluate the end-to-end (E2E) in terms of the bit error rate (BER) for weak and strong regimes. The simulation results show that the proposed scheme can achieve a significant BER performance improvement through the introduction of an iterative process between turbo decoders. Furthermore, we present the extrinsic information transfer (ExIT) charts to evaluate the system convergence. The ExIT functions of the two decoders are thoroughly analysed for a range of parameters under the influence of a turbulence-induced channel fading to demonstrate the convergence behaviour.

Biography

Alaa A Saeed Al Rubaie has completed his PhD in Communications of the Communications, Sensors, Signal and Information Processing (ComS2IP) group from School of Electrical and Electronic Engineering, Newcastle University, Newcastle Upon Tyne, United Kingdom. He has completed his MSc in Computer Network from University of Technology, High diploma (HDSc, Postgraduate studies) in Computer Teaching and Learning from Informatics Institute of Higher Studies and BSc from Baghdad University, Baghdad, Iraq. Currently he is serving as the Director of the Department of Information Technology in the Ministry of Higher Education and Scientific Research. He has published 5 papers in reputed journals and conferences. His research interests include advanced modulation, coding technique, microprocessor programming and wireless communication.

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George I Fomitchev, Am J Compt Sci Inform Technol 2018 Volume: 6
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ULTIMATE ABILITIES OF 3D PRINTERS WITH LASER ATTACHMENTS

George I Fomitchev
Endurance, USA

Since the arrival of powerful diode lasers to mass market a few short years ago, the potential to outfit a 3D printer or CNC machine with a laser cutting tool head as powerful and efficient as its CO_2 and fiber laser contemporaries has been a very real possibility. The benefits of this newly commercially available technology for the home user are clear. Not only are laser diodes lightweight and small, often they are capable of cutting and engraving a wide array of materials including wood, leather, plastic, anodized aluminum and stainless steel. Combining a compact form factor with versatility, the laser diode makes for an excellent post market laser engraving or cutting tool for the motion systems of 3D printers and CNC machines. So, what exactly is a laser diode as an add-on? Endurance presents a solid-state (diode) laser add-on (attachments) that will convert your 3D printer or CNC machine into a powerful laser cutting/engraving machine. Your 3D printer or CNC router will get an ultimate ability to cut wood, plywood, acrylic, ABS, PLA, hardboard, cardboard, balsa, MDF, felt, fabric, leather and many other materials. This laser attachment allows to do laser engraving/etching on any surfaces including stainless steel, copper, brass, anodized aluminum, glass, and acrylic. Endurance lasers help to do laser marking and laser cutting at home or in a small workshop.

Biography

George I Fomitchev is Futurist, Entrepreneur, Founder and CEO of Endurance. He has build 10 business from scratch. Since 2015 CEO and a founder of Endurance robots startup. George is also wanted speaker in many US universities and colleges including FGCU, FSU, MIT, WPI, and others. George is a contributing writer in more than 40 online magazines.

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Young Research Forum

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YRF JUDGE

Ezendu Ariwa

Warwick University, UK

Young Reasearch Forum

Title: Human endothelial culture cells and sterlisation with 3D printed PCL and PLA stents

Paula Cano Calvo, Universitat de Girona, Spain

Title: Development of a marine collagen hydrogel for 3D-printing

Mathieu Loste-Berdot, Renoble Alpes Institute and the New Zealand Institute for Plant & Food Research Ltd, New Zealand

Title: Selection of poly(lactic acid) scaffolds design for triple negative breast cancer 3d culture

Emma Polonio Alcala, Universitat de Girona, Spain

Title: Assessment method for additive manufacturing in the Architecture-Engineering-Construction industry

Natasa Mrazovic, Innovation and Solutions Permasteelisa Group, USA

Title: 3D Printing and circular economy:re-manufacturing of fibre glass composites

Andrea Mantelli, Politecnico di Milano, Italy

Paula Cano Calvo et al., Am J Compt Sci Inform Technol 2018 Volume: 6
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HUMAN ENDOTHELIAL CULTURE CELLS AND STERILIZATION WITH 3D PRINTED PCL AND PLA STENTS

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[2]University of Girona, Spain

Biodegradable stents (BRS) were introduced to overcome the limitations of permanent stents, offering the potential to improve long-term patency rates by providing support just long enough for the artery to heal itself. Ideally, BRS should meet four requirements: a) BRS manufacturing process should be precise, fast, and economic, b) BRS degradation should not be toxic to the body, c) BRS degradation rate should match the recovery rate of vascular tissue, and d) BRS should induce rapid endothelialization. While the second and third requirements have been deeply studied, the first and last requirement had been overlooked. This work presents a novel 3D printed BRS made of Polycaprolactone (PCL) and Polylactic acid (PLA). Authors aim to study effects of different sterilization methods over the stents properties and effects of stents material and geometry over the cell proliferation. Three sterilization methods were applied such as ethanol 70%, ultraviolet lamp and antibiotic sterilization. All treatments were performed for 0.5h, 1h, 8h and 16h. Supplemented Dulbecco's Modified Eagle's Medium (DMEM) with phenol red (pH indicator) and without penicillin/streptomycin was added after different treatments. Remaining infection was indicated by yellowing of the media and increased of media opacity. With regards to ethanol treatment, all samples treated below 8 hours showed signs of infection, while samples treated during 8 and 16 hours exhibited a complete sterilization. Therefore, subsequent chosen methodology for sterilization was ethanol overnight and ultraviolent lamp 20 min. To elucidate cell behavior on stent, sterilized parts were placed in non-adherent microplates and seeded with a final concentration of 40,000 human umbilical vein endothelial cells (HUVEC) per stent. Endothelial cell proliferation was tested by MTT assay. Results showed a strong influence of flow rate, number of cells and material over HUVEC growth ($p<0.05$), while stent cell geometry did not show significant influence

Biography

Paula Cano Calvo holds a Bachelor's degree in Biology from University of Girona. She has successfully completed her final project entitled 3D Printed PCL and PLA Stents Sterilization and Culture with Human Endothelial Cells. The project was performed in research units of University of Girona named New Therapeutic Targets Laboratory Research Group (Targets Lab), Oncology Unit in the Department of Medical Sciences and Product, Process and Production Engineering Research Group (GREP) in the Department of Mechanical Engineering and Industrial Construction. She also has performed practices in TargetsLab where her research was focused on Three Dimensional Breast Cancer Cell Culture in 3D Matrices and Mammospheres Generation.

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DEVELOPMENT OF A MARINE COLLAGEN HYDROGEL FOR 3D PRINTING

Mathieu Loste Berdot[1, 2], Kathleen Hofman[1]Aurore Denneulin[2], Davide Beneventi[3], Julien Bras[2] and Deborah Le Corre Bordes[1]

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[3]Centre national de la recherche scientifique (CNRS), France

The development of biosourced materials compatible with 3D printing holds promise for innovative biomaterials and addresses both medical and environmental matters. Our study aimed at assessing the potential of pure marine collagen formats from a fishing industry byproduct as a matrix for bioink formulation. Both native and denatured formats of fish skin collagen were studied as candidates for 3D printing of an organ shaped construct. Hydrogels were prepared and their rheological properties assessed. They were printed using a simple mechanical extrusion 3D printer at low temperature to prevent the denaturation of the native collagen. Proof of concept was successfully obtained and a short overview of the opportunity of complementary crosslinking of the hydrogels unlocked new perspectives for the development of bioinks.

Biography

Mathieu Loste Berdot has completed his Engineering Degree in Polysaccharides and Biomaterials Science from the International School of Paper, Print Media and Biomaterials of Grenoble National Polytechnic Institute and received a Double Degree in Chemical Engineering from KTH Royal Institute of Technology, Stockholm. He is a PhD student working with the University Grenoble Alpes Institute and the New Zealand Institute for Plant and Food Research Ltd on the development of a marine collagen scaffold cross-linked with nano cellulose for 3D printing and tissue engineering.

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SELECTION OF POLY(LACTIC ACID) SCAFFOLDS DESIGN FOR TRIPLE NEGATIVE BREAST CANCER 3D CULTURE

Emma Polonio Alcala[1], M Rabionet[1, 2], A J Guerra[2], J Ciurana[2] and T Puig[1]
[1]University of Girona, Spain
[2]GREP-University of Girona, Spain

Cells are traditionally cultured *in vitro* in two dimensions (2D), but it presents some limitations, as loss of their *in vivo* morphology and reduction of cell-cell and cell-extracellular matrix (ECM) interactions. Hence, three-dimensional (3D) cell culture models, such as scaffolds, are being developed to overcome the aforementioned restrictions and to mimic the physiological tissue environment. Cancer stem cells (CSCs) are a subpopulation of a tumor or cancer cell line, which are responsible for metastasis and tumor recurrence. They have the capacity to initiate tumor growth and maintain long term self-renewal, as well as they exhibit resistance to conventional therapies. Their study in 2D culture is limited due to the induction of differentiation during CSCs propagation. Interestingly, 3D culture systems can avoid it, besides they can produce an enrichment of CSCs population. In the present study, scaffolds were manufactured by Fused Filament Fabrication (FFF) technique with the BCN3D Sigma 3D printer. Five fabrication parameters were selected to obtain 27 scaffolds designs, which have different pore size and filament diameter. The tested parameters were layer height, infill density, infill pattern, infill direction and material flow. Poly (ε-caprolactone) (PCL) was the material used to manufacture scaffolds. PCL is commonly used for tissue engineering applications due to its good mechanical characteristics, as its low melting temperature and low biodegradability, good biocompatibility, FDA approval and low cost. MDA-MB-231 triple negative breast cancer (TNBC) cells were cultured on FFF scaffolds to analyze cell efficiency. Therefore, fabrication parameters of scaffolds with highest cell proliferation rates were chosen to accommodate 3D cancer cell culture and further analyze the CSCs enrichment. The enrichment of this malignant subpopulation would facilitate future experiments to find and develop new therapeutic strategies against CSCs.

Biography

Emma Polonio Alcalá has completed her Bachelor's degree in Biotechnology and Master's degree in Molecular Biology and Biomedicine, from University of Girona. Her Bachelors' degree project was regarding A New Synthetic Inhibitor of the Fatty Acid Synthase (Fasn) with Cytotoxic Effects and her Master's project was entitled Effects of the New Antitumoral Drug Abtl0812 in Preclinical Models of Triple Negative Breast Cancer. She has performed both the projects in New Therapeutic Targets Laboratory (Targets Lab) research group in the Department of Medical Sciences from University of Girona and scored excellent marks. Some of her results were published in a congress proceeding (Giro- Perafita et al., 2017). Nowadays her research is focused on The design and fabrication of biocompatible scaffolds for three-dimensional breast cancer cell culture, in collaboration with the Product, Process and Production Engineering Research Group from University of Girona and is also linked with Targets Lab.

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ASSESSMENT METHOD FOR ADDITIVE MANUFACTURING IN THE ARCHITECTURE ENGINEERING CONSTRUCTION INDUSTRY

Natasa Mrazovic and M Fischer
Stanford University, USA

Buildings made of additively manufactured (AM) components are likely to have higher energy efficiency and environmental sustainability than conventionally manufactured (CM) buildings. AM building components can be highly customizable and produced with less material. Given the continued development of AM and CM technologies, many markets and the use scenarios of buildings that prioritize different performance criteria, building components will likely be produced with a mix of AM and CM technologies for the foreseeable future. However, since building professionals are not informed about the value of AM through transparent metrics like cost and environmental impact they are unable to make well-informed decisions about the application of AM in the building sector. Case studies of two AM metallic building components, a large window frame and a bracket, carried out by the authors in collaboration with a global building façade contractor demonstrated that AM for building components is technologically feasible and can lower environmental impact by up to 87%, but is cost-prohibitive today; in some cases, the manufacturing cost and schedule were about 90% higher and 91% longer respectively. Based on the case studies, a 19 step assessment method was developed with the aim to allow building professionals to rapidly and consistently assess the applicability (A), schedule (S), environmental impact (E), and cost (C) of producing building components with AM vs. CM. The formal, partially automated application of the method showed that it reduces the effort required for the ASEC analyses by 97% and improves the consistency of the A, S, and C analyses. However, it did not improve the consistency of the environmental impact (E) analysis due to the inherent flexibility of the life cycle assessment (LCA) method standardized by ISO14040. Future work includes fuller automation of the method and extension of this approach to other industry sectors.

Figure 1: Observed problem: building professionals are unable to make well-informed decisions about the application of AM in their projects, because they are not informed about the value of AM through transparent metrics like cost and environmental impac

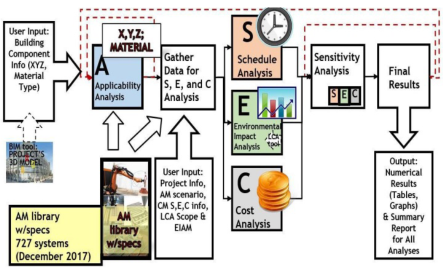

Figure 2: High-level concept diagram of the workflow of the assessment method.

Biography

Natasa Mrazovic, M Arch Eng, MCE, completed her PhD at the Civil and Environmental Engineering Department (CEE), Stanford University with a focus on Sustainable Design and Construction, specifically the implementation of additive manufacturing technologies popularly known as 3D printing, into the Architecture-Engineering-Construction industry. The title of her thesis is Assessment Framework for Additive Manufacturing Technologies in the AEC Industry. During her PhD studies at Stanford, she was a Research Assistant at the Center for Integrated Facility Engineering (CIFE) at CEE, Stanford University, an affiliate in the Simulation Research Group in the Environmental Energy Technologies Division (EETD) at Lawrence Berkeley National Laboratory (LBNL), US and a Visiting Doctoral Researcher at the Additive Manufacturing and 3D Printing Research Group, University of Nottingham, UK. In her 10-year long professional career as an Architect, Chief Designer, and Project Manager, she worked on large-scale projects in Eastern Europe and managed her own architectural office.

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3D PRINTING AND CIRCULAR ECONOMY: REMANUFACTURING OF FIBER GLASS COMPOSITES

Andrea Mantelli, E Paracchini and M Levi
DCMC-Politecnico di Milano, Italy

The use of 3D printing for real life objects is often limited to the low amount of materials that can be used or, in some cases, for the cost of the technology. Since the advent of Makers, 3D printing processes started to be cheaper and enthusiasts and researchers began to experiment with them. In the last years the experimentation process has found a prolific terrain fed by low cost materials and machinery, and by a vibrant community. This helps the experimentation on different materials, like ceramics and thermosetting polymers. The possibility to 3D print thermosets materials enabled a whole class of materials to candidate as 3D printable. A flexible 3D printing process for viscous materials have been developed, such process could be used to 3D print thermoset resin reinforced composite materials. It has been demonstrated that recycled composite material can be 3D printed enabling the recycled material re-manufacturing, following a circular economy approach. Since the first wind farms constructed in the world are turning 25 years old, and will soon be decommissioned, the aim of this research is to build a circular economy path for thermoset recycled fiberglass reinforced materials in which the 3D printing process creates the added value for a new class of re-manufactured composites and products. In order to 3D print the material, the viscosity of the system has been analyzed and the polymerization process has been studied and optimized. A frugal innovation approach have been used: low cost 3D printers could be easily modified to 3D print the new composites, and, thanks to the simplicity of the system, the process could be scaled up, allowing for bigger volume 3D print. Some proposals regarding the possibility of using this novel approach for the construction of attractions within amusement parks have been studied and prototyped.

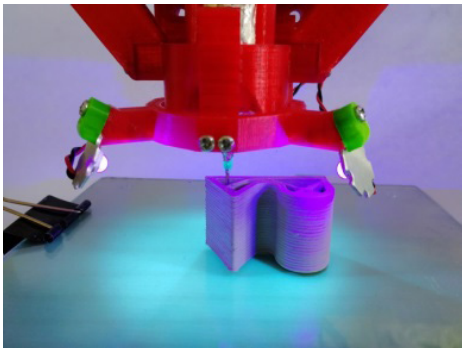

Figure 1: Modified 3D printer during the 3D printing of a sample with thermoset resin recycled fiberglass composite

Figure 2: 3D printed model of an amusement park gate

Biography

Andrea Mantelli has completed his Master of Science in Materials Engineering and Nanotechnology from Politecnico di Milano with an original work on continuous composite 3D printing. He has completed his Internship at FabLab London in 2015 where he consolidated his 'maker' attitude. Currently he is working as a Research Fellow at +Lab in the Department of Chemistry, Materials and Chemical Engineering "Giulio Natta" at Politecnico di Milano.

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