ISSN 2411-3050

NATIONAL TECHNICAL UNIVERSITY OF UKRAINE
“IGOR SIKORSKY KYIV POLYTECHNIC INSTITUTE”

POLYTECHNIC UNIVERSITY OF THE PHILIPPINES

UNIVERSITY OF ECONOMICS IN BRATISLAVA, SLOVAKIA

XXII INTERNATIONAL R&D ONLINE CONFERENCE FOR STUDENTS AND EMERGING RESEARCHERS

SCIENCE AND TECHNOLOGY OF THE XXI CENTURY

November 10, 2021

CONFERENCE PROCEEDINGS

Kyiv – 2021

НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ УКРАЇНИ
“КИЇВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ ІМЕНІ ІГОРЯ СІКОРСЬКОГО”
ПОЛІТЕХНІЧНИЙ УНІВЕРСИТЕТ ФІЛІППІН (ФІЛІППІНИ)
ЕКОНОМІЧНИЙ УНІВЕРСИТЕТ В БРАТИСЛАВІ (СЛОВАЧЧИНА)

МАТЕРІАЛИ XXII МІЖНАРОДНОЇ НАУКОВО – ПРАКТИЧНОЇ ОНЛАЙН КОНФЕРЕНЦІЇ ЗДОБУВАЧІВ ВИЩОЇ ОСВІТИ ТА МОЛОДИХ УЧЕНИХ

‘SCIENCE AND TECHNOLOGY OF THE XXI CENTURY’

“НАУКА ТА ТЕХНІКА XXI СТОЛІТТЯ”

10 листопада 2021 р.

Київ – 2021

УДК 330.341.1(063)

І-57

ISSN 2411-3050

***Science and Technology of the XXI Century*:** Proceedings of the XXII International R&D Online Conference for Students and Emerging Researchers, 10 November, 2021. Kyiv, 2021. Part III. 156 p.

The edition is recommended by the organizing committee of the Conference and approved by the Academic Council of the Faculty of Linguistics.

The edition features proceedings delivered at the Twenty Second International R&D Online Conference for Students and Emerging Researchers ‘Science and Technology of the XXI Century’ held at the National Technical University of Ukraine ‘Igor Sikorsky Kyiv Polytechnic Institute’ on November 10, 2021.

The Conference attracted over 400 students and postgraduates.

The publication is intended for scholars, undergraduate and postgraduate students from Ukraine, the Philippines, Slovakia involved in research and development work in different fields of science and technology.

The articles compiled in the book are reproduced without editorial interference as they were presented by the authors.

Results. For example, in San Francisco there is a smart parking system SFpark: special devices process information about the number of free spaces to a special case. Experts estimate that thanks to this system, the search time for parking spaces has decreased by 50%, and the amount of harmful emissions into the atmosphere – by 25%. Another example of using data to optimize e-government at the local level is the experience of New York, in particular its municipal emergency management. Its main purpose is to prepare for and respond to major emergencies. Emergencies activate urban resources in new ways, forcing the creation of new data and operational processes that did not exist before (Tapscott,1999).

Conclusion. In order to effectively implement and disseminate the concept of the Internet of Things, it is necessary to actively involve citizens in this process. In the implementation of e-government, the priority should be – quality, efficiency, quantification and ease of use of open data.

References:

Gillis, A. S. (14.04.2021). EVALUATE Ultimate IoT implementation guide for businesses [Web log message] [Web log message]. Retrieved 19.09.2021, from https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT

Lee, J.H., Phaal, R., & Lee, S.-H. (2013). An integrated service-device-technology roadmap for smart city development. *Technological Forecasting & Social Change 80(2),* 286–306.

Tapscott, D., & Agnew, D. (1999). Governance in the digital economy: The importance of human development. *Finance & Development 36(4),* 34–37.

ROLE OF ADDITIVE MANUFACTURING IN CREATION OF SUSTAINABLE CLOTHING

Anna Bilous

Faculty of Applied Mathematics, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Key words: additive manufacturing, 3D printing, clothing, sustainability

Introduction. Since ancient times clothing served humans as protection from exposure to heat, cold, precipitation and various hazards. In the course of time, in addition to its original purpose, clothing also became the symbol of status, and during the last few centuries clothing has also become an instrument for self-expression. Unfortunately, nowadays the excessive amount of produced clothing and material wastage during the manufacturing process result in waste of precious natural resources and poisoning of the environment with non-biodegradable materials.

Additive manufacturing is considered a revolutionary process technology (Despeisse, Ford, 2015). It faces constant improvements and possesses high potential, but its impact on the fashion industry is still relatively low. That is why the development of clothing making technologies that involve the usage of additive manufacturing with the aim to create sustainable clothing is one of the most relevant topics.

Objectives. The objective of this work is to explore how additive manufacturing, also known as 3D printing, can be used during the clothing manufacturing process, define the advantages of 3D printing for the fashion industry and identify how 3D printing can produce sustainable clothing. The existing examples of clothing projects, footwear and jewelry, which were created using additive manufacturing technologies, will be reviewed in this work.

Methods. There are three main types of 3D printers: the Fused Deposition Modeling (FDM), the Selective Laser Sintering (SLS), and the Stereolithography (SLA) types (Kim, Seong, Her, Chun, 2019).

The SLS type is mostly used for industrial purposes and is unnecessary for fashion industry: the clothing does not require high durability that this type of 3D printer provides. In addition, the materials for this type require additional equipment for post-treatments, which is expensive, takes up a lot of space and is disadvantageous for fashion industry.

The SLA type produces parts with high level of details, smooth surface and tight tolerance. It seems suitable for clothing manufacturing, but the main disadvantage of this type is the price of equipment (mostly due to the high detailing of the products, which is unnecessary for clothing in most cases and is beneficial for industrial purposes as well).

The FDM type is cost-effective and is currently the most appropriate equipment for mass production clothing manufacturing, even though the products have rougher surface, compared to SLS and SLA type of products. Moreover, the FDM type uses plastic filaments for printing onto the build platform, whilst the SLS and SLA types use lasers to print with polymer powder and resin respectively. This allows the usage of recycable and bio-degradable plastic filaments, such as polylactic acid (PLA) and polyethylene terephthalate (PET).

With the help of 3D printing more complex designs become available without exceeding waste in materials. Even the highly detailed projects only require the materials for the parts themselves, with little to no non-recyclable leftovers as compared to more traditional methods of clothing production. Thus, not only does the process save on resources, but it also reduces the cost of the materials being used.

Results. Here are stated the best implemented 3D printed clothes projects.

– In 2015, a Dutch designer Anouk Wipprecht developed the Spider Dress that has extending and retracting mechanical arms, which react in response to external stimuli when people approach. The dress was fully 3D printed with SLS technology.

– In 2018, an American designer Julia Daviy presented her sustainable 3D-printed clothing collection that is comfortable to wear on daily basis. The first collection consisted of dresses, skirts and tops. She also designed a jewelry line and bags collection from recycled materials.

– Adidas company in partnership with Carbon 3D launched project called Futurecraft 4D. Its goal is the development of sport shoes with 3D-printed midsoles. These shoes are mass-produced and are currently available for purchase around the globe.

– Nervous System company specializes in 3D-printed jewelry that is inspired by natural phenomena and human blood vessel structure.

Conclusion. To sum up, additive manufacturing has already begun its gradual way into fashion industry and has high potential of becoming permanent part of fashion manufacturing in the future. The active development of environmentally-friendly synthetic materials gives chance for sustainable clothing to become 3D-printed and widespread much faster.

References:

Despeisse, M., Ford, S. (2015, September). The Role of Additive Manufacturing in Improving Resource Efficiency and Sustainability. *IFIP Advances in Information and Communication Technology, 460(1),* 129–136.

Kim, S., Seong, H., Her, Y., & Chun, J. (2019, December). A study of the development and improvement of fashion products using a FDM type 3D printer. *Fashion and Textiles, 6(1),* 201–225.

Sculpteo (2021). 3D printed clothes in 2021: What are the best projects? Retrieved from https://www.sculpteo.com/en/3d-learning-hub/applications-of-3d-printing/3d-printed-clothes/

FACIAL RECOGNITION TECHNOLOGY

Evgeniy Bondarchuk

Faculty of Biomedical Engineering, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Key words: facial recognition, technology, identification

Introduction. Recently, it has become increasingly interesting to observe the development of newer technologies such as facial recognition. More than 10 years have passed since the first developments in this field were presented, and during this time new and promising possibilities have already emerged. With all that said, the development of the technology has advanced far and wide, never stopping for a second and far from being complete.

Objectives. Features facial recognition technology to improve our lives.

Methods. Facial recognition technology is a biometric software application that can uniquely identify or verify a person by comparing and analysing patterns based on a person's facial contours. Everyone has a unique facial structure. Special software is able to analyse it, matching it against information in a database to further identify who you are. The task of facial identification and recognition is one of the first practical tasks that stimulated the formation and development of the theory of object recognition and identification (Reddy, Kulkarni, & Hariharan, 2009). The interest in the procedures underlying the process of face recognition and facial recognition has always been considerable, especially due to the increasing practical needs: security systems, verification, forensic analysis, teleconferencing, etc. Despite the clarity of the mundane fact that humans are good at identifying people's faces, it is not at all obvious how to teach a computer to carry out this procedure, including how to decode and store digital images of faces.