

ApPEARS

APPEARANCE PRINTING

European Advanced Research School

Newsletter November 2022



Welcome!



As most of the PhD fellows of ApPEARS, also known as Early Stage Researchers or just ESRs, are busy wrapping up their final work and thesis, more publications are being published. You can find three examples of recently published papers in this edition of the ApPEARS newsletter.

In addition, this Newsletter gives you a couple of stories from our latest events, the training event in Bristol, UK and the Closing Event in Gjøvik, Norway. The image to the left is from the sculpture park "Ekebergparken" we visited during the closing event.

Getting their hands "inky" in Bristol

In the Harbor city of Bristol, surrounded by 19th-century warehouses, the scene was set for the 4th training event of the project. At the University of the West of England, specifically the Centre for Print Research, they were ready to host 15 ApPEARS Early Stage Researchers (ESRs) with a week of interesting and various content.

During the training the ESRs did a lot of hands-on exercises, starting with the development of a simple model for 3D printing with the computer-aided design (CAD) tool called Rhino. They also got an insight in different printing techniques by getting their hands dirty, or at least "inky" when given the opportunity to test lithography, relief, and screen printing. ApPEARS PhD fellow Fereshteh Abedini who attended the training and had never tried any hand-made printing techniques before. – Controlling print parameters in hand-made printing techniques is very



challenging, but I found it an interesting topic to explore in more details, she says about her newly acquired skills.

Image: Fereshteh Abedini testing screen printing.



Image: Tanzima Habib watching Riccardo Tonello and Dipanjana Saha testing Lithography.

PhD fellow Tanzima Habib was also very pleased, saying it was very educational and helpful to practically learn about the different printing techniques and methodologies. – It definitely increased my understanding about how different printers work, how materials are used, and the printing processes, she says. Meeting people who are working with different printing methodologies specially focusing on reproducing good piece of art was a great experience to her as this was new knowledge and she learned a lot from them. – I would like to increase this network that deals directly with applications and production, she says.



Image: Colours of Bristol

Fereshteh Abedini felt the training was very well-organized. After three days in Bristol, the journey went on to Birmingham where the PhD fellows visited the national exhibition “Sign and Digital”, a trade show for the visual communications sector a place for inspiration and networking.

The last city to visit was Leeds, where the ApPEARS beneficiary the University of Leeds is located. - “In Leeds, we received a good demonstration of the devices they have, specially Xrite TAC7 material scanner”, Tanzima Habib says. They also got to present their projects through a poster session for other fellows at the University, practicing communication of their projects as well as discussing with peers.



Image: The ApPEARS group in Leeds

The networking possibilities these training events provide, are probably the most appreciated part according to the ESRs. Discussing with people gives you new perspectives and opens up for possible collaborations in the future.

Below you can find a link to a video showing some of the activities of the ApPEARS Training Event 4 in Bristol and Leeds.

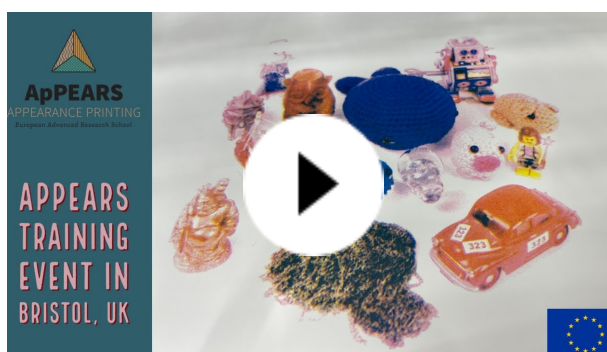


Image: Watch this YouTube video of Training event in UK by clicking the image!

Several new journal publications

The Early Stage Researchers of ApPEARS have been publishing many papers lately. Here are three journal papers published recently:

Journal of Imaging MDPI

Towards a Low-Cost Monitor-Based Augmented Reality Training Platform for At-Home Ultrasound Skill Development

Marine V. Shao ^{1,✉}, Tamara Vagg ^{1,✉}, Matthias Schmidt ^{1,✉} and Mitchell Douglas ^{2,✉}

Abstract: Ultrasound education traditionally involves theoretical and practical training on patients or on simulators. However, affordably accessible training equipment during the COVID-19 pandemic has highlighted the need for remote-based training systems. One of the prohibitive costs of ultrasound probes, few medical students have access to the equipment required for at-home training. Our goal is to develop a study focused on the development and assessment of the technical feasibility and training performance of an at-home training solution to teach the basics of interpreting and generating abdominal flow. The training solution aims to overcome these significant needs for displaying virtual content and requires only a monitor retained on a monitor and a connector with software. With

Applied Sciences MDPI

The Amber Project: A Survey of Methods and Inks for the Reproduction of the Color of Translucent Objects

Abigail Trujillo-Vazquez ^{1,✉}, Marie Falles, Suzanne Klein and Carina Parman

Abstract: Unlike regular pigments based on selective light absorption, the so-called "effect pigments" are based on the phenomenon of structural color, or selective reflection. Structural color has appealing aesthetic qualities, such as angle-dependent hue, and is able to produce lighter colors. When used as a pigment, however, the gamut of the print is more limited, the color is difficult to measure, and structural color management and pigment process become challenging. The aim of this paper is to compare the behavior of effect pigments in the process of lithographic and screen printing with standard pigments used in so-called process inks, and to analyze their optical properties when used on their own or in combination with absorption pigments. An array of amber beads was printed on screen prints and lithographs. These sets of inks were used for color. Standard process inks in

Materials MDPI

What Elevation Makes 2.5D Prints Perceptually Natural?

Altyнай Kadyrova ^{1,✉}, Marlon Pedersen ^{2,✉} and Stephen Westland ^{3,✉}

Abstract: Elevation plays a considerable role in naturalistic perception of 2.5D prints. The necessary level of elevation to make 2.5D prints look perceptually natural may vary from application to application. Therefore, one needs to know the right elevation for specific applications to make the prints look perceptually natural. In this work, we investigated what elevation makes 2.5D prints of wood images perceptually natural. We started with various wood content images such as wooden wicket, wall, roof, and floor. We found that the optimal elevation that makes 2.5D prints of wood images perceptually natural is content-dependent and in a range between 0.5 mm and 0.5 cm. Moreover, we found that the optimal elevation becomes 0.5 mm if we consider images of wood regardless of the wood content. In addition, there was a high correlation between majority of observers on subjective perception of 2.5D prints of wood images.

Keywords: naturalness; 2.5D printing; elevation; wood images

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Read paper

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Image: The ApPEARS Early Stage Researchers showing their ApPEARS certificates

ApPEARS Closing Event

More than three years have passed since ApPEARS started, and the first Early Stage Researcher (ESR) has already submitted the thesis. Although the project has been extended until the end of 2023, we went through with the ApPEARS Closing Event as planned in September 2022, hosted where it all started, in Gjøvik, Norway.



Image: Elevated print from Canon

The Closing Event was a dissemination event as much as it was a training event. The main goals of the Event were to disseminate the project results to potential end users as well as preparing the ESRs on what comes next by starting to think of career opportunities in the industry or academia.

For disseminating the project results, two events were planned and the first was a visit to Canon Norway. Whereas Canon in Venlo (the Netherlands) is a partner organisation of ApPEARS, Canon Norway has also been an important cooperation partner to the ApPEARS coordinator NTNU – Norwegian University of Science and Technology.

It was a natural place to visit when discussing research results. From the representative from Canon in Venlo, we learned about the value of being part of a project like

ApPEARS, where he meets young, talented researchers that bring in new perspectives to their activities.

After learning about Canon's printing technology, the ApPEARS ESRs presented their research posters to Canon employees and some of their customers who visited to learn more about the newest research in the field.



Image: Ruili He presenting her poster at Canon

The second main dissemination event was the ApPEARS Expo held at NTNU in Gjøvik, targeting the attendees of the Colour and Visual Computing Symposium (CVCS 2022). With more than 80 participants the ApPEARS Expo served as an excellent arena for interesting discussions about the projects of each of the PhD fellows present.

Life after PhD

As the ESRs are entering the final stage of their work, several topics of the Closing Event were focusing on potential future careers. Through an Industry Day, the ESRs learned about research opportunity at different companies like HP and Technicolor. For some ESRs, the thought of taking their technology to business might be intriguing, so the Innovation and Entrepreneurship Day hopefully provided both inspiration and tools for how to bring their idea into life. Vaager Innovation, a technology incubator, guided the participants through IP rules, design sprint, design thinking and financing opportunities.

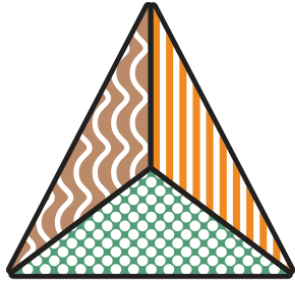
Presumably, some ESRs will continue their journey in academia, and throughout two full days of research presentations, the CVCS 2022 facilitated for learning as well as networking possibilities. This year the symposium hosted more than 120 participants, over 20 papers were presented, and four invited speakers gave excellent presentations of different topics in the field of colour science.



Image: The ApPEARS group in Oslo

ApPEARS publications





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ApPEARS, MSCA-ITN - Teknologi vegen 22 / P.O. Box 191, 2802 Gjøvik, Norway

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