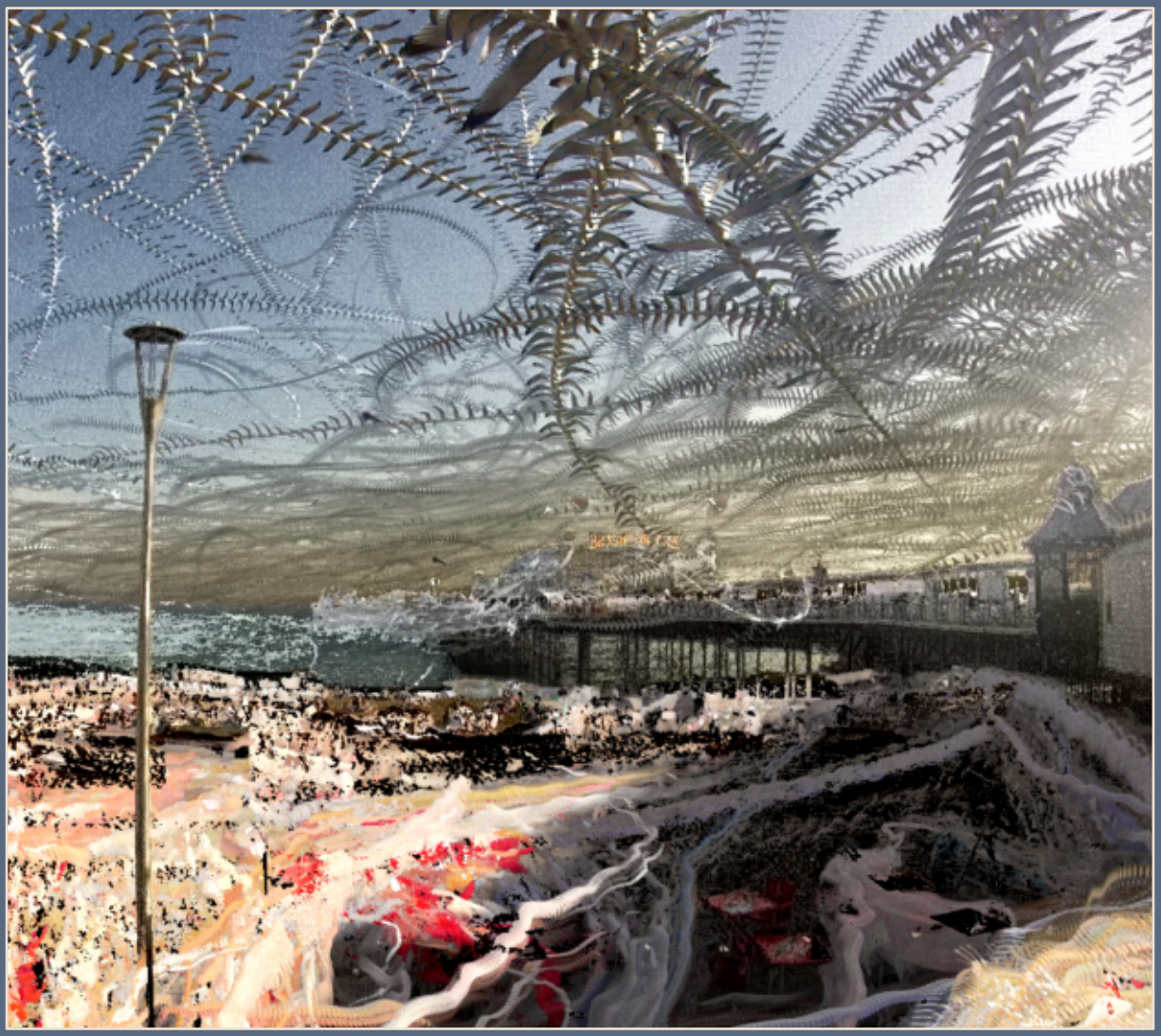
Alex May



Algorithmic Photography

Alex May

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www.computer-arts-society.com

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Introduction

Alex May developed *Algorithmic Photography* to capture data and reveal hidden or unnoticed information in his own moving image artworks using bespoke computer vision algorithms that he has coded in C++.

Through a multistage process encompassing video capture, motion detection, and colour space conversion, his abstracted compound compositions emerge, exploring subjects as diverse as ant swarms and starling murmurations, to wind farms and New York taxis.

Central to May's practice is an attempt to understand time and memory through digital processes. *Algorithmic Photography* brings together twenty images for the first time that provide a broad contextualising overview of the techniques and subject matter May has been engaging with over the past eight years in his *Algorithmic Photography* practice.

Alex May's wider artistic practice questions how our individual and collective experiences of time, and formation of memories and cultural record, are mediated, expanded, and directed by contemporary technologies.

His work forges creative links between art, science, and technology through a wide range of digital new media, including virtual and augmented reality, photogrammetry, photography, interactive robotic artworks, video projection mapping, generative works, performance, and video and sound art.

May has an international exhibition profile, including Tate Modern (UK), MIT Museum (USA), Nobel Prize Museum

(Sweden), ZKM (Germany), Ars Electronica (Austria), Milan Triennale (Italy), Beijing Art and Technology Biennale (China), WRO Media Art Biennale (Poland), HeK Basel (Switzerland), Kunstlerhaus Vienna (Austria), Victoria & Albert Museum (UK), The Francis Crick Institute (UK), Science Gallery Dublin (Ireland) and Science Gallery Bengaluru (India), ZHI Art Museum (China), and the Beall Center for Art + Technology, University of California, Irvine (USA).

His work is held in the collections of ZKM, The Computer Arts Society, and The Amelia Scott (UK).

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This exhibition was produced by the Computer Arts Society (CAS). CAS was founded in 1968 to promote the understanding of the role of digital and electronic media in the arts. As it has developed over time, a key aim has become to ensure that the long history of the computer arts is recognised by contemporary artists, technologists, audiences and collectors. The society currently organises talks, events, exhibitions and performances, and uses social media to highlight the ways that digital and electronic technologies can be of value to the creative sector. After celebrating its 50th anniversary in 2018, CAS renewed its commitment to promoting the use of digital media in contemporary practice and to providing a forum for diverse audiences of all ages and backgrounds to meet and exchange ideas. The Computer Arts Society is a specialist group of the BCS Chartered Institute for IT and works closely The Computer Arts Archive Community Interest Company.

www.computer-arts-society.com

Alex May Interview

with Francesca Franco

Media art curator and historian Francesca Franco and Alex May discuss *Algorithmic Photography*.

Francesca Franco: First of all, what inspired you to explore *Algorithmic Photography* as a medium for your artistic expression?

Alex May: The inspiration almost certainly goes back to the photographic work of Eadweard Muybridge, who was a big influence on me when I was a teenager. I was fascinated with looking at his photos that broke apart movement into a series of discrete images.

The technical development of the process originated in my experiences of being involved with the VJ (Visual Jockey) scene in the early 2000s. I had found this creative coding outlet where I would write real-time video-processing code during the day and perform with these effects it in the evenings creating dynamic visuals at gigs and club nights. I released these effects as plugins for other VJs to use under the name VJ bigfug. There was a video feedback one, that is still popular today, and is all about image accumulation and masking, and those are the techniques that I carried through into the *Algorithmic Photography* process.

With the application of computer vision algorithms and digital hardware, we are able to see the world beyond our physical means. The human eye is an incredible thing, but it cannot see the very small, the very far, or the very quick. Digital technologies reveal these hidden realms to us and allow us to see aspects of our universe that we are surrounded by, but not aware of. *Algorithmic Photography* is con-

cerned with the aesthetic relationship between objects moving through time, in a shared physical space, as witnessed by an algorithm.

Can you call it a 'medium' then? *Algorithmic Photography* is that core as a term?

I have a lot of internal conflict with the premise of photography. It is often used to freeze a moment in time, which looks like a world we recognise - we see as a camera sees the world, subject to lens length and other technical factors – though we can never experience that frozen moment in time like the camera does. Even when we are looking at a completely still scene, our eyes are still moving, vibrating. It breaks the way we naturally see - where our mental focus is naturally drawn within a live scene - and offers an experience more akin to a painting where we can relax and spend time exploring the most inconsequential features of that moment, preserved in a frame but outside of time. The algorithms I've written make this relationship more obvious by compressing the image along a time axis but still staying true to the essence and data of the captured moment. To me it feels just one abstraction step further away than photography. I don't think that makes it its own medium, but more of an extension or counterpoint to traditional photography.

Can you share the story behind the inception of the *Algorithmic Photography* series?

I had created an interactive installation called *Statues Also Die* in 2008 as part of a series of statue video mapping interventions along the south bank of the Thames with the wonderful sound artist Martin A. Smith. It was commissioned by Kensington and Chelsea Council as part of their InTRANSIT festival. This piece was responding to concepts in the 1953 French video essay by Alain Resnais, Chris Marker, and Ghislain Cloquet. I was

struck by the idea that statues that are seen everyday fade into the background and no longer have any presence in the mind of the observer. The installation was a screen, a projector, and a camera. If people walked past, they wouldn't register, but if they stopped and stood still, they would slowly start to appear on the screen in a ghostly static form that lasted after they had walked away. They had manifested the statue by stopping to take notice.

The algorithms I used for this such as real time background subtraction, image accumulation, and frame difference detection became running themes in my works.

In May 2016, the idea popped into my head of trying these techniques with a live video camera feed to form a single compound image, and that was the first *Algorithmic Photography* image. I spent the next few years developing and refining the technique into the images that you can see in the exhibition.

For the Computer Arts Society selection is there a specific story that you want to tell or specific theories that you want to show?

For me, this exhibition is a chance to reflect on the diverse range of techniques and subject matter I've been experimenting with since I started working with this process. Also, it highlights the story of searching for the right subject matter, and the development of the aesthetic and algorithmic choices I've made along the way. A lot of experimentation has gone into these pieces, and I hope that comes through in the selection. Also, they represent the body of work I did before lockdown, during which I couldn't go out and take photos in the same way. I felt I wanted to draw a line under that period of time, to have a showcase from that world, before I present a new chapter of work taken since the pandemic.

And in terms of the technical process, can you walk me through the technical process of creating an Algorithmic Photograph from start to finish?

The process starts with taking a video. This is almost always a static, tripod-based shot, that usually lasts for around five minutes. I have mainly used GoPro cameras as they are very easy to travel with, and you can see from the locations of the photographs in the exhibition, I am travelling widely. I've recently switched to using DJI cameras.

I like action cameras, not just for their small form and ruggedness, but the shutter speeds are usually quite high, and I don't have to worry about focus. If you look at the fast-moving subjects in my photos, you can see they are not blurred, which is due to the fast shutter. This helps aesthetically, but also makes capturing a scene faster as there are less settings to worry about, and post processing easier.

All the processing of the image takes place on my main home computer that has a powerful graphics card, which I feel is somewhat like developing an image in a darkroom. You don't know really know if what you've taken will work until you 'develop' the image using the software.

I originally prototyped the system using my open-source software *Fugio*, but since then I've recoded it into a dedicated C++ application that uses a chain of *OpenGL* based shaders, which allows me to do parallel processing of the images. This means that I can quickly see if I have the settings dialled in right. If I'm working with 4K video, it operates at around 8-10 frames per second. Using CPU based algorithms would take many seconds per frame, making the iterative process too slow and painful.

These days the software has thousands of potential combinations of operations. Over time I have learnt that certain al-

gorithms are almost guaranteed to work with particular subject matter. For instance, if we always take the darkest pixel from each frame of video and put it directly in the output images, this will easily show the silhouettes of birds flying across a blue sky. If we take the brightest pixels, we will see stars and car headlights trail through the night. These are some of the simplest types of algorithms.

I often use ones that take a colour value, split it into various colour spaces, pass them through an adaptive masking stage, and recombine them in novel channel combinations with a dynamic accumulation factor. That's done for each pixel, for each of 7,500 frames for a five-minute video.

I usually do a little colour and exposure adjustment for the final image, but I try to do the absolute minimum.

How do you go about choosing or designing algorithms for your different projects?

A lot of it came from learning about how computers store and process image data. Even converting images from colour to grey is relatively complex due to the many different ways of doing it. Each technique has its own use and its own aesthetic choice, which is why I support so many of them in my software. Then there are multiple colour spaces and pixels formats for storing data in anywhere from 1-bit to 32-bits per channel. It's hugely complicated and I researched a lot of it to find novel ways of extracting information from the incoming image data.

I also spent a lot of time working with the amazing *OpenCV* library that introduced me to a wide range of complex image processing algorithms that fortunately someone else had spent the time implementing.

When we compare this to traditional photography what advantages do you believe *Algorithmic Photography* offers from traditional chemical photography?

It could be described as capturing motion in long form. Where chemical photography can get very muddy when doing long exposures because it is purely additive. This technique is highly selective and can make dynamic pixel level choices to retain a level of fidelity in motion that is unachievable any other way. I don't know if it's an objective advantage per se.

It depends on the person operating the camera. If it lets them capture something they're seeking, it's certainly a subjective advantage.

In terms of subject matter how do you choose the subject for your projects?

There's an exciting element of not knowing whether something will work or not, or whether I can devise an algorithm to make something work. Sometimes you are presented with a scene, and you just know it's going to work based on previous similar situations, and perhaps it'll be an interesting image, but I am trying to push things all the time. As I try new techniques and subjects, I'm gradually exploring my own aesthetic preferences in the work.

What I really like about your algorithmic photography is that it seems to reveal the hidden motion of the world. Can you share some examples of moments that you captured that might be imperceptible to the human eye?

Most every photo reveals something unexpected as it develops. It makes the difference between the eye of the digital camera and the eye of the human very apparent. I watch the scene as the camera takes the video. My eye notices certain elements and informs me when to start

and stop recording. However, what the camera sees can be quite different. It makes no choice about what to look at: if it's in the frame, it's recorded and written to the memory card. There's been small bugs, birds, and clouds that I hadn't noticed leaving patterns that only emerge in the final image. This is part of the delight of the process when developing the images afterwards - you never quite know everything about what you've captured.

Okay last question about future explorations. Are there new directions or aspects of motion that you're eager to explore and how do you see the future of this series evolving?

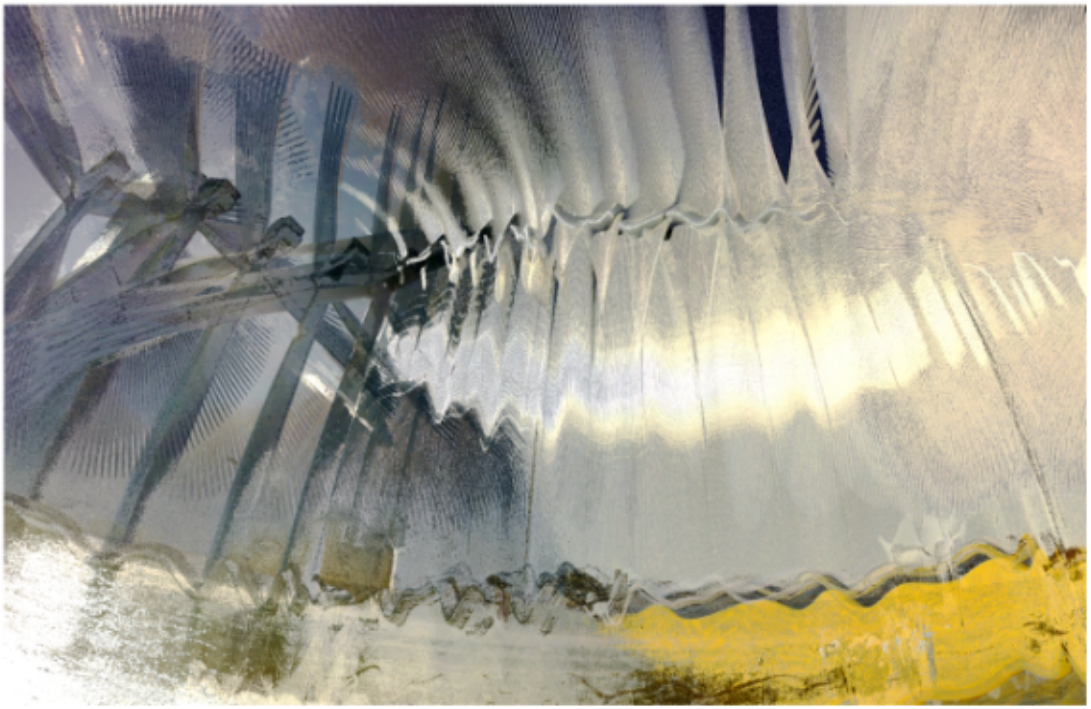
I'm keen to introduce a new layer into the software that uses contemporary machine learning techniques to perform various segmentation algorithms on the images of the video.

Currently the algorithms operate without any higher contextual knowledge of what a particular pixel might represent. It doesn't know that a pixel is part of a bird's wing, it only knows it is darker than the other pixels, which happen to be the sky. With segmentation, the incoming image is labelled, so this group of pixels is a person, this group is a car, and so on. Then the algorithm can prioritise people, or cars above other elements in the masking process. I've made some progress in this area and the results are very different from anything I've done before, as you might expect. They're not quite ready to show yet, but that's one of the directions I'm working towards.

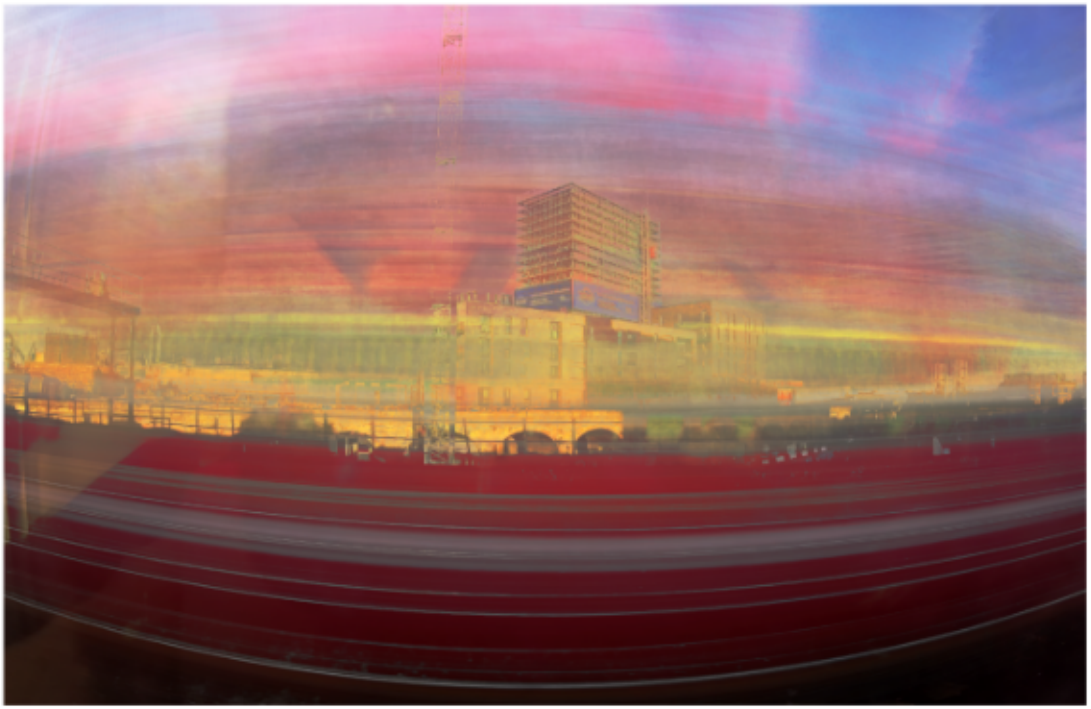
Francesca Franco
www.francescafranco.net
17th January 2024

Artworks

1. The ubiquitous yellow trails of taxi cabs in New York City, NY, USA (2019)



2. Sailing past a wind turbine in the Rampion Wind Farm off the coast of Brighton, UK (2018)



3. Taking the train from Brighton to London. A red Gatwick Express train passes by. UK (2018)

4. Birds and a drone pass a family posing for a photo in front of Brighton Pavilion, UK (2018)

5. Ants trace paths around a pond in the Mediterranean biome at Eden Project, Cornwall, UK. (2018)

6. Boaters on the River Cherwell, Oxford get stuck in the trees. UK (2018)

7. A couple discretely make out while the boats pass by on Retiro Park Lake, Madrid, Spain (2019)

8. Arriving in Vienna late at night. The view through the front window of the taxi. Austria (2018)

9. Seagulls and tourists navigate around St. Mark's Square in Venice, Italy (2018)

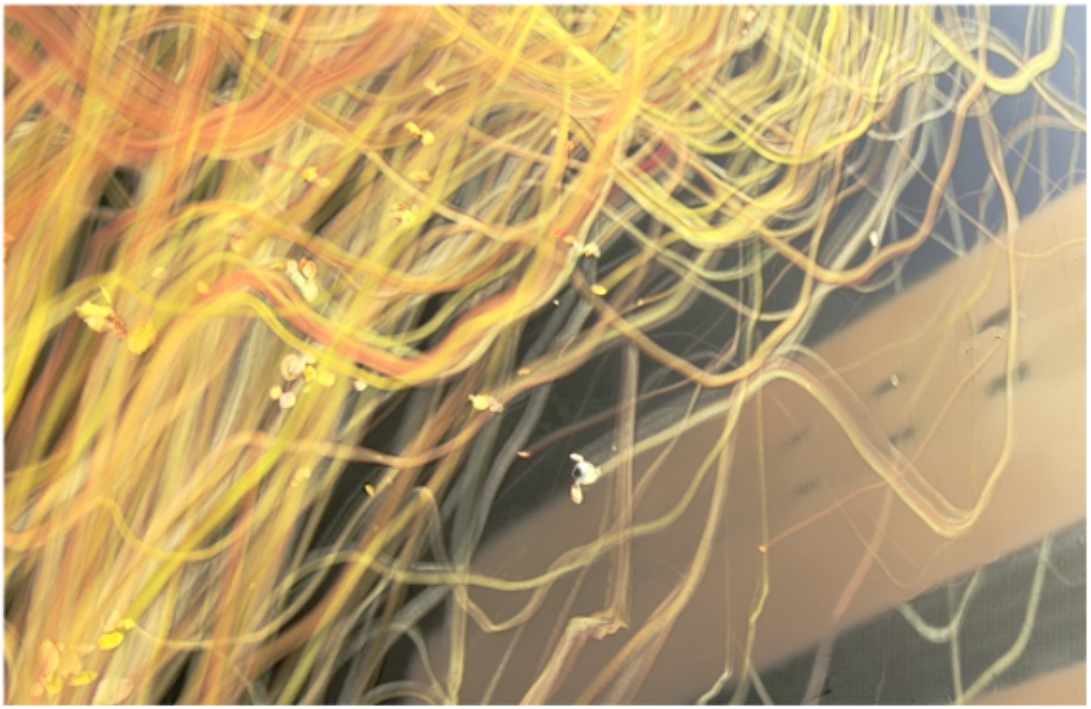
10. Being passed by a vaporetto on the waters of Venice Lagoon, Italy (2018)

11. Cold, darkly clothed tourists cross St. Mark's Square in Venice, Italy (2018)

12. Birds flying to roost as the sun sets over Charleston Farm, UK (2019)

13. Tourists run up the 'Rocky Steps' outside the Philadelphia Museum of Art, PA, USA (2018)

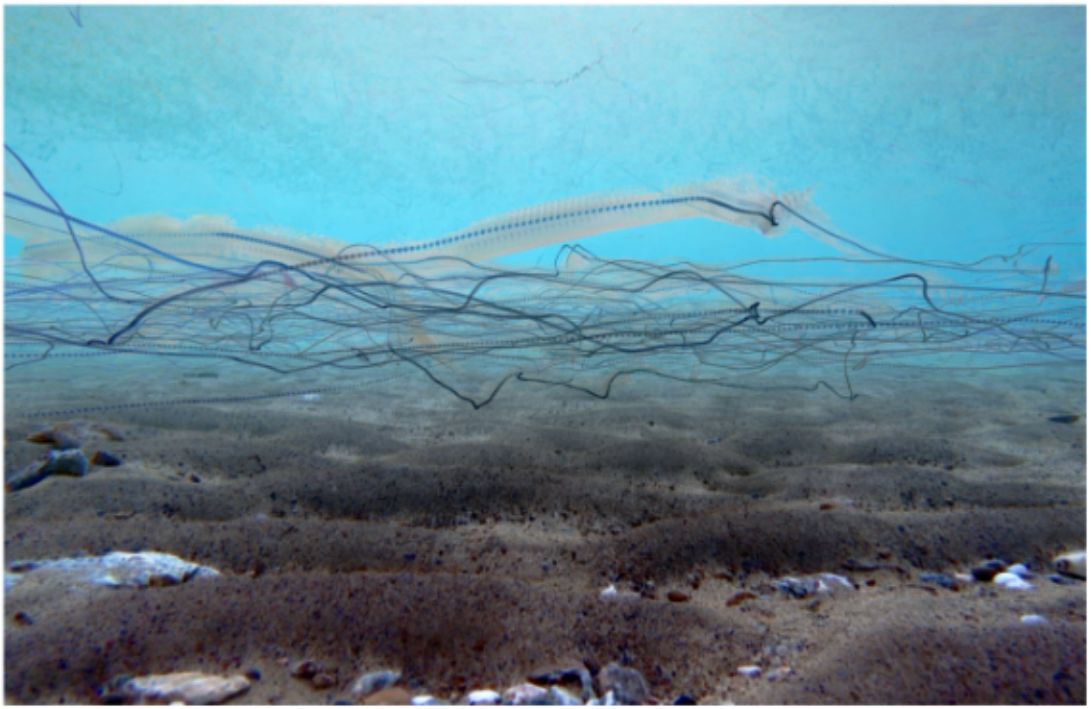
14. Seagulls and tourists around Brighton Palace Pier, Brighton UK (2018)



15. Falling leaves floating in front of a building reflected in a canal, Amsterdam, Netherlands (2018)

16. Murmuration of starlings coming in to nest under the boardwalk of Brighton Marina (2018)

17. Koi carp in the hotel garden pool, Guangzhou, China (2018)



18. Small fish in the sea at Vouliagmeni Beach, Greece (2018)

19. People leaving the El Camino Pilgrim Mass, Santiago de Compostela, Spain (2018)

20. Pigeons search for food on the café paths at Athens Archaeological Museum, Greece (2018)

Credits

This exhibition of original artwork by **Alex May** was produced by the **Computer Arts Society**. The catalogue was edited by Sean Clark. The project was supported by the **BCS Chartered Institute for IT**, **Interact Digital Arts Ltd** and the **Computer Arts Archive CIC** in Leicester.

www.computer-arts-society.com

Other CAS Exhibitions

The **Computer Arts Society** runs regular exhibitions at BCS Moorgate in London and Phoenix Cinema and Arts Centre in Leicester. PDF copies of exhibition catalogues, videos of talks by the artists and other documentary materials are available from the **Computer Arts Society** website. A limited number of printed copies of the catalogues are available from the **Computer Arts Archive s**hop.

shop.computer-arts-archive.com

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