Call for creative students across Edinburgh College of Art, The Institute for Design Informatics, and beyond

Creator in Residence: STEAM Imaging V
Holding the ‘Digital’ in Medicine to Account
Jointly Exploring Digital Medicine: Creators, Scientists, and the Next Generation

We are looking for an artist, designer, creative thinker, or creator interested in research and developments in digital medicine!

Creating digital medicine that serves a diverse range of doctors and patients requires expertise, time, and dedication. Who is developing new technologies in digital medicine? And who is creating the stories, images, and sounds to represent the new digital solutions in medicine and shape how it is interpreted?

STEAM Imaging V is hosted by the Fraunhofer Institute for Digital Medicine MEVIS in Bremen, Germany, in collaboration with the Institute for Design Informatics, Edinburgh, United Kingdom, the International Fraunhofer Talent School Bremen, and the School Center Walle, Bremen, Germany, and supported by Ars Electronica, Linz, Austria. STEAM Imaging V aims to foster engagement with and ownership of future technologies, to add interdisciplinary on-site and online methods and new approaches to artwork development and STEM teaching by connecting digital medicine to education, and to be open to arts and humanities. You will develop your work of art, co-create, and hold a STEAM workshop in Bremen and Edinburgh with our scientists (with the chance to integrate existing material). Your artwork will be featured at the Inspace Gallery at the Institute for Design Informatics at the University of Edinburgh. The STEAM Imaging V program and the outcome will be promoted through Ars Electronica channels.
Wanted and Unintended Impacts of Digital Medicine

Artificial intelligence and self-learning algorithms will bring enormous advancements to clinical routines in hospitals and medical practices. Simultaneously, these solutions call for new structures, for example, in data privacy and interdisciplinary cooperation. However, over-reliance on technology in medicine can lead to a lack of critical thinking among doctors and other healthcare providers, resulting in dependence on technology. Disparities in access to digital medicine technologies, particularly in underserved and low-income populations, can lead to inequity in access to care. Artificial intelligence algorithms used in digital medicine can be biased based on the data they are trained on, potentially resulting in inaccurate or unfair diagnoses and treatments. Additionally, the rapid pace of innovation in digital medicine makes it difficult for regulators to keep up, raising questions around the safety and efficacy of new technologies.

For your artwork development, you will be in close exchange and cooperation with Fraunhofer MEVIS scientists on-site in Bremen, Germany, for two weeks in November 2023 and for six further weeks remotely through scheduled interactions. Tailored to your interests, a mentor will guide you through the process. The residency aims to support self-driven discussion on and engagement with Fraunhofer MEVIS’ R&D, software, related technology, and reflections on the societal implications of innovations in digital medicine. The artwork development and the STEAM workshop function as an experimental framework to open up discussions about both the desired impact of digitalization in health care and the concerns of the public on unwanted side effects. In addition, it could inspire future scientists from diverse cultural backgrounds during critical years to study STEM sciences needed for digital medicine. Together, we explore how STEM and humanities, and arts cross-pollinate within the socially relevant context of digital medicine and to possibly become ‘SHTEAM.’

The Host | Fraunhofer MEVIS develops real-world software solutions for image and data-supported early detection, diagnosis, and therapy. Strong focus is placed on cancer, as well as diseases of the circulatory system, brain, breast, liver, and lungs. The goal is to detect diseases earlier and more reliably, tailor treatments to each individual, and make therapeutic success more measurable. To reach its goals, Fraunhofer MEVIS works closely with medical technology and pharmaceutical companies, providing solutions for the entire chain of development, from applied research to product-ready medical products. Fraunhofer MEVIS, a part of the Fraunhofer Society, has a network of national and international partners from the fields of academia, industry, clinics, and the public sector. The Institute’s scientists are committed to raising awareness about how digital medicine and related STEM sciences influence healthcare. Besides their primary mission, they develop experiential projects at the intersection of science, art, and technology to stimulate critical dialog and ownership of new technologies, reach new audiences, and foster a diverse R&D landscape for the future. Being able to move successfully between a variety of disciplines is a crucial competence for future education and innovation. In STEAM Imaging, we are integrating further stakeholders into the software developers’ and STEM researchers’ discussions and reflections: creators from arts, design, and humanities, and school students and their teachers from a school with a special focus on health.

Cooperation with the Institute for Design Informatics | Fraunhofer MEVIS reached out to the Institute for Design Informatics (IDI) at the University of Edinburgh, where data science is combined with design thinking in a context of critical inquiry and speculation. The central premise of design informatics - that data is a medium for design, and by shaping data, the world around us is shaped - is particularly true for the field of digital medicine. Within Design Informatics, a world facilitated and

Key Areas of Research at Fraunhofer MEVIS – Audio-Podcasts & Texts

• **Introduction: The Digital Transformation in Hospitals and Medical Practices**
• **On the Trail of Important Life Processes – Making Physiological Imaging as Simple and Robust as Structural Imaging**
• **Quick and Accurate Tumor Follow-up for Clinical Routine – Monitoring Tumor Therapy More Precisely**
• **Reduce Recall-Rates and Complication-Risks in Minimally Invasive Interventions – Targeted Navigation and Precise Motion Control**
• **Empowering Multi-center Medical Research Collaborations By Providing an AI Toolkit for Distributed Data Curation, Federated Training, Validation, and Application of AI Models**
• **Precise Planning for Heart Surgery**
• **Integrative Clinical Decision Support – Using Patient-individual Modeling to Obtain Novel Decision Parameters and to Improve Guidelines**
• **AI-Based Precision Pathology: Learning with Small Amounts of Data – Improving Indicators for Tumor Diagnosis**

More about the Fraunhofer-Gesellschaft
experienced through data as a lens to being human is explored critically. Thus, we jointly open the residency program call to students of Design Informatics and the College of Arts, Humanities, and Social Sciences!

**Partner Ars Electronica |** Analyzing and commenting on the Digital Revolution for decades, developing strategies and competencies for Digital Transformation, Ars Electronica addresses central questions of our future jointly with artists, scientists, technologists, designers, developers, entrepreneurs, and activists worldwide. The focus is on new technologies and how they change how we live and work together. Ars Electronica has been cooperating with STEAM Imaging on different levels since 2017. They support transferring technological knowledge and learning through art and foster strategies to diversify STEM and technological developments. STEAM Imaging is a Partner of their European Platform for Digital Humanism.

**Holding the ‘Digital’ in Medicine to Account |** What needs to improve in research that creates “the digital” in medicine? How does the digital realm need to be shaped to support clinicians in creating a sustainable healing process for their embodied and self-responsible patients? With STEAM Imaging V, we are looking beyond the promises of new technological developments and data-driven tools. We aim to establish a critical understanding of aspects of the influence of these new possibilities as they increasingly pervade medicine, our understanding of health, and the interaction of all involved, in the process of developing these new technologies.

“Technology is the campfire around which we tell our stories.”

Laurie Anderson, avant-garde artist, composer, musician & film director

**Cooperation with School Center Walle |** The partners aim to strengthen multidisciplinary talents and encourage prospective university students to engage with science, technology, art, and humanities to gain new skills and expand their creative practice and expression. Additionally, they explore educational models of the future. We work with the School Center Walle’s teachers and students to expand ideas of what education could look like in the context of digital transformation in health care, cross-disciplinary teaching and learning, and community work. The STEAM workshop, which includes the creator’s in-residence perspective, serves to enhance the learning experience of school students by creating a deeper understanding of the latest developments in digital medicine through a new lens. Fraunhofer MEVIS wants to promote the talents and gifts of prospective high school graduates from the Walle district of Bremen and inspire them to study STEM subjects. The district is one of the socio-economically disadvantaged areas in Bremen and has an above-average proportion of citizens with an immigrant background. Walle’s high school graduation rate is also well below the Bremen average. Together, Fraunhofer MEVIS aims to promote talents and gifts and thus attract researchers with diverse life backgrounds for the digital medicine of tomorrow while contributing to more educational equality. Co-created STEAM workshops have been designed for many years at Fraunhofer MEVIS together with creators from different occupational background. The artist injects the artistic approach and skills into the engagement with the school students to open up a transdisciplinary process, blurring the lines between disciplines and also contributing to a wider approach to self-motivated interaction with new technology and difficult health issues.

**Partners, Co-Creators and more on STEAM workshops**

- Tomorrow's Medicine for Today's School—On the Way to an Established Partnership with the Walle School Center.
- Brief overview talk "Making Sense: Purpose and Impact Integrating Science, Art, and Technology – Insights and Examples from an Applied Science Research Institution”
- Evaluation Results:
  - STEAM Imaging IV
  - STEAM Imaging III Course
  - STEAM Imaging II Workshops
  - STEAM Imaging I Workshop
- Walle School Center
- Ars Electronica
Partnership Aims | Our goal with STEAM Imaging is to foster cross-disciplinary collaboration and facilitate effective communication among participants. By bringing together individuals from different fields, we aim to provide fresh perspectives and innovative solutions to real-world questions and challenges in digital medicine. By involving creators as agents, we raise broader questions and alternate approaches to exploring and presenting scientific topics in the field of digital medicine. Additionally, we strive to promote cross-sectional and cross-disciplinary understanding and build lasting ties between the organizations.

Challenges Developing Software Tools for Clinicians
Clinical software must be designed to meet the needs of doctors and nurses, who may have limited technical skills. This requires a deep understanding of healthcare providers’ needs and workflows, as well as user-centered design principles. Clinical software must be designed to fit into existing workflows and not disrupt them. Integrating software tools with existing systems and ensuring they work together can be challenging.

Ensuring that software fulfills its intended use and is safe for patients and users can be time-consuming and requires rigorous testing, verification, and validation. Rapid advances in technology can quickly render software outdated, requiring continuous updates and maintenance. Developing software that is cost-effective and integrates into numerous clinical infrastructures consisting of varying clinical hard- and software, can be challenging. In addition, clinical software often handles sensitive patient information, and ensuring that privacy and this information is secure and protected from unauthorized access is crucial. Healthcare software is subject to strict regulations, and ensuring compliance with these medical device regulations in different regions of the world is difficult.

Residency Overview | This competition is open to students of Edinburgh College of Art, Design Informatics and the wider College of Arts, Humanities and Social Sciences to propose all kinds of innovative concepts and ideas in the field of art, humanities, and technology, including AI and art, computer animation, data visualization/physicalization, digital communities, digital design, digital music/sound art, drawing, film, hybrid art, interactive art, literature, performance and dance, painting, poetry, sculpting, VFX, and many more. The creator should be open to the challenges posed by the partly-virtual residency in addition to the tight schedule of the participating scientists (due to industry delivery in applied science) and thus work out a schedule together with the scientists in advance for the residency period. A key aspect of the creator-in-residency program for STEAM Imaging is the involvement of school students in Bremen and Edinburgh. The aim is to support the creator while, in exchange, learning more about the creator’s processes and approaches, and jointly integrating and exploring digital medicine with the underlying STEM sciences, art, and humanities.

“Research, development, and art do not exist in a societal vacuum and are usually not devised by isolated geniuses. What ideas for the future, sustainable beyond our lifetime, do we want to carry forward collectively?”
Why Fraunhofer MEVIS started the STEAM Imaging program in 2017
**Funding** | The winning creator will receive, via the Institute for Design Informatics, an artist stipend of 5000 EURO, a production budget of 4000 Euro; travel costs of up to 500 EURO, travel subsidy of 450 EURO, and artwork transportation costs of up to 250 EURO. Accommodation costs in Bremen, Germany, up to 1050 EURO, are covered directly by the host.

**The First Phase: A Two-week Stay at the Research Institute in Bremen, Germany** | The selected creator will work for two weeks in November 2023 in close contact with researchers at the Fraunhofer Institute for Digital Medicine MEVIS in Bremen, Germany, within scheduled modules to develop an artwork concept. An integral part is the design and realization of a STEAM 2-day workshop related to the development of the artwork for school students, jointly with scientists. The project's communication tool is a well-established collaborative platform at the Institute, which allows larger teams to work together transparently, participatively, and efficiently across different time zones. At Fraunhofer MEVIS, a transdisciplinary team of scientists will participate, including an experienced STEM workshop leader, a medical product quality assurance representative, an accomplished SciArt producer, an expert in MRI physics, a radiologist, and a mixed reality researcher, amongst other professionals. The MR laboratory and image acquisition possibilities are available to the creator.

**The Second Phase: Remote Interactions** | The creator and scientist stay in close contact for another six weeks to support the artwork development process.

**The Third Phase: Featuring Your Body of Artwork** | The STEAM Imaging V program and the outcome will be promoted via Ars Electronica channels. The work will be featured at the Inspace Gallery at the Institute for Design Informatics at the University of Edinburgh with accompanying public engagement events alongside the scientists, inviting engagement with the art and the sciences and humanities.

**Submission Details** | Each submission has to be made online (in English) before Wednesday, 7th June, 2023, 5pm, including the following:

- About you; name, contact details, eligibility (whether you are masters or PhD student)
- An outline of a possible concept/idea that the artist wishes to pursue at Fraunhofer MEVIS
- A draft production plan with a cost estimate for the realization and timeline
- A selected portfolio showcasing works by the creator
- A breakdown of budget
- A completed equality diversity and inclusion monitoring form

The concept description should be concrete, and it should explain the essentials of the idea, focusing on topics relevant to Fraunhofer MEVIS (including our R&D fields, methods, of software) or related technology topics and the societally relevant implications within the field of digital medicine. In addition, the submission should also explain how and why the ideas and science generated by a residency at Fraunhofer MEVIS are essential to the creator’s project and the work. The production plan should contain a clear description of the production tasks involved in the project. The Jury is comprised of Design Informatics and Fraunhofer MEVIS representatives. Please email the submission to: designinformatics@ed.ac.uk

We value and promote the diversity of our participants' skills and therefore welcome all applications - regardless of age, gender, nationality, ethnic and social origin, religion, ideology, disability, sexual orientation, and identity. Severely disabled persons are given preference in the event of equal suitability.

“Linking science, technology, and art holds great potential for addressing our social, environmental and economic challenges in Europe. STEAM Imaging is a program that has been unleashing this power for years, creating an international lighthouse project focused on knowledge transfer and learning through art. We need more programs like this!”
Veronika Liebl, Managing Director Festival Prix Exhibitions, Ars Electronica