EASTER NEWSLETTER

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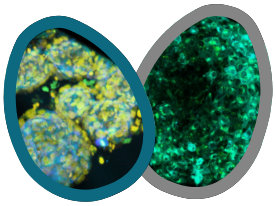
Thursday the 28th March, 2024



Interesting fact

Ada Lovelace (Mathematician)

England-December 10, 1815

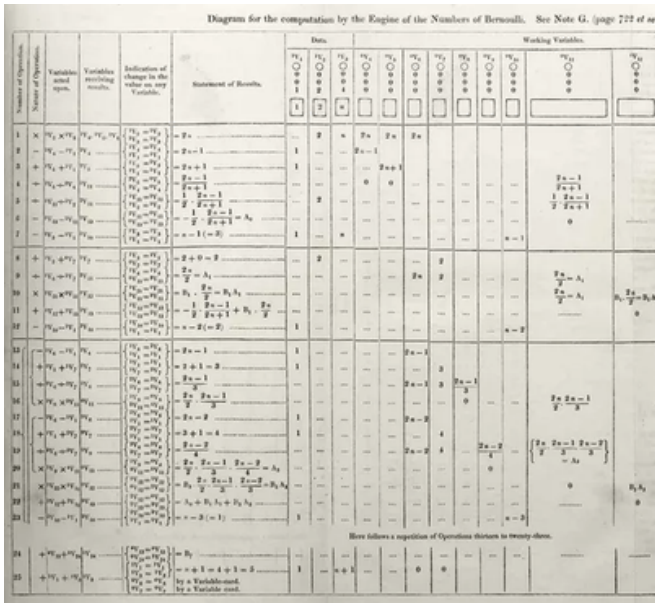
At the age of 17, Ada met the mathematician and inventor Charles Babbage. She was fascinated by his groundbreaking work on his mechanical calculating device, which he called the Analytical Engine.

In 1843, Lovelace was asked to translate from French into English a scholarly article on his calculating machine. Lovelace not only translated the notes but added her own, signing them "A.A.L."

Lovelace's notes, contained what many consider to have been the first computer program—a structured set of instructions to be carried out by a machine. She imagined that the engine could also follow patterns—or codes—not only to calculate numbers but to form letters, too.

Ada Lovelace was the first computer programmer for writing an algorithm, or a set of operating instructions, for the early computing machine.

In 1979, the U.S. Department of Defense named a new computer language "Ada" in her honor.



*Ada Lovelace's diagram motes, the first published computer algorithm**

Top News

flIMAGIN3D NETWORK WIDE EVENT

23RD & 24TH OCTOBER 2024

TÜBINGEN, GERMANY

*Ada Lovelace/Wikimedia Commons/Public Domain- https://www.thoughtco.com/ada-lovelace-biography-5113321

This project has received funding from the European Union's Horizon 2021 doctoral network programme under the Marie Sklodowska-Curie grant agreement No. 101073507

Get to know...

RISHI HARKHOE

Univeristy of Copenhagen, Denmark

Background

Rishi was raised in the Netherlands where he finished his bachelor's degree in Engineering Physics and master's degree in Biomedical Technology and Physics.

For his bachelor's graduation internship, he focused on modeling and simulating the photoacoustic effect. This phenomenon involves the absorption of laser pulses in tissue, followed by the emission of ultrasonic waves. By utilizing ultrasonic transducers to measure these waves, it becomes possible to detect and distinguish endogenous molecules within the tissue.

During his master's degree, he was able to do an experimental internship. This project was about a modality that combined optical coherence tomography (OCT) with near-infrared fluorescence (NIRF) imaging. He set up a standardized method to quantify fluorescence by using optical phantoms. These are artificial objects that replicate the optical properties of tissue. He constructed these phantoms such that they contained a hollow channel with needles at the outer ends. This way, he was able to inject a fluorescent dye that gradually went deeper into the phantom (see: Figure 1). He finished his master's degree with a short internship about fluorescence lifetime imaging (not microscopy FLIm) at the Netherlands Cancer Institute (NKI).

He decided to be more adventurous and pursue one in Denmark (from one biking country to the other). He came across my current project and decided to apply because he thinks FLIM is very interesting, and it appeared to strike a fine line in applying technical work for bio(medical) purposes.

Figure 1 - Schematic of an optical phantom (grey) in a petri dish containing a hollow channel (green) with needles at the outer ends.

Project 9

In this project, he will study biofilms, a community of microorganisms that are ubiquitous in natural aqueous environments. They are covered in an extracellular polymeric substance matrix that makes them resilient to environmental stresses and chemical/sanitizer treatments. Because of this, they cause difficulties in various industries. For example, it was estimated that up to 80% of bacterial infections in the human body are caused by biofilms. Additionally, their formation on ships causes drag and therefore higher fuel consumption. Lastly, biofilms are a major cause of food spoilage associated economic losses, and the list goes on.

With 3D FLIM/PLIM, he will map the oxygen and biomass dynamics to study the chemical microenvironment and metabolic activity. This will also be done on 3D bioprinted constructs that replicate biofilms to create a more controlled experimental setup. Furthermore, he will develop a computational model to simulate the oxygen dynamics in biofilms which will be used to compare the experimental results with.

Some other facts about Rishi: He love music and he plays the drums, recently he also picked up the guitar again after a long time. He loves cooking Asian vegan dishes and Surinamese dishes, which is where he was born. He also loves to go swimming, read Japanese comic books, and take care of my two dogs (babies).

Get to know...

JULIA MARZI

Univeristy of Tübingen, Germany

Background

Julia is an associated PI in the fIIMAGIN3D Network and group leader between the University of Tübingen, Germany and the Natural and Medical Research Institute (NMI) in Reutlingen.

She studied pharmacy at the University of Freiburg, which she finalized in 2014 with a thesis in the pharmaceutical industry. Here, she gained first insights and hands-on experience with spectroscopic methods in the context of quality control in drug manufacturing. She then saw the possibility of translating these spectral technologies into biomedical applications. This is where she joined Katja Schenke-Layland's lab at the University of Tübingen in 2015 to start my PhD. The major goal of my thesis was to implement Raman spectroscopy and imaging to investigate tissue remodeling in cardiovascular tissue engineering.
FLIM so far was not really a topic for her and she only started working on it at the end of my PhD, when she was looking for additional non-invasive imaging methods that she could combine with Raman imaging. After my PhD, she spent a short indecisive phase in a public pharmacy during the onset of the pandemic debating between a career in industry or academia.

In 2022, she was offered a position at the NMI to join Katja in the newly established Institute for Biomedical Engineering at the University of Tübingen as a Junior Group Leader. This opportunity at a non-academic, non-profit research institute, focused on application-oriented research, enables me to address translational research questions and initiate industry collaborations.

The *Biophotonics & Spectroscopy* Lab aims to combine multimodal in situ imaging with advanced in vitro models (e.g. Organ-on-Chip systems) to study (patho-)physiological processes in patient-relevant models and to identify novel diagnostic biomarkers in regenerative medicine.

Major techniques to assess cellular states and tissue conditions are non-invasive imaging modalities such as Raman microspectroscopy, fluorescence lifetime imaging and multiphoton imaging. These are implemented to visualize and characterize tissue remodeling (e.g. fibrosis) and cellular phenotypes in a molecular-sensitive fashion.

Her current research interest focusses on the implementation of correlative imaging approaches for investigations of the dynamics of cellular crosstalk such as host-microbiome or tumor-immune interactions.

She is very excited to be part of fIIMAGIN3D and happy to see so many FLIM enthusiasts, especially her doctoral candidates - the next generation of FLIM experts. As the expertise in her lab focusses especially on endogenous FLIM and PLIM she is also looking forward to learn more about technical developments and FLIM sensors.

Fun fact: Her first office mate during her PhD was Prof. Michael Monaghan.

1st flIMAGIN3D NETWORK WIDE EVENT

Annual meeting designed to foster collaboration, exchange knowledge and facilitate professional growth among doctoral candidates, supervisors and industrial partners. Through a series of presentations, workshops and interactive sessions, participants learned about various aspects of biomedical engineering research, from a laser safety course to discussions on professional development, ethics and gender equality in academia.

19TH & 20TH FEBRUARY 2024

DUBLIN, IRELAND

GerBI FLIM Workshop 2024

The German Bioimaging (GerBI) microscopy workshop focused on cutting-edge techniques for both image acquisition and data analysis of fluorescence lifetime imaging (FLIM). This event provided junior researchers and senior expertise in the field to share knowledge about immunometabolism, advanced software tools, and to discuss about the development of accessible resources for FLIM research.

This opportunity proved to be extremely beneficial for our DCs who got the chance to explore the latest developments in the field.

26TH & 29TH FEBRUARY 2024

BIOMEDICAL CENTER MUNICH

This project has received funding from the European Union's Horizon 2021 doctoral network programme under the Marie Sklodowska-Curie grant agreement No. 101073507