January 2024 VOL. 5

PHAST-NEWS

WORK PACKAGE 4

By the PHAST-ETN Team

Dear reader, welcome back to PHAST NEWS!

In this issue we present the activities of the **Work Package 4 team**, focused on '*MACRO-scale monitoring of therapy*'.

WHO IS INVOLVED?

Jawad Talekkara Pandayil (ESR 11), **Stefan Susnjar** (ESR 12), **Nikhitha Mule** (ESR 13), **Muhammad Daniyal Ghauri** (ESR 14),**Dario Angelone** (ESR15) ,

WHAT DO THEY DO?

- Jawad is involved in **Towards multifunctional multi-material optical fibers for diagnosis and treatment**
- Stefan's work deals with the **Development of advanced online dosimetry algorithms for photodynamic therapy of tumors**
- Nikhita's activity is focused on **Diffuse optical monitoring and prediction of neoadjuvant chemotherapy for personalized breast cancer management**
- Daniyal is involved in ***Tissue identification for surgical guidance using biophotonics***
- Dario is involved in ***Micro-camera for hyperspectral imaging for in-vivo probing***

The ESR Fellows involved in the WP4 with their Supervisors

IN THIS ISSUE

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER THE MARIE SKLODOWSKA-CURIE GRANT AGREEMENT NO 860185

WP4 ESR FELLOWS

Jawad Talekkara Pandayil

I'm Jawad and I come from Malappuram, Kerala, India. I completed my Five-year Integrated Master's degree in Photonics from CUSAT, Cochin in 2020 and Joined IISc Bengaluru as a project associate. In November 2021, I joined the PHAST project at Fondazione LINKS in Italy where I work on developing multifunctional resorbable optical fiber for biomedical applications in collaboration with Politecnico di Torino. I enjoy the multidisciplinary nature of the project which gives me continuous learning experience. The project allows working with other established research centers and companies within the PHAST consortium for a few months where we get to network a lot and get introduced to work with new photonics technologies in Health Care. The hands-on workshops and training organized by PHAST always gave an enriching experience and awareness of the concepts of clinical translation and medical device regulations. After joining the project, I participated in several outreach activities including TEDx and European Researcher's Night, where sharing research with the public was always a fascinating experience.

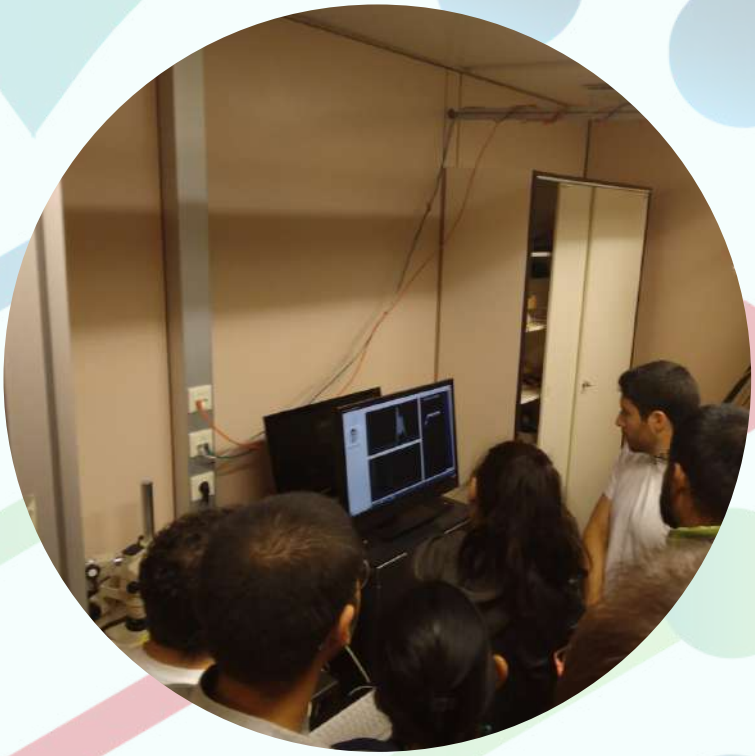
Stefan Susnjar

I come from a 5-memeber family from Pančevo, an industrial city on the Tamiš river, in the plains of northern Serbia. I became interested in mathematics and physics early in elementary school, achieved great results at competitions in these subjects, which brought me to Belgrade's Mathematical Grammar School, which I finished in 2014. I completed Bachelor of Science in Electrical Engineering and Computing, in 2018, at University of Belgrade. I moved to Italy, where I completed Master of Science in Engineering Physics, in 2020, at Politecnico di Milano, with the master thesis in the field of diffuse optics and biophotonics. In 2020 I completed a double-degree programme "Alta Scuola Politecnica", joint with another Politecnico di Torino. I continued my academic journey in Sweden, where I am an industrial PhD student at Lund University, Department of Physics, and at the company SpectraCure AB, Lund, where I work on the development of advanced online dosimetry algorithms for photodynamic therapy of tumours. My general research interest is the application of photonics in medical diagnostics and treatments. Thanks to this PHAST project, I got the opportunity to travel even more over the Europe, and to visit and work at different institutions. Probably the most beneficial is the networking with people of my age or much more experience in our field, with a great potential to advance the technology and improve the quality of lives in future.

Nikhitha Mule

I am Nikhitha Mule. I completed my Bachelor of Science (Honours) in Physics from Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam, India in 2018. Following that, I earned my Master of Science in Physics with a specialization in Electronics from Sri Padmavati University, Tirupati, India in 2020. My master's project focused on evaluating and exploring the efficacy of iron oxide magnetic nanoparticles in the context of magnetic hyperthermia-based controlled drug delivery and cancer therapy. This experience ignited my passion for clinical research. As an early stage researcher in the PHAST Project, I am based at San Raffaele Hospital, Italy and my research revolves around " Monitoring and predicting the efficacy of neoadjuvant chemotherapy through diffuse optical spectroscopy for personalized breast cancer management" which I am doing in collaboration with Politecnico di Milano, Italy. This transdisciplinary environment enhances my overall comprehension and analysis of results, as we systematically correlate optical results with established imaging techniques and histopathology reports. The project's emphasis on hands-on laboratory platforms, thematic workshops, and courses is equipping me to thrive as a biophotonics professional in both academic and non-academic sectors. This unique opportunity is made possible by the PHAST consortium, a collaboration of research institutions, hospitals, and industries spanning seven European countries and I am extremely happy to be part of this fantastic and diverse team!

WP4 ESR FELLOWS



Muhammad Daniyal Ghauri

I hail from Lahore, Pakistan. I received my BSc. and MSc. in electrical and electronic engineering from the University of Bradford, UK, and Lahore University of Management Sciences (LUMS), Pakistan. During those years my research has been focused on the development of optical solutions for water and milk contamination monitoring. My interests inspired me to further explore the field and eventually led me to join the bio-photonics group at Tyndall National Institute in Ireland within the PHAST-ETN project. My project is about developing an optical guidance setup for precise malignant tissue identification during surgery.
PHAST has provided a platform for me to be a part of developing innovative optical technologies of clinical significance. The EU-wide training opportunities with various participating institutes have not only enhanced my skillset but also enabled me to develop a valuable network of world-class researchers. Great to be a part of PHAST!

Dario Angelone

I am originally from Belfast in Northern Ireland. I received my bachelor's degree in Physics from the University of Aberdeen in 2017 with first class honours. In 2018 I received an Erasmus Mundus scholarship for the European Joint Master's Degree in Smart Systems Integration, carried out at Heriot-Watt University Edinburgh, the University of South-Eastern Norway and the Budapest University of Technology and Economics. I received my MSc with distinction in 2020 and had the opportunity to present the work from my thesis on computational microscopy at the Frontiers in Optics and Laser Science (FiO+LS) conference hosted by the Optical Society (OSA) in September 2020.
I started my PhD in May 2021 within the Biophotonics Group at the Tyndall National Institute in Cork, Ireland. My project is on the development of a micro-camera for fluorescence lifetime imaging during surgery. We believe this device could help provide clinicians with additional information, which is not available using traditional endoscopes, that can help differentiate cancerous tissue during surgery.

More info about PHAST-ETN are available at www.phast-eu.unipr.it

Nadia Boetti
LINKS

– What is your role in the PHAST project and why did you decide to be involved in the PHAST?

I am the supervisor of Jawad Talekkara Pandayil (ESR 11) and also co-supervisor during the secondment at LINKS of Vamshi Damagatla (ESR 6).

I joined the PHAST project because of its potential to advance cancer prevention, diagnosis, and treatment through photonic technologies, an area closely related to my research focus. I believe that enhancing our knowledge and skills in this field is crucial because of its significant impact on society.

It is also vital to have highly skilled researchers in the dynamic field of biophotonics. PHAST's comprehensive and multidisciplinary training programme for 15 early-stage researchers provides an excellent opportunity to cultivate the next generation of professionals in this important field.

- Could you tell us your background? Why and how did you start working in biophotonics?

After obtaining my Master's degree in Physics from the University of Turin, I entered the field of photonics. I worked for about 10 years in the R&D group of Agilent Technologies on the development of novel photonic devices for telecommunications. After this experience, my strong interest in photonics led me back to academia to deepen my knowledge of its science and technologies and to explore applications beyond telecommunications.

I therefore embarked on a new career path, joining the Politecnico di Torino as a research fellow while enrolling in a Ph.D. programme. Later, I continued my research journey at the LINKS Foundation. My focus has been on the design, fabrication and characterization of novel glasses and specialty optical fibers and the implementation of optical fiber-based devices. In recent years, particular emphasis has been placed on biomedical applications, specifically the development of bioresorbable multifunctional optical fibers.

– What is the most challenging aspect of doing research in biophotonics?

I think that one of the major challenges in biophotonics research is to balance cutting-edge scientific innovation with practical priorities such as patient safety, ease of use, and successful application in real-world clinical settings. Researchers must face the complex task of developing technologies that are at the forefront of scientific innovation but are also safe for patients and easy for healthcare professionals to use.

Achieving this delicate balance requires a collaborative, multidisciplinary approach that brings together expertise from biophotonics, biomedical engineering, and human factors design. Early attention to safety, usability, and regulatory requirements is paramount to overcoming the challenges of translating these innovations into effective healthcare solutions.

– In your field, what kind of skills are important for young researchers to develop?

In my field of research, young scientists need skills in materials science, optics, and biomedical knowledge. Precision is crucial in the lab, where they handle optical fibers, laser systems, detectors, and complex optical setups. Collaboration across disciplines is key, integrating technical expertise with biology, medicine, and engineering for a comprehensive approach.

Staying updated with the latest advancements is also vital. Researchers must actively participate in conferences, engage in discussions, and explore literature to continually learn and stay at the forefront of the field.

– In your view, what is the future of biophotonics?/Where can biophotonics make the biggest impact?

Looking to the future, biophotonics is set to transform healthcare in profound ways. One important direction is to tailor medical approaches to individuals, essentially creating a more personalized form of medicine. By combining light-based technologies with a person's genetic and molecular information, healthcare can become more targeted and tailored to individual needs.

Another important opportunity is the integration of biophotonics with artificial intelligence (AI). This collaboration aims to make medical devices smarter by using the computing power of AI to interpret complex data from biophotonic devices. The goal is to automate tasks, speed up pattern recognition and gain insights from complex biological information.

These could lead to a medical future where treatments are uniquely designed for each person (personalized medicine) and where intelligent algorithms help make sense of complex biological data (AI integration). These innovations have the potential to revolutionize the way we approach healthcare.

Stefan Andersson-Engles
Tyndall National Institute

- What is your role in the PHAST project, and why did you decide to get involved in PHAST Project?

I am a PhD supervisor and WP leader in PHAST. It was a proposal in the area of my research with many of the groups I would be happy to collaborate with.

-Could you tell us your background? Why and how did you start working in biophotonics?

I am considering myself as a first generation PhD in Biomedical Optics. I am always been interested in the interface between Physics and Medicine. Please see Independent self-motivated research activity should be the goal for the project. Reading the relevant literature about the state of the art in the field in appropriate journals is also important to understand the context of the research. The project is challenging in the respect that it covers mechanical and electrical engineering, micro-optics, micro- technologies, biology, and medicine. So, it is very interdisciplinary. for a more comprehensive description of my path towards where I am.

-What is the most challenging aspect of doing research in biophotonics?

The multidisciplinary aspect is very interesting but also very challenging

-In your field, what kind of skills are important for young researchers to develop?

It is important to become an expert in one basic field and then be able to efficiently collaborate with other areas of expertise.

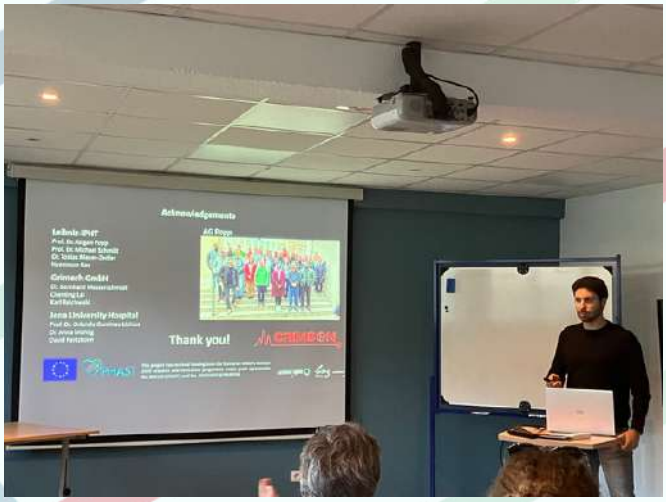
-In your view, what is the future of biophotonics?/Where can biophotonics make the biggest impact?

Biophotonics will grow in impact as it enables low-cost real-time monitoring tools. With the development of photonics integrated circuits the abilities of biophotonics will grow.

PHAST-ETN Events

PHAST-ETN organized a **General Meeting** and an **OCT Laboratory Technology Platform** at Medizinische Universität Wien, in Vienna, Austria.

The PHAST-ETN MT5 General Meeting at Medizinische Universität Wien was a success: we had great presentations from international scientists and from the ESR Fellows. It was a great pleasure to meet again and to acknowledge the intense research and training activities going on, which include strong networking among the project partners.
Thanks to everyone for attending and to Rainer Lietgeb and for their great hospitality and kindness!



Collaboration with other projects

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