

## Final Report

Name of intern: [Aravinth Ravichandran](#)

Home University/Country: [University of Eastern Finland](#), Joensuu, Finland

Subject: [Master of Science in Photonics](#)

Guest University/Country: [Leibniz Institute of Photonic Technology](#), Jena, Germany

Name of supervisor: [Tanveer Ahmed, Shaik](#)

*I am sincerely thankful to DAAD BARI, Hamburg University of Applied Sciences, Leibniz Institute of Photonic Technology, University of Eastern Finland, and everyone involved in realizing this internship despite the Coronavirus pandemic! Together, all of you made 2020 one of the invaluable years of my life, academically and otherwise!*

### Part 1. General information about

#### 1.1 your application (motivation)

I was introduced to biophotonics back in my bioengineering bachelors in 2016. Since then, I was longing for research opportunities in biophotonics. I firmly believe light to be an ideal tool for diagnosis and treatment of diseases. Equally, it is my dream to design and develop light-based techniques and technologies for molecular diagnosis and therapy of diseases and Raman spectroscopy is one such techniques! Raman spectroscopy provides molecular specificity in a label-free and non-destructive manner. For all my patience, I was rewarded with the research internship on the development of large area Raman spectroscopic scanner for life science applications at the [Raman and Infrared Histopathology](#) research group led by one of the spectroscopic pioneers, [Prof. Dr. Christoph Krafft](#) at the Leibniz Institute of Photonic Technology (Leibniz-IPHT) at Jena as a BARI intern along with the prestigious BARI scholarship!

#### 1.2 your preparation

Out of my own interest, I approached Prof. Krafft for possible traineeship opportunities in his Raman and Infrared Histopathology research group at the Leibniz-IPHT in January 2020. Prof. Krafft kindly accepted and agreed to host the traineeship and by February, he provided me with an official letter of agreement as well. By March, corona became an exponent in Europe and almost everything except for survival got shut down. But, Prof. Krafft and Leibniz-IPHT with a bigger heart and of course with strict corona guidelines to be followed still made the traineeship possible for me and the traineeship started from June as scheduled before. Meantime, I was preparing myself for the traineeship by reading some literatures on spectroscopy and I am thankful for going through the course light and matter at my University that time for provided me better insights into Raman and Infrared spectroscopy.

## The Baltic Science Network Mobility Programme for Research Internships

Meantime, I also applied to our BARI and got selected under [Lucas Kreiss](#) on the development of fast staining protocols of native tissues for correlation with label-free multiphoton imaging at the [Institute of Medical Biotechnology \(MBT\) of Friedrich Alexander University Erlangen - Nürnberg \(FAU\)](#). By the time I got to know the selection results from our BARI in July, I was already trained for about a month under Prof. Krafft at the Leibniz-IPHT. Indeed, Prof. Krafft encouraged me to go ahead with our BARI, but time and situation at that point in July did not allowed Lucas to host the internship. It was then our BARI and Prof. Krafft with a bigger heart along with Tanveer proposed a new internship topic under BARI and accepted me as a BARI intern for which I am thankful for ever to our BARI, Prof. Krafft, Leibniz-IPHT, and Tanveer!

### 1.3 your travel

Finnish railways, Latvian airBaltic airlines, and German FlixBus services made sure my travel was safe and sweet.

### 1.4 your accommodation

I lived in the beautiful mountain top [Johann-Griesbach-Strasse-7](#) student dormitory of the [Studierendenwerk Thüringen](#) with the help from [Julia Hecker](#) and [Tatjana Schmidt](#).



Jena city from my Johann-Griesbach-Strasse-7

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I was lucky enough to spot the first double rainbow\* of my life at Jena!

\*Double rainbow signifies future success and I am successful in the ongoing pandemic 2020. I am thankful to BARI and Leibniz-IPHT for made 2020 one of the invaluable years of my life!

1.5 your life in the host country

It was an adventurous, fun, and emotions filled three months of stay at the unforgettable Jena! I will remember the taste of nah und gut remoulade, Milka toffee ganznuss, and late-night French fries with the spicy mayonnaise from the Jena city centre for the rest of my life!



From right to left: Jeet, Shiwani, David, Juan, and me at the Jen Tower of Jena

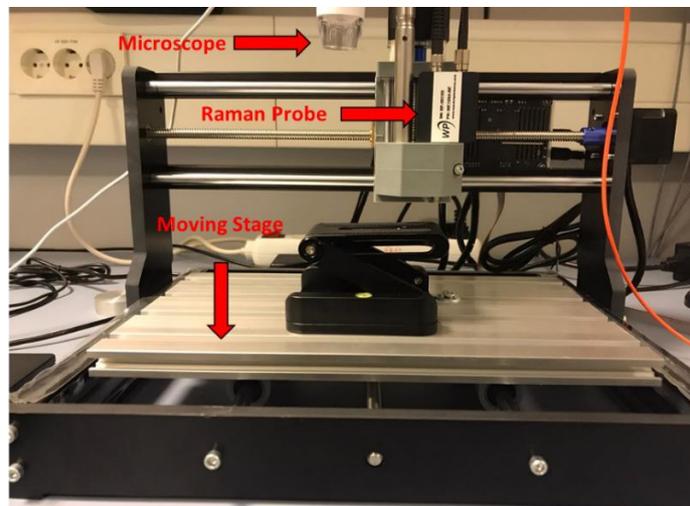
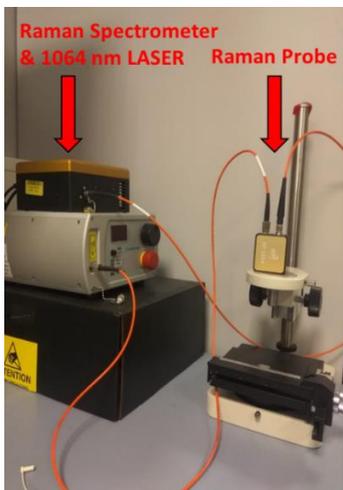


City of Jena from the Jen Tower

## Part 2 Information about the project and your tasks

### 2.1 Information about the research project (short description of the project and your tasks)

The goal of my project was to couple a microscope and a moving stage to the pre-existing 1064 Raman system in the laboratory and then programmatically control the microscope and stage coupled Raman system from LabVIEW. One of my main tasks was to validate such developed system through Raman imaging of series of biological samples like liver, brain, muscle, and plastic samples. In addition, my task was also to write down an instruction manual and then subsequently introduce the developed system to one of my colleagues for further system development and research.



The 1064 Raman system prior to development (left) and after development (right)

## 2.2 your colleagues

I have not only shared lovely lunch and good memories with my colleagues Tanveer, Shiwani, Ganesh, Juan, Clara, Jan, Izabella, and Mohammad, but also constructive criticism, motivation, and direction! They are all wonderful people!

## 2.3 the research institution

Leibniz-IPHT is one of the photonics hotspots of the world led by one of the biophotonics pioneers, [Prof. Dr. Juergen Popp](#). It is one of my dreams to work under Prof. Popp at the Leibniz-IPHT and I am indebted to Prof. Krafft and BARI for the golden opportunity to have my dream realized under the BARI internship! Leibniz-IPHT administrative staffs are one of the kindest and friendlier people I have met, and they really care the mental health and happiness of their researchers and employees. The research groups at the Leibniz-IPHT are inventive, highly collaborative and interdisciplinary as well. The research groups and their ideas are ever evolving, and they even had an intensive corona research unit as well. Leibniz-IPHT's beauty is that they teach, trust, and allow their student researchers like me to get hands on experience and expertise with their world class and state-of-the-art infrastructures. For all these reasons, I would love to be back at the Leibniz-IPHT, again for my master's thesis and possible PhD opportunities.

## 2.4 your experience working within the project

The project work allowed me to experience the interesting, exciting, and challenging life of a professional biophotonics researcher in a friendly, cooperative, and competitive professional research environment. Besides, the project work served me an excellent opportunity to express my natural research qualities and well establish myself at the Leibniz-IPHT. Importantly, it also helped me develop the much-required work-life balance skill and better assess and define research to be my career!

**“I agree that my report and accompanying pictures may be used in whole or in part by the BARI-Programme and its funders in printed materials, presentations, and on websites in order to inform funding organizations, sponsors, and students about the BARI programme.”**