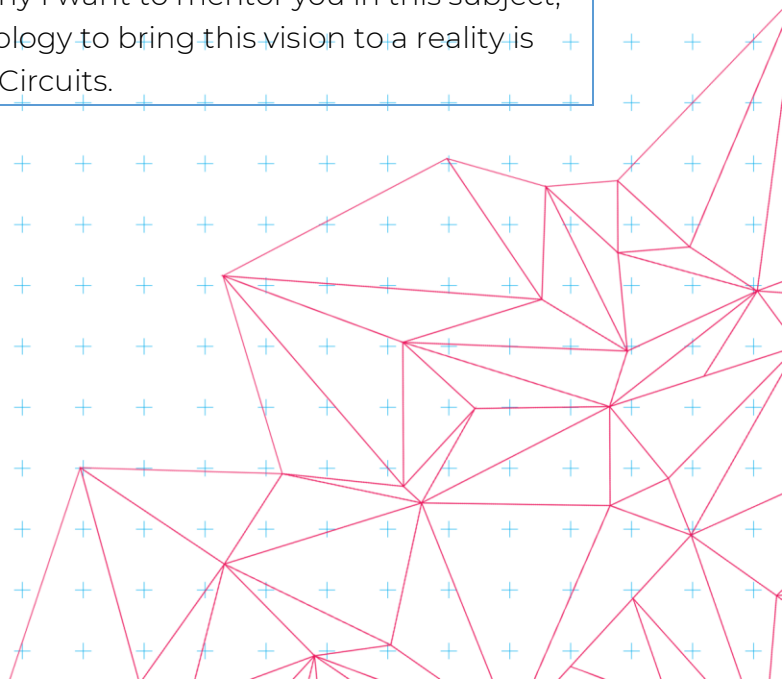


Challenge name	From Photonics to Agriculture
Challenge owner	Photonic Integration research group, and Eindhoven Hendrik Casimir Institute (EHCI)
	– <i>Company</i> <input checked="" type="checkbox"/> <i>Research</i> – <i>Student team</i>
	Bernat Molero Agudo
Brief summary	<p>You can see in your daily life that we are not sustainable enough. However, you notice that each day we demand more and more from our world. What would you say if I stated that new technology exists to get things faster and greener at the same time? Photonic Integrated Circuits is a technology that harnesses the power of light to create energy-efficient, faster, and more accurate microchips. It enables new functionalities to achieve a more sustainable world.</p>

About the challenge owner

I would define myself by my intrinsic curiosity, striving for excellence and taking action. With the purpose of bringing happiness to our society and improving people's lives, I've been doing Research Internships since my first university course and taking roles in NGOs. From all these experiences, I finally understood that entrepreneurship is the most effective and impactful way to bring this vision to reality. And this vision won't be fulfilled by myself alone, but with many people believing in it and taking action. That is why I want to mentor you in this subject, and I think that the most potential technology to bring this vision to a reality is the field of my PhD: Photonic Integrated Circuits.



Challenge description

We live in the era of information technology - data is everywhere and everything is data. We want to be connected and we want things to work faster. Meanwhile, we are in the middle of a global energy crisis. As we grapple with climate change, we need to drastically change how we use energy and we need to do this before the world we know simply stops.

As a response to these needs, we are developing [Photonic Integrated Circuits \(PICs\)](#). A photonic integrated circuit is a chip that contains photonic components, which are components that work with light (photons). PICs offer advantages such as miniaturization, higher speed, low thermal effects, large integration capacity, and compatibility with existing processing flows that allow for high yield, volume manufacturing, and lower prices. Applications for integrated photonics are broad – from data communications and sensing to the automotive industry and the field of astronomy.

The integration of many photonic components within a single chip makes it possible to produce these systems in volume with a high yield at low cost. And the miniaturization of the optical components would achieve lower power consumption. Moreover, the nature of light makes communication with higher bandwidth and longer distances possible, which would create a more sustainable data-driven society.

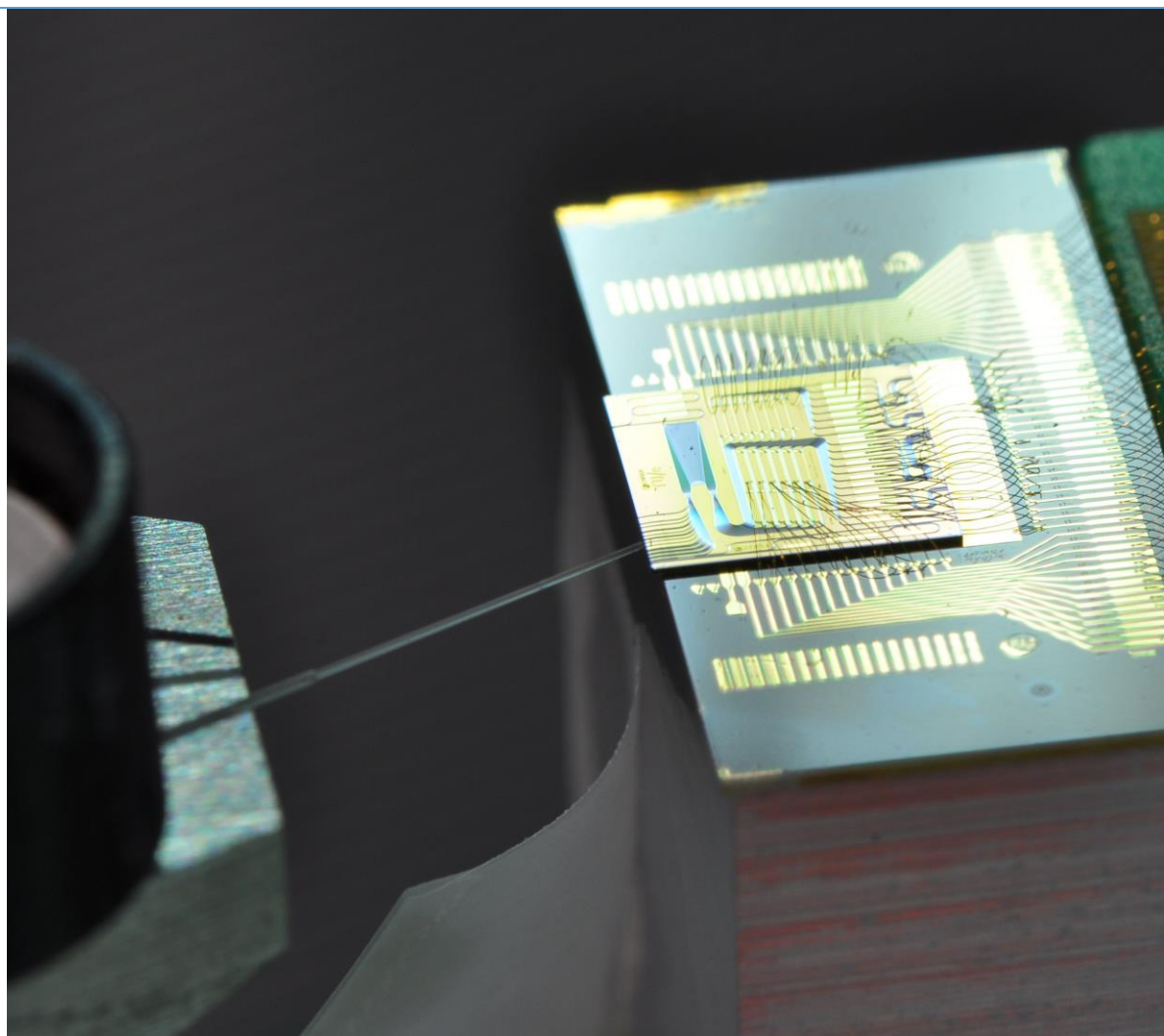
So, this technology in combination with the fresh minds of the youth can create chips with functionalities beyond our imagination.

Photonic Integration could be used to detect different properties of crops using sensing. For this, we don't only need photonics. Some students in other challenge-based learning courses have come up with the idea of applying this technology to detect diseases, ripeness and sweetness. However, we found out we need other disciplines to achieve it: will this technology be a device carried by a human that carries it throughout the crops? Ideally not! Then, we need a robot that can move through the crops.

Challenge pictures and company logo

Please add 1-3 high resolution (> 1 MB) photos that refer to your project in an attractive way and please share your company logo pack – you can upload your content via www.wetransfer.com and share the link here.





If you have any video about your project already, please share the YouTube/Vimeo link here or share them via weTransfer

Input and involvement of challenge owner

I could manage the challenge with the different supervisors / departments. Also I would like to be the supervisor of the BEP student related to Photonics Integration.

Solving this challenge will bring the Photonic Integration technology one step forward for its implementation in the real world. And also it will help to let students and the community know about the potential of this technology – and assess such potential with real world applications.

Resources

What resources do you offer to students?

✕ Materials; Let's elaborate on that later on when we discuss it with the different departments

Roles of different disciplines (only for ISBEP)

Applied Mathematics	Create a path-finder optimization algorithm for the robot in between the crops. Additionally, process the data
Automotive Technology	Work with the mechanical engineer to design the robot itself that carries the sensor and the software needed for it to walk and operate effectively
Electrical Engineering	Photonic Integration: evaluate the behaviour of the photonic chip. Create the design of the needed chip/ adapt the design of Mantispectra's chip, as well as understand and adapt the spectroscopy technology with the applied physics student
Applied Physics	Work together with the photonic integration student to understand the spectroscopy technique needed for the system to work.

