

Developing new phone camera technology

In the course of several projects funded by the Research Council of Norway, the company poLight has been developing technology to further improve the quality of images taken with mobile phone cameras, including the ability to capture close-range photos in much sharper focus than is possible at present.



Jon Herman Ulvensøen with a prototype for a mobile camera lens (Photo: Claude R. Olsen)

Since 2006 the company has been working to develop small camera lenses with a very rapid optical focus mechanism and low energy consumption. Along the way, the Research Council has provided key support through funding for a number of different projects.

"It takes time to bring new autofocus technology into the market because existing solutions still work reasonably well. Even though our technology is already of interest to the mobile phone industry we still need to constantly work on improving it and developing even better products. We have a lot of competitors in this market."

and are targeted towards making mobile phone camera technology better, cheaper and simpler," says Jon H. Ulvensøen, one of the founders of poLight.

"The Research Council has played a key role – both in giving us guidance in finding partners as well as in providing project support via its various funding instruments. All of our projects are related to each other,

Modelled after the eye



poLight's optical lens technology is modelled after the human eye

The secret behind the company's optical lens technology is that is modelled after the human eye. Mr Ulvensøen describes the solution as a "gelatinous ball" of transparent silicon controlled by "muscles".

The innovative effort is currently being funded through projects under the Programme for User-driven Research-based Innovation (BIA), the Research Programme on Nanotechnology and Advanced Materials (NANO2021) and the French Norwegian Foundation (FNS). In addition to further developing and improving the actual product, these projects focus on both simplifying the production process and combining other types of technology.

"Our "Smart AF" project with funding from the FNS is coming to a close. It had originally been proposed as a Eurostars project, but when we discovered that little remained of the Norwegian funding available the Research Council informed us that funding might be available under the FNS."

Combined technology

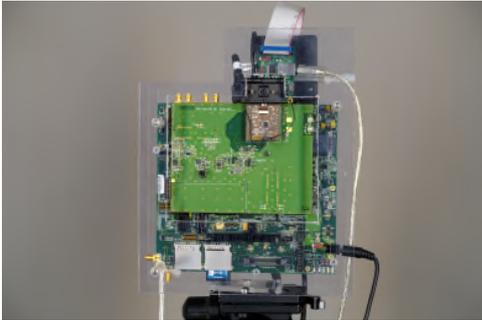
poLight's partner in this project is the French company, DxO, which specialises in digital focus technology in mobile phone cameras. DxO's extended depth of field technology (EDoF) is not an optical solution; rather, it is based on software processing of the image after it has been captured. The technology has been widely used in mobile phone cameras for a number of years but has a tendency to diminish image resolution.

"DxO was looking to develop its technology further so it could offer something more advanced.

Then we came up with the idea of combining their digital and our optical autofocusing technologies. In practical terms, this means that our optical technology is used to focus down to a certain level, at which point their digital process takes over to provide very sharp, close-range focus.”

“This makes it possible to focus in on an image as near as one centimetre away – in some cases, even closer. Mobile phone cameras have no macro image capability as it requires too much space, but the result is approximately the same. At the same time, this solution retains as much of the image resolution as possible,” Mr Ulvensøen explains.

Still work to do



The first demo version of the Smart AF product. (Photo: DxO)

The companies have worked closely together throughout the project period, continually testing the products both in Norway and in France. poLight has an office in France as well, which has made it easier for the two companies to work together.

“We are now ready to combine the technologies into one, but some work remains before we will have a finished product. Producers of mobile phone cameras have expressed interest in both technologies individually, but it remains to be seen whether they will be interested in the two technologies combined into a single, compact solution. In this final phase of the project, we will perform more testing so that we can be 100 per cent sure that it works.

After that we can begin our market push,” Mr Ulvensøen emphasises.

Hoang-Phi Nguyen in DxO firmly believes that the French-Norwegian cooperation will be fruitful for both parties.

“The combination of our technologies provides a much faster and more reliable auto-focus solution than traditional VCM-based auto-focus. Since Auto Focus is turning more and more mainstream on the mobile phone market, we have great expectations that the project will end up with mass production”, he says.

“Beat the human eye”



The project targets improved quality of images taken with mobile phone cameras

Smart AF is not the company’s main product at the moment. As part of the newly launched “Beat the human eye” project under the NANO2021 programme, their existing basic technology will be improved through further development in collaboration with Buskerud and Vestfold University College and the Norwegian University of Science and Technology.

“We need to go back and make some technical adjustments in order to make our products even better. It is a two-part project with one part focusing on developing a curved lens capable of focusing at an even shorter distance. We also want to develop solutions to increase the

amount of light passing through the lens onto the sensor, thus improving image quality. It is a long-term project. We will have four doctoral fellows beginning work this summer on different aspects of the technology.” Mr Ulvensøen states.

Simpler production technology

In addition poLight has started the BIA-funded project “High force piezo actuator” in 2014. This project focuses on making the production technology itself as inexpensive and simple as possible. The SINTEF research group is a key partner here, as it has been throughout the entire process.

“Together with SINTEF Microsystems and Nanotechnology (MiNaLab), we are going to take the disc-based processes within the actuator a tiny step further. We are going to see if there is any part of the technical process we can alter to increase the optical strength in the actuator

controlling the lens while at the same time streamlining the production of actuators.”

poLight is also taking part in a project under the ENIAC Joint Undertaking, with funding from the European Commission and the Research Council of Norway. The project is focused on developing insulation technology to encase and protect a component while making it possible to integrate it electrically with other vital components surrounding the lens.

Adviser and funding agency

Long-term, broad-based research is an important element of poLight’s planning strategy and the funding from the Research Council has given the company a great boost.

“The Council is both creative and solution-oriented, such as when it advised us about the French Norwegian Foundation. It is beneficial that the funding schemes within the research and innovation system can work together, which enables the Research Council to serve as an adviser as well as a funding agency. This is a critical role to play, particularly when it comes to small enterprises,” concludes Jon Herman Ulvensøen.

Click [here](#) for an article about “[Beat the human eye](#)” in Gjengangeren (Norwegian language only).

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