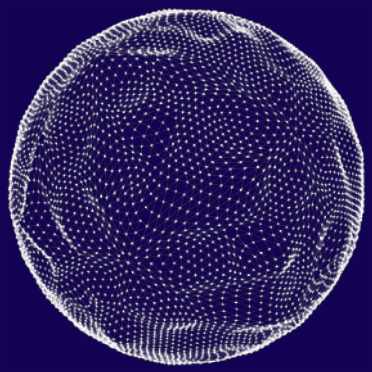


IALL

Integrated Adaptive liquid crystal lenses

PUBLIC SUMMARY

The IALL project is the logical progression of the original adaptive liquid crystal lens (ALL) project from the ATTRACT phase 1. In this former project the ground-breaking adaptive liquid crystal lenses developed by the UPM reached a technical readiness level making it possible to combine the developed lenses and drivers with a conventional standalone camera, showing the full functionality of the lenses in a relevant imaging environment.

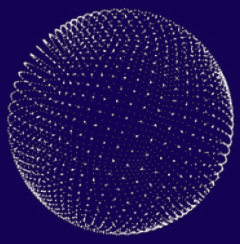
The results of the original consortium have been presented to the most important European lens and camera producers (which for competitive reasons cannot be named at present), which all expressed sincere interest in the project, but expressed the need for a further integrated system to prove the added value of the lenses in an integrated system.

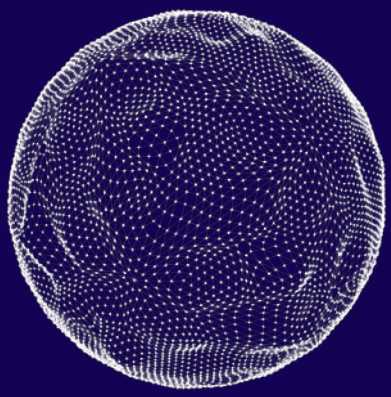
The current proposal is thus centred on meeting these requirements. The developed lenses will be integrated with a camera and a microcontroller that will control both the lens configuration and the capture of images. The integrated system will be designed so that it can be implemented as the imaging system in a machine vision unit, in a microscope, and/or in a surveillance system. The integrated system will capture images at the available focal distances, upon request.

The microcontroller will include simple image treatment software like that employed in standard web and smartphone cameras to provide an instant excellent i mage performance, as perceived by the camera user. The integrated camera system will provide the conventional functionality of a focusing camera, with the added advantage of the video rate tuning speed of the liquid crystal lenses, and the absence of mechanically moving parts, which not only reduces the manufacturing cost of a focusing system, but also prevents mechanical wear, while reducing footprint, power consumption and focusing speed, and improves the mechanical robustness. An integrated system reaching at least a TRL 7 is expected.

The main effort in this phase will be the seamless integration of lens and camera. Nevertheless, some producers (especially camera producers) expressed interest in zoom lenses, while lens manufacturers expressed the need for an increased number of discrete focal distances (currently limited to 13 steps in the high-quality lens range of ± 1 dioptre). Both aspects can be addressed simply by cascading lenses, and potential commercial impact of these improvements makes it imperative to develop integrated demonstrators of both systems.

A demonstrator of the integrated cascaded lens system with a TRL 7 is expected. The response time of the lenses can be improved by doping the active liquid crystal with polymers. This, in combination with a high-speed camera would enable the capture of images at a rate over video frequency, what could potentially provide real-time 3D imaging. It is intended to undertake the initial steps towards this 3D camera, although outside the scope of this project, since a TRL 6 cannot be guaranteed.





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