HORIZON EUROPE
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HYPERIMAGE

A universal spectral imaging sensor platform for industry, agriculture, and autonomous driving.

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= Deliverable D2.4 =

Prototype of ento- and telecentric SWIR lens module

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Responsible WP: Michael Büeler, Optotune Switzerland AG (OPTO)
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AUTHOR

Author	Institution	Contact (e-mail, phone)
Michael Büeler	OPTO	michael.bueeler@optotune.com

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Point of Contact	Name: Michael Büeler Partner: Optotune Switzerland AG (OPTO) Address: Bernstrasse 388, 8953 Dietikon Phone: +41 58 856 30 16 E-mail: michael.bueeler@optotune.com
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Executive Summary

Focus-tunable lens in a lens objective for SWIR imaging in autonomous driving with SILIOS and ROBOTNIK

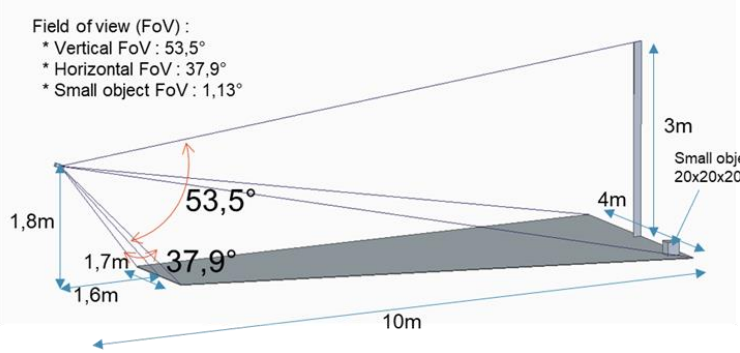
Based on the specifications for the autonomous driving case an electrical lens module (ELM), which combines an imaging optics with focus tunable lens for fast focus distance changes, could be identified. Testing needs to be performed at SILIOS. No results available yet.

This partial duplication of content was intentional and serves to ensure consistency in reporting across related deliverables. In particular, the relevant information was also included in Deliverable 2.2 to maintain coherence in the documentation of project outcomes.

Table of Contents

1. INTRODUCTION

The application of the tunable lens technology planned here is the autonomous driving concept developed by Robotnik and Silios. Silios considers to use a full tunable lens objective with integrated EL for the VIS-NIR part of this application for fast change of the working distance.



To meet the requirements the tunable lens objective needs to cover the spectral range from 420-870nm with a focal length of approx. 8mm and a field of view of 55.6x47.6deg.

More requirements will be defined by SILIOS for the SWIR side of the use case.

2. RESULTS AND DISCUSSION

Focus-tunable lens in a lens objective for SWIR imaging in autonomous driving with SILIOS and ROBOTNIK

The objective of this application is to to use an ELM objective with a hyperspectral imager with a 4x4 color filter pattern for autonomous driving applications. The basic imaging requirements can be seen in the following illustration. The tunable lens objective needs to cover the spectral range from 420-870nm with a focal length of approx. 6-8mm and a field of view of 55.6x47.6deg.

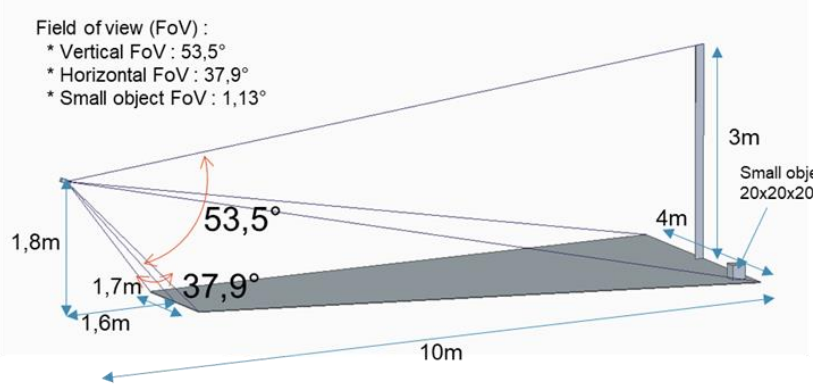


Fig. 2.7: Imaging requirements for autonomous driving application

Silios has further provided the image sensor specifications. A macropixel size of 13.8µm (3.45*4µm) had to be considered.

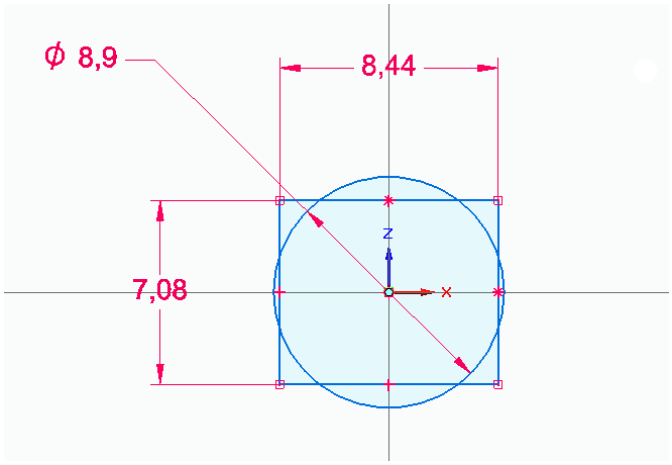


Fig 2.8: A scheme of the sensor and circle.

The existing electrical lens module ELM-6-5.6-9-C with an Optotune EL-3-10-VIS-26D liquid lens was identified as a promising candidate for the ROBOTNIK use case in the VIS-NIR range. This module is expected to support the wavelength range from 420 to 870nm.

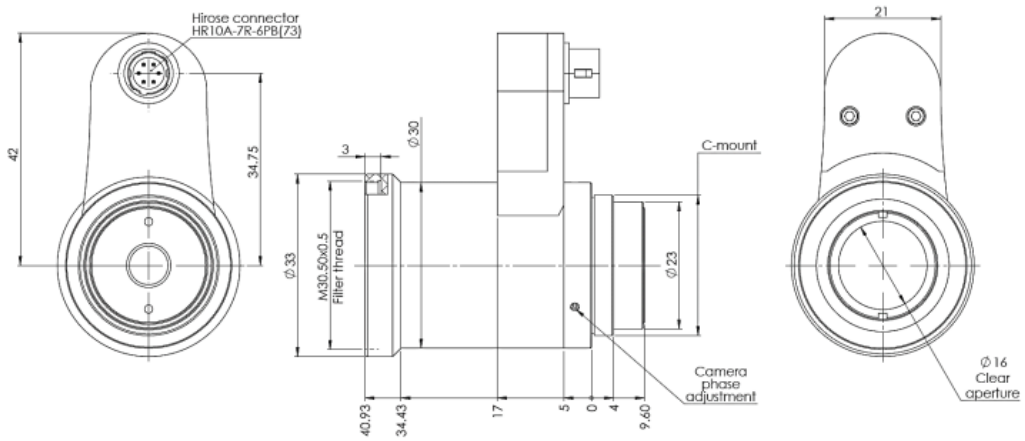


Fig. 2.9: Mechanical drawing of the ELM-6-5.6-9-C electrical lens module

A sample of this lens module was shipped to SILIOS along with controller and accessories. No test results are available yet.

3. CONCLUSIONS

Based on the specifications for the autonomous driving case an electrical lens module (ELM) could be identified. Testing needs to be performed at SILIOS. No results available yet.

4. DEGREE OF PROGRESS

A promising candidate for an electrical lens module was identified by SILIOS. A sample was sent to them for testing, and the characterization results are expected to be included in the upcoming report.

Based on the technical requirements outlined in WP1.1 and the updates provided in WP1.3, we resolved the main technical issue by developing novel gravity-compensated tunable lenses. According to this update, we consider the deliverable to be fully completed (100%).

5. DISSEMINATION LEVEL

Public