



Company NTS Optel (part of NTS group)
Transistorweg 8, Nijmegen

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Educational level Master/Bachelor student

Introduction

At NTS Optel we design, develop and test special and custom-made optics in the field of illumination, imaging, sensing, laser beam delivery and integrated nanostructure metrology solutions. Our specialistic and highly-appreciated knowledge is used to develop and produce modules and complete systems for our high-tech customers in the semiconductor, analytical and health markets. Our team consists of 15 highly-educated people who are working on challenging optical assignments to accelerate the development of our customer's products. We are continuously looking for new technologies to improve our added value to our customer. Three of these new technologies are described in the assignments below.

Assignment 1: MEMS based confocal optical microscope

Micromechanical scanning mirrors have been available for some time now. They potentially offer low cost, small size and fast laser scanning. In this assignment we want to explore the possibilities of commercially available MEMS mirrors, applied to confocal microscopy.

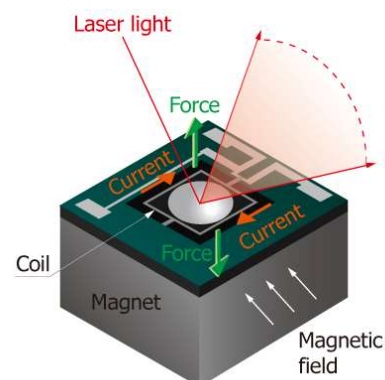
The assignment is to design and, if time permits, build and test a confocal microscope based on MEMS scanning mirrors.

The assignment consists of the following components:

- Literature study
- Market scan of commercially available MEMS scanners
- Comparing the merits of different solutions (e.g. single mirror, dual mirror, re-scan, Lissajous vs raster scan)
- Design a setup for the most promising solution
- Select components needed

If time permits:

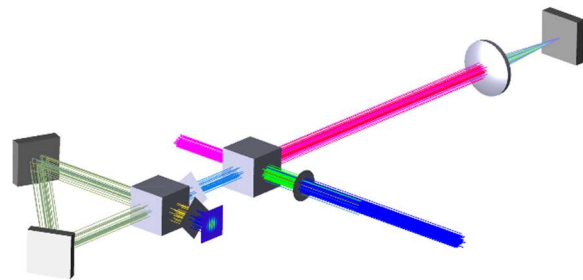
- Build a test setup in the lab
- Experimentally verify the performance



Assignment 2: Interferometric focus sensor

For microscopic systems it is important that the observed objects are within focus. If you want to automate this process, there are in principle various techniques possible. In this assignment we want to further explore an interferometric solution.

We already have a working lab setup (functional model), but this is still far from a usable solution.



The assignment is to further develop the design and test the performance of the system.

The assignment consists of the following components:

- Literature study
- Performance analysis of the current lab setup and compare to alternative methods.
- Come up with and verify possible improvements
- Redesign of the system, so it could work outside the lab

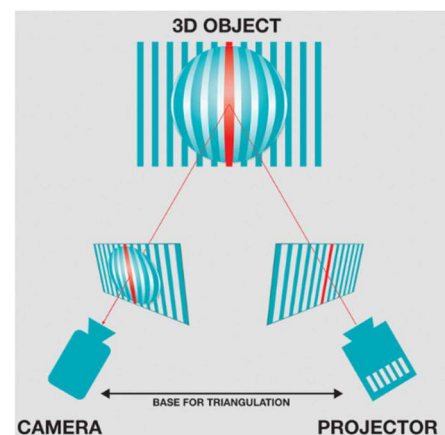
If time permits :

- Build a prototype
- Experimentally verify the performance

Assignment 3: Structured illumination depth sensor

Depth sensing can be achieved by combining an imaging system (camera) with an off-axis structured illuminator. Using parallax (triangulation) the depth information can be retrieved. Different illumination structures can be used such as a phase stepping sine profile or a binary successive approximation profile. Maximum flexibility is achieved with a programmable pattern. This can be achieved using a DLP or LCOS device.

Note that a structured illuminator can also be used in a microscope to achieve sectioning and / or super resolution.



The assignment is to design and, if time permits, build and test a structured illumination projector.

The assignment consists of the following components:

- Literature study
- Market scan of commercial available devices (DLP, LCOS, ...)
- Comparing the merits of different solutions
- Design a setup for the most promising solution
- Select components needed

If time permits :

- Build a test setup in the lab
- Experimentally verify the performance

Required skillset for the student

- Master/Bachelor student (Applied) Physics
- Affinity with optics

Additional information

You will work at our location in Nijmegen. You will be coached by one of our experienced optical engineers and we expect from you a driven and enthusiastic attitude. You will receive an allowance of € 500,- per month. If you are interested, please contact:

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