Internship / Master Thesis Project:

Development of Machine Learning Models for Optical Metrology

ASML

Background information

In-Device Metrology (IDM) aims at inspecting the quality of the semiconductors printed in production wafers. This is done by providing the customer with measurements of certain physical parameters characterizing the semiconductor stack, such as overlay and critical dimension (CD). The measurements are obtained by inferring the parameters from optical signals acquired with the YieldStar system. Inference is done using data-driven mathematical models that relate the physical parameter to the optical signals. The quality of such models is critical to ensure accuracy of the measured parameters.

Your assignment

This project aims at exploring new machine learning techniques which can improve accuracy of the measured parameters. A key to achieve such goal is to enhance the models' capability of using the signal and their robustness against variations in the manufacturing process window.

Topics related to the project include (but are not limited to):

- Physics-motivated data dimensionality reduction;
- Automatic data selection for model training;
- New hyperparameter tuning methods;
- Anomaly detection methods;
- Improved diagnostics tools;
- Study of sensor-to-wafer interactions;
- Development of model performance dashboard;
- Model development on synthetic data;
- Data augmentation techniques.

Educational level:

- Close to graduation of a MSc program.

Required skills:

- Solid understanding in linear algebra, calculus and statistics;
- Good understanding in machine learning and mathematical modeling;
- Fluent in Python and Matlab.

This assignment will be carried out at ASML BL APPS D&E Modeling & Inference Group. You will work at the cutting edge of technology, interact with various experts from ASML D&E, and experience the difference between industry D&E and academia research. This is a graduation internship for 5 days a week with a duration of 6-12 months.

Change the world – one nanometer at a time

Become an intern at a Dutch company that's a global industry leader. You'll gain valuable experience in a highly innovative environment – one that sparks your imagination and creativity. In addition to a monthly internship allowance of maximum €600 (plus a possible housing or travel allowance), you'll get practical guidance from experts in the field and the chance to work in and experience a dynamic team environment.

ASML: be part of progress

ASML is a high-tech company headquartered in the Netherlands. We manufacture the complex lithography machines that chipmakers use to produce integrated circuits, or computer chips. What we do is at the heart of all the electronic devices that keep us informed, entertained and connected. Every day, you use electronics that simply wouldn't exist without our machines.

Behind ASML's innovations are engineers who think ahead. The people who work at our company include some of the most creative minds in physics, electrical engineering, mathematics, chemistry, mechatronics, optics, mechanical engineering, and computer science and software engineering.

We believe we can always do better. We believe the winning idea can come from anyone. We love what we do – not because it's easy, but because it's hard.

Students: getting ready for real-world R&D

We're a global team of 25,000 people of 118 different nationalities and counting. Headquartered in Europe's top tech hub, the Brainport Eindhoven region in the Netherlands, our operations are spread across Europe, Asia and the US.

In such an environment, your colleagues may be sitting next door, or they could be thousands of kilometers away in a different country – or even working for a different company.

An internship at ASML is the opportunity to get to know not only the world of industrial-strength R&D, but yourself – you'll discover just what excites you most. Will you design a part of the machine, or make sure it gets built to the tightest possible specifications? Will you write software that drives the system to its best performance, or work side-by-side with the engineers of our customers in a fab, optimizing a system to the requirements of the customer?

How will you be part of progress?

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