### Registration

#### **Registration by QR Code**



# **Registration Online**

With my registration I accept the terms and conditions of Photonics Hub GmbH (available at www.photonics-hub.de kontakt/agb)

Note According to Art. 6 GDPR (EU General Data Protection Regulation) we inform you about the electronic storage of your data and the processing in the automatic procedure.

# Participation fee

Members of Optence e. V. and Deutsches Flachdisplay Forum 990,-€ (+ 19% VAT, corr. 1.178,10 € gross)

Non Members 1485 € + 19% VAT, corr. 1.767,15 € gros)

Included are lunch, coffee-break, beverages, dinner and skript

After registration you will get a confirmation. According to the terms and conditions cancellations are possible until 21 days before the start of the course.For later cancellations we will charge the full amount of the participation fee

#### Venue

Ecos Workspace Mainz Tagungsraum Gutenberg Wilhelm-Theodor-Römheld Str. 14 55130 Mainz





Photonics Hub GmbH Wilhelm-Theodor-Römheld-Str. 22 55130 Mainz Tel.: +49 6131-698-2871 Fax: +49 6131-698-2873 info@photonics-hub.de www.photonics-hub.de



Photonics Hub Course: Fundamentals of Electronic Displays

## October, 15th/16th, 2024 in Mainz



# Fundamentals of Electronic Displays

For the successful use of electronic displays in professional applications and systems (such as automotive, industrial and medical), a large number of interdisciplinary aspects must be taken into account. Examples include the fundamental display principles and the resulting properties, the visual and optical performance of displays incl. ambient light and system integration of displays. The resolution of the display determines the necessary performance of the microcontroller or processor to be used and the display interface. The course provides the necessary basic knowledge in a practical manner.

The workshop begins with the basic principles of displays such as pixels and the display market. The latter is determined by consumer products with a market share of 90%. Professional displays for industry, automotive and e-signage have very different sizes and quantities.

Displays are the most important component of the human machine interface (HMI). The optical quality, which is determined using dedicated photometric measurement methods, is crucial for a high-quality appearance. The usable lifetime and the sufficient readability in bright ambient light are often highly relevant for professional display applications.

#### **Target Group**

Engineers, physicists, technicians, project managers, buyers, decision-makers and all people who will work with electronic displays (in the future). The one-day workshop covers many aspects and technologies of professional displays. It is suitable for both beginners and specialists in sub-areas who want to get an overall view of a system with displays.

### **Program October 15th, 2024** 10:00 a.m- 5:00 p.m.

#### Introduction

- What is a display
- Display markets
- Professional displays

# Basics of optical display measurement technology and evaluation

- Photometry and measuring devices for displays
- Luminance and contrast ratio
- Grayscale and color (CIE standards)
- Lifetime, burn-in, sticking image
- Degradation of readability in ambient light
- Introduction: Viewing angle, uniformity and switching time

#### Basics of display technologies I

- Pixel drive: direct drive, passive and active matrix principle
- LCDs (TN, IPS, backlight, local dimming)

#### **Program October 16th, 2024** 9:00 a.m. - 4:00 p.m.

#### Basics of display technologies II

- OLEDs (stack, challenges, comparison with LCDs)
- E-paper (technologies, benefits, applications)
- Flexible displays (technologies, challenges, applications)

#### Basics of systems with displays and interfaces

- Embedded systems with displays (microprocessor, display controller)
- Display interfaces (TTL RGB; LVDS, DisplayPort, automotive)
- Introduction: Touch screens (touch as a system, PCAP, resistive)

# The course enables you to answer these questions:

- How to design and use displays and their systems holistically
- How to understand the requirements and specifications for electronic displays and their use
- How to evaluate dispaly technologies with regard to specific requirements



# Instructor



Prof. Dr. Karlheinz Blankenbach: Pforzheim University, Display Laboratory

Prof. Dr. Blankenbach is an expert in electronic displays with over 30 years of experience. He is active in various display networks such as the Society for Information Display and the Displayforum (DFF).

Information: www.diplaylab.org

The course is limited to a maximum of 15 participants.