The HDR frontier and the need for precision

Revolutionising HDR display metrology: Admesy's Prometheus colorimeter in action with InnoPQ by FF Pictures

High dynamic range (HDR) technology is transforming the visual experience, offering unprecedented depth, contrast, and colour richness. However, the complexity of HDR displays presents unique challenges in quality control and calibration. This case study delves into how Admesy's Prometheus Colorimeter has been seamlessly integrated into FF Pictures' InnoPQ HDR measurement system, revolutionising the fields of quality control, research, and development.

An Admesy Prometheus Colorimeter performing critical HDR measurements with spatio-temporal noise backgrounds

The challenge: navigating the complexities of HDR

Florian Friedrich, chair of the ICDM HDR Subcommittee and CEO of FF Pictures, has been at the forefront of HDR technology. His award-winning paper[1] on advanced HDR measurements underscores the intricate interdependencies involved in HDR display metrology.

Any modern HDR consumer-display uses a complex set of rules to adjust the visual result according to the differences between its own capabilities and the input signal. Static and dynamic HDR metadata are influencing the tone-mapping of the HDR display in addition to existing tone-mapping or colour-mapping. Some of this is happening multiple times per second or even frame-accurate, following the framerate of the source, and some of it involves long-term adjustments related to energy consumption and heat distribution.

To truly grasp the intricacies of modern HDR technology, rapid and accurate measurement of the display's response to input signals is absolutely crucial. To achieve this, the InnoPQ HDR measurement system combines varying patch signal values and patch sizes with dynamic motion picture backgrounds, all while masterfully synchronising the timing of each measurement to capture even the most fleeting temporal effects.

The system required a fast and accurate colorimeter that could keep up with its rigorous demands. Friedrich says: "We needed a solution that can measure important parameters of HDR signal reproduction with exact timing down to the individual frame, as well as being able to measure colours accurately even in shadow areas lower than 0.1 cd/m². There are only few colorimeters on the market that meet our demands, but looking at the Admesy Prometheus, I became very interested in implementing it into our measurement tools."

Speed and accuracy: a harmonious blend

The Prometheus Colorimeter is a marvel of engineering, Especially the high measurement speed for ultra-low luminance values down to 0.0002 cd/m² makes it the undisputed fastest colorimeter on the market. Its integration into the InnoPQ system has been transformative. Friedrich says: "The combination of speed and accuracy in the Admesy Prometheus is outstanding. It's a state-of-the-art colorimeter that has significantly enhanced our measurement capabilities."

Versatility: the Swiss Army Knife of colorimeters

The Prometheus is not just fast; it's incredibly versatile. It can perform up to 3125 samples per second and supports multiple software platforms, including Visual Studio, Labview, Matlab, and Python. This adaptability makes it an ideal fit for the InnoPQ system, which requires a high degree of customisation to handle its complex measurement sequences.

Spectral sensitivity: setting a new standard

The Prometheus is designed with a spectral sensitivity that closely aligns with the CIE 1931 2° Standard Observer, making it ideal for measuring a wide range of displays, including wide colour gamut (WCG) displays. This feature has been invaluable for the InnoPQ system, which demands high accuracy across various display types such as conventional LCD with phosphor backlight or more advanced LCD displays with LED backlight and quantum-dot filters as well as OLED, QD-OLED.

Conclusion: a new paradigm in HDR display metrology

The collaboration between Admesy's Prometheus Colorimeter and FF Pictures' InnoPQ HDR measurement system sets new standards in HDR display metrology. To overcome the challenges of measuring HDR TVs and HDR post-production displays or monitors, FF Pictures has developed the InnoPQ HDR measurement system, which automates intricate measurement tasks where conventional systems face their limits.

'We needed a solution that can measure important parameters of HDR signal reproduction with exact timing'

In this scenario, the Prometheus Colorimeter's unmatched speed, accuracy, and versatility have proved to be invaluable in addressing the intricate challenges presented by modern HDR technology, which encompasses various complex interdependencies. As the industry continues to progress, tools such as the Prometheus will play a crucial role in ensuring that the visual experience keeps pace with technological advancements. EO

Reference

[1] "Utilising advanced spatio-temporal backgrounds with dynamic test signals for high dynamic range display metrology" by Timo Kunkel and Florian Friedrich. [https://doi.org/10.1002/jsid.1125]