



Norwegian Biometrics Laboratory Annual Workshop 2026

Back in spring 2011, the Norwegian Biometrics Laboratory (NBL) was established. For the opening, a workshop was organised and since then, the NBL Annual Workshops (NBLAW) have been celebrated. On March 4th 2026, NBLAW 2026 took place online, in cooperation with the European Association for Biometrics (EAB). The event gathered a great variety of speakers: Christoph Busch from NTNU gave the welcoming address, and Subodh Raj (Norwegian University of Science and Technology), Hans Geißner (Hochschule Darmstadt), Luuk Spreeuwers (University of Twente), Chiara Galdi (Eurecom) and Jonathan Boyle (University of Reading) completed the programme.

Building on the success of previous editions, the 2026 workshop focused on “Trustworthiness in Biometrics - Explainability, Fairness, and Regulations.” With increasing deployment of biometric technologies in real-world applications, issues related to transparency, interpretability, bias, robustness, and regulatory compliance have become central to both research and practice. The 2026 workshop aimed to foster in-depth discussions on these aspects and to bridge perspectives across technical, ethical, and regulatory domains.

Christoph Busch, Head of the NBL, opened the event with a warm welcome and an introductory presentation of the NBL. He covered the laboratory’s ongoing research, including topics of interests and Horizon Europe projects, and past achievements before handing the floor over.

I. Subodh Raj - “PopEye - Explainability and Quality in Biometrics”

Subodh Raj, postdoctoral researcher from the Norwegian University of Science and Technology, presented Horizon Europe research project PopEye, (robust Privacy-preserving biometric technologies for Passengers’ identification and verification at EU external borders maximising the accuracy reliability and throughput of the recognition).

It aims to address the high throughput requirements created by increasing passenger flow (including the need for long-distance identification in potentially difficult settings within privacy and regulatory constraints) with a secure, efficient, traveller-friendly and compliant border management solution. Core innovation focuses on face, fingerprint, iris and gait recognition, behavioural biometrics, and XAI, which all be integrated into a single interoperable platform.

This presentation focused on the project's work on explaining Face Image Quality Assessment scores using ISO/IEC 29794-5 quality attributes to accurately predict the suitability of a face image for recognition purposes. To achieve directional stability of feature influence, researchers created a framework with a stability-driven feature selection to train a surrogate model. Selecting attributes based on the stability of their negative or positive contributions to FIQA scores using sign entropy, they were able to improve the reliability of the FIQ explanations without impacting prediction accuracy and recognition behaviour.

II. Hans Geißner – “Feature Type Transformation and Decoding Strategies in Deep Fuzzy Vaults”

Hans Geißner, a PhD student in the da/sec Research Group at Hochschule Darmstadt, presented work on mitigating the security-performance trade-off inherent in biometric cryptosystems. His research focuses on an instance of the Fuzzy Vault Scheme, a primitive that protects biometric templates by using them as noise to conceal a cryptographic secret. To be efficient, such a scheme must have an acceptable security/performance trade-off by protecting privacy due to the sensitive nature of biometric data while preserving performance with a secure system and acceptable runtime. Higher privacy typically results in performance loss because of feature transformation, which can reduce discriminative information, and decoding, where variable effective thresholds and runtime can limit usability.

Investigating the need for stable input behaviour and runtime aware software decoder design, the research found that fixed set sizes mitigate performance loss, reducing probe set size using EqFreq and MaxBin strategy improves runtime and iterative decoding provides a favourable runtime/security trade.

III. Luuk Spreeuwers – Explainable Biometrics

Luuk Spreeuwers (associate professor at the University of Twente) shifted the conversation to a more philosophical level, focusing on the role of academia to explain biometric systems. He defined explainability as a field covering decisions, understanding, mechanisms and who explains what to whom. To explain biometric recognition, it can be divided in 4 levels of description.

First, the most high-level explanation is the comparison to a “reference” and calibration, or an understanding how performant a system is in the relevant circumstances compared to other systems, which is established through extensive testing. This also includes likelihood ratios used in forensic applications. Second, a deeper level of understanding is the interpretation with features/characteristics, which can point to how a decision is made: for example, comparing facial or fingerprint images can point to specific features like minutiae or facial proportion to justify a decision. The third level is understanding the data or the data acquisition process or explaining what a recognition system is looking at and how it collects data with modalities that are more challenging to comprehend (e.g. vascular patterns). Finally, the deepest level of explainability lies in understanding mechanisms of machine learning models or looking into the training of systems to explain their functioning rather than their decisions.

IV. Chiara Galdi – Fairness in AI

Chiara Galdi, Assistant Professor at Eurecom, followed up with a presentation focused on fairness and big data, and how bias can be measured and mitigated. She set out by defining and comparing bias (systematic differences in treatment), and fairness (which requires a system to behave in a way that is not determined by favouritism or unjust discrimination). With respect to AI, biases are necessary to classification and clustering, but they can be positive, neutral or negative depending on system goals and objectives. Negative biases sources are various, stemming from human cognitive biases, data bias, bias introduced by engineering decisions and data characteristics.

To assess their impact on fairness, metrics seek to evaluate differences between average observed values and true values with notions of demographic parity, equality of opportunity, equalised odds and predictive equality. Once measured, bias should be mitigated with a holistic approach as bias can enter at data representation and labelling, training and tuning, and adversarial methods."

V. Jonathan Boyle - Beyond the Numbers: Morphing Attack Detection, Quality Assessment and the Explainability Challenge Towards Trustworthy Face Recognition in Online ID Issuance

Jonathan Boyle, Postdoctoral Research Assistant in the Department of Computer Science at the University of Reading, closed the presentations. He presented insights from the EU and UK Research Institute-funded project EINSTEIN, which aims at improving all aspects of the passenger journey, from ID issuance to border crossing. This presentation focused on ID re-issuance, where applicants are often able to submit a picture themselves without going through live enrolment, leaving a potential vulnerability to attacks such as morphed images.

Through an explainable government app, the EINSTEIN project proposes a solution based on a Biometric Assessment Service combining presentation attacks detection modules, including 4 differential morphing attack detection (D-MAD) components.

Testing highlighted that each model has different strengths varying dependent on morphing techniques, image format and quality, and sensor type, with no single model performing consistently across all conditions. Further real-world constraints (environmental factors, technical limits impacting image quality, and ethical considerations on training and evaluation data) accentuate the need for algorithms and models tuned for different operational scenarios. Preliminary project findings suggest the EINSTEIN solution's combined algorithms model can efficiently address that need. While EINSTEIN is exploring some explanatory approaches, the wider field may need further research into AI explainability before its integration in real-world applications due to regulatory requirements on AI.

We thank all speakers and participants for their valuable input and their interest in the research that was presented. The slides of the workshop and video recordings are available at: <https://eab.org/events/program/405>

About the EAB

The EAB is the leading voice for biometrics and digital identity, for Europe. As a non-profit organisation, EAB represents and connects a growing community of biometrics and digital ID stakeholders from across Europe. Our purpose is to foster innovation, support networking across markets and stakeholders, and provide trusted and impartial advice. The EAB's membership includes the European Commission, business leaders, governments, institutes and academia. Members meet regularly at EAB hosted and partnered events and networking opportunities, across Europe.

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