

Study of watermark visibility with applications to the ID document industry (3-month internship)

HID Citizen Identity Solutions is a global provider of secure identity documents and is involved in more than 60% of the world's electronic document programs. With innovative and future-proof identity solutions we equip today's and future generations for any identity challenge. Our identity documents, such as e-passports and ID cards enable all citizens to transact, access and travel safely. Created in 2006, the **Hubert Curien laboratory** is a joint research unit (UMR 5516) of the Jean Monnet University, Saint-Etienne, the National Research Centre "CNRS" and the Institut d'Optique Graduate School. It is composed of about 240 members who work on scientific topics related to optics, photonics and microwave, computer science, telecom and image. In recent years HID has been partnering with Laboratoire Hubert Curien to develop the technologies that will protect our future identity documents. The partnership has materialized through several research projects, PhD theses and internships, and through the creation of a joint research laboratory, **LAMCID**. Our combined expertise includes laser marking and printing technologies, nanoparticles, chemistry, color science as well as algorithms and AI.

Proposal

HID and Laboratoire Hubert Curien are looking for a motivated intern to join the LAMCID laboratory and help advance our knowledge of how color personalization technologies secure ID documents. Until today, most ID documents were personalized with a black and white picture of the holder, marked by laser or inkjet printing. Black and white laser engraving is currently the preferred way of marking the main portrait, as it embeds the image into the document and prevents its modification. However, its current limitation to black and white hinders the good recognition of the person as it hides so key features of the portrait (e.g. eye or hair color). In recent years, new secured color personalization technologies have appeared, but they tend to create visual artefacts that can affect the clearness of the image.

The subject of the internship is to research and develop a piece of software capable of identifying those visual artefacts using spatial color appearance models. Based on the available scientific literature, as well as exchanging with the team, you will develop a strong understanding of image appearance and visual artefacts in the framework of color personalization technology for ID documents. By utilizing your knowledge of color science and the selected models, you will then create optimized prototypes using the printing technologies available in the lab, to reduce artefact visibility while ensuring the secured aspect of the feature is maintained. Your software will enable you to compare several designs and help HID's team implement the best one into an industrialized prototype.

Profile

The successful candidate will be a strongly motivated individual, curious about new technologies and their applications in the industry. We are looking for a results-oriented person, with a drive to understand complex color science concepts and produce prototypes in a fast and iterative manner. You should be proficient in coding in Python, and able to communicate your results in a precise and concise way. Knowledge of git versioning system is a plus.

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Color portrait on the ePassport of the Kingdom of Bahrain, which won several design awards thanks to its blend of technology and refined aesthetics.