Ph.D Project EIPHI GS COQUIIAJ

Job title	Multimodal image synthesis for AI-based quality control
Job type (PhD, Post-doc, Engineer)	PhD
Contract duration (months)	36 months
Qualifications (Master, Ph.D …)	Master
Job hours (full time/ part time)	Full Time
Employer	UBFC Université Bourgogne Franche-Comté
Financing Institutions	Région Bourgogne Franche-Comté & Graduate School EIPHI
Host Laboratory	ImViA
URL Host Laboratory	https://imvia.u-bourgogne.fr
Address Host Laboratory	9 rue Alain Savary 21000 DIJON
Job description	The objective is to carry out a geometric and photometric modeling of a hyperspectral camera and to implement it in an image synthesis software like Blender, Rhyno3D, Opencascade… The work will start with a bibliographic study and will be followed by the development of the application. The goal of this PhD is to help produce a hyperspectral image database for industrial purposes. The bibliography work is divided into two themes, hyper-spectral imaging and image synthesis: • To define the image of an object, it is necessary to know several characteristics such as its reflectance, its shape, its brdf, etc. The bibliographic study will be used to extract the essential characteristics for the generation of hyperspectral images. • The bibliographic research will also lead to the choice of the image synthesis method (ray tracing, z-buffer, etc.) and the rendering engine best suited to the problem. Thereafter, the first part of the work will consist in implementing, in the selected software tool, the camera and object modeling (acquisition sensitivity curves, object's spectral properties, etc.). This will allow us to obtain a set of synthetic images that will be compared to real acquisitions. In a second part, different noises (from the object, the camera, etc.) can be added to simulate images more realistic. This part will also model defect on the simulated object to create at least 2 classes of object: valid or not. Bibliographie : • Romain Hoarau et al. "Interactive Hyper Spectral Image Rendering on GPU", in *VISIGRAPP*, 2018. • Neil Scanlan et al. "Performance analysis of improved methodology for incorporation of spatial/spectral variability in synthetic hyperspectral imagery.", in *Imaging Spectrometry IX*, 2004.

Supervisor(s)	Olivier Aubreton: olivier.aubreton@u-bourgogne.fr Hermine Chatoux: hermine.chatoux@u-bourgogne.fr Abdallah Makhoul: abdallah.makhoul@univ-fcomte.fr
Candidate profile	• Good programming skills in python or C/C++, • Good mathematical basics, • Knowledge of geometric camera modelling, And/or • Knowledge in colour/multispectral imaging, And/or • Knowledge in computer graphics/image synthesis • Dynamism and autonomy to integrate a multidisciplinary research team.
Keywords	image synthesis, hyperspectral
Application deadline	**01/06/2022**
Application Depending on the type of position	Please send the following documents (all in one PDF file) by e-mail to Olivier Aubreton: olivier.aubreton@u-bourgogne.fr Hermine Chatoux: hermine.chatoux@u-bourgogne.fr Abdallah Makhoul: abdallah.makhoul@univ-fcomte.fr 1. For EU candidates: Copy of your national ID card or of your passport page where your photo is printed. For non-EU candidates: Copy of your passport page where your photo is printed. 2. Curriculum Vitae (may include hyperlinks to your ResearchID, Research Gate, Google Scholar accounts). 3. Letter of motivation relatively to the position (Cover Letter) in which applicants describe themselves and their contributions to previous research projects (maximum 2 pages) 4. Copy of your Master degree if already available. 5. Coordinates of reference persons (maximum 3, at least your master thesis supervisor): Title, Name, organization, e-mail. If you have questions regarding the application, please contact the supervisor.