REAL-TIME ESTIMATION OF LIGHT SOURCES FROM VIDEOS FOR AUGMENTED REALITY

Figure 1: a real-scene showing lighting estimation. Left; pictire the CG character is rendered without the use of the real lights estimation. Right:the character is rendered using the estimated real light sources

The objective of the internship is to work on new techniques for estimating the position, orientation and intensity of light sources from videos.

Two different approaches will be investigated. The first one will consist in investing a direct estimation using a multi-pass inverse rendering technique. A coarse approximation of the position/orientation of the light sources will thus be achieved using an Intel range sensor. The scene will be then rendered in Unreal Engine 5 [1] using the computed properties of the light sources and applying a rendering algorithm from that engine (see figure 1).

A second approach will reside in developing a new deep leaning method based on Neural Radiance Fields (NeRF) [2, 3]. To create a learning data set, the intern will use generate his own set of videos where the ground truth is known using Unreal Engine 5 existing scenes. This means getting computer graphics videos where all light sources properties are known as they were used to create those sequences. The developed NeRF technique will be then applied on new computer generated sequences to validate that approach and the choice of the appropriate neural network.

This work just represents the premises of a future PhD work where real scenes will be then investigated. The data sets will come from VFX companies and movies. The intern will have the opportunity to work with Marc Christie, associate professor at University of Rennes 1, and Sam Boivin senior INRIA researcher and former 8-years CTO of the world-leading real-time AR company for VFX ncam-technologies [4].

Team: VirtUS, INRIA de l'Université de Rennes
Supervisors: Marc Christie and Sam Boivin

Location : INRIA Rennes
Paid Internship

[1] https://www.unrealengine.com/
[2] Ben Mildenhall, Pratul P. Srinivasan, Matthew Tancik, Jonathan T. Barron, Ravi Ramamoorthi and Ren Ng . Representing Scenes as Neural Radiance Fields for View Synthesis. In ECCV proceedings, 2020.
[3] Tewari, Ayush and al. State of the Art on Neural Rendering> in CVPR proceedings, 2020.
[4] https://www.ncam-tech.com/