



## STSM Report

### Analysis of art paintings with a hyperspectral system composed of a LCD tunable filter

REFERENCE: Short Term Scientific Mission, COST TD1201

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Host: Sergio Nascimento, Universidad de Minho, Braga (PT).

Period: from 10/27/13 to 11/06/13

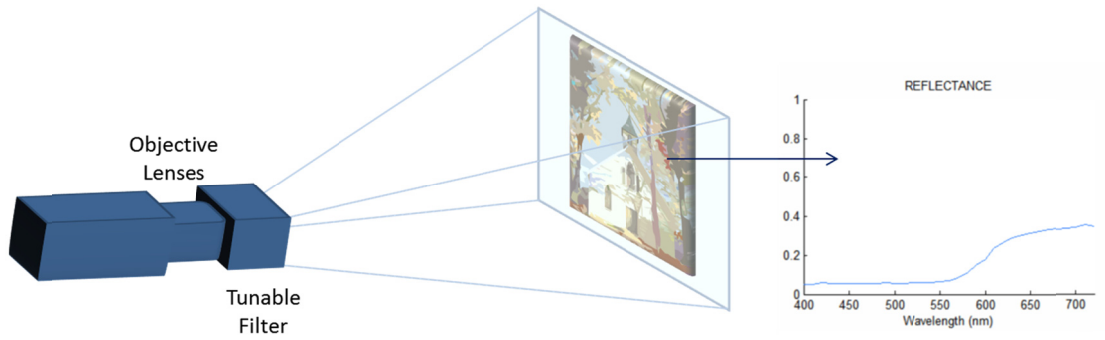
Place: Universidad de Minho, Braga (PT).

Reference code: COST-STSM-TD1201-15461

#### Abstract:

The main goal of this project was to acquire spectral images of oil art paintings belonging to the collection of Museu Nogueira de Silva (Braga, Portugal), using a hyperspectral system. The system was composed of a digital peltier-cooled camera, an objective lens and a tunable filter (LCTF) placed in front of the lens. An infrared-blocking filter was placed permanently in front of the hyperspectral system to avoid contamination from infrared light when the filter was tuned to wavelengths lower than 450 nm. The illumination system consisted of a couple of SoLux lamps emulating daylight. An easel was used to properly place the art paintings, and a white reference made of methacrylate was also used to check illuminance uniformity.

Before performing the hyperspectral acquisitions, several issues regarding the system setup and position were considered such as placing correctly the easel and the white reference plate in order to manipulate as little as possible the paintings. Illumination level was also checked in order to avoid overexposing the paintings according to the standards. Then, the hyperspectral acquisitions from 11 oil paintings from the Renaissance and the 20th century were taken. Dark current and flat-field images were acquired to later compute the spectral reflectance pixel by pixel. A known reference was also used for this purpose (Munsell N7). All measurements were done in the visible range from 400 to 720 nm with increments of 10 nm. In order to process the images and to obtain spectral reflectance information, a software application was created with Matlab®.



Spectral System

Sample

Reflectance