

## Towards a molecular tangible interface in augmented reality



VENISE group (<http://www.limsi.fr/venise/>) at LIMSI/CNRS



Supervisor: [nicolas.ferey@limsi.fr](mailto:nicolas.ferey@limsi.fr), [jean-marc.vezien@limsi.fr](mailto:jean-marc.vezien@limsi.fr)

At the LIMSI-CNRS lab, in the Virtual and Augmented Reality research team VENISE, we are working on an approach allowing us to get a virtual representation of a 3D physical molecular model, just using classical phone RGB camera and image processing [1].

As our goal is to use this physical model as a tangible interface, in order to control interactively the virtual model by manipulations of the physical one, it remains many ways to investigate in order to improve the robustness and the performances of our approach to reach an interactive time 3D reconstruction, about 2D tracking, 2D / 3D point matching, and especially by introducing the use of depth sensors now available on new smartphones.

In addition, drug manufacturers and researchers in the field of molecular biology are very interested by using these tangible molecular interfaces in a context of augmented reality. On the one hand, these physical models could be used to prototype biomolecules before studying their chemical interactions with a virtual complex molecular environment. On the other hand, these physical models could be augmented with complementary and co-located 3D visual representations,

and render on daily working spaces allowing an easy collaboration using augmented reality devices.

The objective of the internship is to propose and evaluate the improvements of the different steps involved in the 3D reconstruction of the physical model by image processing including the use of depth sensor, in order to augment the physical model with co-localized 3D molecular elements in an augmented reality context.



The goals of this current work is to use a physical model to manipulate its 3D virtual reconstruction, to provide a tangible molecular interface, that has to be used and evaluated in an augmented reality context

**REQUIRED SKILLS:** The candidate must have excellent programming skills, and a good knowledge in the field of 3D interaction, or image processing. Experiences in the field of video games development with Unity 3D, or knowledge in molecular biology, would be a good add-value.

**SOFTWARE & HARDWARE:** Visual Studio, HoloLens-SDK, C++, OpenCV, Unity3D, HoloLens, RGB-D depth camera

**WORKPLACE:** LIMSI-CNRS, Bat 512

**REMUNERATION:** 554 euros per month

### REFERENCES:

- [1] X. Martinez, N. Férey, J-M. Vézien, P. Bourdot. *Towards an A&VR molecular tangible interface based on a lightweight RGB markerless tracking of a modular physical model*, EuroVR, Athens, 2016, Best paper award.