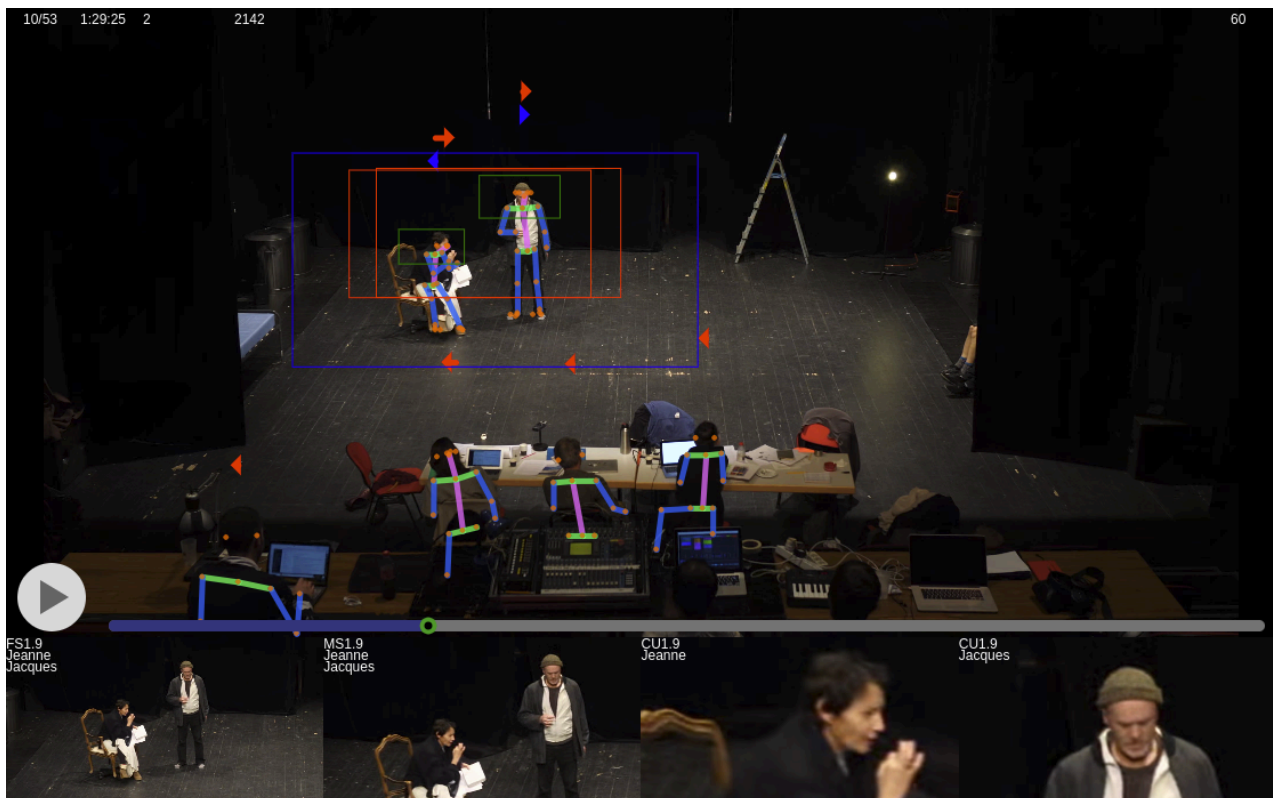


Recording virtual stage performances using sensor fusion

Masters Thesis Internship

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Context

ANIMA is a computer graphics team created in July 2020 at Inria and Univ. Grenoble Alpes to invent new methods for authoring and creating story worlds. Towards this common goal, we pursue research in geometric modeling, physical modeling, semantic modeling and aesthetic modeling.

Objectives

ANIMA is a member of the Performance Lab, a multi-disciplinary research project at Univ. Rhone Alpes investigating the frontiers between the art and science of live performances including theater and dance.

In this context, we are investigating methods for capturing live performances « in the wild » i.e. during long performances (one hour or more) on a real stage and in the presence of a real audience, rather than in a controlled motion capture studio.

Goals

In this internship, our goal will be to design algorithms for automatically reconstructing the 3D movements of actors performing on a large stage, using a combination of wearable sensors and video cameras.

The internship will build upon the open source KinoAi software [3] developed in our team, which uses OpenPose [1] for recovering the 2D pose of actors from a single camera view. We would like to extend the existing software in two main directions

- using inertial sensors placed on the actors to recover their positions and orientations in the geometry of the stage, and identifying them in all available cameras
- using this information for recovering the 3D poses of all visible actors from the incomplete 2D poses [2] found by OpenPose in all available cameras.

To reach those goals, we will review sensor fusion methods for combining multi view stereo pose with inertial sensors [4,5] and propose extensions for dealing with long performances involving many actors.

We will then design and build a prototype capture system to validate the approach with experimental results on the two tasks of automatically naming and locating actors in all cameras, and recovering their 3D poses.

The internships is offered to Master students with a good knowledge of computer vision and computer graphics, excellent programming skills, curiosity and enthusiasm.

The internship is expected to lead to a PhD on a related topic

References

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 3. Rémi Colin de Verdière, Rémi Ronfard. OpenKinoAI: An Open Source Framework for Intelligent Cinematography and Editing of Live Performances. Arxiv, September 2020.
 4. Gilbert, A., Trumble, M., Malleson, C. et al. Fusing Visual and Inertial Sensors with Semantics for 3D Human Pose Estimation. *Int J Comput Vis* 127, 381–397 (2019).
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