



D2.2 Report on high-level control APIs and methods



sauce

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Abstract	The overall aim of this document is to perform a preliminary investigation into an employable, high-level methodology which can be leveraged to achieve the goals laid out in work package 6 of the SAUCE project. This is primarily with respect to generating high fidelity animation within the context of IKinemas domain of expertise, namely, procedurally generated animation through the use of Inverse Kinematics (hereby referred to as IK). In order to achieve these goals, investigation into the current state of the art within procedural animation must take place as well as establishing relevant work and motivations of related partners within the SAUCE group.
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1. Executive Summary

The overall aim of this document is to perform a preliminary investigation into an employable, high-level methodology which can be leveraged to achieve the goals laid out in work package 6 of the SAUCE project. This is primarily with respect to generating high fidelity animation within the context of IKinemas domain of expertise, namely, procedurally generated animation through the use of Inverse Kinematics (hereby referred to as IK). In order to achieve these goals, investigation into the current state of the art within procedural animation must take place as well as establishing relevant work and motivations of related partners within the SAUCE group.

Sections 2 and 3 aim to provide an overview of the works relevant to the goals of work package 6. *Section 2* begins with an exploration of the cutting edge in procedural animation external to SAUCE and the impact this could have on future development. This is followed by *Section 3* which covers an early investigation into relevant background and motivations from members within SAUCE (namely GTI-UPF, Filmakadamie and IKinema) and the existing potential for collaboration.

Section 4, Proposed Animation Pipeline For Character Control, outlines the pipeline planned for production by IKinema within the early stages of SAUCE, specifically *Work Package 6 Task 2*. This pipeline will serve as the platform for future development used for generating procedural animation from high-level user control.

The pipeline discussed can be utilised both offline and online with different use cases for each. In an offline environment, the proposed pipeline could be used for typical post-production IK animation purposes. One area of planned development during SAUCE will see improvements to this pipeline utilizing virtual marker solving to drive IK constraints allowing for quickly modifying animation assets. For example, the pipeline could be utilized for generating new animation from old and repairing existing assets efficiently with very little overhead. In an online environment, the benefits of the proposed pipeline as applied to traditionally produced, joint based, forward kinematic animation (hereby referred to as FK animation) would be twofold.

Firstly, it would promote the reusability of existing FK animation assets. Traditional FK animation assets are typically purpose built for specific use cases. Procedural IK modification acts to extend the range of suitable use-case scenarios of the original asset. For instance, one of the more well explored procedurally generated behaviours is procedural foot placement using IK. Given a joint-based FK animated walk cycle designed for a flat surface, procedural IK can be used to adapt the walk cycle to differing terrain at runtime. This is particularly useful for applications in which a character exists in and can traverse a virtual world as it makes use of the original animation but in a scenario in which (without IK modification) it wouldn't be suitable.

Secondly, utilizing IKinemas' current know-how and the development planned during SAUCE, the animation pipeline will serve to transform existing assets into 'smart' assets. Such assets would be capable of automatically adapting to and interacting with a given virtual world state.

Another area of investigation carried out in this document is into identifying layers within the proposed pipeline which can be utilized for exotic character control and translating user intent into reactive animation. The investigation into these areas takes place in *section 5, Areas For Development*. This section highlights areas which extend the functionality of the pipeline to further the goal of smart and reusable asset production and potential sources of collaboration with partners within SAUCE. Two particular areas of interest are identified in this section. Using user issued semantic directives to drive character animation and generating in-between animations to boost the fidelity of resultant procedural animation.