

IN/E Motion



Team Name: MosaicMovement

Group Members: Asad Mirza, Derrick Perry, Sophia Dao, John Calma

What and why?: What is the problem you are trying to solve?

Problem: Traditional performance spaces are limited to passive observation, resulting in disengaging experiences and restricted creative expression.

Objective: This project seeks to transform traditional performance art into a dynamic, immersive experience where the environment and participants are in constant, real-time dialogue. By doing so, MosaicMovement will not only enhance artistic expression and engagement, but also pave the way for innovative and groundbreaking performances that redefine the boundaries of interactive art.

What and why?: Why does the customer want this?

Enhancement: Enhance artistic expression and engagement through innovative technology.

Immersion: Create a dynamic, immersive experience where the environment and participants are in constant, real-time dialogue.

Impact: Elevate the standards of artistic expression and audience engagement, setting new industry benchmarks.

In short, **the MosaicMovement project offers sponsors a unique opportunity to support a transformative initiative that combines technological innovation with artistic expression.**

What and why?:What is the project supposed to do?

Integration: Combine technology and performing arts by designing a system that uses multiple cameras to capture movements and Unity or TouchDesigner generated projections to generate an immersive space.

Real-Time Interaction: Utilize motion tracking and Unity or TouchDesigner to create a responsive performance space that adapts to the movements of both performers and the audience.

Innovation: Transform traditional performance art into a dynamic, interactive experience, paving the way for groundbreaking performances.

What and why?: Background and Related Work

TouchDesigner - Projection mapping, contains suite of features and customization options to ensure any projection project is achievable.

HeavyM and Memo Akten's Body Paint use motion tracking and sensors for real-time visual interactions.

Limitations:

HeavyM: Simple installations, lacks advanced motion tracking, no real-time adaptability.

Memo Akten's Body Paint: Digital paintings from movements, not suitable for complex performance environments.

Key Requirements: Customer Requirements

- Real-Time Motion Capture
 - Priority: Critical
 - Constraints: Economic, Environmental, Health/safety
- Real-Time Animations
 - Priority: Critical
 - Constraints: Economic, Manufacturability
- •Reliable System Performance
 - Priority: Critical
 - Constraints: Economic, Sustainability
- •User-Friendly Interface
 - Priority: High
 - Constraints: Social, Health/Safety

Key Requirements: Real-Time Motion Capture

Using the Nitrack system and multiple Intel RealSense D435i cameras, data will be captured from participants.

- This is a *critical* requirement, because it is part of the foundation of the project. If there is no motion tracking then there are no projections.

Constraints:

- Have willing participants be aware they are being recorded.
- Cameras set up so they won't be hit/damaged by participants.

Key Requirements: Real-Time Animations

The projected animations must be high quality and visually appealing.

- This is a *critical* requirement because the data captured by the motion tracking system needs to have an output that ties the performance together and entices audience members to participate.

Constraints:

- Participants are properly warned for bright flashing lights.
- Animations should be abstract and not represent anything disturbing.

Key Requirements: Reliable System Performance

Overall system should not fail at any point of the performance. Fail safe measures should be implemented in case minor problems occur.

- This is a *critical* requirement because this is a live performance and will have audience members participating as well.

Constraints:

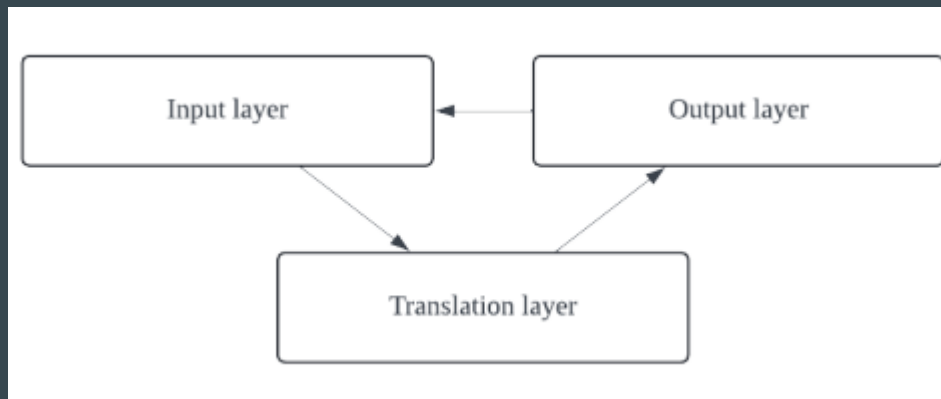
- Having all the components of the system out of reach and the space tidy to prevent any interferences.
- Ensure reliability of the components for the duration of the performance.

ADS Walkthrough: System Overview

Input Layer: Cameras capturing motion data.

Translation Layer: Captured data determines projected animation to generate.

Output Layer: Animation is projected and participants can interact to generate new animation.



ADS Walkthrough: Subsystem Definitions & Data Flow

Input Layer: Responsible for capturing raw motion data that will be processed and transformed into real-time animations

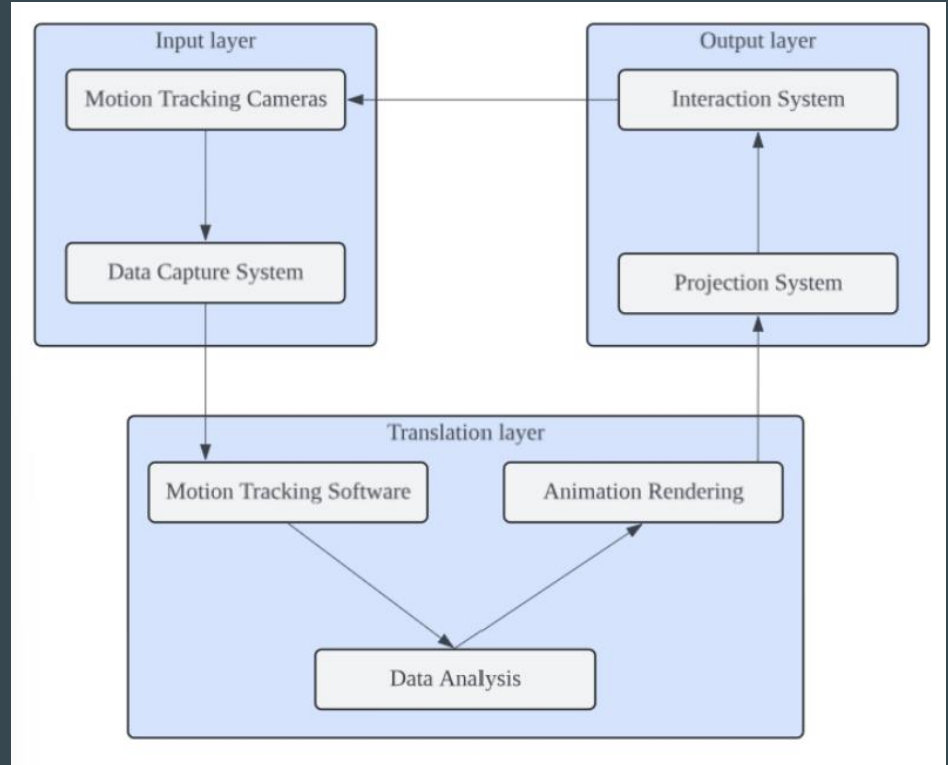
- Includes: High-resolution motion tracking cameras and sophisticated data capture software.

Translation Layer: Serves as the intermediary between the raw data capture and the final output, processing the captured motion data to prepare it for animation rendering.

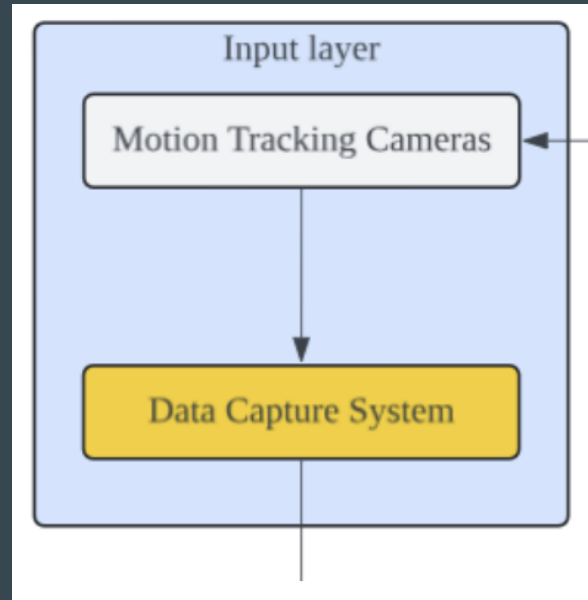
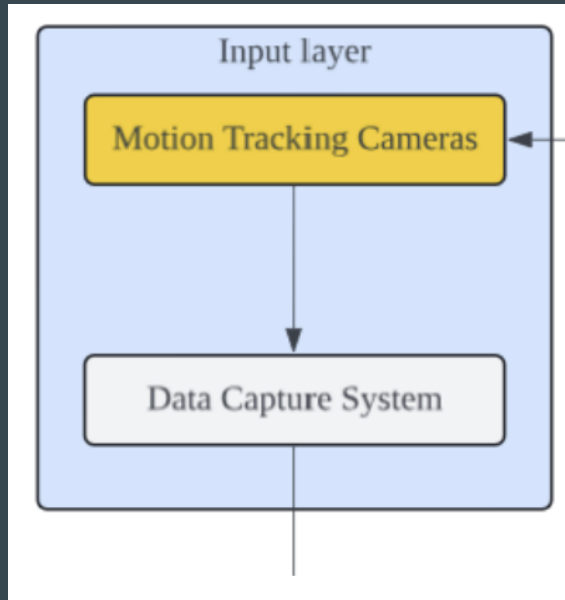
- Includes: Motion tracking software, data analysis components, and animation rendering engines.

Output Layer: Responsible for presenting the processed animations and facilitating interactions with the participants.

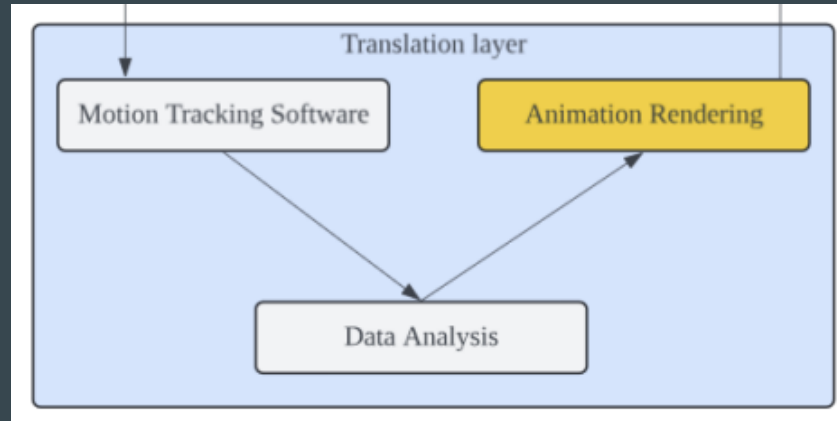
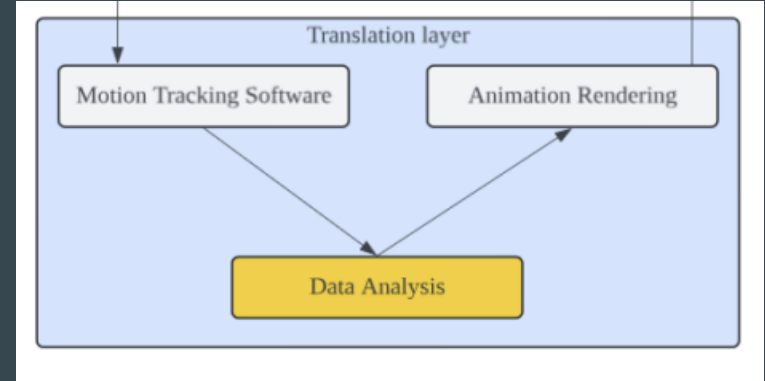
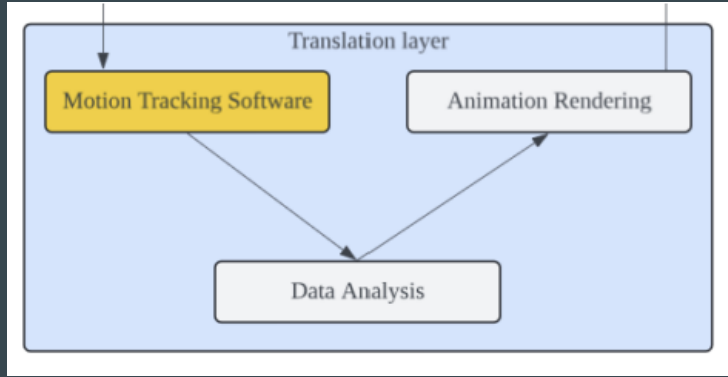
- Includes: Projector system and Interaction System.



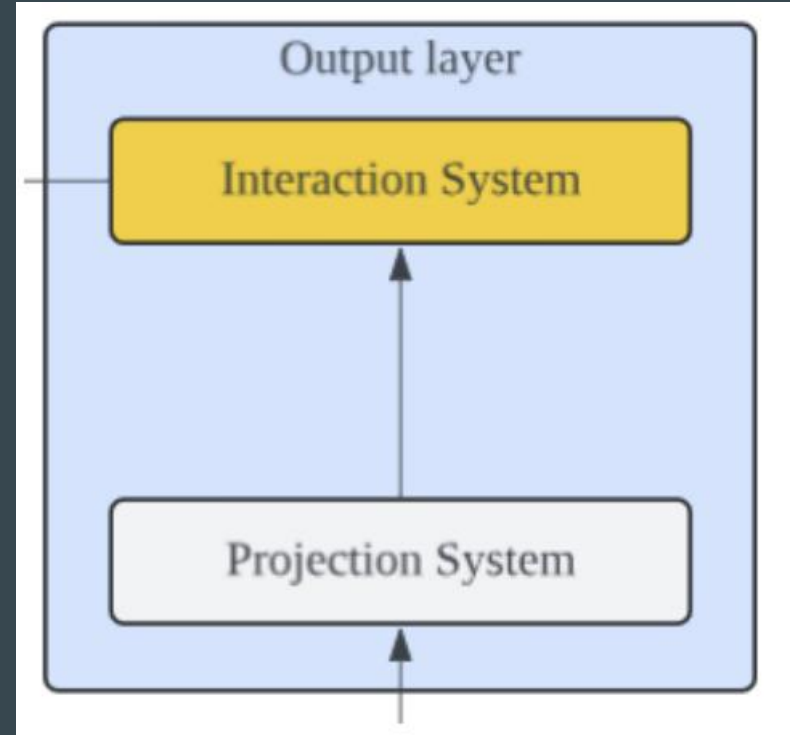
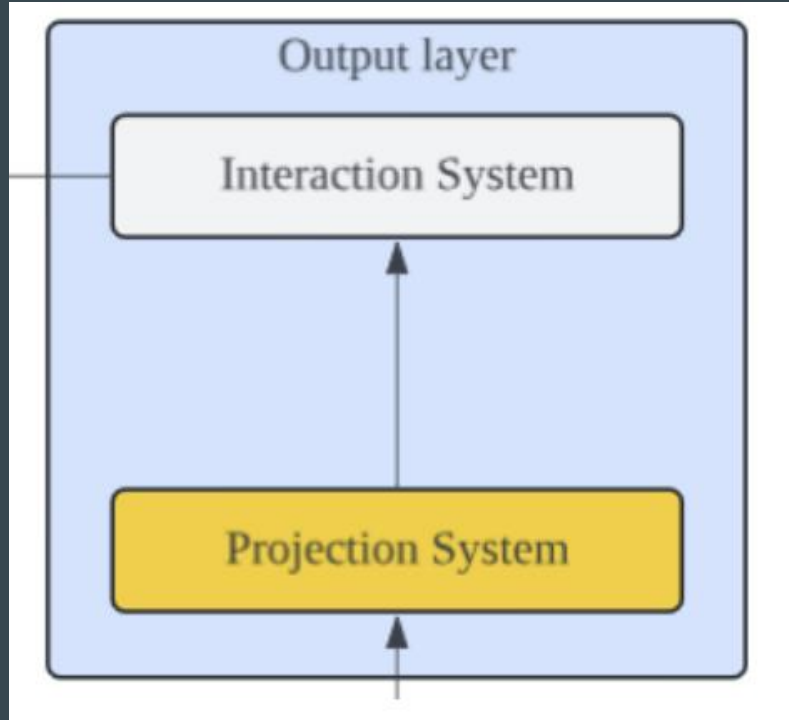
ADS Walkthrough: Input Layer



ADS Walkthrough: Translation Layer Subsystems

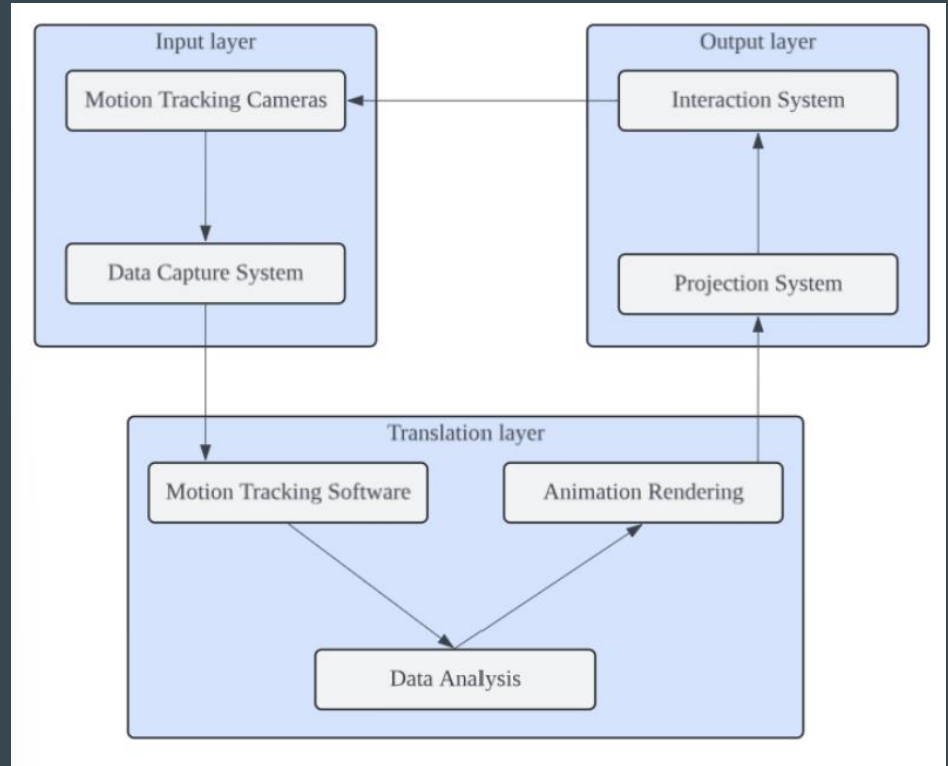


ADS Walkthrough: Output Layer



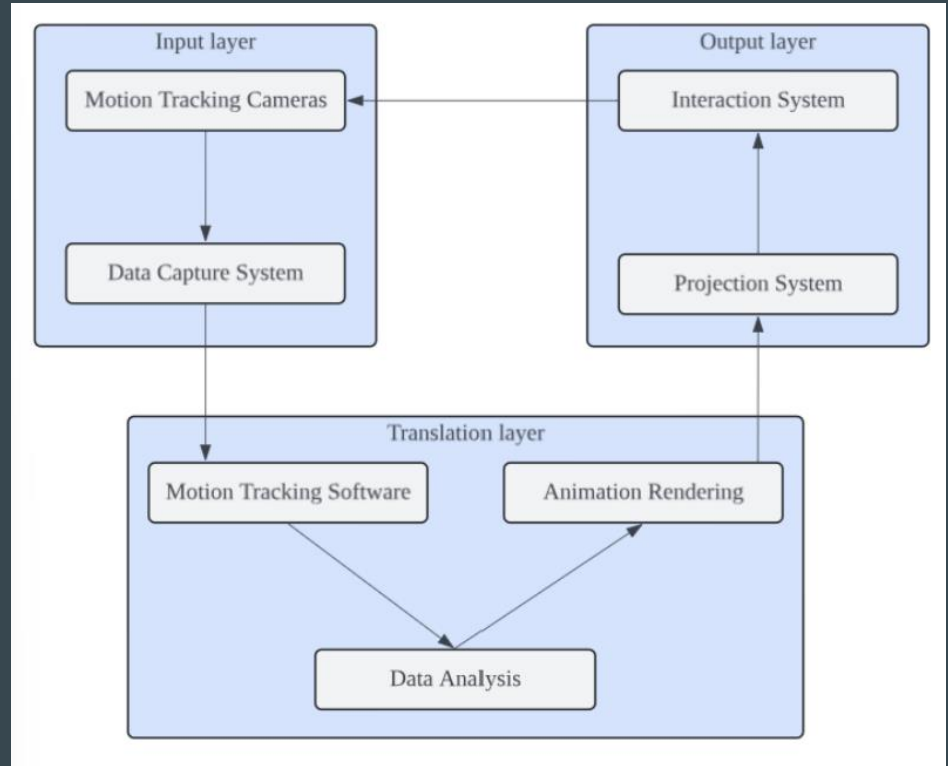
ADS Walkthrough: Why did we do it this way?

The purpose of this system is to blend the lines between performer and audience member. An output will motivate the audience members to become participants in the performance. By designing the system this way, we want the inputs and outputs to blend as well.



ADS Walkthrough: Use case Walkthrough

1. Movers begin moving.
2. Movements trigger animation projection process.
3. Animations are projected across the performance space.
4. Audience members will be encouraged to move across the space as movers are performing.
5. Audience members become movers for new animations!



Next steps: What we will work on next

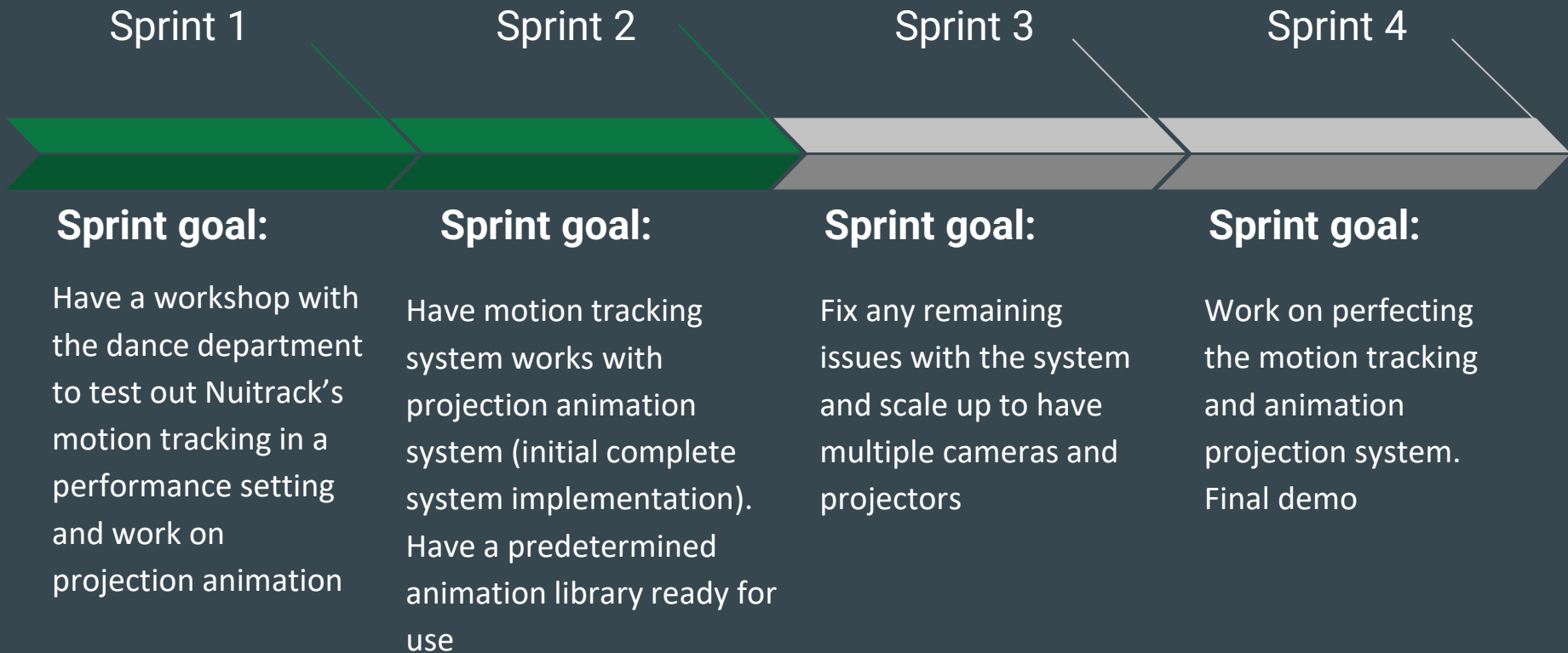
- Focus on animation and decide between TouchDesigner and Unity
- Connect motion tracking with animation
- Work on camera and projector setup location: ERB 208
- Scale up the system to have multiple motion tracking cameras and projectors

Next steps: Outline of Work

Before SD2 first sprint:

- Create animation with both Unity and TouchDesigner to determine which software would be used for animation.
- Get NuiTrack.

Next step: SD2 Sprint Goals



Questions / Feedback