Bridge Builder

# Analysis

## Overview

## I am going to build software that will allow engineers to design and test the performance of bridges. It will be able to build a digital twin of bridges. Then, using a variety of commonly used materials, the engineer can build and then simulate the bridge. By utilizing a custom physics engine, the engineer can investigate where the bridge has weaknesses, which will improve the design and quality of the bridge. All while considering the cost of the materials.

## There are two tools in the software, bridge design, and the bridge simulation tool. The bridge design tool is where the engineer can build the terrain that their bridge will stand on and construct their bridge. This will allow the engineer to place materials, connected by nodes, to easily modify and add to the design of their bridge. They can connect to the terrain at specified anchor points to traverse their chosen terrain.

## The second tool is a bridge simulation tool, this is where the bridge will be tested for integrity under load. Initially, it will be tested under its own weight. Then a traffic simulation will test the bridge with additional forces being applied to the road. This will create a heatmap of the maximum stress placed on the bridge and which components are likely to fracture under the stress. Resulting in the engineer creating informed decisions about the structure

## Current applications

There are variety of solutions to the design and testing of bridges.

## Key Objectives

1. Visualisation tool
   1. For both client and engineer
2. Bridge design and building tool
   1. Terrain design tool
      1. Functionality to add anchor points to the terrain
      2. Add or remove terrain using different size brushes
   2. Bridge building tool
      1. Material selection panel
      2. Connecting materials with nodes and changing the length of the materials
      3. Functionality to delete sections of the bridge
      4. The ability to copy and paste nodes to increase productivity for repetitive tasks
3. Bridge testing and analysis tool

# Design

# Technical Solution

# Testing

# Evaluation