Matthew Savitt

B.J. Johnson

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Project Proposal Document

My project, titled Parametrix (working title), is a React-based animation software leveraging the Three.js library. Parametrix aims to provide a streamlined approach to 3D animation by enabling users to define animation parameters through mathematical functions. These functions will govern transformations such as position, scale, rotation, and skew within an orthographic projection, facilitating the creation of both continuous and cyclical animations exportable as GIF files.

The core concept behind Parametrix is to empower users to generate complex animations efficiently by inputting mathematical equations that are evaluated per frame. These evaluations dynamically adjust the attributes of objects within the scene, offering a streamlined workflow for modeling dynamic motion. This approach allows 2D animators to utilize 3D projective geometry to pre-visualize and expedite their production process.

The software will implement the following key features:

- **Function-Based Animation:** Object attributes will be modulated by user-defined mathematical functions evaluated against a time delta incremented each frame.
- **Object Management:** Users can import 3D models or utilize built-in primitives, with the option for mesh deformation. Objects can be grouped into hierarchical structures, enabling simultaneous animation of both composite objects and their individual components.

- **Frame Rate Control:** Variable frame rates will allow users to adjust the sampling frequency of the applied functions, influencing animation speed and smoothness.
- **Modular GUI:** A customizable graphical user interface will provide a flexible and efficient workflow, allowing users to arrange and manage various interface elements.
- **Data Persistence and Sharing:** Animations can be saved to a Firebase backend and exported as GIF files. An optional "gallery" section will allow users to share their creations.

Parametrix is designed to serve two primary purposes: facilitating rotoscoping for 2D animation and functioning as a standalone 3D animation tool. This software aims to provide a competitive alternative for animators seeking rapid prototyping and animation design without the extensive time investment typically required by traditional methods. It also offers a functional-programming-inspired environment for mathematically inclined individuals to explore animation through algorithmic expression.

As a computer science student with a background in animation, I am well-positioned to develop this software. I will actively ask for feedback from both the animation and CMSI departments every week throughout the development process, focusing on delivering a functional minimum viable product. This project aims to empower animators with efficient tools, offering a competitive alternative to generative AI-driven solutions and promoting creative exploration through mathematical principles.