

3D SKETCH-BASED PIXEL WORLD

QIYUE ZHANG (10131658)
JIAN LI (30023214)

ABSTRACT. This project focuses on the recreation of natural landscapes through 3D sketching, by using strategically placed cameras to capture the movement of a pen with a specially colored tip.

1. INTRODUCTION

In this project, we will explore the idea of virtually sketching in 3D space, specifically, a sketch involving natural landscape elements. We will be continuously receiving camera input of a moving pen with a specially colored tip by using a strategically placed cameras and sending the point data to a computer application. In the application, the data received will be processed and shown in real-time, modelled as different elements depending on the tool selected by the user.

2. GOALS AND OBJECTIVES

Our goal is to create a sketch-based 3D modeling application through the use of iphone cameras and a simple pen tool. The application will enable users to create their vision of a natural landscape with minimal knowledge of the back-end, using equipment that is easy to obtain and set-up. Through this project, we expect to learn about modelling techniques such as:

- Bilinear blending surface
- B-Spline curves
- Transformation between coordinate systems

3. METHODOLOGY

We plan to get 3D point data by using two iphones of the same model. By placing them on planes perpendicular to each other, the appearance of 3D space can be achieved.

The drawing tool to be used may be any pen or stick with a red tip, so that the iphone cameras may look for a specific set of RGB values to collect on and ignore any other values. After obtaining the data, the coordinates will be passed to the C++ application through TCP. The C++ application will render data set by applying the proper tool-kit API to be built.

The whole model should be able to be output as a raw file and take a the file back as input for further sketching.

To be more specific about the tool-kit to be used:

- Ground surfaces such as hills or plains will be modeled by bilinear blending surfaces while 4 edge curves should be either Bezier curve or B-spline curve

- Clouds will be implemented as a random spray along some curve
- Tree branches and trunks will be modeled by 2 curves as rotational blending surfaces
- Tree leaves will be modeled by 3 curves as cross sectional blending surfaces
- Users will be able to reuse elements of the scene by selecting and pasting, and we may apply operations like union, intersection and difference of two objects.

4. EXPECTED RESULTS

We expect to be able to achieve all components of the project, with at least two different functionalities in our toolkit.

5. TIME LINE

We will begin this project starting Monday, February 12th, and expect to finish in 6 weeks, with 2 weeks reserved before the due date to debug, write a report (- Qiyue), add finishing touches, and possibly extend the project to a browser application. The project will be built in approximately 4 steps:

- Point detection for iOS - Jian (This will be finished in the first week)
- Communication interface - Jian (This will take approximately 2 weeks, and will be worked on along with other steps starting week 1)
- Frame build (- Jian) and tool-kit build (- Qiyue) (We will begin this in the second week, and this will take approximately 3-4 weeks)
- Testing and demo scene - Qiyue (We will start working on this in the 5th week, and we expect this to take 2 weeks)

6. PROGRAMMING LANGUAGE / API / PLATFORM

The main programming language we will be using is C++, as well as OpenGL as our graphics API. We will also be using an iOS platform and possibly some SQL to store our data. We may also extend our program to work in browser through WebGL.

7. GROUP MEMBER WORK DISTRIBUTION

Please refer to the names listed beside each task in timeline.