

# Mesh-Segmentation

## SRS Documentation



## Centre for Computational Technologies

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## 1. Introduction :-

### 1.1 Purpose :-

The purpose of this document is To Create the segmentation of the mesh and define the requirements for the development of a software system capable of detecting planar surfaces and cylindrical surfaces from a given mesh .

### 1.2 Scope :-

The software will analyze a 3D mesh, identify planar,cylindrical surfaces within it, and extract relevant information about these surfaces.

### 1.3 Definition

C++: Programming language used for development

Qt-UI Design : QT Framework for UI development.

Visual Studio: Integrated Development Environment (IDE).

## 2. System Overview :-

### 2.1 System Description: -

The system will take a 3D mesh as input and output information about the detected planar,cylindrical surfaces, including their vertices and faces.

### 2.2 System Features :-

- Mesh loading and preprocessing.
- Calculation of face normals.
- Clustering of faces based on similar normals.
- Extraction of planar surfaces.
- extraction of the cylindrical surfaces
- Visualization of detected planar surfaces.

### **3. Functional Requirements :-**

#### **3.1 Mesh Loading and Preprocessing :-**

The system shall be able to load 3D mesh data in common formats (e.g.STL).

The vertices are converted into the triangles during preprocessing.

#### **3.2 Face Normal Calculation :-**

The system shall calculate the normal vector for each face in the mesh.

#### **3.3 Planar Surface Extraction :-**

Extracted planar surfaces shall include information about vertices and faces.

#### **3.4 Cylindrical Surface Extraction :-**

Extracted cylindrical surfaces shall include information about vertices and faces.

#### **3.5 Visualization:-**

The system shall provide a visualization of the detected planar surfaces.

Visualization tools such as OpenGL are utilized=.

### **4. Non-Functional Requirements**

#### **4.1 Performance:-**

The project shall efficiently process meshes and find the planar ,cylindrical surfaces in it.

#### **4.2 Constraints:-**

The project assumes that the input mesh data is in a valid 3D format.

The software may not perform optimally with extremely large or complex meshes.

### 4.3 Dependencies:-

The project may depend on external libraries for certain functionalities (e.g., mesh loading, visualization).

### 4.4 Documentation:-

The code shall be thoroughly documented, including explanations of algorithms used and any assumptions made.

## 5. Milestones :-

Index	Work	Description	Timeline
1.	SRS Approval	SRS document approval by client.	06/01/2024 12pm
2.	UI making	Graphical user interface which include an OpenGL window to view 3D terrain Model, Zoom Slider for (Zoom in Out), and Generate button to show 3D map Block.	06/01/2024 4pm.
3.	(.STL) reading	STL reader to read (.stl) file	06/01/2024 6:30pm.
4.	Data Structure creation	Task is to create the data structure of the point triangle and the mesh segmentation	06/01/2024 EOD
5.	implementation of the feature	implementation of the method for the finding the planar surface in the given mesh	07/01/2024 3 pm.
6.	Testing and Final output.	testing of the implemented method and the whole project.	07/01/2024 9 Pm.
7.	Final Presentations	presentation of project and its final working	08/01/2024 3 pm.

## 6. Conclusion:-

In summary of this SRS Document, the mesh segmentation aims to develop a visualizer application to implement a feature of detecting the planar surface out of the mesh of the 3d model provided and accordingly distinguish it from the whole mesh model.