5.0 SYSTEM DESIGN

5.1 Introduction

After carrying out analysis on the potential users and system requirements, the design phase is where the system will be developed by translating system requirements obtained earlier into system characteristics. Systems design is the process of defining the hardware and software architecture, components, modules, interfaces, and data for a computer system to satisfy specified requirements. The design includes database, functions or process, and other dynamic aspects of the system. The design also specifies how the interfaces design.

5.2 System Flowcharts

5.2.1 Drawing Objects

![Flowchart Diagram]

- Move or orient object
- Check OBB collisions
- Highlight the parts that are intersecting
- Check triangle collisions
- Highlight the parts that are intersecting
- Continue
5.2.2 Moving or Orienting Objects & Collision Detection

![Flowchart diagram]

5.3 Expected Outcome

The output of this project will fulfill user’s requirements. The system functions which are expected from Artificial Immune System (AIS) for IDS are:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1. ImportObject</td>
<td>Parse the tool’s directory for any Wavefront OBJ models and load into the tool</td>
</tr>
<tr>
<td>2. DrawObject</td>
<td>Read the Wavefront OBJ models’ binary data and use OpenGL standard libraries and functions</td>
</tr>
<tr>
<td>3. CreateOBB</td>
<td>Use the Quick Hull algorithm by Tim Lambert at the University of New South Wales and Covariance method for triangles by Stefan Gottschalk in his PhD dissertation at University of North Carolina</td>
</tr>
<tr>
<td>4. MoveObject OrientObject</td>
<td>Use OpenGL standard libraries and functions</td>
</tr>
<tr>
<td>5. CheckOBBCollisions</td>
<td>Use Separating Axis Test for bounding boxes by Christer Ericson in the book <em>Real-Time Collision Detection</em></td>
</tr>
<tr>
<td>6. CheckTriangleCollisions</td>
<td>Use Faster Triangle-Triangle Intersection Tests by Olivier Devillers and Philippe Guigue in the book <em>Faster Triangle-Triangle Intersection Tests</em></td>
</tr>
<tr>
<td>7. HighlightIntersection</td>
<td>Use OpenGL standard libraries and functions</td>
</tr>
</tbody>
</table>
8. **ExportData**

The coordinates of the center of each OBB moving in the tool will be recorded to a text file.

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### 5.4 Interface Design

#### 5.4.1 Program Startup
5.4.2 Objects loaded on screen

5.4.3 Collision occurrence
5.4.4 Secondary console window

![Secondary console window image]

- Motion #1576
  - COLLIDING: NO
  - BOX 1:
    - X: -1.3
    - V: 0.5
    - Z: 0
  - BOX 2:
    - X: -4.10728e-009
    - V: 1
    - Z: 4.3

- Motion #1577
  - COLLIDING: YES
  - BOX 1:
    - X: -4.10728e-009
    - V: 1
    - Z: 4.3
  - BOX 2:
    - X: 1.57726
    - Y: 0.976675
    - Z: 4.3956