1.0 Introduction

In this assignment, we are required to develop a new robot design with some interactive features and basic customization options for the sequel of the movie called “Pacific Rim Uprising”. According to the theme of the movie, a fighting robot shall be produced with different special features and capabilities in terms of animations and weapons.

Under a deep consideration and plan, we have designed a robot that fulfils the criteria. The idea is grown under the inspiration of an anime called Gundam Age. The robot model that we have referred to is Blue Destiny Unit 4 which is shown in the Figure1 below.

Figure 1

The reason for choosing this model is because of its battle row appearance. The design is great and attractive which will grab the attention of the audiences. Besides, the robot has different weapons, which are the shield, the sword, the jetpack, and the gun that make it to suit the combating style.

2.0 System Specification (Tool you use to develop the prototype)

In this assignment, we have utilized different tools and software applications to develop the prototype. The tools that we use to develop the prototype are C++ programming language, Visual Studio 2019, OpenGL as well as Tinkercad Online 3D modelling tool.

Visual Studio 2019 is an Integrated Development Environment (IDE) software used for programming. The reason for choosing it is because it provides the feature of Live Sharing, which allows us to collaborate online. Other than that, the IDE also comes with syntax validation and a great interface that eases the development process. As mentioned above, C++ will be used as the programming language in this assignment.

OpenGL, an application programming interface for us that acts as an intermediary to develop a graphic using an application and be displayed on a computer screen. It is a graphic library that contains a set of graphic functions that enables us to develop the robot prototype. OpenGL can be considered as the core of the system, in which it is being taught in the Graphic Programming course as well. It brings a great convenience in the development by drawing the primitive using understandable and manageable functions.

Tinkercad 3D modelling tool, a web-based application that provides the functionality to draw and model in a 3D simulation space. In this application, it enables us to build and customize a model with different types of polygons and geometries. On the other hand, it also allows us to view the model in 360 degrees to design a neat and complex model. This tool has been absolutely useful for us in scaling, shaping as well as visualising the model for easing the development of the model.

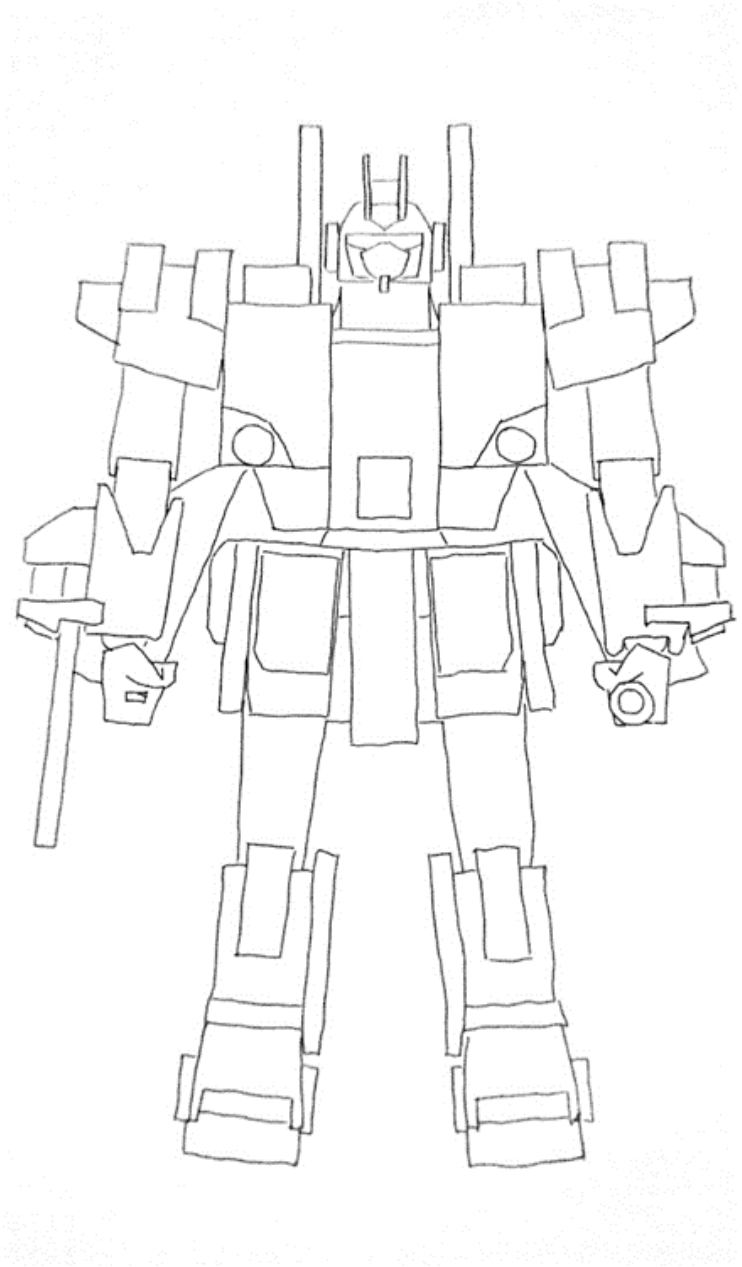
3.0 Design concept

Model Name: Metalite Unit 1

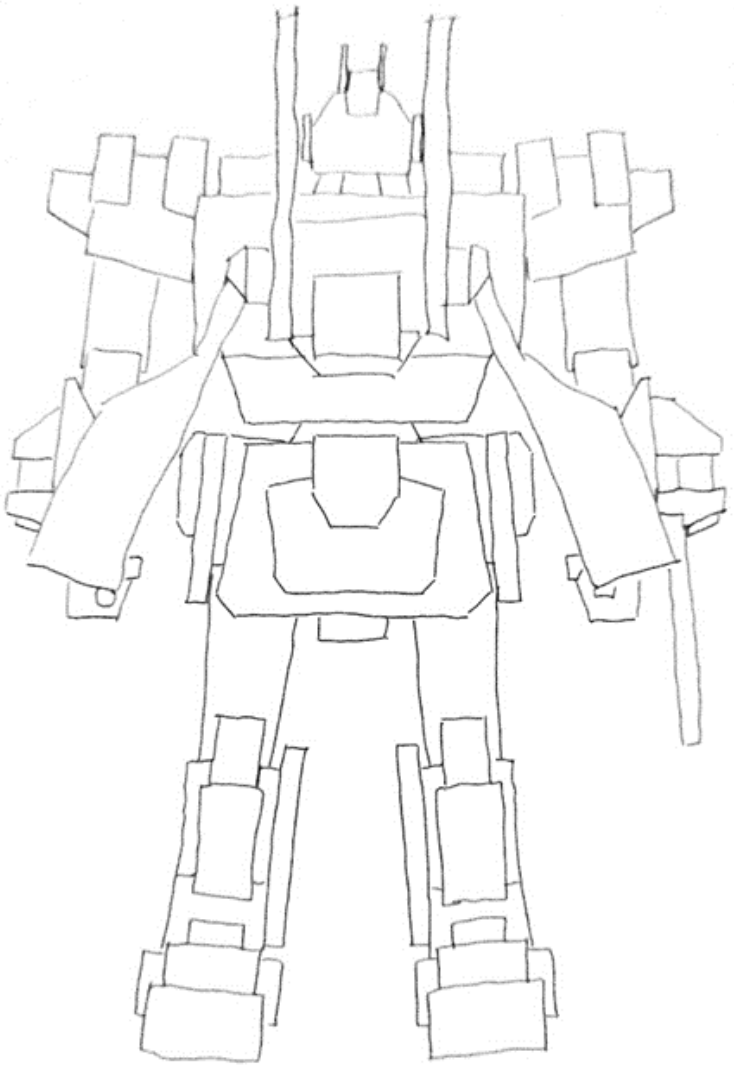
Colour: Blue

Characteristic: Defensive

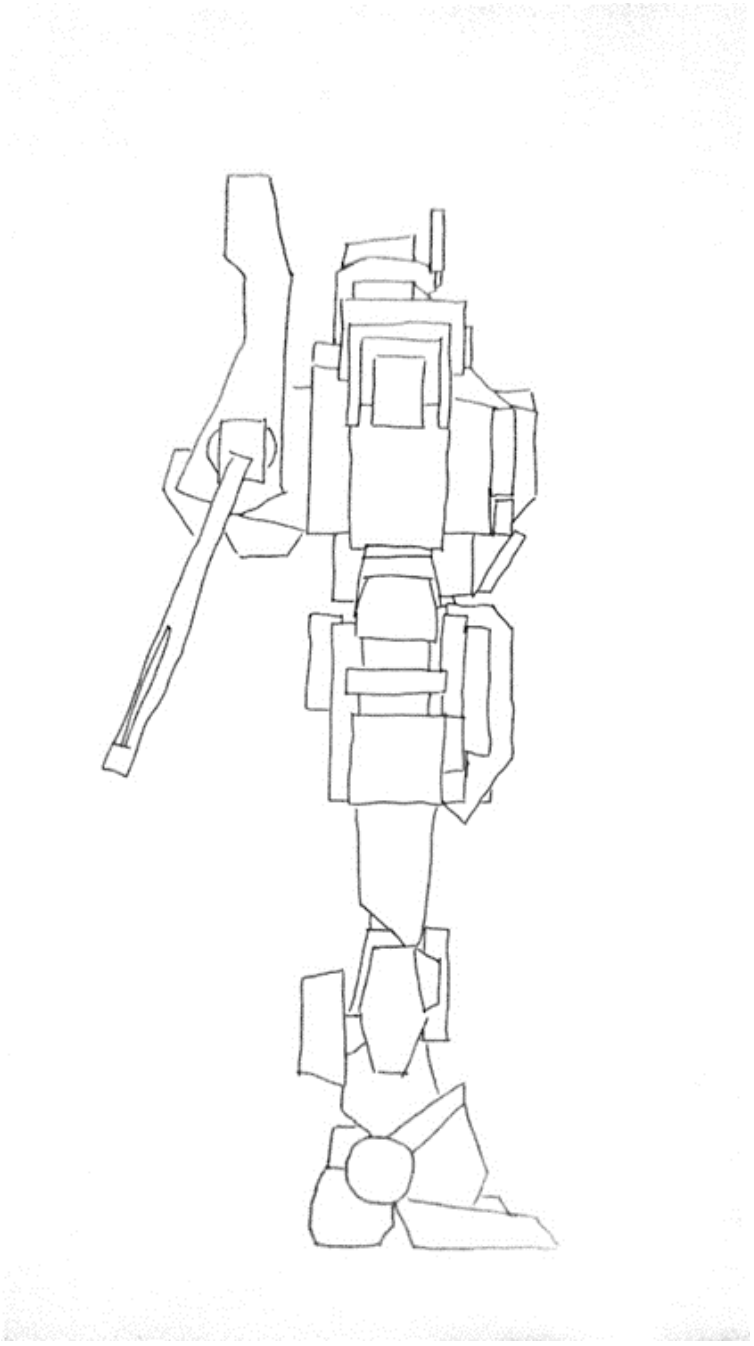
3.1 Front view



3.2 Back view



3.3 Side view



4.0 Polygon counts for each part and total polygons for the whole robot

Parts/Primitives	***Lines***	***Polygon***	***Quads***	***Triangles***	***gluSphere***	***gluCylinder***
Head	-	20	58	-	1(20*20)	-
Body	-	4	53	4	2(10*10)	2(20*20)
Lower Body	-	7	28	-	-	-
Arms	-	12	212	-	2(10*10)	2(10*10)
Legs	-	36	162	-	2(10*10)	2(20*10)
Jetpack	2	14	63	-	-	2(10*2)
Sword	-	7	-	-	-	4
Shield	-	1	11	-	-	-
Gun	-	-	3	-	-	2
Background	-	-	6	-	-	-
Count	2	101	596	4	7	14
Total	724					

- (slices*stacks) is shown for GLU primitives

5.0 User manual (all interactive feature you have include in your robot)

5.1 Overall

Features/Animations	**Commands**
Reset all	SPACE key

5.2 Model, Projection and Camera

Features/Animations	**Commands**
Model Rotate Left	A key
Model Rotate Right	D key
Switch to Orthographic/Perspective projection	0 key
Move camera to right	RIGHT ARROW key
Move camera to left	LEFT ARROW key
Move camera upward	UP ARROW key
Move camera downward	DOWN ARROW key
Camera Zoom In	4 key
Camera Zoom Out	5 key

5.3 Lighting, Colour and Texture

Features/Animations	**Commands**
Enable or Disable Light	L key
Light Move -X Direction	VK_OEM_MINUS (-) key
Light Move X Direction	VK_OEM_PLUS (+) key
Light Move -Y Direction	{[key
Light Move Y Direction	}] key
Light Move -Z Direction	Colon/Semicolon (:)(;) key
Light Move Z Direction	Double quote/Single quote (“)(‘) key
Enable or Disable Texture	1 key
Switch texture	T key

5.4 Robot Animation

Features/Animations	**Commands**
Head Rotation	2 key (Up), 3 key (Down), Q key (Left), E key (Right)
Walk	W key
Run	R key
Jump	J key
Fly	F key
Activate blade (Weapon#1)	9 key
Activate gun (Weapon#2)	8 key
Activate shield (Weapon#3)	7 key
Sword Attack	C key
Gun Attack	Z key
Shield Defence	X key