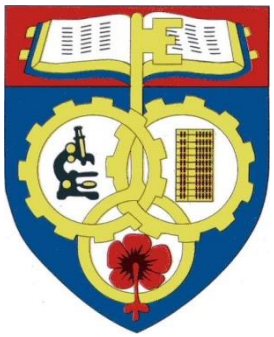

Tunku Abdul Rahman University College

Jaegers Prototype

BACS 2173

Graphics Programming

Student Names	Student ID	Contribution (%)	Sign	Grade (for Tutor)
1. Lim Kah Yee	20WMR09487	50		
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Total		**100%**		

Programme : RSF2

Tutorial Group : G5

Date Submitted : 6 September 2020

1 Introduction

The Jaeger that we created for the upcoming Pacific Rim Uprising sequel movie is named RGM-79C. The RGM-79C Gundam is a fictional manned robot and was the first mobile suit mass produced by the Earth Federation. The reason we choose this model as our giant robot for the upcoming sequel is that the exterior appearance of the jaeger is a classical design and able to attract the attention of the audience compared to the mecha that appeared in the previous Pacific Rim Uprising which is more fashionable. Besides, the design of the jaeger represents the symbol of the feminine as we thought that it could gain and attract the attention of the female audience as well. The Jaeger that we designed is based on the concept of the Gundam that appeared in the recent novel <Mobile Suit Gundam: The Blazing Shadow> which was written by Toshiyuki Itakura in 2013.

2 System Specifications

2.1 Integrated Development Environment (IDE)

The Integrated Development Environment(IDE) we choose for our assignment for creating and designing the robot (RGM-79C) is Microsoft Visual Studio 2017. The reason that we choose to use this IDE for creating and designing the robot is because Microsoft Visual Studio is an IDE that is developed by Microsoft Corporation, it allows us to easily develop the robot (RGM-79C) in Microsoft platform. Besides, Microsoft Visual Studio is fully compatible with the open source graphic library which is OpenGL that we will be used to creating and designing the robot (RGM-79C). Therefore, Microsoft Visual Studio 2017 is our first choice IDE to be used.

2.2 Programming Language

The programming language that we choose to design and develop this robot (RGM-79C) is C++ language since this language provides few benefits for us when we develop the robot (RGM-79C).

Firstly, C++ can **reduce the latency** of our robot's Frames Per Second(FPS) when it is showing in the Windows Form. For example, by using C++, an optimized application can run even on low-end devices that do not have any high computation power available. Therefore, C++ able renders our robot faster and prevents the robot from becoming choppy and laggy due to low FPS.

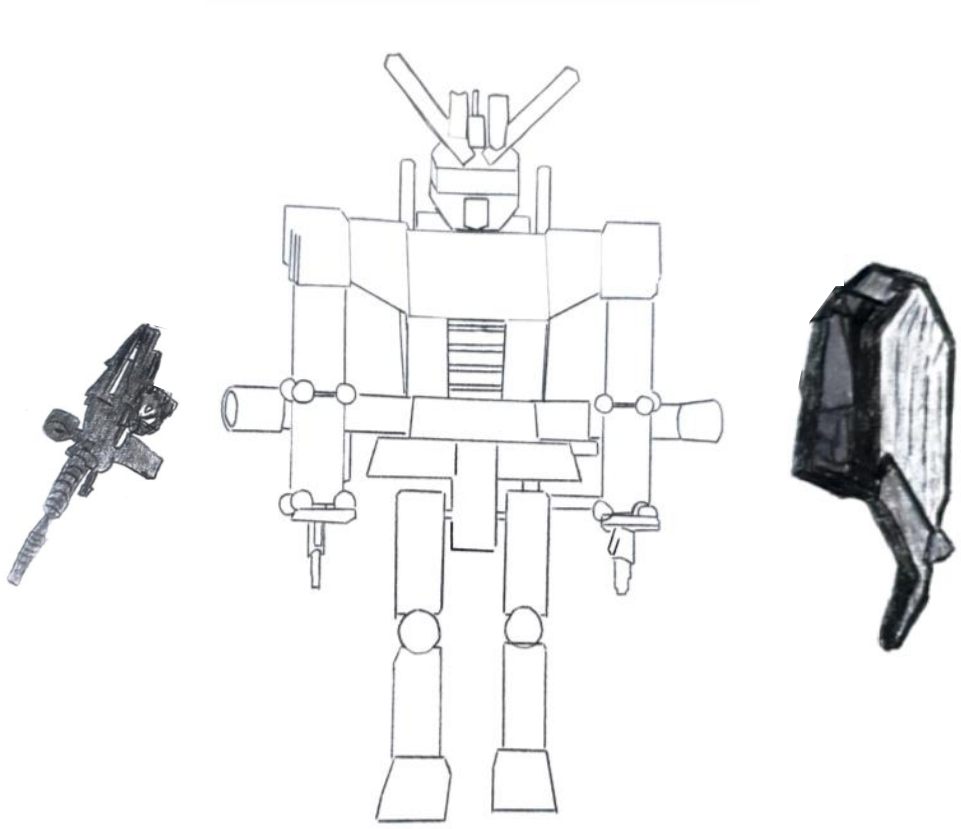
Secondly, C++ able provides us the **provision of total control over memory management** when we develop the robot. For example, we will be able to observe the memory usage of our robot when it is running in the Windows Form. This is very important since high memory allocation for our project may cause the computer overload and crash of the Windows Form. Therefore, by using C++, we can observe and optimize the memory allocated for the robot to prevent the computer overload.

2.3 Graphics Library Used

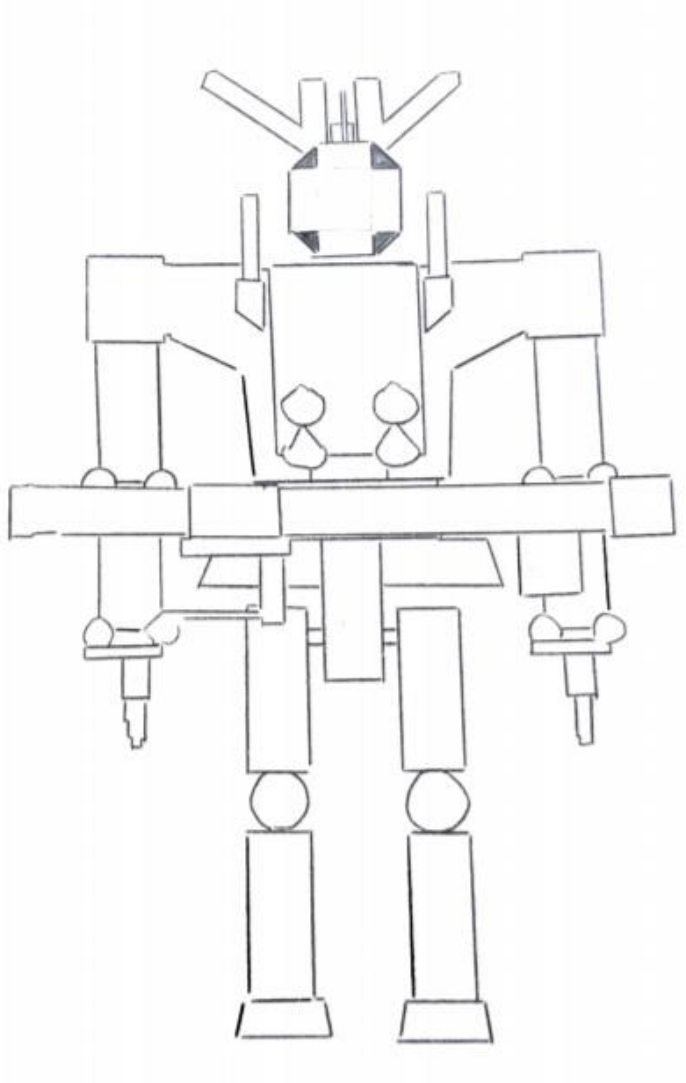
The graphics library that we use in this project is Open Graphics Library (OpenGL) that was initially released by Silicon Graphics, Inc. OpenGL is a cross-language, cross-platform Application Programming Interface(API) for rendering 2D and 3D vector graphics in application programs. OpenGL provides an API for the application program to interact with the Graphics Processing Unit(GPU) to achieve hardware-accelerated rendering.

3 Design Concept

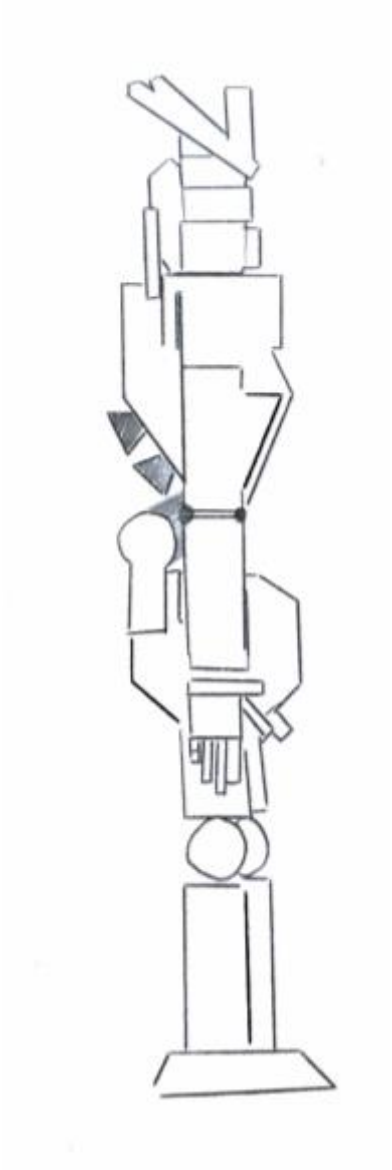
3.1 Front View



3.2 Back View



3.3 Side View



4 Primitives Used

	QUADS	SPHERE	TRIANGLE	POLYGON	CYLINDER	TRIANGLE_FAN	LINE	LINE LOOP
HEAD	76	0	10	2	1	0	0	0
LEFT ARM	139	8	4	0	0	0	0	0
RIGHT ARM	139	8	4	0	0	0	0	0
BODY	42	0	0	0	0	0	4	0
LEG	66	4	0	0	0	0	2	0
BACKPACK	6	0	0	0	4	0	0	0
WEAPON	102	1	0	0	13	22	0	11
SHIELD	43	0	0	2	0	0	0	30
TOTAL	**613**	**21**	**18**	**4**	**18**	**22**	**6**	**41**
GRAND TOTAL	**743**							

5 User Manual

5.1 Whole Robot

Key	Action
‘W’	Walking Animation (front, left, right)
‘S’	Stand
VK_LEFT	To Rotate Robot to Left
VK_RIGHT	To Rotate Robot to Right
VK_TAB	To Stop the Action of the Robot
VK_SPACE	To Reset All Settings

5.2 Robot Head

Key	Action
‘N’	To Move the Robot Head to Left and Back to Origin
‘M’	To Move the Robot Head to Right and Back to Origin

5.3 Robot Arm

Key	Action
‘H’	To Perform Both (Left && Right) Arm Movement
‘K’	To Move Left Arm Up and Down
‘P’	To Move Right Arm Up and Down
‘V’	To Move Left Lower Arm Up and Down

‘Z’	To Move Right Lower Arm Up and Down

5.4 Robot Finger

Key	Action
‘F’	To Activate/Deactivate Finger
VK_UP	To Close the Finger
VK_DOWN	To Open the Finger

5.5 Robot Leg

Key	Action
VK_SHIFT	Move Left Leg Up
VK_CTRL	Move Left Leg Down
VK_UP	Move Right Leg Up
VK_DOWN	Move Right Leg Down

5.6 Weapon & Shield

Key	Action
VK_F1	To Activate/Deactivate Weapon and Shield
‘G’	To Do Preparation for Fire
‘F’	First Time - To Accumulate Beam Second Time - To Fire Beam

5.7 Shield

Key	Action
VK_F8	To Activate Attack Mode (Shield Shown)
‘B’	To Move Shield Up and Down (in Attack Mode)

5.8 London Bridge

Key	Action
VK_F9	To Activate/Deactivate London Bridge
‘W’	To Move Middle Bridge Up
‘S’	To Move Middle Bridge Down

5.9 Projection

Key	Action
VK_F2	To Change View between glOrtho or gluPerspective
‘2’ / VK_NUMPAD2	To Zoom Out the View (gluPerspective view only)
‘8’ / VK_NUMPAD8	To Zoom In the View (gluPerspective view only)
‘4’ / VK_NUMPAD4	To Move View to Left (both view)
‘6’ / VK_NUMPAD6	To Move View to Right (both view)

‘5’ / VK_NUMPAD5	To Move View Up (both view)
‘0’ / VK_NUMPAD0	To Move View Down (both view)
‘7’ / VK_NUMPAD7	To Rotate View to Left (glOrtho view only)
‘9’ / VK_NUMPAD9	To Rotate View to Right (glOrtho view only)

5.10 Texture Changing

Key	Action
VK_F5	To Activate/Deactivate Change Robot Texture
Number Key 1 - 9	To Change Robot’s Texture
VK_F6	To Activate/Deactivate Change Background Texture
Number Key 1 - 6	To Change Background’s Texture

5.11 Lighting

Key	Action
VK_F7	To Control Light On / Off
‘8’ / VK_NUMPAD8	To Move Light Up
‘2’ / VK_NUMPAD2	To Move Light Down

‘4’ / VK_NUMPAD4	To Move Light Left
‘6’ / VK_NUMPAD6	To Move Light Right
‘7’ / VK_NUMPAD7	To Move Light Near
‘9’ / VK_NUMPAD9	To Move Light Far