

MEP - Shader dev

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Assignment – Shader Development (ACCB6014)

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Introduction

This assignment tasks with applying two effects onto an image and researching those effects used. The assignment provides 3 options, with each option affecting the image in different areas and having different effects for each option.

I have chosen Option 3, which has;

- Bloom Effect for the centre area of the image
- Greyscale conversion for everything else

All effects mentioned in the assignment are used in the gaming industry in some shape or form, with some being more interesting than others, Task 2 will go in deeper with how these effects are used and why with Task 1 showing an example of these effects.

Task 1

After choosing the option with different effects assigned to it, and picking out an image to apply the said effects onto, I have chosen the main menu image of Baldur's Gate 3 (as not only does it have a wide range of colours and brightness, but it is also a very good game)



From an image that originally looks like this:



To an image that looks like this after applying 'Bloom' and 'Greyscale' effects:



Video Proof (that it is **not** two separate images) is available in the Appendix below.

Task 2

This section will be split into two sections, 'Bloom' and 'Greyscale', with each discussing their effects in terms of how they are used and where (regarding games).

Bloom

The way the Bloom effect is calculated is by getting the image (or an area of an image) and turning it into Greyscale, as Greyscale desaturates the image from all its colour and hue, leaving it with only value and therefore brightness can be extracted from that image. In this assignment, if the brightness was above a certain value (in the code it is set to 0.7), the colour brightness would be amplified by 50% (multiplying the RGB colour by 1.5), therefore making the image much brighter (as seen above in Task 1)  3

The Bloom effect, is a heated debate within the gaming communities with the main discussion of "should it be included in games", a discussion was brought up on reddit 3 years ago [3] where the poster showed hate towards the bloom effect whilst showing screenshots comparing a scene in The Witcher 3 with Bloom on and off. Comments on this post have mostly been in the positive, being 'for' Bloom rather than against it, as in most cases, Bloom is used in areas to emphasise the effects of a realistic lens glare or to show it is bright outside through a window when inside a building [2], which can provide more immersion for story-driven games or in cinematics.

As this is a shader effect that uses variables to calculate, Bloom can be used in wrong ways as well. An article posted in 2008 [1] shows many examples of how games back in 2005 used Bloom incorrectly, with some examples being;

- The Elder Scrolls IV: Oblivion



- The Legend of Spyro: Dawn of the Dragon



[1]

The Bloom used in these games shown above, is like the shader used in Task 1, making bright spots brighter, but this has an adverse effect of also having that brightness bleed onto other textures and making the whole game brighter than it should be, due to the overuse of such shaders [2].

Additionally, the article [1] mentions that with the implementation of Bloom into games, it has benefitted the graphics of the games by smoothing out aliasing artifacts [1].

In today's games, Bloom is used sparingly and where it needs to be, with many games having an option to fully turn off Bloom if the user does not like it, and having options is always good, and the more competitive players tend to opt out of having Bloom to have more of a visual advantage (talking from experience of playing tactical shooters of the likes of Rainbow Six: Siege).

Greyscale

The Greyscale (or Grayscale for how Americans like to spell it) shader effect is in a weird spot in terms of use, as true Greyscale is rarely used in videogames but rather variations of it, an example of this can be found in the game "Helldivers 2", where when you get to lower health all the colours become desaturated other than the colour red or it can also be used in more story-telling based games where Greyscale would be used as a way to show the player that what they are seeing, is happening in the past.

In the industry itself, Greyscale can be used to help with games design with the way things are being coloured, Greyscale in this case would be used to help if colours were to pop or to better design things regarding people that may have colour-

blindness [5], source [5] goes into detail on how Greyscale can be used to help design certain aspects in a game around colour values.

As for the values used within the Greyscale effect, are very peculiar as the values that are used for the assignment of $R=0.299$, $G=0.587$, $B=0.114$, are the values used within Luma coding [4]. The reason as to why such values are used are mainly due to human biology of the eye and how it perceives colour, as these values are used due to how sensitive the human eye is to those colour channels, more sensitive the larger the value [4]. Luma coding is used with colour TVs and other video systems [4] to display images, and some other common uses is to determine light levels of images or when using a printer [4].

The Luma values is what is used to make Greyscale work, within the code used for this assignment, it first gets the RGB colour values of the image in question and gets the DOT product of the colour with the Luma values, then it returns the "colour" in monochrome grey (as seen above in Task 1).

References

[1]

M. Gallant, "Bloom Disasters - The Quixotic Engineer," Jul. 18, 2008. [Online] Available: <https://gangles.ca/2008/07/18/bloom-disasters/>. [Accessed: Mar. 26, 2025]

[2]

"Bloom (shader effect)." Wikipedia, Last edit: Oct. 20, 2024. [Online] Available: [https://en.wikipedia.org/w/index.php?title=Bloom_\(shader_effect\)&oldid=1252153341](https://en.wikipedia.org/w/index.php?title=Bloom_(shader_effect)&oldid=1252153341). [Accessed: Mar. 26, 2025]

[3]

Reddit, "Thoughts on visual bloom? I personally hate it because it reduces clarity. Most of the time its forced on though...", Jan. 2, 2022. [Online] Available: https://www.reddit.com/r/FuckTAA/comments/rue1hy/thoughts_on_visual_bloom_i_personally_hate_it/ [Accessed: Mar. 26, 2025]



[4]

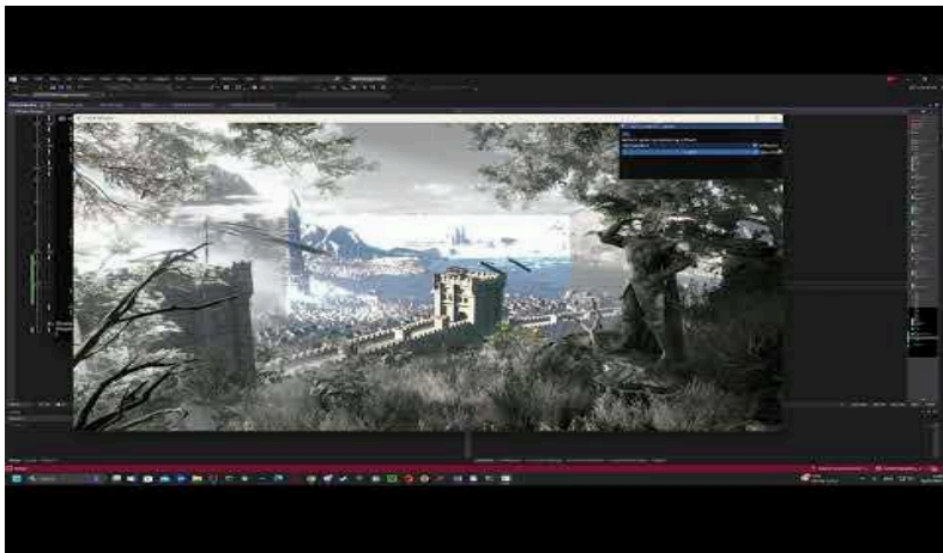
"Grayscale." Wikipedia, Last edit: Feb. 18, 2025. [Online] Available: <https://en.wikipedia.org/w/index.php?title=Grayscale&oldid=1276359132>. [Accessed: Mar. 26, 2025]

[5]

J. Keyser and P. R. Contributors, "An introduction to choosing colors in game VFX," Jan. 25, 2023. Available: <https://www.gamesindustry.biz/an-introduction-to-choosing-colors-in-game-vfx>. [Accessed: Mar. 26, 2025]

Appendix

YouTube Video: <https://youtu.be/VpfQ-xSHlzo>



Code used has been uploaded onto moodle.

FINAL GRADE

43 / 100

GENERAL COMMENTS

The submitted code closely mirrors that provided during class exercises, with minimal adaptation or development beyond the original material. While it is acceptable to build on in-class examples, this submission does not demonstrate the student's ability to abstract the key concepts and apply them in an original context. As such, there is insufficient evidence of independent code development or of designing and implementing their own method for displaying textures and applying the intended visual effects.

Additionally, the written report showed limited engagement with relevant literature and lacked depth in analysis and critical evaluation. The tone throughout the report was often overly casual, which undermines the academic rigour expected at this level. A more formal style, supported by references to appropriate sources, would be necessary to demonstrate critical thinking and an understanding of the topic.

===== MARKING GRID ===== Engagement with Literature Skills [20] - Review of GPUs/shaders

7

Knowledge and Understanding Skills [10] - Understanding shader/GPU architectures - Evident in review + code 8

Cognitive and Intellectual Skills [25] - Critical review of literature - Problem analysis & solution design 10

Practical Application Skills [40] - Solution/testing in C++ OGL + shaders 15

PAGE 1

PAGE 2



Comment 1

Subjective



Comment 2

Could have added a figure/caption

PAGE 3



Comment 3

here you could have said

"see fig 1"

PAGE 4



Comment 4

very informal, not really suitable to discuss in a report

PAGE 5



Comment 5

This shouldnt have been included, see the subreddit name

