TETRIS

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1. 簡介

一個簡單的但是做很久的俄羅斯方塊。是 DClab 的期末報告主題。

2. 操作說明

function	FPGA	keyboard
move right	BTN0	Right arrow
move left	BTN1	Left arrow
rotate clockwise	BTN2	Up arrow
hold	BTN3	H
speed toggle	SW0	-
change mode	SW3	-
hard drop	-	Space
rotate counter-clockwise	-	Z

3. 功能說明

3.1. **Basic.**

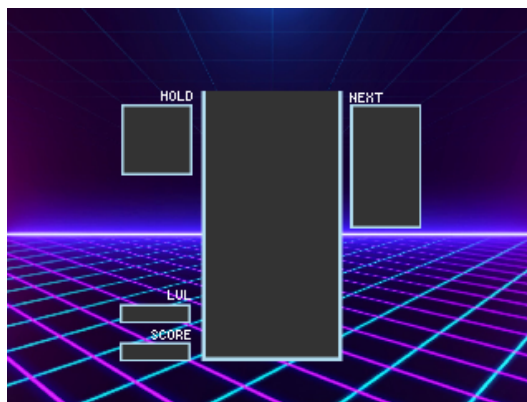3.1.1. *Background.* As the picture 1 shown.

Fig 1. Background

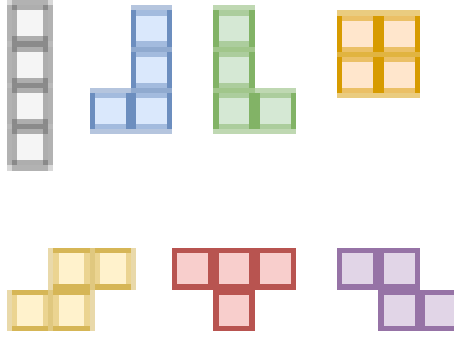3.1.2. *Different Shape Units.* Have 7 different unit.

Fɪɢ 2. Block

3.1.3. *Row Disappeared.* The row will disappear while the row is full.

3.1.4. *Rotation.* The unit can be rotate, include clockwise and counter clockwise.

3.1.5. *Boundary.* The game scene has boundaries, and the block stays within the boundaries.

3.1.6. *Use* `BTN` *or* `SW` *to control.* As the section 2 show.

3.2. **Advance.**

3.2.1. *Scoring System.* After clear the line or doing the T-spin, players will obtain score.

Tᴀʙʟᴇ 1. scoring system

Categories	Number of line cleared	Score
Regular Line Clear	1	100
	2	300
	3	500
	4	800
T-spin Clear	0	400
	1	800
	2	1200
	3	1600

3.2.2. *T rotate.* Can do the T rotate and obtain score.

3.2.3. *Change Unit.* `HOLD` function allows user to change the current unit once per cycle.

3.2.4. *Randomly Generate New Unit.* After every cycle, the new block will be generated randomly.

3.3. **Extra.**

3.3.1. *Screen for Start and Game Over.* We have a screen for Start and Game Over.

3.3.2. *Dark Mode.* We allowed user to change between dark mode and the light mode, using `SW3` on the FPGA board.

3.3.3. *Ghost Piece.* The Ghost Piece shows the player where the current tetromino will land.

3.3.4. *Clear animation.* When a row is full, blocks disappear from both ends moving inward.

3.3.5. *Speed Toggle.* `SW0` of the FGPA board allows the user to select between normal and fast speeds.

3.3.6. *Next Queue.* The game features a 'Next Queue' that displays the upcoming three pieces.

3.3.7. *UART control.* Allow user using the keyboard to control.

3.3.8. *Level System.* Level increments by 1 for every time there is a line clear happened, causing block's fall speed to accelerate.

3.3.9. *Dead animation.* When the player loses, the blocks turn black starting from the top.

3.3.10. *Wall Kick.* The wall kick mechanism allows the player to rotate pieces even when they are tight against the wall or the floor.

The demo video for the wall kick is in this link. https://drive.google.com/drive/folders/1-idAkAqjOoGosfMhonKjtCsQTWSQkBAb

3.3.11. *Hard Drop.* Allows the player to instantly place the current block after press `Space`.

4. 每位組員的貢獻與貢獻度

112550072 曾彥熹 $33.\overline{3}\%$ ：main functions, UART

113550007 林士紘 $33.\overline{3}\%$ ：scoring system, debug

113550002 葉宥均 $33.\overline{3}\%$ ：HOLD, game over, drawing, report

5. 報告心得與建議

俄羅斯方塊很好玩，所以做好玩的東西過程也很好玩。看到很多想法一一被實作出來也很有趣。除了畫圖過程有一點點煩以外其他都很好玩。有很多功能原本是做來給測試的時候方便而已，結果用一用發現很好用就變成 extra 的一部分了。很開心。