CSCI E-7

Graduate Project FINAL SUBMISSION  
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## Project Background and Description

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| For my graduate project, I intended to re-create a game I used to play as a child. It was called “ParaTrooper” and used to run on an 8-bit XT 8088 PC (if I recall correctly). The goal of this game is essentially to protect the gun base from paratroopers jumping from planes who would attack the base if allowed to reach the ground.  As I started building out the game mechanics, I decided to deviate from my original idea of replicating a version of “Para Trooper” and instead pivoted to a building a medieval edition of “Space Invaders”. I made this pivot largely due to the less complex game mechanics I would have to build in comparison to the former. For example, I did not have to build logic for handling horizontally moving places/helicopters that spawn enemies that move vertically from the point of origin and having to account for enemies moving horizontally once they reach the ground. The game mechanics was much simpler in a Space Invaders game where enemies simply move vertically once spawned at the top of the screen and when they reach the ground the game ends. So, this decision to pivot helped me keep the scope of the project more achievable within the given time constraints.  Here are a few screenshots of the game in motion:    Figure 2 – Sample game play  Figure - Startup splash screen    Figure 3 – Game over splash screen  I used several 3rd party Python libraries for this project.   * PyGame (the core of the game was built using this foundational library) * Math * Random   I used the following tutorials and documentation resources to learn about PyGame and how to approach the process of building a game using this library.  <https://coderslegacy.com/python/python-pygame-tutorial/>  <https://www.pygame.org/docs/>  The most challenging aspect I encountered while building this game was how to get the gun barrel to rotate with keypresses/mouse movements and making the projectile (bullet/laser) to shoot out at the corresponding angle in the direction the gun barrel is rotated towards. After many hours of research online and experimentation, I was able to get it to work properly using a few sample pieces of code for guidance that I found here : <https://github.com/Rabbid76/PyGameExamplesAndAnswers/blob/master/documentation/pygame/pygame_move_towards_target.md>  Another fun and a bit challenging aspect I learned was how to perform animations of sprite images. Again, quite a bit of research went into figuring it out and sample code I found online (<https://www.pygame.org/wiki/Spritesheet>) was extremely helpful.  Given this iteration is a v1 of the game it has a few limitations (future opportunities) that I can think of, that I may address in a future version.   * Does not track high scores. * Enemies only move vertically presently. Maybe diagonally moving enemies could be a difficulty level-based feature that could be added. * Different types of enemies (bosses, bonus entities etc.) * Can only use the mouse to move the gun. Keyboard support would be nice. * No two-player mode. Would be nice to have. * Better graphics and sounds   I had quite a lot of fun working on this game. The learning curve of building a game was greatly reduced due to the foundational steppingstones provided by PyGame. Despite some of the challenges that I encountered with game mechanics and graphical animations, it was a great learning experience and an excellent use of my new-found knowledge of Python. |