

Project Plan [20 pts]

Write up a proposal file (in the file proposal.txt, or .docx, or .pdf) which should include the following components:

Project Description [5 pts]: The name of the term project and a short description of what it will be.

Dynamic Defense: A unique tower defense with simple (nonexistent) graphics that allows buildings to be placed open-map and enemies to pathfind freely across the placed buildings to reach the destination. Refer to the classics bloons td and fieldrunners for reference.

Structural Plan [5 pts]: A structural plan for how the finalized project will be organized in different functions, files and/or objects.

What I currently have:

main.py - main file for scene rendering, most game logic, main grid for building placement, etc
geometry.py - a helper file I made for rendering rectangles (as canvas polygons) that can rotate, be set as child of other rectangles, look towards a point, etc etc
ui.py - a helper file for my buttons, text, and other ui
towers.py - stores all tower classes
levels.py - stores all levels
enemy.py - stores enemy properties

My structure is pretty complete, save for any additional map editor files/save files I may add after hitting MVP with the pickle module.

Note: no images are used, because I tried using images with alpha and anything >200x200px significantly dropped the framerate (a single 500x500 image with alpha values lowered the fps from ~50 to ~20)

Algorithmic Plan [5 pts]: An algorithmic plan for how you will approach the trickiest part of the project. Be sure to clearly highlight which part(s) of your project are most complex.

- Pathfinding: what's tricky about this pathfinding is that I have to make sure all building placements are legal, e.g. I can't place a building if any existing enemy paths get completely blocked off. Thus, I had to pathfind every frame for every enemy when checking building placement. I wrote the script myself using A* pathfinding techniques as a guideline.
 - Enemy paths are recalculated upon any building change, and since they don't teleport to a certain grid they must "slide" towards it. This means adding interpolation between two points.
- Geometry.py rotation/parent child: in order to rotate points, a LOT of trig was used. The same goes for moving in an object's local position (when rotated, forward is different), setting a child to pivot with the parent when rotating, etc.
- Complex OOP structure: towers inherit from common parents, ui inherits from common parents, all classes have to have their own render function, etc
- Layering system: when rendering, I made a system so that creating a rectangle class in appstarted() means I don't have to deal with redrawall() at all. This means I designate a layer

for the object at the beginning and lower layers always must be rendered first. UI also renders on top of all geometry objects.

Version Control Plan [5 pts]: A short description **and image** demonstrating how you are using version control to back up your code. Notes:

I use Github (Desktop) to organize my CMU files. The repo is currently private and will be public after the course is all over and graded.

Current Repository: CMU-15-112

Current Branch: main

Fetch origin: Last fetched 20 minutes ago

Changes: 15 | History

No Branches to Compare

v220806
Zack Sima • 2 days ago

v220806
Zack Sima • 3 days ago

v220803n2
Zack Sima • 5 days ago

v220803
Zack Sima • 5 days ago

v220731
Zack Sima • Jul 31, 2022

v220722n2
Zack Sima • Jul 22, 2022

v220722
Zack Sima • Jul 22, 2022

v220715
Zack Sima • Jul 15, 2022

v220713
Zack Sima • Jul 13, 2022

Initial commit
Zack Sima • Jul 13, 2022

v220806
Zack Sima • c25de95 • 10 changed files • +265 -65

File	Change
TP/Main/___/enemy.cpython-39.pyc	Changed
TP/Main/___/geometry.cpython-39.pyc	Changed
TP/Main/___p.../main.cpython-39.pyc	Changed
TP/Main/___/towers.cpython-39.pyc	Changed
TP/Main/___pyca.../ui.cpython-39.pyc	Changed
TP/Main/enemy.py	Changed
TP/Main/geometry.py	Changed
TP/Main/main.py	Changed
TP/Main/towers.py	Changed
TP/Main/ui.py	Changed

This binary file has changed.
[Open file in external program.](#)

[Update TP2]

Design changes/updates:

- Added two entrances, where enemies now have two entrances and two exits to go through. This means the player maze must get very complicated to accommodate for enemies coming from both sides.
- Added full money system, upgrade system, lives system, game over/win UI
- Added cannon towers, explosion radius, etc
- [hidden] added cheat codes (try typing showmethemoney)

[Update TP3]

Design updates/changes:

- Multiplayer: there's now an experimental multiplayer for 1v1 online!
- Added multiple map systems, with different entrances and obstacles on maps

Note: multiplayer requires “websockets” to be installed in order for it to run. Install by typing “pip install websockets” in terminal or command prompt.