

Submarine Wars

A Game Proposal
for
CPSC 427 - Video Game Programming

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Jointly Present By
TEAM 7

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> Story

To prevent your strategic facilities from being attacked by enemies, you, as an honorable captain, need to control your boat and place the bombs to attack as many enemy submarines as possible. However, you have a limited number of bombs that could coexist under the water, so you need to drop the bombs wisely. There are multiple stages for you to clear, and as the stage number increases, more and more enemies will initiate attacks toward your boat. You also have a limited number of lives, so you need to balance between attacking enemies and protecting yourself from enemies.

> Basic Technical Elements

- **Rendering:** 2D sprites of the player boat, enemy submarines, torpedoes, missiles and treasures. Different types of submarines have different colors and lighting effects.
- **Transformations:** Different types of submarines move at different speeds and depths. A range of depths is assigned for each type of submarine.
- **Collisions:** Detects collision between submarines and the player's bomb, also between player's boat and enemy projectile.
- **Assets:** Simple explosion animations of player boat and enemy submarines.
- **Audios:** Background music; sound effects of the launch of a missile, explosion of the player boat and enemy submarines, collecting the treasure.
- **Multiple stages:** Players will have access to several levels with increased difficulty. The number of submarines will accordingly increase, and their rates of initiating attacks toward the player boat will also increase.
- **Enemy AI:** Enemy submarines will use a basic AI to attack the player, e.g. the path of missiles, the rate of initiating attacks, etc.
- **Cheat system:** Press the magic key to enable an infinite number of lives, etc.
- **Awarding system:** Increase the limit of bombs temporarily, earn an extra life, etc.
- **Scoring system:** The game will feature a scoring system which will allow players to challenge themselves to try and beat their own high score.

> Advanced Technical Elements

- **Bomb Explosion:** A bomb is assigned a default explosion radius, so it is possible to destroy multiple submarines by a single bomb.
- **Cash System:** Player can purchase additional enhanced weapons and upgrade their ship. Details are present below.

- **Different types of bombs:** Advanced bombs feature a larger explosion radius/faster diving speed and are used to attack submarines (a new type) that cannot be destroyed by a standard bomb.
- **Crosshair and targeted missile:** Player can enter the crosshair mode by pressing the key “C” (and leave the mode by pressing the key “D”). The position of the crosshair is used to set the target coordinate of the missile. Player can then launch the missile by clicking the left mouse button. Targeted missiles can be purchased by pressing the key “M” (tentatively), and the crosshair mode cannot be activated when there is no targeted missile purchased.
- **Torpedo-resistant boat:** Player can purchase an upgrade for their boat so that their boat can resist a certain number of torpedo attacks.
- **Night Stage:** As night falls, the player can no longer see submarines moving at the deepest water, but they can use the sonar system to detect their position. (or a periodical sonar to see the position for a short interval, etc. This is highly tentative; we thought of this idea during the meeting on Wednesday, but we haven’t finalized the rules or designs.)
- **Water current:** A water current is introduced to certain challenging levels that can shift the trajectory of the player’s projectiles.

In summary, these advanced features could further make the game more challenging and fun to play. Our team will try the best to implement these cool features if time permits.

> Devices

We plan to use the keyboard for inputs, with the possibility of adding the mouse later if we give the player the ability to fire missiles.

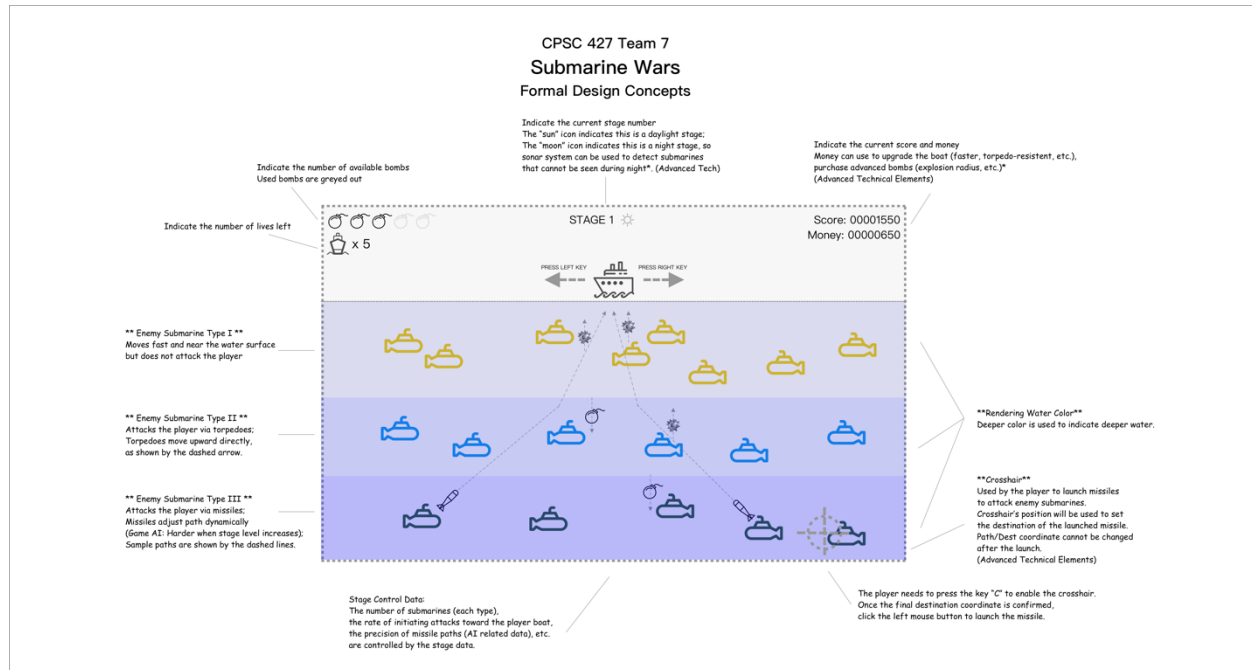
Specifically,

- 1) LEFT/RIGHT keys are used to move the player boat along the x-axis;
- 2) SPACE key is used to place the bomb at the current boat position;
- 3) C is used to enter the crosshair mode, and D is used to leave it*;
- 4) M is used to purchase a target missile for the crosshair mode*;
- 5) Mouse is used to place the crosshair and LEFT button is used to launch the missile*;
- 6) U is used to upgrade the boat*.

Items marked with * are advanced features.

> Concepts

A high resolution (5464 × 2936) descriptive design concept is available at CPSC427Team7SubmarineWarsPrototype.png file.



> Tools

We plan to use a JSON library (`libjson`) to import control data for each stage.

Control data includes but limited to

- 1) the number of submarines (each type);
- 2) the rate of initiating attacks toward the player boat;
- 3) game AI related data such as the precision of missile paths;
- 4) price of upgrading the boat, advanced bombs, targeted missiles for each stage.

No additional libraries or tools beyond C++, OpenGL and aforementioned libraries.

> Development Plan

Week: October 4 - Skeletal Game

Render all entities as rectangles

Very basic tutorial-style level

Players will be able to move and fire a bomb

Week: October 11

Add movement to enemies

Add scoring system

Week: October 18 - Minimal Playability

Fully rendered player and enemies

One fully completed level

Week: October 25

Render background and scene

Add some kind of background music

Week: November 1

Add treasure system for bonuses

Allow enemies to fire projectiles

Week: November 8 – Playability

More levels and enemy types

Power-ups

Week: November 15

Add SoundFX to actions

Improve controls and add physics

Week: November 22

Improve enemy AI

Work on advanced features

Week: November 29 – Final Game

Even more levels

Addition of advanced features