Game Design Document (GDD) Minesweeper+

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1. Game Overview

Title: Minesweeper+

Genre: Puzzle / Strategy

Platform: Pygame

Game Description:

Minesweeper+ is an enhanced version of the classic Minesweeper game. Players must reveal safe cells while avoiding mines and complete the objective before the timer runs out. The game introduces **power-ups**, a **score system with combos**, and **small visual effects** to make gameplay more interactive and strategic.

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2. Gameplay Mechanics

2.1 Basic Rules

- **Grid Size:** 15x15 with 35 hidden mines.
- **Objective:** Reveal all non-mine cells without detonating a mine.
- **First Click Safe:** The first revealed cell is guaranteed safe.
- **Lose Condition:**
    - Clicking a mine without an active shield ends the game.
    - If the timer reaches **0**, the game ends in a loss.
- **Win Condition:** Revealing all non-mine cells successfully ends the game.

2.2 Controls

Action	Control

Reveal cell	Left Mouse Click
Place/Remove Flag	Right Mouse Click
Activate Radar	R Key
Activate Shield	S Key
Use Hint	H Key
Pause Game	P Key
Return to Menu	ESC Key
Restart Game	SPACE Key

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3. Power-Ups

Power-ups are **randomly placed on the grid** (up to 15 power-up tiles). Each power-up tile grants **one use** of a randomly selected power-up type (Radar, Shield, or Hint). Players must reveal a power-up tile to gain its use.

3.1 Radar

- **Description:** Reveals the number of mines in a 5x5 area centered at the clicked cell.
- **Uses:** Gained by revealing a Radar power-up tile (1 use per tile).
- **Duration:** 3-second overlay.
- **Visual:** Cyan highlight on affected cells.
- **Activation:** Press **R** to activate.

3.2 Shield

- **Description:** Protects the player from detonating a mine once.
- **Uses:** Gained by revealing a Shield power-up tile (1 use per tile).
- **Duration:** 5 seconds active or manual deactivation.
- **Visual:** Gold border around the grid, color changes as time runs out.
- **Activation:** Press **S** to activate.

3.3 Hint

- **Description:** Reveals a random safe cell temporarily.
- **Uses:** Gained by revealing a Hint power-up tile (1 use per tile).

- **Glow Duration:** 2 seconds.
- **Visual:** Green glow and "HINT!" label above the cell.
- **Activation:** Press **H** to activate.

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4. Scoring System

Action	Points	When Awarded
Reveal Cell	+10	Immediately upon revealing a cell
Combo Bonus	+2 per combo level	Immediately for fast reveals (<1 sec apart)
Correctly Flag a Mine	+20	Only when the game is won
Time Bonus (per second left)	+5 per second remaining	Only when the game is won

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5. Grid & Cell Mechanics

- **Grid Size:** 15x15.
- **Cell Size:** 40px x 40px.
- **Cell States:** Hidden, revealed, flagged, mine, power-up.
- **Cascading Reveals:** Revealing a cell with zero neighboring mines triggers a chain reaction, revealing adjacent safe cells.

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6. UI & Visuals

6.1 Main Menu

- **Title:** "MINESWEEPER+"
- **Buttons:** Start Game, How to Play, Quit
- **Hover Effects:** Orange highlight

6.2 Pause Menu

- **Title:** "PAUSED"
- **Buttons:** Resume, Restart, Main Menu

6.3 In-Game HUD

Displays:

- Score
- Time remaining
- Number of flags placed
- Mine count
- Power-up availability

6.4 Visual Effects

- **Radar:**
  - Cyan overlay on 5x5 area.
  - Number of mines in the 5x5 area displayed at the center of the radar overlay.
- **Hint:**
  - Green glow on revealed safe cell.
  - **"HINT!"** label above the cell.
- **Shield:**
  - Border around the grid.
  - Color changes as the timer counts down.
  - Shield icon glows.
- **End Screen:**
  - Semi-transparent black overlay.
  - Game Over/You Win message and final score.

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7. Game Flow

1. **Start Menu:** Player chooses Start Game, How to Play, or Quit.
2. **Gameplay:** Reveal cells, manage flags, use power-ups.
3. **Game Over/Victory:** Display final score; press SPACE to restart.
4. **Pause:** Accessible anytime with P; options to Resume, Restart, or return to Main Menu.
5. **Tutorial:** "How to Play" screen guides new players through controls and mechanics.

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8. Technical Details

- **Language:** Python
- **Framework:** Pygame

File Structure:

/MinesweeperPlus
├── main.py   # Entry point, main game loop, and state management
├── constants.py   # Global constants, game settings, colors, and configurations
├── cell.py   # Cell class, cell states, and rendering logic
├── game_logic.py   # Core game mechanics, grid state, power-up handling, and scoring
system
├── renderer.py   # Handles all drawing: grid, visual effects, HUD, and end screens
├── menu.py   # Main menu, pause menu, and UI rendering
├── how_to_play.py   # Tutorial screen and instructions rendering