

# Fire Evacuation - Environment

## Game

We chose the **Fire Escape** game for this project. The game plays out on a grid of tiles, where the player controls a firefighter whose goal is to rescue people from a building. The building is made up of multiple rooms, and some of the people may be locked behind obstacles. Items and floor tiles can randomly catch fire during gameplay, and fires may also randomly extinguish over time. These unpredictable hazards increase the challenge and urgency of each rescue attempt.

## Mechanics

The game operates on a frame-by-frame update system. At the start, the grid is initialized in three stages: first, walls are placed to define room boundaries and obstacles; then, the remaining tiles are filled in as floor tiles; finally, items are placed on certain floor tiles to add gameplay complexity and provide obstacles or objectives. During each update cycle, the system checks whether tiles should ignite or be extinguished. Fire spreads and dies out randomly, creating dynamic and evolving challenges.

Rendering is handled one tile at a time, with each tile being drawn based on its current state—intact, burning, or destroyed. This allows for detailed control of the game visuals and makes it easier to reflect state changes, such as an item being consumed by fire.

## Tiles

- **Tile** – The base class from which all other tile types inherit. It defines core behavior such as rendering, fire state, and update hooks.
- **Floor** – Represents carpeted or tiled ground. These are inflammable and traversable, meaning the agent can walk over them, and they can catch fire.
- **Wall** – Acts as barriers in the game. Walls cannot catch fire and are not traversable, serving to block movement and define room boundaries.
- **Item** – Objects placed on floor tiles. Items are inflammable and not traversable, and they can burn down completely. Once destroyed by fire, they reveal the floor underneath, which may itself catch fire later.

Each tile type has its own behavior in terms of how it interacts with fire and with the player, adding layers of strategy. For example, an item may serve as an obstacle until it's consumed by fire, altering the layout mid-game.



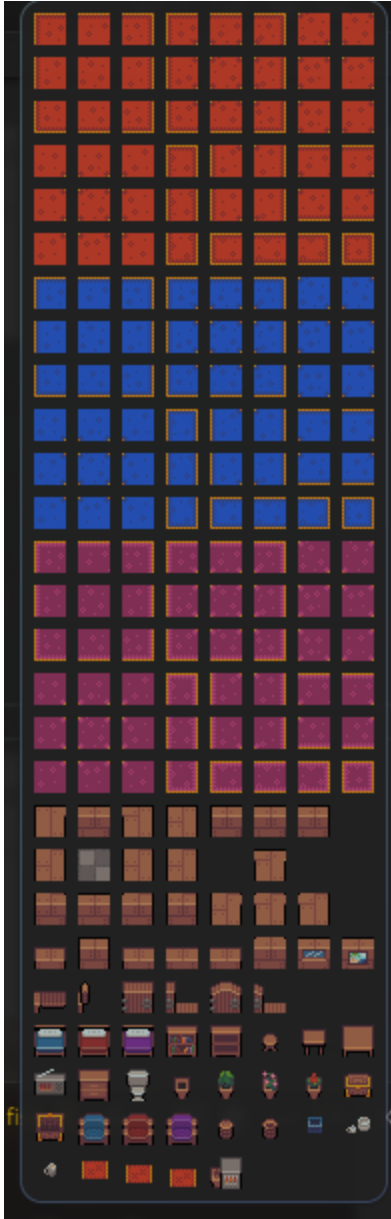
## Fire

Fire is central to the game's danger. If the agent steps onto a burning tile, the agent is immediately killed, and the game ends. Items that catch fire are gradually destroyed. Once they are fully burned, only the floor tile remains, which may itself be at risk of catching fire. This chain reaction can quickly alter the environment and force the player to adapt.

## Items

The game features a diverse collection of items, each contributing differently to the environment's complexity and realism. Some items serve as furniture or obstacles, while others can play roles in game logic, destruction, or rescue paths. For example, windows and doors define structural boundaries. Furniture like tables, chairs, beds, and nightstands populates the rooms and may act as obstacles, especially when on fire. Chairs come in various colors, offering visual diversity without necessarily altering behavior. Some items, like ovens and toilets, have higher durability for realism. Others, like bookshelves (full or empty), radios, or pots, can burn and disappear over time faster, affecting the agent's path or strategy.

Items like doors represent interactable states, allowing movement that would otherwise be blocked, however the closed doors are destroyable by the agent and represent a time consuming choice



## Actions

The firefighter agent can perform several actions to interact with the world. Basic navigation is handled through the four directional actions: `RIGHT` , `UP` , `LEFT` , and `DOWN` . These move the agent across the grid, checking for collisions or fire hazards. The `PICK_PERSON` action allows the agent to rescue individuals they encounter, which is the primary objective of the game. `BREAK_D00R` is used to destroy closed doors and clear blocked paths—this action is only valid on destructible door tiles. The `PUT_OUT_FIRE` action allows the agent to extinguish flames on adjacent tiles, offering a strategic tool to control fire spread and protect valuable or essential areas.

Each action is governed by legality checks: the agent cannot walk through walls or perform context-inappropriate actions such as breaking a toilet or extinguishing an unlit tile. The interplay between these actions and the environment adds depth to the gameplay, requiring the player to think carefully about movement, timing, and priority.

## Future Plans

There are several planned improvements for the game. First, we intend to add a sprite for the agent to enhance the visual presentation. People that need to be rescued will be added next, forming the primary objectives of each level. A scoring system will be introduced, starting at 1000 points and decreasing based on negative events like burned items or failed rescues.

We also plan to improve the environment by implementing procedural room generation to increase replayability. Illegal player actions—such as walking through walls or destroying indestructible objects—will be blocked to maintain realism and challenge. Specific destructible items, such as doors, will be implemented with unique logic, and attempts to destroy inappropriate objects like pots or toilets will be penalized.

## Resources

- [itch.io - Fire Assets](#)
  - [16x16 Indoor Tileset by Tilation](#)
  - [Fire Animation by Brullov](#)
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