Evacuation Simulation: EvacX

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Context

In our modern world, we unfortunately have to deal with many unprecedented events that may happen in our lives. From flooding in coastal cities, tornadoes in the midwest, to even the horrible intruder threats in our schools. In many cases, local governments have been caught off-guard, with many not even mounting a proper response until hours later. Denizens of affected or at risk communities may wonder, "is there anything that can be done?"

Our group says that there is. EvacX is a simulator that will be able to mount a much better response than past measures. In this project, we will use active intruder threats as an example to display the suite of functionality EvacX is capable of. Although, EvacX should ideally be able to mount a response against a variety of threats.

Phase I

The main goals of this phase consist of:

1. Create a GitHub Repository & Invite all group members
2. Read & Learn Godot & GDScript and create a project
3. Load in assets needed for the simulator
4. Investigate the Algorithms required for the simulation
    - Collision Detection:
        - Spatial Hashing: Using a Hash-Table to map collisions such that multiple items within a bucket means collision
        - Quadtrees: A tree data structure where each root quadrant points to 4 inner child quadrants
    - Network Flow:
        - Edmonds-Karp: Maximum Flow from source to a sink
    - Traversal:
        - Breadth-First Search
        - Depth-First Search
    - Shortest-Path
        - Dijkstra's: Shortest Path to every vertex
        - A* Search: Shortest Path with an emphasis in a direction
    - Machine Learning
        - K-Means: Classify victims based upon several factors - Proximity, and Location