**Game Design Document: Sandcastle Surprise**

**Overview**  
Sandcastle Surprise is a lighthearted stealth game where players take on the role of a mischievous child sneaking up on a family member to tip over a sandcastle bucket. The challenge comes from different terrain types affecting noise levels and an AI-controlled family member who reacts to sound and movement. The goal is to successfully surprise the family member without getting caught.

**Core Gameplay Loop**

1. Navigate the beach while avoiding making too much noise.
2. Use soft sand, distractions, and stealth techniques to approach unnoticed.
3. Time movements carefully to get close to the target.
4. Successfully tip the sandcastle bucket over them to win the round.
5. If caught, restart and try again with different strategies.

**Key Mechanics**

* **Movement:** Players can walk, crouch (quieter but slower), and tip the bucket.
* **Sound System:**
  + Hard sand = Louder footsteps, easier to be detected.
  + Soft sand = Quieter but slower movement.
* **AI Behavior:**
  + Family members have different awareness levels.
  + React to noise by turning or investigating.
  + A "suspicion meter" increases with noise but resets over time.
* **Distractions:** Players can throw shells, kick sand, or use objects to divert attention.
* **Difficulty Levels (Family Member Types):**
  + **Grandparent (Easy Mode):** Hard of hearing, slow reaction time.
  + **Parent (Medium Mode):** Balanced difficulty with normal reaction time.
  + **Sibling (Hard Mode):** Very alert, reacts quickly to sound and movement.

**Level Design & Progression**

* **Level 1 (Tutorial):** Introduces movement, sand types, and basic stealth mechanics.
* **Level 2:** Adds AI vision cone and reaction to noise.
* **Level 3+:** Introduces new obstacles such as seagulls that can give away the player’s position, moving NPCs, or beach toys as cover.

**AI Implementation in Unreal Engine 5.5** To create the AI for Sandcastle Surprise in Unreal Engine 5.5, we will use a combination of Behavior Trees, AI Perception, and Blueprint/C++ logic:

1. **AI Perception System:**
   * **Hearing:**
     + Use the **AI Perception System (Sense Config Hearing)** to detect player-made noises.
     + Implement noise events triggered by different sand types (louder on hard sand, quieter on soft sand).
     + If the noise level is high, the AI will turn toward the sound and investigate.
   * **Sight:**
     + Use **AI Sight Sense** with a vision cone to detect the player if they are within line of sight.
     + If spotted, AI will move toward the player and increase suspicion.
2. **Behavior Tree Setup:**
   * **Idle State:** The AI casually observes the environment.
   * **Investigate State:** If a sound is heard, the AI moves to the noise location.
   * **Alert State:** If the player is seen, the AI moves toward them and increases the suspicion meter.
   * **Return to Idle:** If the player is not detected for a set time, the AI resets.
3. **Suspicion Meter:**
   * Implement a **floating suspicion meter** that increases when the AI hears noises or sees the player.
   * If the meter reaches max, the AI “catches” the player, triggering a game-over/reset.
   * The meter gradually decreases if the player stays hidden.
4. **Difficulty Scaling:**
   * **Grandparent:** Shorter perception range, slower investigation speed.
   * **Parent:** Balanced reaction time and suspicion decay rate.
   * **Sibling:** Longer perception range, faster reaction, and persistent suspicion increase.
5. **Distractions & Player Interaction:**
   * Implement interactable objects (shells, beach balls) that the player can throw to mislead the AI.
   * AI will react to these objects based on proximity and sound intensity.

**Scope Considerations**

* AI behavior will be simple, with basic pathfinding and reaction mechanics.
* The game will use a single beach setting with small variations for replayability.
* Animation focus will be on exaggerated, fun reactions for comedic effect.
* Minimal UI to keep the experience clean and immersive.

**Stretch Goals**

* Additional difficulty modes with more unique family members.
* Dynamic weather or tide effects that alter terrain and noise.
* Multiplayer mode where one player is the child and another is the family member.

**Conclusion**  
Sandcastle Surprise aims to be a fun, casual stealth experience with a humorous twist. By keeping the mechanics simple and engaging, the game can offer short, enjoyable gameplay sessions while allowing room for creative strategy and replayability.