Physical Prototype

Doomsday: Underground Uprise

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First Assessment

Initially, the task of designing an effective physical prototype for a real-time strategy game appeared daunting. However, we recognize significant opportunities in this approach to address various balancing challenges, to rigorously evaluate game mechanics, and to fine-tune other crucial aspects of gameplay.

Approach

To adapt our real-time strategy game for a physical prototype, we're implementing two key abstractions:
- Firstly, we're transforming continuous time into discrete intervals by establishing a round-based system, where each round represents one minute of gameplay.
- Secondly, we're reducing the complexity of resource management by simplifying the numerical values associated with resource collection and consumption.
- Thirdly, introducing action event cards to have some kind of randomness involved (e.g. exploding generator if dice <=3)

Our Game's Mechanics

Game mechanics serve as the interface through which players engage with the virtual world, allowing for a range of interactions. The game designer's role is to craft these mechanics not to dictate every choice a player makes but to facilitate enjoyable and meaningful play, fostering personalized experiences within the game universe. Our game presents several mechanics that introduce strategic layers to achieve game victory, the main ones:

- Managing the workforce by balancing recruitment to increase productivity against the limits imposed by food availability.
- Constructing new buildings that incur a steady electricity cost, necessitating careful planning around worker allocation and the placement of additional electricity generators.
- Building defense towers on the surface, which involves strategic considerations regarding location and type selection.
- Producing and positioning defense robots, which, while resource-intensive, are crucial for robust defense.

Restrictions and Challenges

While we cannot fully replicate the dynamic and physics-based movements and combat seen in games like "Totally Accurate Battle Simulator" with simple paper stick figures, nor can we effectively simulate the spatial strategy of optimal building placement to minimize path lengths, these limitations of our physical prototype do not diminish its value. It serves as a crucial tool for understanding fundamental gameplay mechanics and strategic interactions, even though it abstracts some of the more complex and nuanced elements of the digital experience.

Scope and Goal

In our prototyping efforts, we aim to assess the effectiveness of the entire resource management sequence, from strategic building placement to the intricacies of electricity demand and the timing of surface expeditions because it seems like a key component of our game.
 To this end, we will substantially streamline combat encounters by reducing them to a system of point tallying, augmented by dice rolls to determine whether the player has constructed sufficient defenses. This approach allows us to focus on the core resource management aspects

while still incorporating an element of chance and strategy in defense scenarios.

Procedure of Playtesting

We designed our map from card boards that resembles our vision of having a separated bunker and surface. The Bunker is small and cluttered while the surface has more place for buildings and is used as the arena or battlefield.
We played the game together by exploring different playing strategies, iterating over the amount of start resources, start amount of people, wave counters and so on by using these rules:

Underground Basement Prototyp Rules
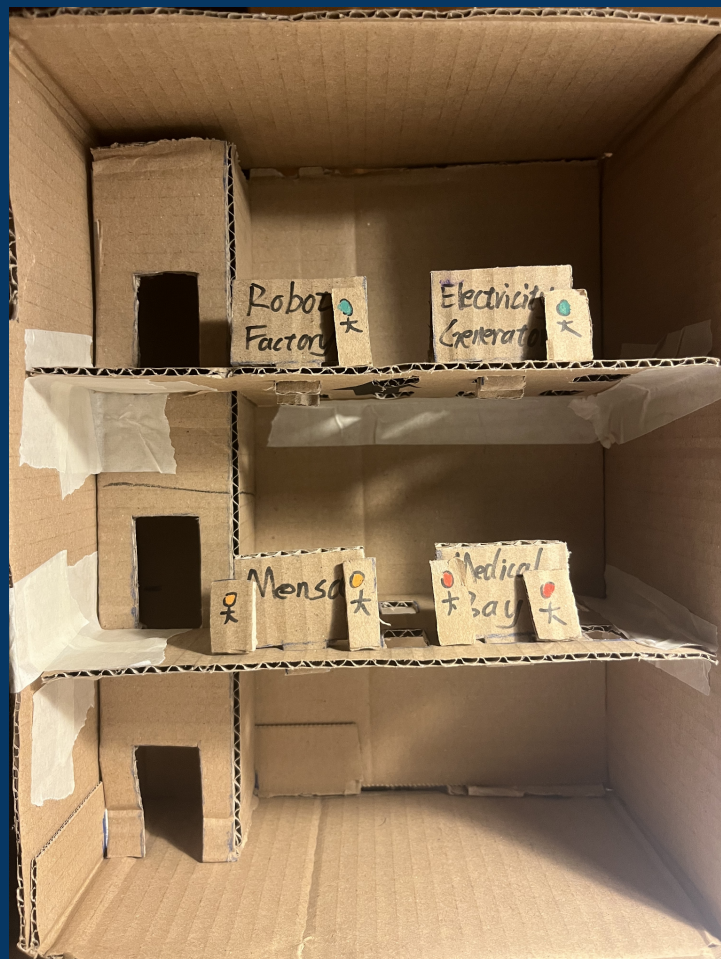
Workers can work in **Robot Factory** or **Electricity Generator** for only **one round**;
After working for **one round**, the workers become **Hungry** and need to be sent to **Mensa** in the next turn;
If **workers** keep working in **Robot Factory** or **Electricity Generator** for two turns, then they are **Hurt** and should be sent to the **Medical Bay** for **two rounds** to rest
If a **worker** is sent to the **Medical Bay**, then he/she can't be deployed by the player in the next **two rounds**, after two rounds, they become **Normal**
If **workers** keep working in **Robot Factory** or **Electricity Generator** for **three rounds**, then the workers **die**

Electricity Generator always needs one people to operate, If no people in **Electricity Generator,** then **no new robots** in the next round, **defense towers don't function** in the next round
Electricity Generator has two **workers** to operate, then double the **robot production speed** and double the **defense towers' damage**

How many **workers** are sent to the **Robot Factory**, How many **new robots** can we get in the next round
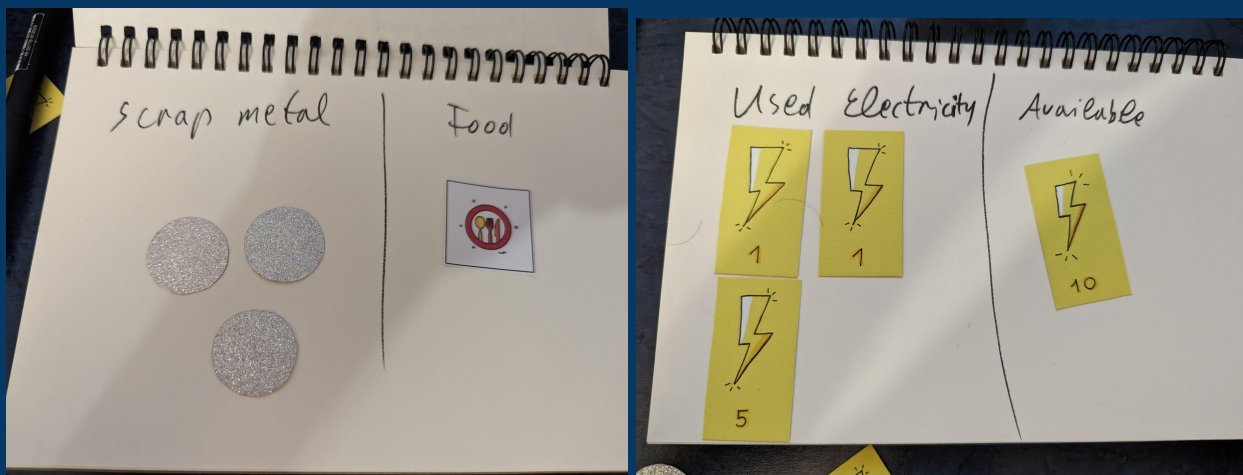
Workers' status
**Normal:** **Hungry:** **Hurt:**

Resources

Our three resources are food, scrap metal and electricity. Electricity will in the real game not be "used" but should have a similar behavior like real electricity, a constant current. We model this with electricity sum cards.

Upper World Basement Operation

- Monsters will attack the player base at regular intervals (wave). Players must build defense   towers and robots to resist the monsters. When the health of the base reaches zero the game is lost.
- At the beginning of the game, there is only one base on the surface without any defense system.
- When enough resources are produced underground, players can choose to build defense towers,robots and weapons. They all have unique values (attack power, attack range, etc.).
- Robots can only fight with designated weapons. Players can control robots and designate them to go to specific places to fight.

- Players can also build crops on the surface to reduce hunger. There are also harvest robots to harvest crops (can't fight).
- Building any object will reduce different metal values, and towers and robots will reduce electric value per min.
- Monsters will appear from the lower left and upper right corners of the map. They will move towards the base and attack anything nearby. Monsters have different settings.
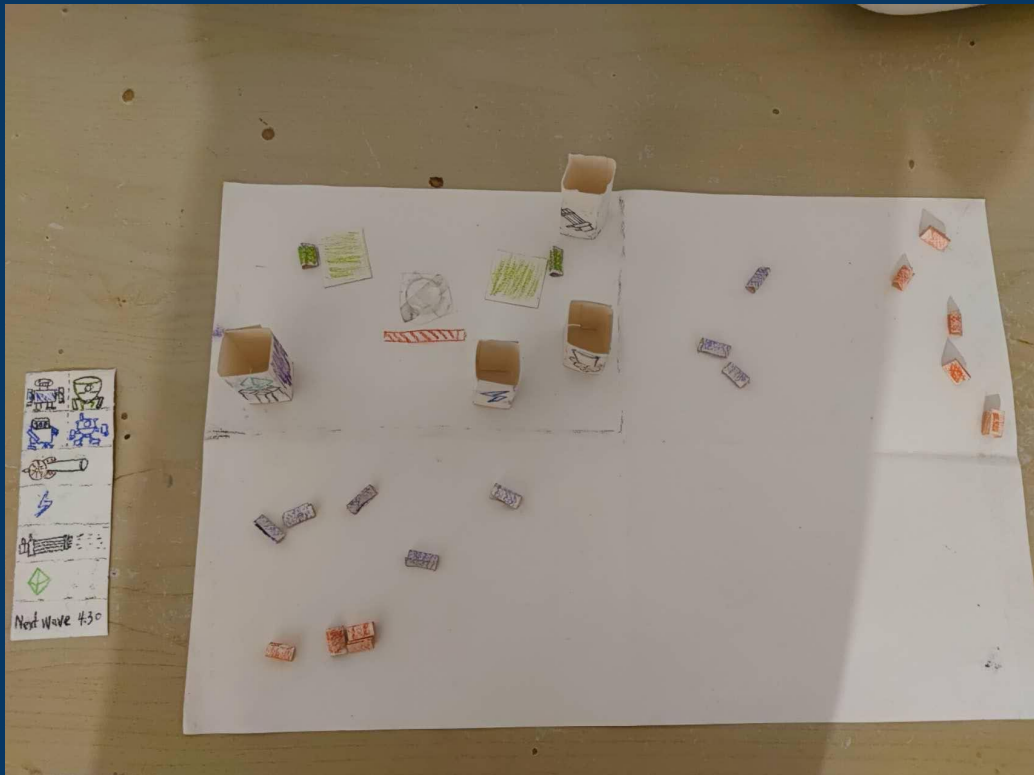
Experience and Design Revisions

Overall Result

Due to our game's satisfactory fun we have not changed any major feature. Nevertheless, the main benefit of this phase was to start thinking about concrete measures and design decisions we were unable to concretize before or simply had not in mind, like:

- where do the human workers spawn at the beginning -> where to place them in the physical prototype (introduces demand for start building/lobby)
- how many human workers we should have, how much space exactly should a building take
- which size should the placing grids have
- building procedure (self constructing over time vs instant build vs worker assigned)

The prototyping phase uncovered numerous unforeseen questions. However, these could be effectively addressed through the tactile paper prototype, aiding in the refinement of our gameplay loop.

Surface Map Design

Another issue was the monotony of the map design. Initially, the most effective strategy was to place crops close to the base for quick delivery by workers. To enhance interest, we introduced a more complex map with obstacles and specific blocked areas. Additionally, we considered incorporating buildings of varying sizes and aspect ratios to mix and match buildings on the space the player has.
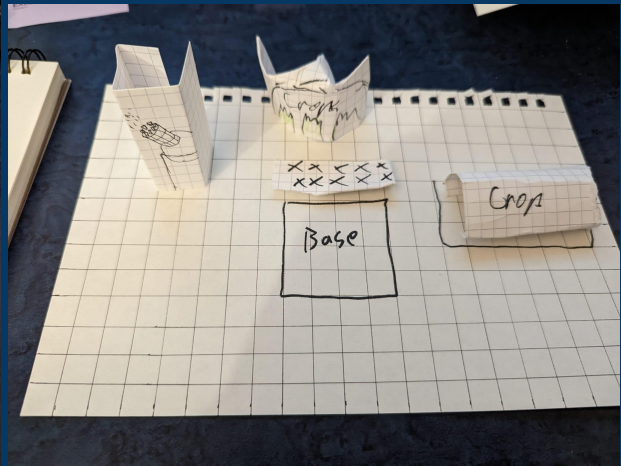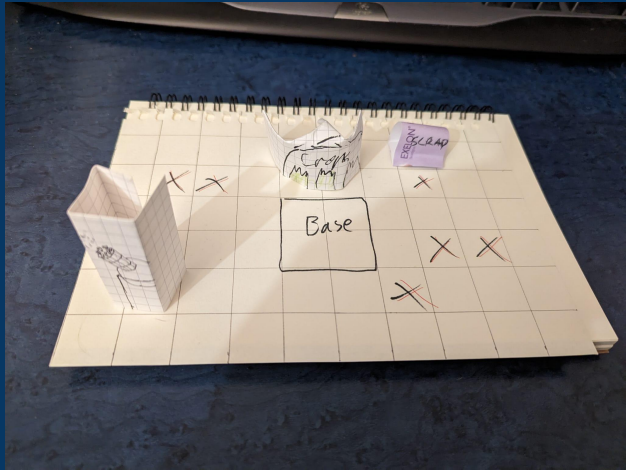
Stated Main Goal Assessment

To address our stated main goal of resource management it became clear that we need a mathematical model to approximate the right amount of resource production, costs etc. Every part is interconnected so a naive approach is not sufficient. We will explore this issue inour further development.