AT-Co-Creation Project Documentation

ASSIST HEIDI - Designing and implementing Assistive Tools for people with disabilities

Mole in the Hole: where every player finds their way underground

By: Giorgia Guerra, Israel Sandoval, Anna Lukonina

Vienna, 21.01.2026

FACHHOCHSCHULE TECHNIKUM WIEN

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1 Introduction

The goal of this project was to take a well-known tabletop classic and make it accessible to everyone through inclusive design. Standard board games often rely entirely on visual cues, which excludes blind or visually impaired players from participating independently. Our mission was to bridge this gap by redesigning the game experience around touch and haptic feedback.

The inspiration for this work came from Erich Schmid at the Blinden- und Sehbehindertenverband Wien, Niederösterreich und Burgenland (BSVWNB). Erich worked closely with children and gave us this challenge because he saw a real need for games that could be used as playful learning tools. His guidance was the fundament of our design, especially when it came to the haptic features and how the pieces should feel. Sadly, Erich passed away before he could see the finished prototype, but we worked hard to stay true to the vision and requirements he shared with us.

By utilizing 3D printing and tactile mapping, we transformed the original concept into a sensory-driven experience. Our focus was not only on making the game functional but also on ensuring it remains a fun, social tool that brings sighted and non-sighted players together.

This document outlines our design process, the technical specifications for reproduction, and how we integrated Braille to turn a simple game into an engaging learning tool.

2 User’s request

The user requested us to make an adaptation of the popular Ravensburger game Mole in the Hole that was truly accessible for blind or visually impaired players, for this reason we had to reimagine the entire design through a tactile lens. The core challenge we had to face was transforming a visual experience into a sensory one where every element, from the board levels to the action cards, can be identified through touch. This requires a complete revision of the board’s surface organization, incorporating raised edges and braille markings on both the cards and the levels to ensure that all players can navigate the game independently.

The vision for this project was to create a version that is not only portable and rich in haptic features but, most importantly, genuinely fun for both sighted and non-sighted users to play together. A central focus of the redesign was to transform the game into an engaging educational tool, helping blind children master Braille in a natural, playful setting rather than through repetitive drills. By weaving tactile learning directly into the gameplay, the project makes the game as much about learning and connection as it is about strategy and competition.

Beyond just identifying the board layout, we had to carefully consider the physical interaction between the player and the pieces, because in the standard version of the game, pieces are easily shifted, but for a visually impaired user, "reading" the board requires physical contact. That’s why, to prevent the game state from being accidentally ruined, the playing pieces-the moles-must remain securely in place once they are moved. We addressed this by designing a "lock-in" mechanism, basically a peg-and-hole system, which allows players to feel the exact position of every mole on the board without the risk of knocking them over or displacing them. This stability is crucial, as it allows the user to build a mental map of the round through touch for every phase of the game.

3 Result

The titol of our project is: Mole in the Hole - accessible version, and the slogan we chose for this game is: “Where every player finds their way underground”.

Here’ a short description: Mole in the Hole: Inclusive Edition, a tactile-enhanced adaptation of the popular family game. This version features braille-coded elements and textured playing pieces (cowboy pawns and kings), making it a 100% blind-friendly experience. The game focuses on haptic exploration, enabling players to track their progress through the board's layers using their sense of touch rather than sight.

Our Teamname is: The Hot Dogs, because we really enjoy both dogs and hot dogs. Here you can find a drawing of our team’s flag, that we designed on the first class:

3.1 License

We chose CC BY-SA 4.0 because the project includes modified parts from existing models licensed under CC BY-SA, which legally requires any derivative work to be shared under the same license.

This license also allows others to use, modify, and share the models freely, as long as they give credit and keep the same license, ensuring openness and compliance.

3.2 Final prototype

3.3 Estimated cost of solution

The production of the tactile set for Mole in the Hole has an estimated total cost of €44.50. This extimation covers approximately 1.05 kg of PLA filament and 50 hours of electricity.

3.4 Detailed description

This game is composed of two layers where the moles can be placed. There are two teams: cowboys-yellow and kings-black. Each team has its dedicated set of cards: cowboys-pentagon, kings-circle.

The objective of the game is, moving according to the number of positions that you have on your card, to get to the next level passing through an avaiable hole. The player that has more moles in the last layer's holes wins.

With this solution it is possible for everyone, visually impaired or not, to play the game.

The game documentation for Mole in the Hole – Tactile Edition provides the full game rules in Braille in both English and German. The main goal was to create a documentation that blind and visually impaired players can read and use independently, without support from sighted players.

The rules were written in clear and simple language and follow standard Braille conventions in both languages. The English and German versions were carefully adapted to the specific structure of each language instead of being translated word for word. Throughout the

documentation, the same terms are used consistently for game elements such as moles, holes, levels, and movement, so players can easily follow and remember what we are refering to.

The documentation follows a logical order, starting with the game components and setup, followed by gameplay, movement rules, the interaction between holes and levels, and the end of the game. Special attention was given to explaining the two-level game board and the difference between small and large holes. The movement system using tactile and Braille-numbered discs is described in detail, including all limitations and special cases. The text was written to be detailed enough for clarity, but still easy to read and suitable for use during the game.

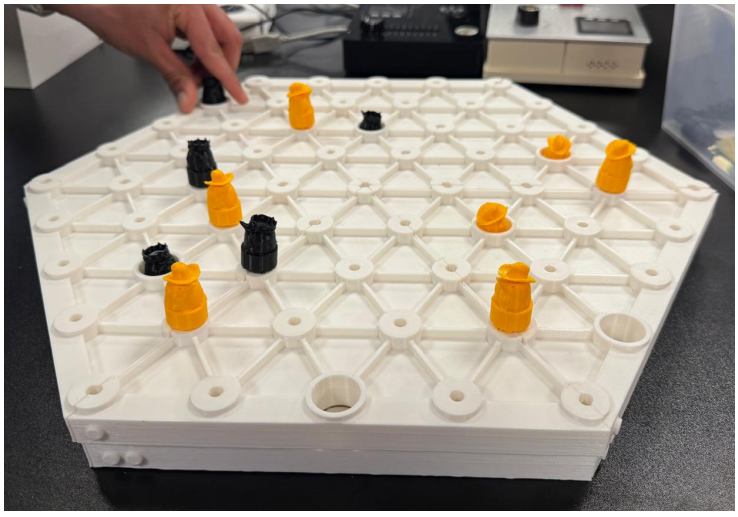
3.4.1 Game

The original game's name is Mole in The Hole, it's produced by Ravensburger and it belongs to the board game category.

3.4.2 How to put it into operation

The assembly process begins with the user building the board by connecting individual segments using a specialized protrusion-and-void locking mechanism, which allows for a customizable and secure fit. Each horizontal layer is constructed by joining six separate slices together to form a complete hexagon. Once the top layer is assembled, a second layer—designed with a slightly smaller diameter—is positioned directly beneath it. It is essential during this step to ensure that the holes of both levels are aligned to maintain the game's vertical mechanics.

Once the structure is stable and the layers are properly stacked, players can begin to play following the specific rules included in the box. As the game progresses and every available hole in the top tier becomes occupied by a mole, the user then carefully lifts that entire layer straight up and removes it from the play area revealing the second level underneath and allowing the game to continue with the remaining moles on the new surface.



3.4.3 Technical Documentation

The project can be reproduced by cloning the GitHub repository (you can also download all the files in a ZIP file) and produced using standard 3D printing processes with commonly available materials and slicer software, we used the software (webpage) OnShape, and for the printing process we used PrusaSlicer.

To print our entire project, we used PrusaSlicer version 2.9.3 software. For all the pieces, we used 0.20 mm PLA filament, and for the support material, we used an organic style. For the cards and moles, we let the support material be generated automatically, and it took approximately 12:30 hours to finish printing everything (10 moles and 6 cards), weighing approximately 140 grams in total. while for a single piece of our board (considering that we printed 12), we established where we wanted the support material to be placed. In addition, for a single piece, it took approximately 9:30 on average, weighing approximately 150 grams each.