Haunted Decoder
Binary Conversion Game

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Abstract
We report on a serious game that assesses a player’s ability to perform binary, octal and hexadecimal conversions. This is a topic in computer science that is covered in several courses and is considered one of the fundamentals of computer design and architecture. The game, Haunted Decoder, was created using the Unity engine and C# code. Using the model of a 2D role playing game, many design patterns and tools are applied to facilitate a modern gaming experience.

Story
• A well-developed story that establishes the plot, characters, setting, and events.
• The game’s narrative helps players feel engaged and more immersed in the game.
• The story takes place in the great country of Galldari that is broken into five districts. You play as Detective Rayleigh of District 5. He is on his way of solving a great mystery case of missing disappearances in area District 1. However, what he finds is something extraordinary that puts him in great danger.

Student Feedback
A pilot study was conducted where students took a pre-survey, played the game and then took a post-survey (with feedback on the game experience). About 90% of players liked the gaming experience and about 70% had a better understanding of conversions after playing the game. Most CSC majors commented that it helped them refresh the material on binary conversions and some non-CSC majors reported learning and understanding the concepts.

Gameplay
• Decoding Messages
Players unlock a chest that gives them an encoded scroll. In order to decode the message players, must solve a binary conversion problem.
• Riddles
Once the message has been decoded a riddle will display. This riddle hints upon choosing the right door to advance to the next level. If answered incorrectly you’ll meet the haunted spirit in which you’ll lose a life. However, If your lucky you may encounter a special item that gives you the ability to skip a riddle.

User Experience
• The user interface and user experience was made for a seamless gaming experience.
• UI elements include the menu which displays the high score, game info, player achievements, and player information.
• The achievements UI is designed to show players the different achievements they have accomplished for each conversion types such as decimal, octal, and hex and there is also game related achievements as well.

Assessment Design
• The teaching process is integrated through an intuitive UI design.
• Players can learn the process of converting different conversions through an interactive UI. There are buttons that players can click which correspond to the values of a conversion type. They get feedback by a green lit tile which shows they got the right answer.
• As you progress through the game conversions get harder with a variety of different problems.

References