**Title: "Wandering in the Woods"**

**Software engineering**

**Final project**

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# Abstract

The "Wandering in the Woods" project is an educational simulation game designed to enhance computational thinking and problem-solving skills among K-8 students. Developed using Python and the Pygame library, this interactive game immerses students in a dynamic learning environment where they navigate characters through a grid-based forest to meet predetermined objectives.

The game is tailored to three different educational levels: K-2, 3-5, and 6-8, each progressively introducing more complex concepts and challenges. Younger students engage with basic grid navigation and character interaction, while older students experiment with variables like grid size and character count, exploring concepts such as data analysis and strategic decision-making.

By providing age-appropriate challenges and intuitive gameplay, "Wandering in the Woods" fosters an engaging learning experience, promoting collaboration, critical thinking, and computational skills essential for academic success. The project includes comprehensive installation guides and user manuals, ensuring accessibility and ease of use for educators and students.

# Introduction

The project “Wandering in the Woods” is mainly a game-developing project that needs to be designed aiming to engage young learners in developing their computational thinking and problem-solving skills and they will be introduced to the fundamental concepts of game design. This project is aimed at young learners from grade five and this is the challenge that we need to apply our knowledge of Python to produce an interactive game that will be both engaging and educational at the same time.

This game aims to increase computational thinking in young learners through a simple, grid-based environment where the users will guide the characters to complete the tasks they are assigned. The gameplay will increase and encourage the young learners’ ability of logical thinking and skill of problem-solving. This project is not fully based on the coding but behind that, this project introduces some of the essential elements of the user interface design and user experience. This approach helped to achieve the set goal meaning the users will get a user manual where they can know how to get access to the game and enjoyable for its targeted audiences. This project will show a perfect balance of technical skills with creative design to deliver a well-tested functional game.

Python Programming Language and the Pygame Library are being used by the game to produce a visually engaging environment where the users or the targeted audiences will control characters navigating a grid aiming to meet one another.

“Wandering In The Woods” serves as a pinnacle project, on one hand it solidifies the knowledge of programming, and on other hand understanding of software development. Overall this project will portray the making of an educational game targeting the K-2 and 3-5 grade students to increase their problem-solving skills. At the end of the project, there will be a fully developed and functional game that will eventually show our ability to integrate coding skills with creativity and design thinking.

# Purpose

The initial purpose of the project “Wandering in the Woods” is to deliver a fun and educational platform that introduces students to computational arithmetic thinking and its fundamentals. The process of the game is structured so that it can accommodate different levels of complexity, divided into various age groups with customized gameplay experiences. For the K-2 students the game focuses on simpler navigation, this approach will help those students to boost their understanding of direction and movement. For grade 5 students the game becomes a little complex as some additional features are introduced such for instance, size of grid can be adjusted, more characters, and statistical analysis. Through this approach the students are allowed to experiment with more advanced concepts such as probability and optimization.

Additionally reinforcing computational thinking, the project aims to serve as a practical exercise in software installation and execution. This will eventually guide the students through the process of setting up a Python environment and running a program. On one hand, this practical experience will build their (students) technical skills and on the other hand, it will encourage the students after realizing that their efforts have come to life in the form of a functional game. The final project promotes the importance of learning through play, making complicated concepts accessible and enjoyable for children.

# Methodology

In this project the prototyping name is “Wandering in the Woods”. It's important to stake that the mai9n idea of the game has been developed within the framework of the structured approach to help the k-8 students. The main goal is to create an educational game that would engage students in several levels of CT, Mathematics and also aspects of computer science as the advance in the game. Based on the simplicity and flexibility in software development we have chosen Python to be the major programming that is used in developing educational software. Pygame is used for all game graphical and audio interfaces as this package provides a solid foundation for the project with a good graphical user interface. The game is divided into three stages where each is designed to target a specific grade level from the level of junior kindergarten to level eight. It should be emphasised that each of them increased in the level of difficulty and educational tasks.

The development process starts by first drafting out basic mechanics that generate a grid based movement band interaction system where characters exist. Characters room with an environment in a way that is driven by a set of rules which directly resemble certain aspects of character movement in the game. Some other options added as the player moves to the next stages are the options of setting the grid sizes as one desires and the addition of more participants to the game.

The advantages of the design as it guarantees that students give a uniform interface of the game as they play in the advanced stages. It's important to give the rich content, wonderful graphics, different vibrations and soft tones to support students of all classes levels and the ease of the use interface which helps the cognitive development of the students.

A stress test is performed to check that the game is not mishandling input and that inputs are correctly interpreted and any glitches are typically for a young user. It should be noted that the end product is an educational piece that engages through play and also better explains the concepts of computation in fun.

# System requirements

Before installing and running the wandering in the Woods game its important to ensure that the system meets specific requirements. These requirements are designed to provide users with a smooth and enjoyable experience while interacting with the game. The game is intended for K-8 students and depends on technological foundations to operate effectively.

**Operating system**

**Windows 10/11**

This is one of the most commonly used OS's in the world. It is famous for an easy and well organised interface, and compatibility with numerous applications. Windows 10 and 11 provide the required framework for executing Python and Pygame which makes these OS appropriate for the sophisticated clients who like to work in familiar surroundings.

**MacOS**

Being the operating system for Apple’s mac computers the MacOS is appreciated because of its looks and efficiency. The game itself can be run on macOSwithout any issues or modifications due to macOS resource and graphical performance. macOS users can smoothly work with other apple devices and applications.

**Linux**

Linux is an operating system that has its sources available for anyone and its quite flexible and customisable . developers prefer it as the OS and computer geeks due to the reliability and security it provides.. Linux is also supported that enables users who are fans of the OS to operate with the game without experiencing performance issues. The fact Linux is open source matches with the educational concept of the game and curiosity.

**Python 3. x**

Python is the language used in developing the “Wandering in the Woods”game. Python as requirements to engage this decimal baseball game is Python 3. x to work as it builds on the basic constituents of the language to produce an effective and fun method of learning.

**Python 3. x Compatibility**

Python 3. x has several advantages over Python 2, the previous version of the language: better syntactic structures, better performance and better incorporation of modern paradigms of programming. Here it is important to install Python 3. x to guarantee the correctness of the game code to take benefit from these enhancements.

**Ease of Installation**

To obtain Python it is quite simple because there are installers for Windows and MacOS to download and for Linux to compile it. Essential during installation is to include Python in the PATH, this assists the operating system in identifying the Python interpreter and running the scripts that run using Python. This step is highly essential for the game to be run without any problems.

**Pygame Library**

The Pygame library is a core component of the game’s architecture that is responsible for creating the graphical elements and handling user interactions. Pygame enables the creation of wealth that's important for engaging young learners. It supports several image formats and includes tools for rendering text, shapes and animations. The library also has handless sound playback that allows for background music and sound effects. Pygame is designed to work effectively over different operating systems ensuring users on windows, macOS, or Linux can enjoy the game without compatibility issues. This cross platform support aligns with the project's goals.

# Implementation details

The implementation of the wandering in the woods game requires a systematic approach to set up the development environment, install necessary software and execute the game.   
**Step-by-Step Installation**

The installation process involves several key steps including downloading and installing Python, setting up the Pygame library, obtaining the game files and finally running the game. Each step is important to ensuring the game runs smoothly and provides an engaging experience for users.

Download Python 3.x

Visit the official website at [python.org](https://www.python.org/downloads/). on the homepage locate the downloads section. The website automatically suggests the best version for the operating system. Then click the download link to obtain the installer for the platform.

1. Install Python

Run the downloaded installer file to begin the installation process. During the installation ensure the check box that says Add Python to PATH. This option is important as it allows you to run Python from the command line or terminal.

2. Install Pygame

Pygame is a set of python modules designed for creating video games. It handles graphic rendering, user inputs and sound playback which makes it an important component of the Wandering in the Woods game.

Open a terminal or command prompt by searching for cmd in the start menu. On maxOS or Linux open the terminal application. Type the following command and press Enter: pip install pygame to download and install the Pygame library. After installation the terminal will display messages indicating the progress and any potential warnings or errors.

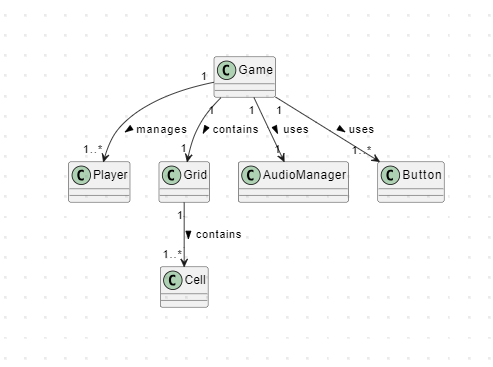
3. Download the Game Files

Obtain the "Wandering in the Woods" game files from your teacher or download them from the provided link. The game files are usually compressed in a ZIP folder for easy distribution.

4. Run the Game

With Python, Pygame and the game files in place run the game. Navigate to the folder where the game files are saved. Open a terminal or command prompt in that folder. Run the game by typing: python main.py.

# UML Diagram



# Result

**Main Menu**

After starting playing the wandering in the woods game players are faced with the main menu that has been made as simple as possible. The main menu includes two primary options.

start : selecting this option initiates the game and brings the user to the gameplay screen where they will have to select the correct grade level to start wandering through the woods.

Exit: This option ends the game and gives the user the opportunity to quit the game and is directed back to the desktop.

Due to minimalism of the main menu young students will not have issues organising themselves while playing the game. The main goal of which is to learn something new.

Gameplay Overview:

The “Wandering in the Woods” game takes into account that target learners are of different educational levels, and each level will present different difficulties as well as teaching strategies. The gameplay varies across three grade levels. For this type of assessment it will be useful to categorise students into the following groups: K-2, 3-5.

1. Grades K-2:

The K-2 version is to induct students into computational thinking and general spatula skills using a simple grid based interface. The grid design describes a square field with two cartoons on it. Lack of compilation makes a grid easily manageable when applied in class. Students' concentration is not diluted on other aspects of a complicated design.

The game presents a simple square grid with two characters. One character is controlled by the player using the keyboard, while the other moves randomly which adds some level of incongruity to the game so it makes students have strategies regarding the manner in which character moves. In this case the objective is to lead the character controlled by the player to reach the random;y moving character. In problem solving, this taks assists the students to build the problem solving skills and also succeed in identifying the cause.

The goal is to guide the characters to meet. when meeting a celebratory screen appears, showing the number of moves taken. There is a graphic that appears with bing sounds. This screen shows the number of moves that were necessary to solve the focus.

2. Grades 3-5:

Students can set the grid size (which can be rectangular) and choose the number of characters (2, 3, or 4). For students 3-5 the game introduces the complexity and control that encouraging the experimentation and deeper engagement with computational concept. This features allows students to experiment with different dimensions and observe how grid shape affects gameplay dynamics.

Characters start at student-selected positions and move according to game rules. Players can choose the number of characters l;ike 2,3,4 to include in the game. Statistics such as the longest run without meeting and the average run are displayed after each round. This aspect of the game teaches students about algorithms and the decision making process. After each round the game displays statistics like longer run without meeting, shortest run and average run. These metrics encourage students to analyse their performance and develop strategies for improvement.

# Flowchart

# Personas

**User persona 1: Emma, the curious First Grader**

**Age:** 6

Grade level: 1st grade

**Background:**

Emma is a first grader who loves exploring and learning through play.

Goals and needs: Emma wants to engage in activities that are fun and help jher learn basic maths and computational thinking.

She needs intuitive and intuitive and straightforward controls that are easy to understand.

Emma benefits from immediate visual and auditory feedback to keep her engaged and motivated.

**User persona 2: Liam, the analytical Fifth Grader**

**Age:** 10

**Grade Level:** 5th Grade

**Background:**

Liam is a fifth grader who loves puzzles and challenges. He is familiar with basic computational concepts and enjoys experimenting with different strategies to solve problems.

Goals and needs:

Lian seeks games that challenge his problem solving skills and allow for experimentation with strategies.

He is interested in understanding the statistics and how they relate to game performance.

# Discussion

**Game Controls**

“Wandering in the Woods” The design of this game is very simple and intuitive, making sure that students of all age groups can easily control and interact with the game. The arrow keys will help to move the players and control the character across the grid. This approach makes it super easy for the students to understand and apply directional movement. Space bar to be used to pause the game and resume if paused, this shows the flexibility of the game in that it allows the users to take breaks or make new strategies that too by not losing the progress. The exit button will allow the users a straightforward way to return to the main menu. This approach helps make sure that the users can easily exit whenever they desire. How to use the keys those instructions are given in the table below to understand it better.

| **Arrow Keys:** | Move the player-controlled character. |
| --- | --- |
| **Space Bar:** | Pause/resume the game. |
| **Exit Button:** | Exits the game and returns to the main menu. |

**Additional Features**

To provide a good gaming experience “Wandering in the Woods” included background music and an attractive sound effect during the continuation of the game. These sound elements not only make the game attractive but will also help to maintain the players’ engagement. The background music of this game sets the tone initially while the different sound effects indicate the immediate results of each movement this approach makes the game more dynamic and interactive. The game also has a reset feature that eventually allows the users to restart the game and try other scenarios or experiments. This approach will help to detect whether the student is willing to try a new approach to solving the puzzle or simply restart the game for fun.

# Troubleshooting

If the game does not start then it becomes essential to make sure that Python and Pygame are installed in the right way. During the installation period, it is a very common issue that the installation process has gone wrong, and verifying these things is very important and it is considered as the first step in troubleshooting. If someone is facing a slow performance then they will have to free up some space by closing other running applications and through this process they can enjoy a smooth game run. If someone gets no sound during the gameplay then they are requested to check the device’s volume button and the setting of sound to make sure if they are up to date and are in working condition.

Overall it can be said that game controls, additional features, and troubleshooting tips are designed to help the users (students) to enjoy a seamless experience during the gameplay and thus it makes “Wandering in the Woods” both an educational tool and fun for the younger minds.

Enjoy exploring "Wandering in the Woods" and enhancing your computational thinking skills!

# Conclusion

The “Wandering in the Woods” project represents the result of a carefully designed educational tool aiming to merge education with fun for little children. This game has provided a suitable environment where young learners can playfully learn these concepts by putting their focus on the principles of computational thinking and problem-solving. The features like easy controls, background music, and sound effects made sure that the students are learning juxtaposed and they are enjoying the process. This game has been designed for a wide range of young learners and they will face complexity according to their age group or skill levels.

The troubleshooting guidelines and user-friendly instructions made sure that the young students will be able to identify the technical challenges that would eventually deliver a smooth and enjoyable game running experience. By combining coding with creative design, “ Wandering in the Woods” stands as proof of the power of educational games to encourage essential computational skills in young students' minds. We think this project has achieved its goal of creating complicated concepts enjoyable and building a strong foundation for future learning and development for our society. In the end, we would like to add that “Wandering in the Woods” is not just a game but it is also a beneficial educational tool that tends to combine technical proficiency with the joy of discovery, making learning a alluring experience for students.

# Reference

Kapp, K. M. (2012). *The gamification of learning and instruction: Game-based methods and strategies for training and education*. Pfeiffer.

Gee, J. P. (2007). *What video games have to teach us about learning and literacy*. Palgrave Macmillan.

Zelle, J. M. (2017). *Python programming: An introduction to computer science*. Franklin, Beedle & Associates Inc.

Matthes, E. (2019). *Python crash course: A hands-on, project-based introduction to programming*. No Starch Press.

Sweigart, A. (2012). *Making games with Python and Pygame*. Independent.

Dawson, M. (2010). *Python programming for the absolute beginner*. Course Technology.