

Arcademia Project Summary

Arcademia is an interactive educational arcade game designed to teach fundamental coding concepts to children aged 9–11 through engaging gameplay. The system gamifies programming education by allowing learners to solve puzzles using visual drag-and-drop code blocks that control a character in themed game environments. The project was developed to provide a fun and accessible introduction to computational thinking without requiring traditional computers or internet connectivity.

Project Objectives

- Make coding education engaging and accessible for young learners.
- Introduce foundational programming concepts such as sequencing, loops, and conditional logic.
- Encourage computational thinking and problem-solving through gameplay.
- Provide a classroom-friendly platform that works entirely offline.
- Allow teachers to monitor student progress and manage learner profiles.

System Overview

Arcademia operates as a self-contained arcade console powered by an i5 mini PC running a Godot Engine application. The system includes a display, joystick, and arcade buttons which students use to navigate menus and interact with the game. The application is built using the Godot Engine and GDScript and stores data locally in JSON files, allowing it to function completely offline.

User Roles

The system supports two primary user roles:

- Teacher

Teachers have administrative access that allows them to create, update, or delete student profiles, monitor student scores, and manage classroom use of the system.

- Student

Students are the primary users of the system. They create or select profiles, explore the game world, and complete coding challenges using visual programming blocks.

Core Functionalities

- User profile management for students

- Password-protected teacher dashboard
- Open-world map used as a hub for accessing levels
- Drag-and-drop visual coding interface
- Real-time execution of code sequences
- Level progression and star-based scoring system
- Offline data storage using JSON

How the Program Works

When the system starts, users select either Teacher or Student mode. Teachers authenticate with a password to access the profile management interface, where they can add, update, or delete student profiles and review progress.

Students select their profile and are taken to the main menu. From there they can start the game and explore an open-world map. The map contains different themed areas representing coding challenges.

Inside a level, students solve puzzles by arranging coding blocks in the correct sequence. These blocks represent actions such as movement or interaction. When the player runs the sequence, the character performs the programmed actions. If the sequence is correct, the level is completed and the student earns stars based on efficiency.

Coding Concepts Taught

- Sequencing (ordering instructions correctly)
- Loops (repeating instructions efficiently)
- Conditional logic (If statements)
- Problem solving and logical reasoning

Example Levels

- River Level – teaches basic movement sequencing
- Tractor Level – introduces path planning
- Barn Level – introduces action commands
- Garden Level – teaches loops and conditional logic
- Cow Level – applies conditionals to solve a logic puzzle

Technology Stack

- Game Engine: Godot Engine
- Programming Language: GDScript
- Hardware Platform: i5 Mini PC arcade console
- Input Devices: Joystick and arcade buttons

- Data Storage: Local JSON files

Project Resources

eFundi Page:

<https://efundi.nwu.ac.za/portal/site/d827c072-5db6-4066-948b-5ff2eb0431da/tool/b6e1bfe0-a455-45a4-bc95-b5efa399607d?panel=Main>

Gameplay Demonstration Video:

<https://efundi.nwu.ac.za/access/content/group/d827c072-5db6-4066-948b-5ff2eb0431da/2025%20Projects-1/Arcademia%20-%20Arcade%20Based%20Learning%20Platform%20-%20Ms%20Inge%20Senekal/Video%20Demo%20of%20Arcademia.mp4>

Repo link:

[https://github.com/HumaidEbrahim/Arcademia\](https://github.com/HumaidEbrahim/Arcademia)

Conclusion

Arcademia demonstrates how educational games can be used to introduce programming concepts to young learners in an engaging and intuitive way. By combining arcade controls, visual programming, and interactive puzzles, the system creates a learning experience that is both fun and educational while remaining accessible in classroom environments that may lack internet connectivity.