

MICORRIZAS

DESIGN AND DEVELOPMENT OF A GEOLOCATED MOBILE VIDEO GAME TO PROMOTE KNOWLEDGE AND RELATIONSHIP WITH THE NATURAL ENVIRONMENT

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ABSTRACT

This document presents the technical proposal for a Final Degree Project in the Degree in Design and Development of Video Games. The project aims to develop *Micorrizas: Nature's Lost Legacy*, an educational video game whose main objective is to promote knowledge of and engagement with the natural environment through active exploration and collaborative learning.

The design of the game is based on a real pedagogical activity carried out with university students of Early Childhood Education in the subject MI1815 - The Natural Environment in Early Childhood Education, which consists of a guided visit to the "Jardín de los Sentidos", an outdoor space at Jaume I University characterised by high biodiversity. This project is based on the transformation of that activity into a playful and interactive experience, using game design principles to encourage observation, discussion and reflection, while avoiding the mere digitalization of theoretical content.

The game will be a cooperative, location-based mobile game developed with Unity, incorporating geolocation and a lightweight multiplayer system based on a local host and cloud synchronization to support group decision-making and shared progress.

KEYWORDS

Serious game - Mobile games - Cooperative gameplay - Experiential learning - Environmental education

INTRODUCTION AND MOTIVATION OF THE WORK

The project consists of the design and development of 'Micorrizas', a cooperative educational video game for mobile devices, conceived as a serious game based on geolocation.

The game is designed to be played on site in the "Jardín de los Sentidos". The main objective of the project is to promote knowledge of the natural environment and the ability to use it as an educational resource. To this end, the design of the video game is based on a real educational activity taught in the MI1815 - The Natural Environment in Early Childhood Education course of the Early Childhood Education Degree at the Jaume I University (UJI).

Currently, the activity is carried out through traditional guided tours, which have certain limitations in terms of active student participation, as well as logistical constraints such as weather and schedules, and the availability of a trained instructor to lead the activity. Rather than simply digitising theoretical content, the video game uses narrative and mechanics based on exploration, observation and group decision-making to encourage active debate and reflection. This approach allows students to identify natural elements and understand how the environment can be used as a teaching resource.

Technically, the game will be developed using Unity for mobile devices and will feature a lightweight multiplayer system based on a local host and cloud synchronisation.

RELATED SUBJECTS

- ♦ [VJ1238 - Fundamentals for the Design of Educational Video Games](#)
- ♦ [VJ1220 - Databases](#)
- ♦ [VJ1222 - Video Game Concept Design](#)
- ♦ [VJ1208 - Programming II](#)
- ♦ [VJ2309 - 2D Design](#)

OBJECTIVES OF THE TFG

- ♦ To design a cooperative educational video game that promotes active learning through exploration and observation of a real environment.
- ♦ To develop a mobile game that reacts to the player's physical position within the Garden of the senses.
- ♦ Offer teachers of the subject in collaboration a valid and entertaining educational tool for independent activity.
- ♦ To provide an educational and entertaining tool to raise awareness of the environment and its biodiversity.

TASK AND TIME PLANNING

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Task	Description	Estimated Hours
Project analysis	Study of the educational context and requirements	10
Game design	Definition of mechanics, narrative and gameplay loop	50
Technical design	Architecture and system planning	30
Art design	Design and draw assets	10
Development	Implementation in Unity	100
Multiplayer & geolocation	Integration of host-client and cloud sync	40
Testing and iteration	Debugging and design refinement	30
Documentation	Writing the final report	20
Presentation	Preparation of oral defense and materials	10
Total		300

EXPECTED RESULTS

At the end of the project, the following results are expected:

- ◆ A functional prototype of a mobile educational video game to teach about the biodiversity of the sensory garden.
- ◆ A cooperative gameplay experience playable by small groups of students in a real outdoor environment.
- ◆ A system that integrates geolocation and shared game state synchronization.
- ◆ A documented evaluation of the system through quantitative/qualitative assessment by user testing

TOOLS

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Tool	Description
Game engine	Unity (C#) and Visual Studio
Cloud data synchronization	backend ligero (Firebase/Supabase)
APIs y SDKs	Mapbox SDK (para mapas y geolocalización)
Art	Clip Studio
Version control	GitHub
Task and Time Planning	Excel and Trello
Documentation	Latex

REFERENCES

Pitarch García, R. (2012). Guía de la flora Ornamental de la Universitat Jaume I : Un campus per a la biodiversitat. Universitat Jaume I. Servei de Comunicació i Publicacions. <https://lectura-unebook-es.eu1.proxy.openathens.net/viewer/9788480219457/2>

ONE SHEET

1. TÍTULO DEL JUEGO

Ruku: la caída de un mundo

2. PÚBLICO OBJETIVO

Adolescentes y adultos jóvenes, sobre todo amantes de los RPG y jugadores de juegos de rol y más específicamente el juego de rol Dungeons and Dragons.

3. RESUMEN DEL JUEGO

Un juego RPG por turnos con proyección isométrica. En el que tienes varios personajes (entre 1-4) y luchas contra unos enemigos. Los Slaad criaturas anfibio que descienden del cielo con sus naves para intentar conquistar este planeta. La idea es que cada personaje en su turno puede usar diversas habilidades mediante una acción grande, una acción pequeña y una acción gratuita, aparte de una reacción para usar fuera de turno (lo que da más juego). Depende de la habilidad que quiera usar el personaje tendrá un coste u otro. Cada una de estas habilidades obviamente estará relacionada con el rol que adquiera cada personaje en el equipo.

4. DISTINTOS MODOS DE GAMEPLAY

El fuerte principal del juego es un modo campaña al más estilo plantas versus zombies (enemigos a rachas en un mapa limitado con una zona que defender), y después como parte secundaria del juego habrá un modo online en el que poner a prueba la combinación de tus personajes contra las de otro jugador y así ascender en el ranking global y codearse con los mejores jugadores.

5. ¿PORQUE ESTE JUEGO ES ORIGINAL?

Es un juego que implementa un mundo de fantasía medieval con una invasión de Slaads, juntando así la magia de este mundo fantastico medieval contra la tecnología traída desde otra parte del multiverso. Esta fusión de elementos crea un entorno único y fascinante que no se encuentra comúnmente en otros RPGs.

6. ¿PORQUE ESTE JUEGO ES INTERESANTE?

Narrativa envolvente: La historia de un mundo en caída libre debido a una invasión tecnológica, en la cual el jugador es responsable de escasa resistencia que queda en este mundo todo esto sin contar que solo hay unos pocos usuarios capaces de lanzar magia con la que hacer frente a la alta tecnología con la que se les asedia. No obstante aun quedan usuarios diestros en las artes marciales que rivalizan con los usuarios de magia.

Estrategia profunda: La combinación de acciones grandes, pequeñas y gratuitas, junto con reacciones fuera de turno, ofrece una jugabilidad rica y estratégica. A todo esto hay que añadirle las diferentes clases y habilidades de los personajes que puedes juntar en tu equipo.

7. ¿CUALES SON LAS PRINCIPALES DIFERENCIAS CON LOS JUEGOS DEL MISMO GENERO?

Sistema de progresión de mundo dinámico: A diferencia de juegos como Divinity: Original Sin y Wasteland 3, donde el mundo es estático, en Ruku: la caída de un mundo, las decisiones del jugador afectan directamente el entorno y la narrativa, cambiando la disposición de los enemigos, aliados y recursos disponibles.

Economía y gestión de recursos: A diferencia de Baldur's Gate 3, Ruku incorpora un sistema de economía y gestión de recursos donde los jugadores deben recolectar y gestionar materiales para mejorar su equipo y habilidades, lo que añade una dimensión estratégica adicional.

Modo cooperativo asimétrico: A diferencia de muchos RPGs tradicionales, Ruku ofrece un modo cooperativo asimétrico donde un jugador puede controlar a los héroes y otro a los enemigos, creando una experiencia competitiva y colaborativa única.

PERSONAJES PRINCIPALES Y CONTROLES

PARTS

The `part` command generates a full-page heading with space for an image, as seen on the page before this one. Use the `partimage` command to set the image used on the page. Parts are also a good level to use the `partcolor` command to set the accent colour featured in many of the class's elements.

CHAPTERS

The `chapter` command produces a large, accent-coloured, fancy title, such as the one on this page. Apart from its decoration, the chapter heading looks like the other section titles, set by the `segment` environment.

SEGMENTS

The `segment` environment generates a two-column layout. This is an easier way than the `twocolumn` option to create a two-column document with many column-spanning elements, such as tables. Remember to end your segments. Otherwise, you will get error messages.

With Heading: Segments take an optional argument that generates a column-spanning section heading in green, as above. This is the main way to generate section headings; alternatively, you can also use the `section` command. In that case, be careful to place it outside any `segment` environment, or you will get an oddly placed, one-column title.

Without Heading: The optional argument can also be omitted to generate no heading, as after the table below.

SUBSECTIONS

The `subsection` command generates the standard bold-faced, left-aligned heading you see above this paragraph. Use them to divide your longer texts into smaller chunks to provide a nice orientation for the reader.

PARAGRAPHS

The smallest defined division in this document class is the paragraph. This command generated an inline bold heading that is best used for an unnumbered list of entries that are too long to put in an actual list environment.

This is a Paragraph: A nice way to use paragraphs is to add a colon at the end of the heading, as seen here.

TABLEBOX

DICE	LABEL	ALIGNMENT	DESCRIPTION
1	Dice	Center (c)	If you want a table to be rollable, use the first column as the die or dice column. Give it a header denoting the die/dice used, and number the rows.
2	Label	Left (l)	The first or second column of a table should be the label of the entry. This gives a short and meaningful name to the entry in the row.
3	Score	Center (c)	You can add several narrower columns for short, standardized scores, such as price, availability, durability, etc.
4	Description	Left (l)	The typically last column in a table is a longer description of the entry. Use a breaking alignment for this, so the description can be more than one line.

BOXES

There are three types of box provided by this class: the Demonbox, Dragonbox and Emptybox. These are special environments that can be used to highlight special rules or important information in a compact way. These boxes are not floats but are placed as part of the text. Therefore, they can be placed both inside a `segment` environment, to produce a one-column wide box, or outside, to create a two-column spanning box.

DRAGONBOX

♦ These Rules Are: Obligatory

This is a dragonbox, it can be used to highlight important information in a compact and noticeable way.

It can be used, for example, to typeset a Heroic Ability. In that case, you can use an `itemize` list, as above, to note the Willpower cost for the ability.

EMPTYBOX

This is an `emptybox`, it features the same heading as a `demonbox` but not the coloured background. It is used in the `Tablebox` environment but can also be used by itself.

DEMONBOX

♦ These Rules Are: Optional

This is a `demonbox`, they are used to add information about optional rules.

The `demonbox` is fully coloured in the current accent colour and can be a drain on printer toner or ink. It is generally a good approach to use these boxes sparingly. A restrained use of boxes in general also prevents the layout from looking cluttered.

WIDE BOXES

Both `dragonbox` and `demonbox` can be used outside a `segment` environment to make it span the whole page width. When using text inside a wide box, it is good practice to use a `segment` environment inside the box to get a two column layout in the box and prevent overly long lines.

SUBSECTION

Lower level headings such as subsection and paragraph can be used inside boxes.

Paragraph: Using these headings can help make the text inside a box more ordered and provide a better overview.

PACKAGE OPTIONS

GENERIC OPTIONS

You can use all class options available to the standard report document class included in LaTeX.

Papersize: You can use the class with paper sizes other than A4, but be sure to keep the `textwidth` at 16cm, otherwise the headers will get uncentered.

BLACK AND WHITE

You can use the `blackwhite` option in the `documentclass` command to generate the document in black and white colours. When doing so, you have to manually set monochrome images, the option cannot change included images.