AR GAME
DESIGN DOCUMENT
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REVISION HISTORY

Version	Date	Author	Description	Action	Pages
1.0	07.02.2023	ATERMON	Creation	C	4

(*) Action: C = Creation, I = Insert, U = Update, R = Replace, D = Delete

REFERENCED DOCUMENTS

ID	Reference		Title
1	2021-1-EL01-KA220-VET-000034695		AR4RECLOTHING Proposal
2			

APPLICABLE DOCUMENTS

ID	Reference		Title
1			
2			

Contents

1. Introduction

1.1 Project Scope

Research has shown a connection between eco-friendly activities and gender disparities, emphasizing the importance of gender equality in achieving environmental sustainability. Women contribute to two-thirds of global working hours and rely more heavily on natural resources than men (Irish Aid, 2013). Despite numerous efforts to promote eco-friendly actions, the goal of recognizing the significance of gender equality for the ecosystem remains unaccomplished (UN Women, 2014). Women, as half of the world's resource managers, have a vital role in protecting the environment (Global Environment Facility, 2018). Clothing upcycling is a growing trend in sustainable fashion, but there is a lack of solid initiatives to encourage women's active involvement in upcycling practices, even though the EU is committed to environmental sustainability. Consequently, there is a new need for vocational education and training (VET) trainers and textile experts (such as manufacturers, designers, and colourists) to participate in open discussions to support gender-focused training aimed at addressing environmental challenges through clothing upcycling activities, aligning with EU objectives for resource efficiency (Europe 2020 Strategy).

1.2 Document Purpose

This document outlines the structure, unique features, visuals, and functions of the AR4Reclothing Mobile Application. Designed as a game-like app, it seeks to enhance understanding of the connection between environmental sustainability and gender equality by utilizing the 'ReClothing Training Guide' created in earlier project outcomes.

1.3 Project Target Groups

The groups directly and indirectly impacted by this research include:

Directly:

- Textile professionals (e.g., manufacturers, designers, colorists, stylists, converters) who are interested in or already involved in environmental sustainability initiatives.
- VET and textile specialists eager to engage in open discussions about eco-friendly approaches that emphasize the significance of gender equality for the ecosystem.
- Higher education institutions with textile departments.

Indirectly:

- Vocational education and training (VET) organizations.
- Public agencies.
- Non-governmental organizations (NGOs) or other entities/authorities working on renewable resources and energy efficiency initiatives.
- Augmented reality (AR) developers or developers/organizations interested in adopting innovative digital solutions for sustainable training and enhanced learning experiences.
- Policy makers.

1.4 Methodology

In order to efficiently increase awareness about the best practices conceived during previous stages in the project, the app will be divided into the following pillars:

Module 1: The role of gender equality in environmental sustainability and gender-based methods.

- Topic 1.1: Definitions & Principles.
- Topic 1.2: The role of women in environmental sustainability.
- Topic 1.3: Environmental awareness.
- Topic 1.4: Gender equality training and capacity building.

Module 2: Sustainable practices in clothing manufacturing.

- Topic 2.1: Understand the basics of clothing manufacturing.
- Topic 2.2: Analyze the different means towards a more sustainable environment.
- Topic 2.3: Identify the most efficient practices in clothing manufacturing.
- Topic 2.4: Develop and promote new practices in the field.
- Topic 2.5: Increase one awareness to maximize understanding and motivation.
- Topic 2.6: Implement knowledge and skills within real environments and create impact.

Module 3: Clothing upcycling as a green practice.

- Topic 3.1: The basics of clothing upcycling.
- Topic 3.2: Sources of textiles used in the upcycling practice.
- Topic 3.3: Distinct groups involved in the upcycling process.
- Topic 3.4: Types of clothing upcycling.
- Topic 3.5: Promotion and scaling-up of upcycling practices.

Module 4: Soft skills for clothing manufacturers.

Module 5: Gender-equal digital competences for clothing upcycling.

After completing the game, the users will be able to:

- Understand the role of women in environmental sustainability.
- Know how sustainable practices can be applied in clothing manufacturing.
- Increase soft skills and digital competences for sustainable clothing upcycling.
- Apply different gender-based methods for sustainable development through upcycling practices.
- Promote upcycling practices through gender-based methods.

2. The AR4Reclothing AR Application

2.1 Introduction to Augmented Reality

Augmented reality (AR) enriches the physical environment by incorporating digital elements into a smartphone, creating the impression that holographic digital content is integrated with the real world (SmartTek, 2021). As a result, AR is employed to 'scan' real-life surroundings, examine those settings (such as an image, place, location, etc.), and display pertinent virtual content on the smartphone. Consequently, users can view the actual object while simultaneously seeing information provided by the AR software, displayed as an image, text, video, gif, or 3D model (Program Ace, 2021).

In summary, Augmented Reality comprises two components:

1. The 'Reality' part.
2. The 'Digital' content that augments the 'Reality' part.

2.2 How Does It Work?

Augmented reality operates using a device with a camera, like a smartphone or tablet. The user directs the camera at a real object, and the AR software identifies and processes it. The device, equipped with AR software, retrieves information about the object from the cloud, similar to how a web browser loads

a webpage. However, unlike a webpage, the information displayed through AR appears as a 3D-like experience overlaid on the actual object (Porter & Heppelmann, 2017).

2.2.1 Marker-based Augmented Reality

Marker-based AR requires pre-existing information about real-world objects. Before the app can overlay AR digital content, it must first identify the actual object in front of the camera. Upon recognition, the AR app begins to analyze (track) the object and displays the corresponding digital content (Program Ace, 2021).

2.2.2 Marker-less Augmented Reality

Unlike marker-based AR, there is no need for pre-defined real objects to display digital content on a smartphone screen. This allows virtual content to be shown in any location or situation, without requiring a specific 'triggering' real object to access AR content. Typically, these AR apps prompt users to find a flat surface to place their AR elements (Zvejnieks, 2022). Pokémon Go, which uses location-based AR, is a prime example of a marker-less AR app.

2.2.3. Projection-based Augmented Reality

This type of AR does not need a mobile device to demonstrate AR content. Instead, the AR content is projected to physical objects utilizing specialized devices, such as projectors, cameras, etc.

2.3 The AR4Reclothing AR App Description

The present application will employ a marker-based AR software to assist users in navigating the content more effectively. This requires real objects to be predetermined alongside the digital information they will present so that the camera can identify them. In this project, the tangible object for the game will be a printed A5-sized handbook (cookbook) that discloses segments (small portions) of information related to the educational modules of the project. The content will be derived from the 'ReClothing Training Guide'.

Image 1. Cover of the AR4Reclothing Cookbook for the AR App Users

Every page in the cookbook will correspond to a distinct subject from the 'Reclothing Training Guide' (consisting of five modules). Actual information will be presented on one page featuring a brief paragraph about the topic and an accompanying page with a relevant image.

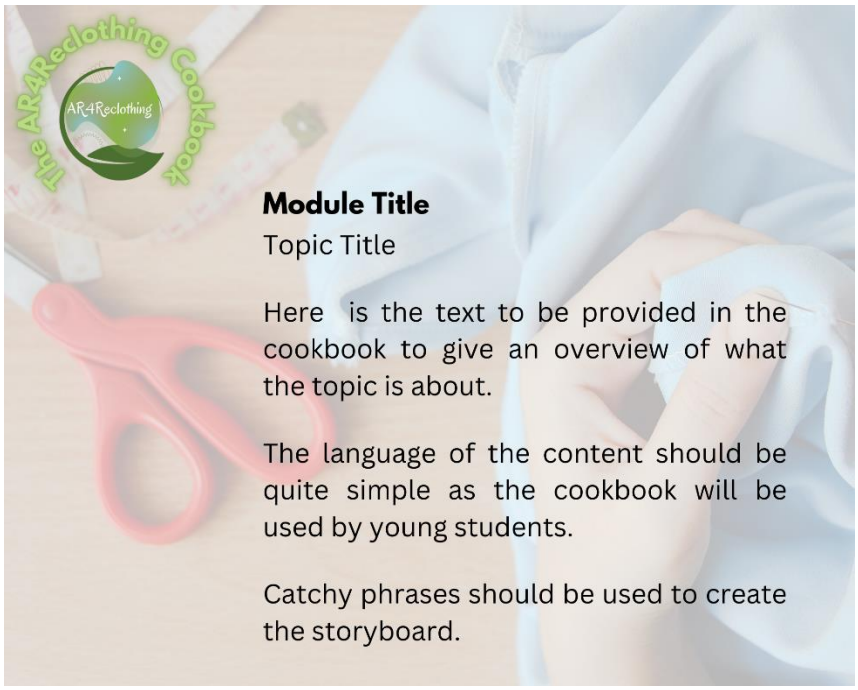

Image 2. Example pages of AR4Reclothing Cookbook for the AR App Users

To access the digital content, players must scan the image associated with a particular topic. The digital content can take the form of informative text or images providing further details about the topic or a brief 1-minute video related to it. Usage of YouTube for video content should be avoided.

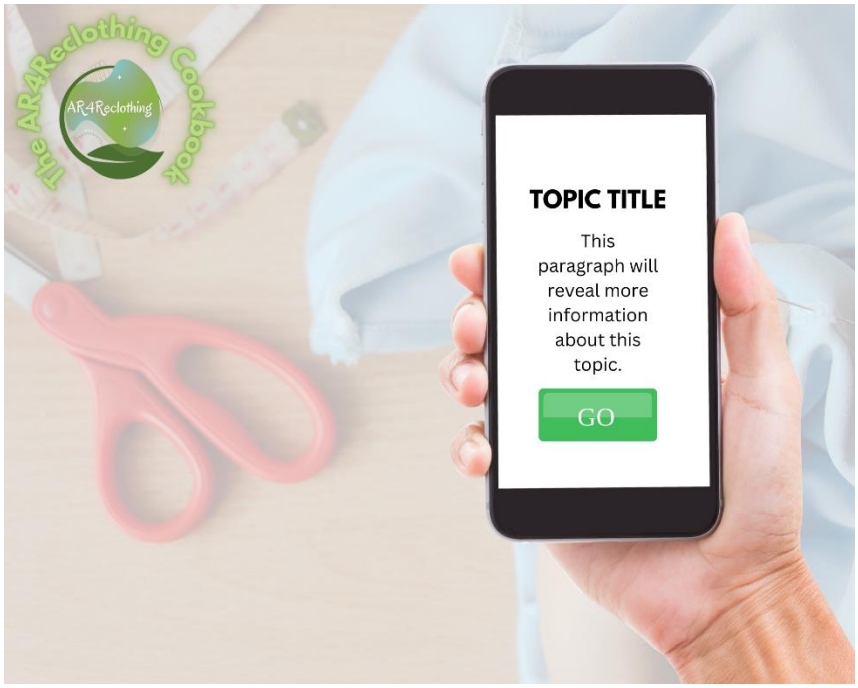

Image 3. Example of Digital Content of the AR App

The user can return and scan another image from the cookbook. The objective is to scan all the cookbook's images to acquire the most comprehensive understanding of each subject.

2.4 The AR4Reclothing AR App Specification

The augmented reality (AR) app will be compatible with Android smartphones (version 11+) and will offer content in the following languages:

- English
- Dutch
- Greek
- Spanish
- Romanian
- Latvian
- Polish

2.4.1 Registration

After downloading the app, users must register and choose an avatar for their profiles.

The specific steps are:

2.4.1.1 Screen 1: Landing Page

An introductory video (in mp4 format) featuring a brief overview of the project is displayed. The video, lasting up to one minute, will automatically play when a user launches the application for the first time. A 'next' button will guide users to the subsequent screen.

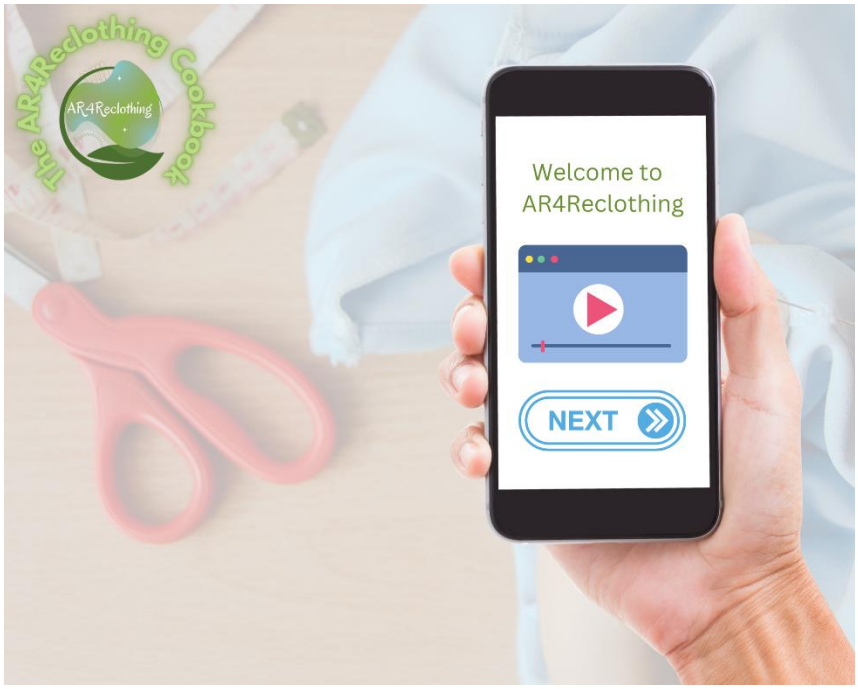

Image 6. Landing Page of the AR App

2.4.1.2 Screen 2: Registration Page

To create an account, users must provide their basic information, including the following required fields:

- Username
- Email
- Password

- Age group
- Country
- Preferred language

Before completing their profile, users must agree to the project's Privacy Policy. The Privacy Policy will be displayed in a separate window. Afterward, learners can choose an avatar from a selection of options. These avatars should represent adult professionals of various genders and ethnic backgrounds.

Image 7. Registration Page of the AR App

The selected avatar representing the user profile will be displayed in the top left or right corner of the game and will remain visible throughout gameplay. The user's profile will maintain their scores (points from scanned scenarios) and the total number of scanned images. Additionally, a button will be available for users to change languages.

2.4.2 Point System

The application consists of five (5) sections, with twenty-five topics in total. Consequently, a total of 25 scenarios will be created. Every scenario will contain:

- an educational text appearing in the book
- digital content in format of text, image or video.

Each scanned scenario is worth 4 points. Therefore, the highest score a user can achieve is 100 points. Each image or scenario can only be scanned one time. The player can navigate freely through the app

and finish the game anytime through a 'Finish' button that will be available throughout the game right next to the avatar icon.

2.4.3 Badge / Reward

When the game is finished (all scenarios have been scanned), players will receive a trophy in the form of an AR face filter. Depending on the number of visited scenarios, a distinct trophy will be awarded, as follows:

Image 8. Reward Page of the AR App

2.4.4 Results Page

After finishing the game, a results page will be shown, which includes (refer to the 'Rating functionality' page image):

- Duration of gameplay.
- Total number of scenarios scanned.
- Earned badge.

From the results page, users can choose to restart the game. If they do, all data and progress will be erased. By clicking on the badge reward page, the results page will be displayed, presenting the time

spent in the game and the number of correct answers. Additionally, users can opt to restart the game from the beginning at this stage.

2.4.5 Profile Page

During the game, by clicking on the avatar displayed on the screen, the player can access their profile page.

Image 9. Profile Page Icon

The profile page will display the following details:

- A button labelled "Show Results" which will take you to the results page.
- The badge that has been earned.
- A button to return to the game.
- A button to log out.

Image 10. Profile Page of the AR App

2.4.6 Rating Functionality

Users will have the option to give feedback on the likability of the game by rating their experience on a scale of 1 to 5 stars on the results page.

3. Conclusion

In conclusion, our partnership has developed a comprehensive design document for an AR app game that offers a unique and immersive experience for users. We have provided a clear vision for the team. Using AR technology, we aim to create a game that seamlessly blends the real world with the virtual, encouraging users to explore and interact with their surroundings. We believe that this game has the potential to be a hit in the industry, and we are excited to see it come to life. With a solid design foundation in place, we look forward to working with each other to bring this AR app game to fruition.

3. References

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