EcoPath
An Interactive Educational Mobile Application for Sustainable Development Goals (SDGs)

Introduction

EcoPath is an innovative mobile application designed to educate students about the 17 Sustainable Development Goals (SDGs) set by the United Nations. By utilizing cutting-edge technologies such as Augmented Reality (AR) and Artificial Intelligence (AI), EcoPath delivers an immersive and interactive learning experience. The app combines multimedia content, interactive quizzes, AR experiences, and AI-powered search tools to engage students with sustainability topics in meaningful ways. Educators can also benefit from features that allow them to monitor student progress and customize their teaching approach.

This proposal outlines the objectives, features, technological framework, and resources behind EcoPath. It also highlights the enriching experience our team had during the hackathon, which greatly contributed to the app's development. Additionally, this proposal provides context on the origins and significance of the SDGs.

Background: The Sustainable Development Goals (SDGs)

The **Sustainable Development Goals (SDGs)** are a universal call to action adopted by all United Nations (UN) Member States in 2015 as part of the 2030 Agenda for Sustainable Development. These 17 interconnected goals aim to address the world's most pressing challenges, including poverty, inequality, climate change, environmental degradation, peace, and justice. The SDGs are designed to guide global efforts toward a better, more sustainable future for all.

The SDGs build upon the progress made by the **Millennium Development Goals (MDGs)** (2000-2015), which focused primarily on reducing extreme poverty, improving education, and combating diseases. Recognizing the need for a more comprehensive and inclusive framework to address global challenges, the UN developed the SDGs as a broader, more holistic approach. Each of the 17 goals comes with specific targets (169 in total) and measurable indicators to track progress over time, ensuring that all countries can contribute toward achieving these global objectives.

The SDGs emphasize the importance of collaboration between governments, businesses, civil society, and individuals. Education is seen as a critical component in driving awareness and action toward the SDGs, which is where EcoPath fits in. By educating students about these goals and empowering them with interactive tools, EcoPath contributes to raising global awareness and inspiring actions that will help achieve the SDGs by 2030.

Project Overview

EcoPath seeks to offer an engaging way for students to explore the SDGs, combining traditional educational content with advanced technologies like AR and AI. The integration of these technologies turns abstract sustainability challenges into interactive, hands-on learning experiences. Students can explore topics in real time, interact with AR models, and use AI tools to enhance their learning experience. At the same time, teachers are empowered with tools for tracking student progress and customizing lessons to suit classroom needs.

The inspiration and development of EcoPath were further strengthened during a hackathon, where our team thrived in the collaborative and fast-paced environment. The experience fueled our creativity, and we were motivated by the shared passion for technology and sustainability that surrounded us.

Objectives

EcoPath was designed to meet several key objectives:

- **To educate students** about the SDGs through interactive multimedia content, AR experiences, and AI-powered tools.

- **To integrate real-time data** and AI to help students engage with up-to-date sustainability issues.

- **To provide educators** with the ability to track progress, customize learning paths, and assess student engagement.

- **To empower students** by encouraging them to search for and explore SDG-related topics through AI-powered interactive tools.

Features of EcoPath

EcoPath offers an innovative suite of features that combines traditional education methods with emerging technologies like AR and AI:

1. SDG-Centric Learning Modules

The app presents each of the 17 SDGs through detailed learning modules, incorporating text, images, videos, and AR experiences. This content allows students to explore topics like climate change, poverty, and inequality in a visually dynamic way. The integration of AR gives students the opportunity to interact with 3D models that represent global sustainability challenges.

2. AI-Powered Search Tool

A new feature of EcoPath is the integration of an AI-powered search tool using API technologies such as the ChatGPT API. This tool enables students to engage with any SDG-related topic they wish to learn more about. For example, a student researching "ocean plastic pollution" can interact with the AI, which will provide personalized, in-depth explanations, suggest additional resources, and clarify complex concepts in real time.

The AI tool enhances the learning experience by providing instant answers to questions, recommendations for further study, and opportunities for deeper exploration into any sustainability topic, making learning more dynamic and customized to each student's curiosity.

3. Interactive Quizzes and Evaluation

Following each SDG lesson, students can take interactive quizzes to test their understanding. Teachers have the ability to create and modify quizzes based on their curriculum needs. Quizzes are designed to reinforce key concepts, promote critical thinking, and help students engage actively with the material.

4. Augmented Reality (AR) Experiences

EcoPath uses AR to enhance student interaction with sustainability topics. For example, by scanning a QR code, students can visualize 3D models of deforestation, shrinking glaciers, or rising sea levels. These AR experiences create a deeper connection between students and the global issues being addressed, making learning both engaging and memorable.

5. Progress Tracking and Analytics

The app provides students with tools to track their own learning progress, giving them a sense of achievement as they advance through the SDG modules. Teachers are provided with analytics and reports that detail student performance on quizzes and engagement with the content. This allows educators to adapt their teaching methods and focus on areas where students may need additional support.

6. Real-Time Data Integration

EcoPath integrates real-time data from trusted sources such as NASA and other global organizations. This feature ensures that students are exposed to current information on environmental changes, giving them up-to-date insights into global sustainability trends. For example, students can explore how real-time data on carbon emissions or deforestation correlates with the goals of climate action.

Resources and Data Integration

To provide students with accurate and up-to-date information, EcoPath integrates resources from leading global organizations:

- **NASA's Earth Observing System Data and Information System (EOSDIS):** EcoPath integrates real-time environmental data from EOSDIS to provide students with an understanding of changes in climate patterns, deforestation, and other global environmental factors.

- **United Nations SDG Resources:** The SDG learning modules are built upon official resources provided by the UN, ensuring that the content aligns with the specific goals and targets set by the United Nations.

- **NASA's Global Climate Change Resources:** These resources were essential for modules focused on climate change, enabling the app to present accurate and detailed information on climate trends and their impacts.

- **World Bank's SDG Atlas:** To further enhance student understanding, EcoPath uses the World Bank's SDG Atlas to incorporate regional and global statistics on SDG progress, including interactive charts that show progress toward key sustainability goals.

Hackathon Experience

EcoPath was conceptualized and developed as part of a hackathon event, where our team thrived in the creative and fast-paced atmosphere. The event fostered collaboration and inspired innovative ideas, with participants working together to push the boundaries of what technology can achieve in education and sustainability.

The energy of the hackathon was incredibly motivating. We were surrounded by like-minded individuals, all working toward creating solutions for global challenges, which created a shared sense of purpose and excitement. The event encouraged us to experiment with new technologies, such as AR and AI, and to think creatively about how we could use these tools to improve sustainability education.

Working under tight deadlines, the hackathon also taught us the importance of teamwork and adaptability. We were able to rapidly prototype key features of EcoPath, and the feedback we received from mentors and peers helped us refine and improve the app's functionality. The positive and energetic "vibes" of the hackathon left us inspired and proud of our progress, reinforcing our commitment to developing a tool that can make a real difference in education and sustainability.

Technological Framework

EcoPath is built using a robust technology stack to ensure a smooth user experience across platforms, as well as secure data handling and real-time functionality.

1. Coding Languages

- **Dart**: Used for developing the app through the Flutter framework.

- **JavaScript**: Implemented for backend services and API integration, including real-time data handling and AI search functionality.

2. Frameworks and Libraries

- **Flutter**: Allows for cross-platform development, ensuring the app works smoothly on both iOS and Android devices.

- **Firebase**: Used for user authentication, cloud storage, and real-time data management, ensuring secure and scalable infrastructure for student progress tracking.

- **ARCore/ARKit**: Powers the AR experiences for Android and iOS devices, respectively, providing high-quality 3D interactive content.

3. AI Integration

- **ChatGPT API**: The AI-powered search tool is implemented through an API like the ChatGPT API. This allows students to engage with topics they are curious about, receiving real-time, AI-generated responses to their questions, which adds depth and interactivity to the learning experience.

4. Design Tools

- **Figma**: Used for designing the user interface to ensure a smooth, user-friendly experience that is visually appealing.

Expected Benefits

EcoPath offers significant benefits for both students and educators:

1. Enhanced Learning Through AI and AR

The integration of AI-powered tools and AR experiences ensures that learning about sustainability is engaging and personalized. Students can explore complex topics with ease and clarity.

2. Customization for Educators

Educators can create tailored quizzes and track student progress, allowing for flexibility and personalization in the classroom.

3. Awareness and Action

EcoPath encourages students to explore and understand global sustainability issues. With AI-powered insights and real-time data, students can make informed decisions and take action on sustainability challenges.

Conclusion

EcoPath represents a groundbreaking approach to sustainability education, combining AR, AI, and real-time data integration to create a rich, interactive learning experience. Developed with resources from trusted organizations like NASA and the United Nations, and refined through the collaborative environment of a hackathon, EcoPath is designed to empower students and educators alike.

The inclusion of an AI-powered search tool adds another layer of engagement, allowing students to explore sustainability topics on their own terms, further enhancing their learning experience. We believe EcoPath has the potential to inspire the next generation of global citizens to take meaningful action toward achieving the SDGs.