GREENSORT AI: SMART WASTE IDENTIFICATION FOR A CLEANER, GREENER SCHOOL

1. SUBJECT MATTER EXPERT DETAILS

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2. INTRODUCTION

Google AI Studio is an AI-powered development platform that enables users to create and prototype applications using generative AI through natural-language instructions. It can support the development of simple web applications by converting ideas and functional requirements into working prototypes. For teachers and students, Google AI Studio can be used to explore AI-based problem solving, application development and digital innovation without requiring extensive programming expertise.

In this tutorial, Google AI Studio is used to create GreenSort AI – Smart Waste Identification Assistant, a simple AI-powered application designed to help school students identify different types of waste and understand where they should be placed. The application analyses an uploaded image of a waste item and provides a suggested category, a brief explanation and a general action for appropriate segregation. Through this example, learners can understand how an environmental problem can be converted into a practical AI-based solution.

The project demonstrates how generative AI can support problem identification, prompt-based application development, testing and innovation in a school context. It also encourages students to connect Artificial Intelligence with environmental awareness and responsible everyday action.

3. OBJECTIVES

By the end of this tutorial, you will be able to:

- **Understand the basic features and applications of Google AI Studio for AI-based application development.**
- **Convert a real-world environmental problem into a simple AI-based solution.**
- **Create a basic AI-powered web application using natural-language instructions.**
- **Use effective prompts to define application features, workflow and expected outputs.**
- **Test an AI application using different waste items and evaluate its responses.**
- **Apply AI responsibly while promoting environmental awareness and appropriate waste segregation practices.**

4. GETTING STARTED WITH GOOGLE AI STUDIO

Step 1: Access the platform

1. **Visit the official Google AI Studio website.**
2. **Sign in using an available Google account.**
3. **Open Build mode and select New app.**
4. **The Build mode provides a prompt-based environment for creating applications using natural-language instructions. [Google AI for Developers]**
5. **Explore the prompt area, application preview and available development options.**

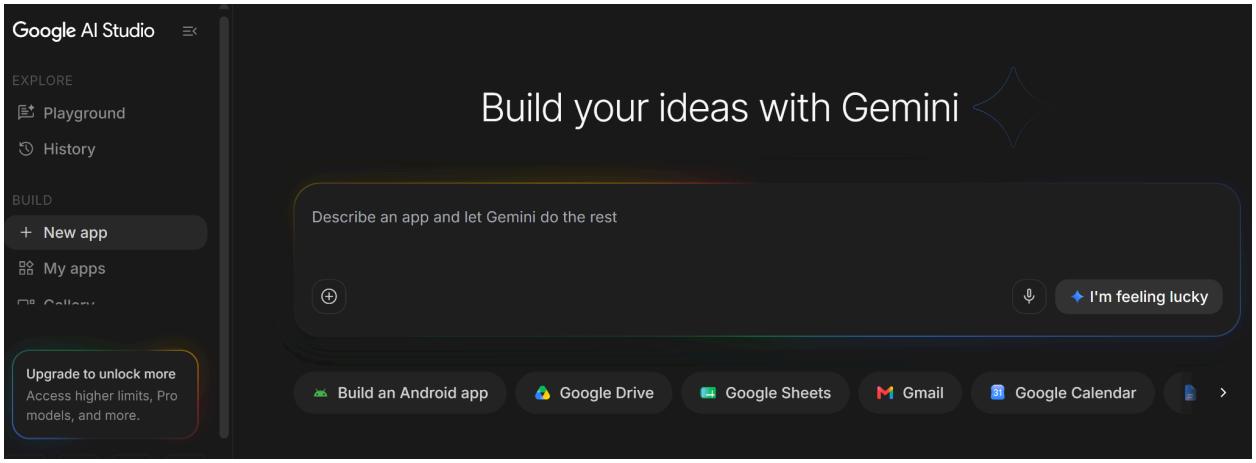

Figure 1: Accessing Google AI Studio Build mode

Step 2: Understand the interface

The main workflow involves:

- **Prompt area: Describe the application and its required features using natural-language instructions.**
- **Build: Submit the prompt and allow AI Studio to generate the application.**
- **Live Preview: View and test the working application.**
- **Code: View the generated application code when required.**
- **Refinement: Use further instructions to modify the application, improve the interface or add features.**

For GreenSort AI, the basic workflow is:

Describe the Idea → Build the App → Preview → Test → Refine

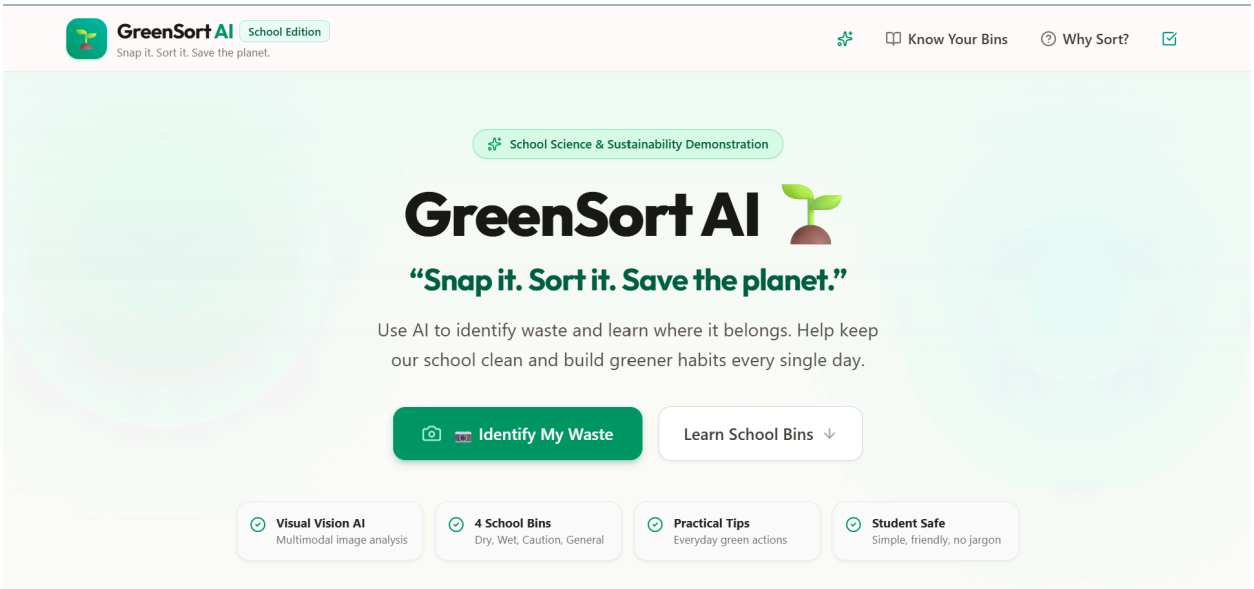

Figure 2: GreenSort AI application interface

Step 3: Create your first AI application – GreenSort AI

Consider a common school-based environmental problem:

> **Students often get confused about where different waste items should be placed.**

GreenSort AI is designed as a simple AI-powered assistant that analyses an uploaded image of a waste item and provides a suggested category, a short explanation and a general recommended action.

To create the application:

1. **Open Google AI Studio Build mode.**
2. **Enter the master build prompt describing the GreenSort AI application.**
3. **Submit the prompt and allow AI Studio to generate the application.**
4. **Review the generated application in the live preview.**
5. **Check the image-upload and analysis workflow.**
6. **Test the application using different waste items.**
7. **Refine the application through additional prompts, if required. [Google AI for Developers]**
8. **Check the generated responses for clarity and appropriateness before using the application for educational purposes.**

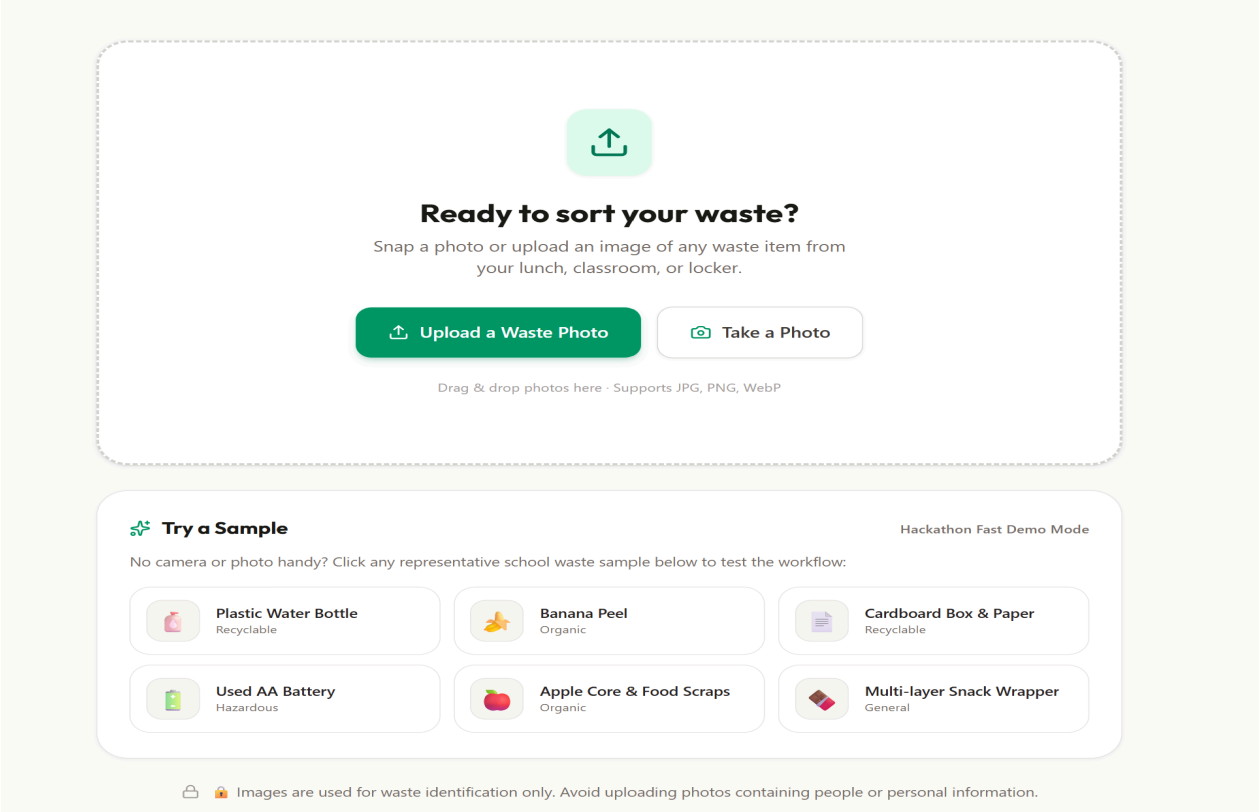

Figure 3: Uploading or capturing a waste item for analysis

Step 4: Test the application

Use representative school and household waste items to test the application.

Suggested test items:

Waste Item	Expected Category
Banana Peel	**Organic / Wet Waste**
Paper	**Recyclable / Dry Waste**
Plastic Water Bottle	**Recyclable / Dry Waste**
Broken Earphones	**E-Waste**
Used AA Battery	**Hazardous / Special Waste**

Upload one item at a time, select Analyse Waste, and review the AI-generated category and guidance

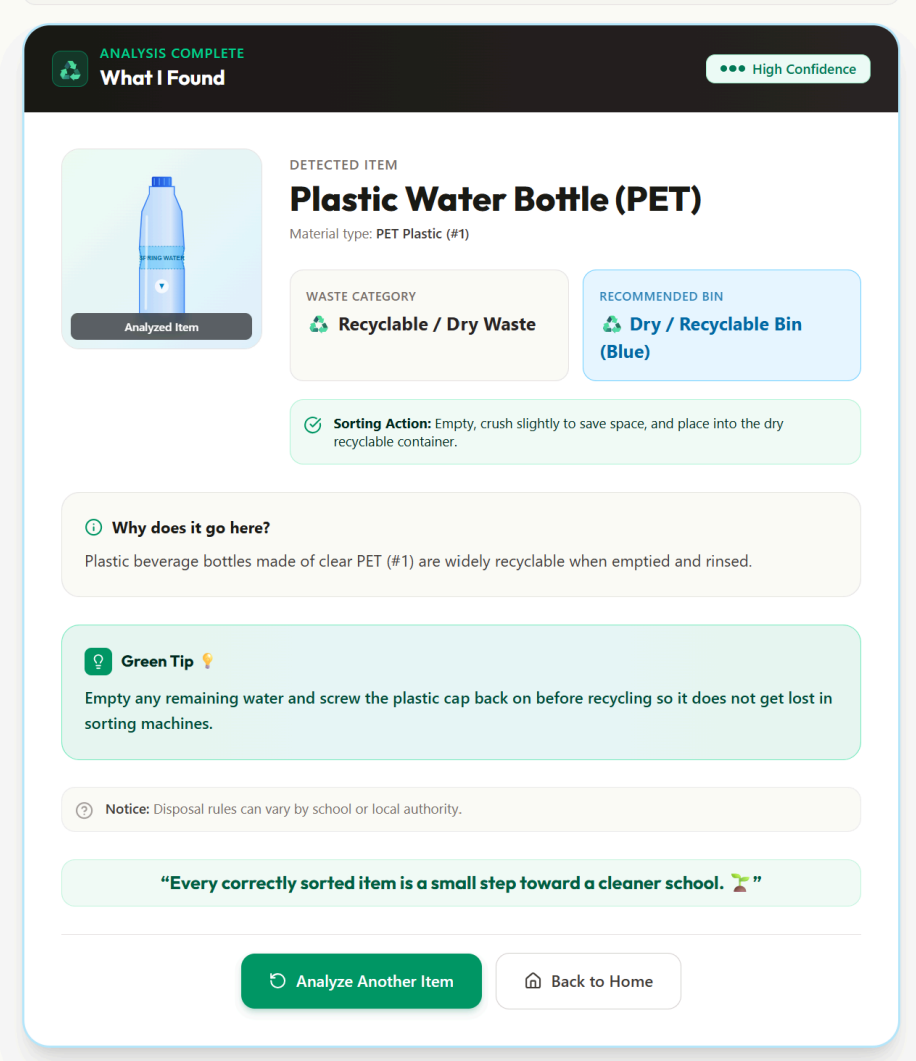

Figure 4: AI-generated waste identification and guidance

Step 5: Review and improve the application

After testing, review whether:

- **the waste item has been identified appropriately;**
- **the category is clearly displayed;**
- **the explanation is easy for students to understand;**
- **the suggested action is clear;**
- **the application communicates uncertainty when the image is unclear.**

Further prompts can be given in Google AI Studio to improve the interface or add features. AI Studio supports iterative modification of an application through natural-language instructions. [Google AI for Developers]

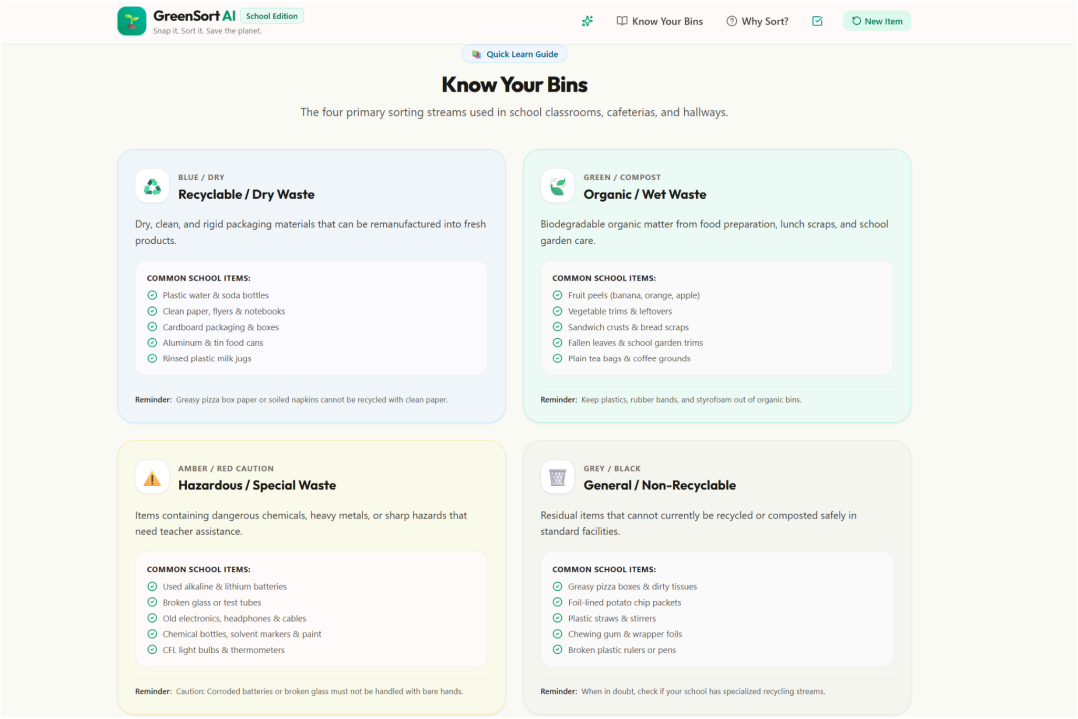

Figure 5: Waste categories and school bin guidance

5. GOOGLE AI STUDIO FOR LEARNING AND INNOVATION

A. Learning and Application Development

Google AI Studio can be used to explore Artificial Intelligence through prompt-based application development. It enables users to describe an idea, define the required features and develop a simple working prototype with the support of generative AI. It can be used to explore real-world problems, develop interactive applications, test ideas and refine solutions through iterative prompting.

The tool can be used at different stages of learning and innovation:

- **Introduction: Introduce a real-world problem or challenge.**
- **Ideation: Discuss how Artificial Intelligence can be used to address the problem.**
- **Development: Describe the application requirements using natural-language prompts.**

- **Testing: Test the generated application with different inputs and examples.**
- **Refinement: Improve the application by providing additional instructions and reviewing the results.**
- **Reflection: Evaluate the usefulness, limitations and responsible use of the developed solution.**

B. Application Example: GreenSort AI

Google AI Studio can be used to develop simple AI-powered solutions for real-world problems. One such example is GreenSort AI – Smart Waste Identification Assistant.

In this project, Google AI Studio is used to create a web application that analyses an uploaded image of a waste item and provides a suggested waste category, a brief explanation and a general recommended action.

The project follows a simple development workflow:

- **Problem Identification: Identify the difficulty students may face in recognising and segregating different types of waste.**
- **Prompting: Describe the purpose, features and expected behaviour of the application using natural-language instructions.**
- **Application Development: Use Google AI Studio to generate the working prototype.**
- **Testing: Upload different waste items and observe the AI-generated responses.**
- **Refinement: Improve the interface and functionality through additional prompts and iterative testing.**

For example, images of a banana peel, paper, plastic bottle, broken earphones and a used battery can be used to demonstrate how the application responds to different waste categories.

GreenSort AI demonstrates how a real-world environmental problem can be transformed into a practical AI-based application through problem identification, prompting, application development, testing and refinement.

C. Project-Based and Experiential Learning

Google AI Studio can support project-based learning by allowing learners to move from an idea to a working prototype. A project can begin with identifying a real problem and then progress through solution design, prompt creation, application development, testing and improvement.

For example, in the GreenSort AI project, learners can observe waste-segregation practices, identify the problem, design the required features, develop the application, test it with different waste items and discuss the accuracy and usefulness of the results.

This approach can help learners develop:

- **problem-solving skills;**
- **computational thinking;**
- **prompt-writing skills;**
- **creativity and innovation;**
- **digital application development skills;**
- **critical evaluation of AI-generated outputs.**

The developed application can also be extended with additional features such as multilingual support, awareness messages, activity-based learning and simple gamification such as Green Points.

6. RESPONSIBLE AND ETHICAL USE

AI-generated applications and outputs must be reviewed and tested before educational use. The following practices should be followed while developing and using GreenSort AI:

- **Verify AI-generated classifications and recommendations before relying on them for actual waste-management decisions.**
- **Avoid uploading confidential information, identifiable student information or unrelated personal data to AI platforms.**
- **Follow age requirements, school policies and applicable privacy and data-protection guidelines.**
- **Use only appropriate and authorised images and resources during demonstrations and project development.**
- **Do not treat AI-generated waste classifications as a substitute for official waste-management guidelines or human judgment.**
- **Encourage learners to observe, question and verify the AI-generated results rather than accepting them without evaluation.**
- **Inform users that image-based AI analysis may sometimes produce incorrect or uncertain results, particularly when the image is unclear or contains multiple objects.**
- **Follow local municipal and authorised waste-management instructions, especially for e-waste, batteries and other special waste categories.**
- **Use the application as an educational awareness and learning tool rather than as a legally authoritative waste-disposal system.**

The application should be reviewed periodically to ensure that its classifications, instructions and user-facing information remain appropriate. Responsible use of

AI also requires transparency about its limitations and meaningful human oversight.

7. CONCLUSION

Google AI Studio provides a practical way to explore Artificial Intelligence through prompt-based application development and working prototypes. It can support problem identification, solution design, application creation, testing and iterative refinement.

In this tutorial, GreenSort AI – Smart Waste Identification Assistant demonstrates how a simple environmental problem can be transformed into an AI-based application. The prototype allows users to upload an image of a waste item, receive a suggested category, understand the reason for the classification and view a general recommended action.

The project provides an opportunity to connect Artificial Intelligence, environmental awareness, problem-solving and digital innovation through a practical hands-on activity. It can be used as a starting point for further projects involving sustainability, waste management and responsible technology use.

The educational value of such a project depends on thoughtful prompting, meaningful problem selection, testing of the application, human verification and responsible use. AI should support creativity, problem-solving and informed decision-making, not replace human judgment.

8. REFERENCES

- **Google AI Studio – Official Website: https://aistudio.google.com/**
- **Google AI for Developers – Build with Google AI Studio: https://ai.google.dev/gemini-api/docs/aistudio-build-mode**
- **GreenSort AI – Smart Waste Identification Assistant: https://greensort-ai.ai.studio/**
- **Central Pollution Control Board (CPCB) – Official Website: https://cpcb.nic.in/**
- **SCERT Uttarakhand Hackathon 3.0 Concept Guidelines: https://innovateuttarakhand.com/event/hacathon-3.0**