

# Project Brief

## Product-based Capstone Project

**Website EcoPlan**

**Product Capstone**

**Team ID** : C242-PR602

**Selected Themes/Case** : Sustainable Futures: Nurturing harmony between humanity and ... ▾

**Mentor Name** : Wahyu Ramadhan, done (November 14, 2024)  
Nuikita Wachid, done (November 24, 2024)

**Member Name** :

1. C227B4KY0420 - Alvian Hidayat - Universitas Jember - Learn - Cloud Computing - active
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5. M225B4KY4550 - Yossi Rifky Shabara - Universitas Islam Sultan Agung - Machine Learning - active
6. A312B4KY0676 - Arya Jati Yudha Perwira - Universitas Sebelas Maret - Mobile Development - inactive

# Project Brief

## Product-based Capstone Project

### BACKGROUNDER:

The EcoPlan project is targeted at the resolution of the biggest problem in waste management, expected to reach 11.3 million tons of unmanaged waste by 2024, and the threatening rate of plastic pollution reaching 23-27 million tons by 2040, so technology-based innovations are urgent for application. EcoPlan is an image detection technology application that shows the kind of waste through the photos uploaded by users. The algorithmic model of this technology undergoes training with a data set of images of all varieties of waste, like plastic, organic, and metal wastes. After detection, this app is to provide practical guidance in helpful tutorials on how to separate or sort these wastes. Besides the automatic waste detection feature, EcoPlan also provides educational content in the form of waste processing videos and tips for household waste management. In addition, in an effort to increase user participation more and more, this app is enriched with an incentive system in the form of a point exchange system which can be exchanged for rewards that are quite attractive. Through this feature, the community will contribute to being more active in sorting and managing waste independently.

The stages of project implementation are the development of the image detection technology using a framework like TensorFlow or Keras, followed by testing the application with environmental communities to assess the accuracy of the detection and user experience. Next, the application will be launched through an environmental awareness campaign, with support from collaboration with local governments, waste banks, and environmental care communities.

The expected outcomes of this project are increased awareness and ability of the community in waste sorting, reduced amount of unmanaged waste, and accelerated achievement of national waste management targets. With an intuitive and educational technology-based approach, EcoPlan can become a strategic solution to support Indonesia in facing the challenges of waste management and plastic pollution in the future.

1. Machine Learning: Training the model using TensorFlow and Keras with the prepared dataset. The model is saved in .h5 format to be integrated into the application later. In addition, we also conduct model evaluation to ensure performance before deploying it to the server by the Cloud Computing team using Flask.
2. Web Development: Developing responsive web-based applications for various devices such as laptops, mobile phones, iPads, and tablets. The applications use real-time connections with Firebase to store and manage data, and have a data buffer feature to remain usable even without an internet connection.
3. Cloud Computing: Implementing a backend server using Flask to host the machine learning model created by the ML team. The backend is equipped with an API to receive prediction requests from the web application and send back real-time

# Project Brief

## Product-based Capstone Project

prediction results to provide an optimal user experience. In addition to the prediction API, the backend will also manage data with a relational database using Google Cloud SQL to ensure data is stored in a structured, secure, and easily accessible manner.

**PROJECT STATUS** (Select One):

1. 90% Completed

# Project Brief

## Product-based Capstone Project

### TECH STACK CHECKLIST

#### A. Main Quest

##### 1) Machine Learning Stack

- Utilize ~~TensorFlow architecture~~ for building machine learning models.
- Vertex AI can only be used if you intend to build Generative AI.

##### 2) Cloud Computing Stack

- Utilize ~~Google Cloud services~~ to support application needs, such as:
  - Compute services for hosting APIs or other web services.
  - Database services for database applications.
  - Storage services for storing data, etc.
- Utilize ~~Google Cloud services~~ for the machine learning workflow, including analysis, training, and serving models. For example:
  - Use computer services for hosting machine learning deployments.
  - Utilize data services for data solutions, etc.
- Build ~~cloud architecture~~ to illustrate all necessary components and technologies required by the applications and machine learning models.
- Calculate the costs via [Google Cloud Pricing Calculator](#) to avoid sudden credit running out, and use the minimum costs.
- Manage access to your Google Cloud Project to ensure only the Cloud Computing team has access and can manage the costs.

#### B. Recommendation Quest (Optional)

Kindly explain which features or tech were completed to make your project more advance (if any)

#### SCREENSHOTS/DEMO VIDEO:

# Project Brief

## Product-based Capstone Project

**Log in to your account.**

**Login**

Don't have an account? [Create Account](#)

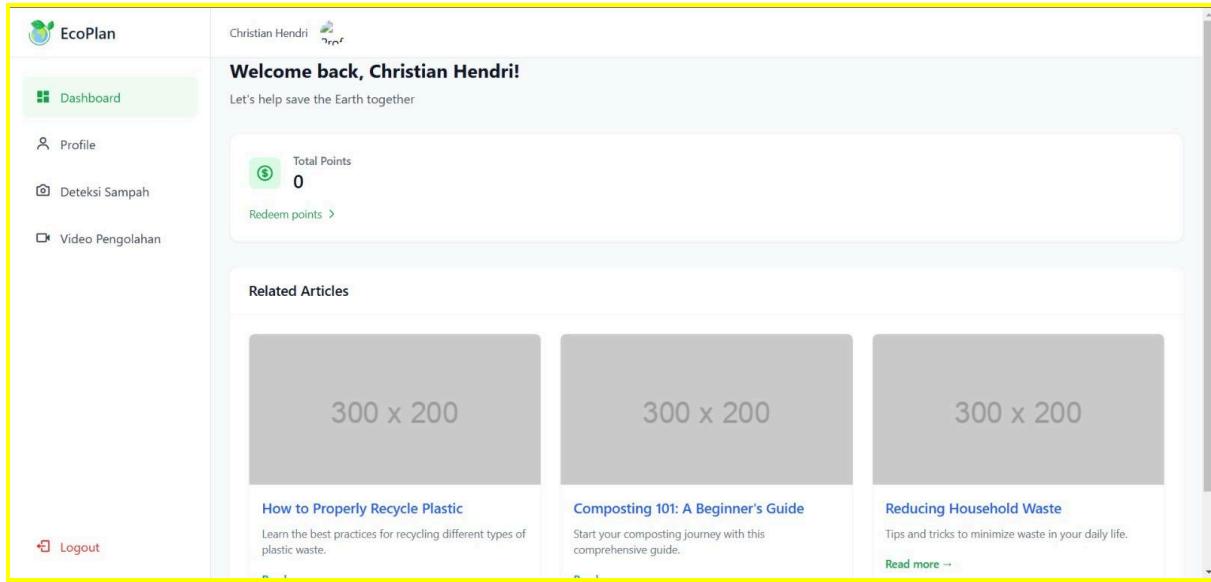
**Create new account.**

**Create account**

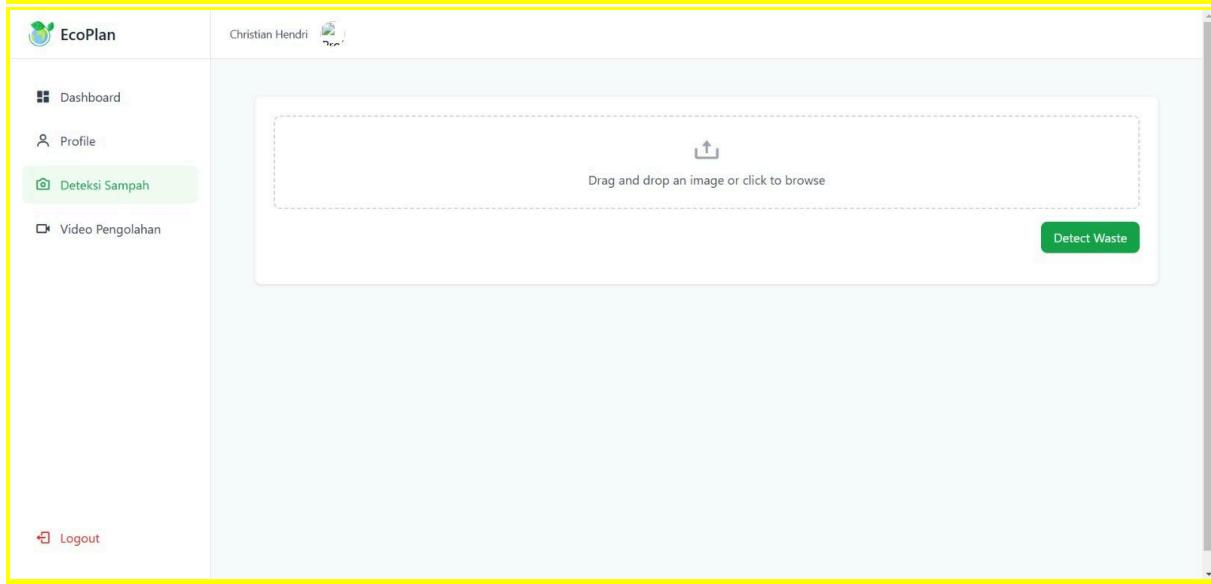
Already have an account? [Log In](#)

# Project Brief

## Product-based Capstone Project



The screenshot shows the EcoPlan dashboard for Christian Hendri. The sidebar includes links for Dashboard, Profile, Deteksi Sampah, Video Pengolahan, and Logout. The main area displays a welcome message, total points (0), and three related articles: "How to Properly Recycle Plastic", "Composting 101: A Beginner's Guide", and "Reducing Household Waste".



The screenshot shows the EcoPlan waste detection feature. The sidebar includes links for Dashboard, Profile, Deteksi Sampah, Video Pengolahan, and Logout. The main area features a dashed box for image upload with the instruction "Drag and drop an image or click to browse" and a "Detect Waste" button.

# Project Brief

## Product-based Capstone Project

EcoPlan

Christian Hendri

Dashboard

Profile

Deteksi Sampah

Video Pengolahan

Logout



Remove image

Detect Waste

EcoPlan

Christian Hendri

Dashboard

Profile

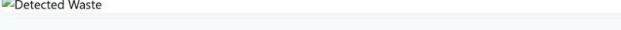
Deteksi Sampah

Video Pengolahan

Logout

### Detection Result

Analysis of your waste image



Detected Waste

**Detection Details**

Waste Type  
**Inorganic**

Points Earned  
+10 points

**Handling Recommendations**

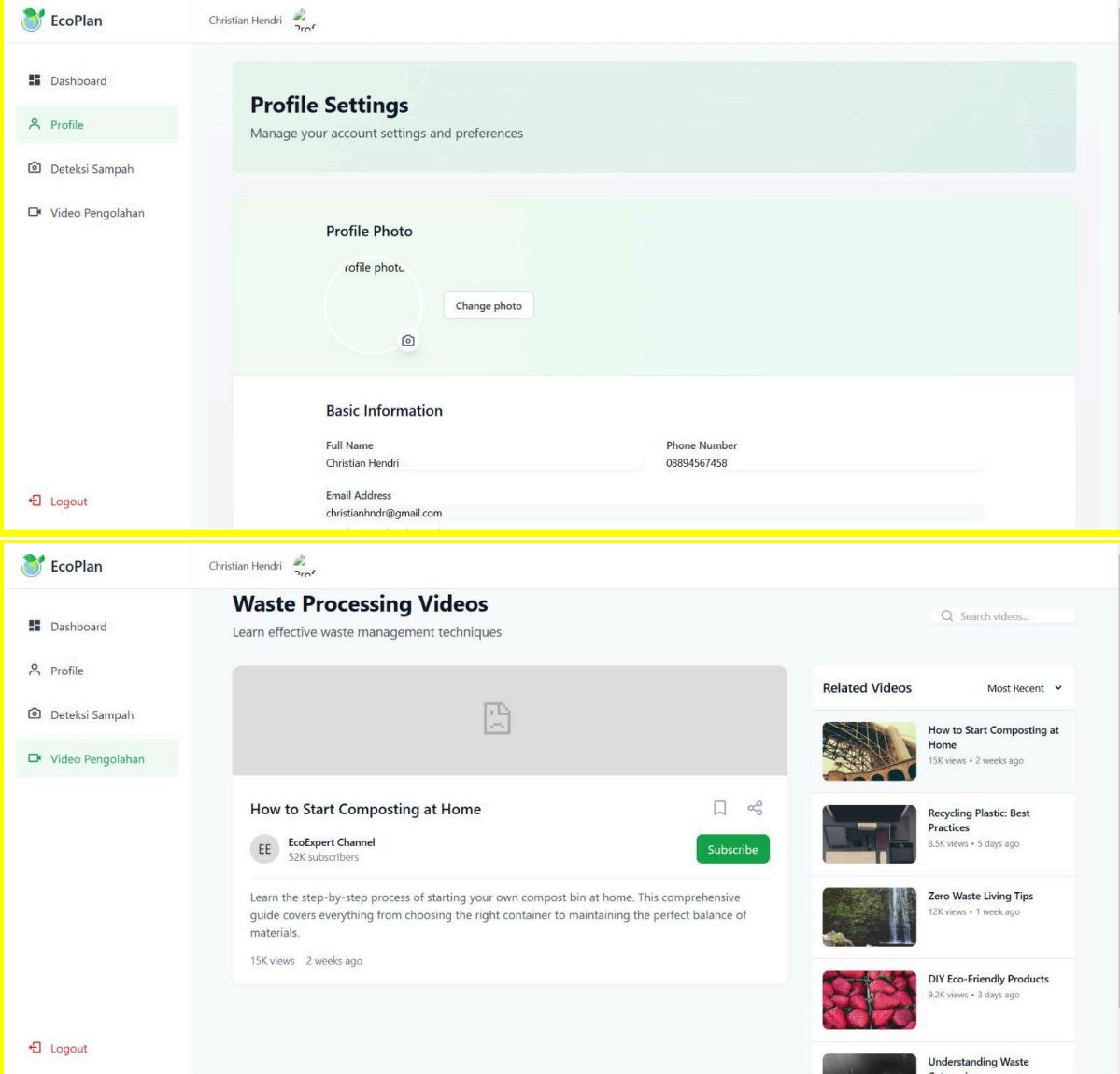
Plastic waste can be recycled to make new plastic products.

Keep Supporting Us to Save The Earth!

Back to Dashboard Detect Another

# Project Brief

## Product-based Capstone Project



The screenshot displays two pages of the EcoPlan application, both featuring a yellow border.

**Profile Settings Page:**

- Left Sidebar:** Includes links for Dashboard, Profile (highlighted in green), Deteksi Sampah, Video Pengolahan, and Logout.
- Header:** Shows the user name Christian Hendri and a profile picture.
- Content Area:**
  - Profile Photo:** A placeholder for a profile photo with a "Change photo" button.
  - Basic Information:** Displays Full Name (Christian Hendri), Phone Number (08894567458), and Email Address (christianhndr@gmail.com).

**Waste Processing Videos Page:**

- Left Sidebar:** Includes links for Dashboard, Profile, Deteksi Sampah, Video Pengolahan (highlighted in green), and Logout.
- Header:** Shows the user name Christian Hendri and a profile picture.
- Content Area:**
  - Section Header:** Waste Processing Videos. Subtext: Learn effective waste management techniques.
  - Video Preview:** "How to Start Composting at Home" by EcoExpert Channel (52K subscribers). It shows a thumbnail of a compost bin, a "Subscribe" button, and stats: 15K views, 2 weeks ago.
  - Related Videos:** A list of four videos:
    - How to Start Composting at Home (15K views, 2 weeks ago)
    - Recycling Plastic: Best Practices (8.5K views, 5 days ago)
    - Zero Waste Living Tips (12K views, 1 week ago)
    - DIY Eco-Friendly Products (9.2K views, 3 days ago)

**DATASET LINK:**
<https://www.kaggle.com/datasets/mostafaabla/garbage-classification>
[https://drive.google.com/file/d/1wN0ns7nzZB6Zkl7rQEzGXz1LVt8A1apR/view?usp=drive\\_link](https://drive.google.com/file/d/1wN0ns7nzZB6Zkl7rQEzGXz1LVt8A1apR/view?usp=drive_link)
**DEPLOYED LINK:**
[https://docs.google.com/document/d/1I2-pESHdo2yg\\_AdGSLgEvHAy8FBYYTlw7NIhWUQ9Dyl/edit?tab=t.0](https://docs.google.com/document/d/1I2-pESHdo2yg_AdGSLgEvHAy8FBYYTlw7NIhWUQ9Dyl/edit?tab=t.0)

# Project Brief

## Product-based Capstone Project

**GITHUB REPO LINK:**

[https://github.com/Shinta505/EcoPlan-Product\\_Capstone\\_Project-Bangkit2024](https://github.com/Shinta505/EcoPlan-Product_Capstone_Project-Bangkit2024)

**10-MIN VIDEO PRESENTATION LINK:**

<https://youtu.be/kBf8GK6YnS4>

**SLIDE PRESENTATION LINK:**

[https://www.canva.com/design/DAGZFe4bhb0/z\\_DYhoM3z3arhYwt5BeNMA/edit?utm\\_content=DAGZFe4bhb0&utm\\_campaign=designshare&utm\\_medium=link2&utm\\_source=sharebutton](https://www.canva.com/design/DAGZFe4bhb0/z_DYhoM3z3arhYwt5BeNMA/edit?utm_content=DAGZFe4bhb0&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton)

**GO-TO-MARKET PROPOSAL****a. TARGET MARKET**

- Characteristics
  - Environmentally Conscious Users: People who are enthusiastic about reducing waste, promoting recycling, and contributing to environmental preservation.
  - Tech-Savvy Individuals: Users who are comfortable using technology and mobile/web applications.
  - Educated Consumers: Individuals who want to learn more about waste management and its impact on the environment.
  - Urban and Suburban Residents: Likely to generate more waste and have access to technology to track and manage it.
- Age Range

15-45 years : Targeting individuals within a wide age range, who care about environmental sustainability and are open to using technology to solve everyday challenges.
- Why the Target Market Needs This Solution
  - Addressing the Problem: The lack of accessible tools to identify waste, understand proper disposal methods, and motivate recycling.
  - Increased Awareness: A growing global focus on sustainability and individual responsibility towards environmental preservation.
  - Empowerment through Education: Providing information and tools to help users adopt environmentally friendly habits.
  - Rewarding Action: Encouraging recycling by offering tangible benefits such as redeemable points.
- Goals and Stakeholders

# Project Brief

## Product-based Capstone Project

**Care-Oriented Goals:** Reducing environmental waste, educating users, and promoting sustainable practices.

**Stakeholders:**

- Government Agencies: Benefit from reduced landfill waste and better compliance with environmental regulations.
- Non-Profit Organizations: Partnering to raise awareness and promote recycling initiatives.
- Local Community: Empowered to adopt waste management practices.
- Business: Potential collaboration for award and partnership programs.

### b. MARKETING STRATEGY

#### 1. Social Media Campaign

- Targeted ads on platforms like Instagram, Facebook, and TikTok to reach users who care about the environment and are tech-savvy.
- Interactive content: Waste management tips, user testimonials, and success stories.

#### 2. Partnerships with Environmental Communities

- Collaborate with environmentally friendly organizations and non-profits to promote the application.
- Hold workshop events to introduce the application to the community.

#### 3. User Testimonials

- Collecting and displaying user stories to build credibility and highlight the impact of the application.
- Video reviews and success stories are shared through social media and application platforms.

### c. COMPARISON WITH SIMILAR SERVICE/APPS (if any)

- Similarity percentage
- Waste Detection: It has been implemented by several applications, but it remains a niche feature with limited adoption.
- Educational Content: Many platforms offer educational videos, making it a common yet important feature.
- Points that Can Be Redeemed: Rarely used in similar applications, offering a unique incentive to increase user engagement.
- Analysis of the different or unique

# Project Brief

## Product-based Capstone Project

- Integration of Various Features: Combining waste detection, education, and a reward system, creating a holistic solution.
- Gamification: Providing incentives for environmentally friendly actions through redeemable points is a standout feature.
- Local Impact: Focus on local waste management regulations and community-specific challenges.

### d. SWOT Analysis of the project

- **Strengths**

- Innovative Features: Combining waste detection, educational content, and gamification.
- Social Impact: Raising environmental awareness and promoting sustainability practices.
- User-Friendly Interface: Designed to be accessible to all demographics.

- **Weaknesses**

- High Initial Costs: Requires a significant investment for development, testing, and marketing.
- Limited Initial Reach: Early adoption may be restricted to certain demographics.

- **Opportunities**

- Global Awareness: The increasing focus on sustainability and eco-friendly solutions provides a fertile market.
- Scalable Model: Opportunities to expand features, such as waste pickup scheduling or integration with smart bins.
- Strategic Partnerships: Collaboration with local governments, NGOs, and businesses for rewards and outreach.

- **Threats**

- Market Competition: The potential emergence of similar applications with more advanced features.
- Technological Challenge: Maintaining high accuracy in waste detection and ensuring smooth functionality.
- User Retention: Maintaining user interest and engagement after initial adoption.

### MENTORING REMARK(S), IF ANY:

1. Advisor Project Management (Nuikita Wachid)

# Project Brief

## Product-based Capstone Project

- It is necessary to create a more specific background, for example, based on community complaints or needs (e.g., neighbors who are reluctant to sort waste).
  - It is important to highlight concrete benefits for users, such as the reasons why sorting waste is important.
  - Add a feature that provides waste management suggestions after detection. (contoh: mengolah sampah organik menjadi pupuk).
  - Focus on specific user targets, such as students, to support campus cleanliness.
  - Prioritize the main features first to align with the available time and capacity.
  - Ensure the project schedule is more detailed with time allocations for each feature.
  - Consider eliminating the non-essential login process so that users are directed straight to the main features.
  - Add interactive elements such as a welcome greeting and educational information about the environment.
  - Waste sorting can be simplified into two categories: organic and inorganic.
  - Focus on features that have a significant impact and align with the available time priorities.
  - Maintain dedicated time for the project, for example, within a specific time frame each day.
  - Hold meetings and follow up on progress at least once a week, and report developments to all team members.
2. Advisor Mobile Development (Wahyu Ramadhan)
- Focus on creating the application first, don't get too caught up in the design so that time isn't wasted.
  - Create a flowchart to map the flow of the simple website that will be built, or you can also use UML to illustrate the relationships between elements.
  - To learn UI/UX design and UML, it is recommended to explore independently.
  - There's no need to worry too much about UI/UX design because your main role is as a programmer.

**Did the implemented capstone project differ from the original plan, and if so, how did these changes impact the project's success and outcomes?**

Yes, there was a change in our capstone project. Initially, we planned to add a notification feature to remind users to recycle or sort their waste. However, we decided to remove this feature due to time constraints. Despite this, the overall application was developed according to the original plan, and we successfully implemented the core functionalities. The decision to remove the notification feature did not significantly affect the overall success and outcomes of the project, as the primary goals were still achieved.