TAYLOR'S UNIVERSITY

Wisdom · Integrity · Excellence

# ITS 63504 Human Computer Interaction

# ASSIGNMENT 2

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|---|---|
| **HAND OUT DATE:** | **28 April 2025 (week 2)** |
| **HAND IN DATE:** | **14 July 2025 (week 13)** |
| **WEIGHTAGE:** | **40%** |

**Instructions to students:**

The assignment should be attempted in groups of 3-5.

Complete this cover sheet and attach it to your assignment – this should be your first page!

| **Student declaration:** |
|---|
| ***I declare that:*** <br>▪ ***I understand what is meant by plagiarism*** <br>▪ ***The implication of plagiarism have been explained to us by our lecturer*** <br>***This project is all our work and I have acknowledged any use of the published or unpublished works of other people.*** |

| **Names of Group Members** | |
|---|---|
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*Avoid copy and paste job in your report and it is considered as plagiarism. Plagiarism in all forms is forbidden. Students who submit plagiarised assignment will deserved a 0 marks.*

## 3.0 Marking Scheme

| Criteria | Marks (10 marks for each criterion below) | | | |
|---|---|---|---|---|
| | **Excellent (10-9)** | **Good (8-7)** | **Average (6-4)** | **Poor (3-1)** |
| 1.0 Vision, mission and problem definition, proposed scenario, target audience selection | | | | |
| 2.0 Solution and innovation, social impact, conclusion and future enhancement | | | | |
| 3.0 Technical diagram on the overall system architecture, and integration with at least 3 latest IT technologies | | | | |
| 4.0 Scope definition and functional requirements | | | | |
| 5.0 Presentation - Language and Delivery<br>✔grammatical accuracy<br>✔fluency<br>✔pronunciation<br>✔intonation<br>✔volume and pace | | | | |
| 6.0 Expression and Body Language Delivery<br>✔confidence and enthusiasm<br>✔ positive non-verbal body language (eye contact, poise and gestures)<br>✔connection with audience | | | | |
| 7.0 Discuss your design rationale - Strengths and weakness of the final design, and alternative design ideas | | | | |
| 8.0 Group analysis - strengths and weaknesses of the project team, and lessons learnt about teamwork | | | | |
| 9.0 Design and develop a user interface that incorporates visual and audio techniques used for a local organisation using a standard Application Programming Interface (API), e.g. OpenGL, etc. | | | | |
| 10.0 Software prototype (high fidelity alpha version prototype is required) | | | | |
| **SUB-TOTAL (100 marks)** | | | | |
| **Total Marks (40 marks)** | | | | |
| Lecturer's Feedbacks: | | | | |

**All the best!**

# Table of Content

# 1. Introduction

EcoSort is an intelligent waste-sorting mobile application developed to promote environmental responsibility through accessible education and engaging features. The platform is designed to motivate individuals, families, and communities to adopt green waste management practices in their daily lives.

By leveraging gamification, AI-based recommendations, and location-based recycling data, EcoSort encourages users to make informed decisions that reduce environmental impact. Its development is aligned with the principles of Sustainable Development Goal (SDG) 12: Responsible Consumption and Production.

**Background**

**Global Waste Crisis**

According to the World Bank, over 2.01 billion tonnes of municipal solid waste is produced annually, with 33% not being treated in an environmentally safe manner (Kaza et al., 2018). This figure is expected to rise to 3.4 billion tonnes by 2050 (World Bank, 2018). Poor waste management contributes to:

- Ocean pollution
- Overflowing landfills
- Harmful emissions
- Long-term ecological damage

**Problem**

**Lack of Awareness and Accessibility**

Despite increased environmental awareness, many individuals remain unsure about:

- How to differentiate between general, recyclable, and special waste
- Proper disposal of complex packaging or e-waste
- Local recycling guidelines and infrastructure

In addition, existing recycling tools are often static, non-interactive, and unengaging. Most current applications fail to create meaningful change due to:

- Lack of user motivation
- Absence of feedback mechanisms
- Limited accessibility for families and educators

**Vision**

Our vision is to foster a generation of eco-conscious citizens who practice responsible waste disposal. We believe that by instilling environmental awareness at a young age, we can create a long-lasting culture of sustainability within communities.

EcoSort aims to transform environmental learning into a simple, convenient, and enjoyable activity. The application serves as a catalyst for behavioral change, bridging the gap between environmental ideals and everyday actions.

**Mission**

EcoSort's mission is to deliver an inclusive and educational mobile platform that helps users understand how to sort and recycle their waste accurately. By integrating emerging technologies, gamified learning paths, and a human-centered design, EcoSort provides an effective tool for promoting sustainable behaviors.

We aim to embed environmental responsibility into everyday routines. EcoSort is not merely a reference tool, it is a comprehensive solution for educating, empowering, and inspiring users toward environmentally responsible living.

# 2. Solution

To address the above issues, our team developed EcoSort, an interactive mobile app that guides users through the waste sorting process in an educational and fun manner.

**Research Findings**

A survey conducted among mainly university students revealed the following:

- 75% admitted to having only a vague understanding of correct waste sorting
- 70% expressed interest in using an app to improve their recycling habits

These findings validated our hypothesis that there is a clear need for an accessible educational platform that bridges the knowledge gap in waste management.

**Key Features**

**1. Artificial Intelligence (AI) and Machine Learning Implementation:**

AI will power the core waste recognition and classification system. The app will utilize Convolutional Neural Networks (CNN) and deep learning algorithms to automatically identify waste items through image processing. Machine learning algorithms will enable personalized learning recommendations based on user behavior patterns and continuously improve classification accuracy through user feedback.

Key Features:

- Real-time waste identification with up to 98% accuracy
- Predictive analytics for waste generation patterns
- Intelligent error correction and habit formation tracking
- Automated sorting suggestions with continuous learning capabilities

**2. Augmented Reality (AR) Technology Implementation:**

AR will provide immersive, educational waste sorting experiences by overlaying digital information onto real-world objects. Users can point their smartphone camera at waste items to receive instant visual guidance showing the correct disposal bin with interactive 3D overlays.

Key Features:

- Real-time AR waste bin recommendations through camera scanning
- Interactive 3D waste sorting tutorials for enhanced learning
- Gamified AR experiences especially designed for children
- Visual contamination detection and prevention guidance

**3. Internet of Things (IoT) Integration Implementation:**

IoT sensors will connect the app to smart waste management infrastructure, enabling real-time monitoring of bin fill levels and optimization of collection routes. The system will integrate ultrasonic sensors, GPS tracking, and cellular/LoRaWAN connectivity for comprehensive waste management.

Key Features:

- Smart bin monitoring with fill-level sensors and real-time alerts
- Dynamic route optimization reducing fuel consumption by up to 29%
- Integration with municipal waste collection systems
- Real-time data transmission for operational efficiency

**4. Cloud Computing and Big Data Analytics Implementation:**

Cloud infrastructure will enable scalable data storage, processing, and analytics capabilities. The system will leverage big data analytics to identify waste generation patterns, optimize collection schedules, and provide insights for sustainable planning.

Key Features:

- Cloud-based data storage and processing for user profiles and waste data
- Big data analytics for waste trend prediction and resource optimization
- Real-time synchronization across multiple devices and user accounts
- Advanced reporting and visualization dashboards for performance tracking

**5. Blockchain Technology Implementation:**

Blockchain will ensure data integrity, transparency, and traceability in waste management processes. The technology will create immutable records of waste disposal activities and enable reward systems for sustainable behavior.

Key Features:

- Transparent tracking of waste from generation to disposal
- Immutable record-keeping for environmental compliance
- Tokenized reward systems for recycling and proper waste sorting
- Smart contracts for automated waste management processes

EcoSort features:

| Feature | Description |
|---|---|
| AI-Powered Sorting | Recognizes waste items using image and text input |
| Gamified Learning | Points, badges, and quizzes to reinforce learning |
| Augmented Reality (AR) | Visual sorting assistant for real-time categorization |
| Voice Integration | Google Assistant integration for hands-free sorting help |
| Localized Info | Tailored sorting rules based on local municipality and recycling laws |
| Family Mode | Collaborative sorting features for households with children |

EcoSort is a daily-use application designed not just to inform, but to actively engage, motivate, and support users.

**Solution Impact**

**Behavioral Change**

EcoSort's potential impact is multidimensional and aligned with global sustainability efforts.

EcoSort encourages responsible behavior by:

- Educating users on material types and disposal methods
- Motivating users through progress tracking and achievements
- Reducing "wishcycling" and contamination of recyclable materials

**Target Users**

- Students & Young Adults: Eco-friendly tech-savvy demographic
- Families: Promotes joint learning and sustainability practices
- Educators: Teaching tool for environmental awareness
- Communities: Supplement to public recycling campaigns

**Long-Term Goals**

- Promote awareness of waste classification and environmental responsibility
- Reduce the environmental footprint at the community level
- Support SDG 12: Responsible Consumption and Production

# 3. Project Scope

**Overview**

The EcoSort project envisions the development of a user-friendly, intelligent mobile application that addresses the global issue of improper waste management through innovative digital solutions. As waste volumes grow exponentially and recycling systems remain underutilized or misunderstood, EcoSort aims to bridge the gap between environmental awareness and sustainable action, starting at the individual and household level.

EcoSort is a technology-driven solution that blends Artificial Intelligence and Machine Learning, Augmented Reality (AR) Technology, Internet of Things (IoT) Integration, Cloud Computing and Big Data Analytics, and Blockchain Technology while also having gamified education to help users sort waste accurately, learn eco-friendly habits, and engage with local recycling systems. Designed with the everyday user in mind students, families, and urban dwellers, EcoSort transforms waste sorting into an interactive, educational, and rewarding experience.

**Project Objectives**

The key objectives of the EcoSort project are:

- To educate users on proper waste sorting through AI-powered item recognition and location-based recycling instructions.
- To make learning about sustainability fun and engaging through gamification elements such as quizzes, rewards, and progress tracking.
- To utilize AR-based sorting tools to visually guide users in distinguishing between recyclable, organic, hazardous, and general waste.
- To increase community participation in sustainability by including family challenges, school modes, and shared goals.
- To provide localized, real-time guidance by integrating recycling center locations, operating hours, and region-specific disposal rules.
- To encourage habit formation that supports broader environmental goals and builds a culture of eco-conscious behavior.

**Deliverables**

The EcoSort project will produce the following deliverables:

- Mobile Application compatible with Android, iOS, and PWA platforms, with support for both individual and family use.
- AI-based waste recognition module, enabling users to identify and classify items using camera input or voice commands.
- AR-powered sorting assistant to offer real-time visual guidance for disposing of items.
- Gamified user experience, including quizzes, achievements, leaderboard rankings, and eco-rewards.
- Integration with IoT and APIs, including location tracking for nearby recycling centers and calendar reminders for recycling schedules.
- Blockchain-enabled reward tracking, allowing users to earn eco-points and redeem them through sustainable brand partnerships.
- High-fidelity prototype, showing UI design, navigation flow, and feature interaction.
- Technical documentation including system architecture, and API specifications.
- Survey findings and evaluation report based on user feedback, validating market demand and usability.

**Assumptions**

Several assumptions underlie the EcoSort project implementation:

- Users are willing to share basic data (location, item types) to receive personalized waste sorting recommendations.
- Users will have internet access to fully utilize AI, AR, and real-time feedback features.
- Target users are digitally literate, particularly students, young professionals, and families who are open to learning through mobile applications.
- EcoSort will operate in collaboration with local recycling agencies to access municipal waste data and ensure regional accuracy.
- Sustainable product partners and NGOs will be open to integrating rewards into the app for promoting eco-friendly behavior.
- Users will opt into features such as gamification and family mode voluntarily and will accept privacy settings governing their use.

**Constraints**

While EcoSort aims to be an innovative and robust solution, several constraints must be acknowledged:

- Data availability: Real-time recycling data, regional sorting rules, and bin location information may be unavailable or inconsistent across locations.
- Privacy and trust: While blockchain and encryption mechanisms will be used, some users may still have concerns about data collection, particularly for AI-based recognition and GPS tracking.
- Resource limitations: Advanced features like AR, AI training, and reward systems require significant development resources, infrastructure, and ongoing maintenance.
- Financial sustainability: EcoSort must secure sponsorships, partnerships, or government support to ensure financial viability beyond initial development.
- Scalability: Supporting large user bases, especially in urban areas with high daily usage, will require a scalable cloud infrastructure and proactive performance optimization.
- Offline support: Since most features depend on cloud-based AI models, APIs, and live data, offline functionality will be limited or unavailable.

**Inclusion**

- Mobile Application Development: The app will be developed for Android, iOS, and web-based platforms, optimized for phones and tablets.
- AI-Powered Waste Sorting: Integration of machine learning models for item recognition based on camera or text input.
- AR Visual Assistant: AR-based camera overlay to visually guide users in sorting items correctly in real-time.
- Gamification System: Implementation of rewards, points, badges, and educational quizzes to reinforce learning and habit formation.
- Voice Assistance & Accessibility: Support for voice input and multilingual UI to enhance usability across different user groups.
- Blockchain Reward System: Use of smart contracts to track eco-point rewards securely and transparently.
- Family & School Modes: Features tailored for children and families, including shared challenges and educational content.

**Exclusion**

- Desktop or Web Dashboard: A full desktop/web app is excluded due to the mobile-first nature of real-time sorting and camera-based features.
- Physical Waste Collection Services: The app will not provide logistics for waste pickup, bins, or recycling center operations.
- Industrial Waste Management: The system is not designed for use in industrial or commercial recycling operations.
- Offline Functionality: Due to the need for cloud-based AI and database queries, offline use will be limited to static content only.
- Illegal or Prohibited Waste Handling: The app will not provide guidance on disposing of regulated or hazardous items like explosives or controlled substances.
- Enforcement of Recycling Policies: EcoSort does not monitor or enforce recycling behavior; it is an educational and voluntary engagement platform.

**System Functional Requirements**

| FR ID | Functional Requirement | Priority | Core Feature |
|---|---|---|---|
| FR-01 | Waste Item Scanner | High | Core Feature |
| FR-02 | AI-Powered Waste Recognition | High | AI/ML |
| FR-03 | Voice Interaction Assistant | Medium | AI/ML |
| FR-04 | Augmented Reality (AR) Waste Sorting Guide | High | AR/VR |
| FR-05 | Barcode Scanner for Packaged Items | Medium | Computer Vision |
| FR-06 | Educational Quiz Mode | Medium | Educational |
| FR-07 | Personalized Learning Recommendations | High | AI/ML |
| FR-08 | Real-time Waste Tracking and Analytics | High | Data Analytics |
| FR-09 | IoT Integration for Smart Bins | High | IoT |
| FR-10 | Recycling Center Locator with GPS | Medium | Location Services |
| FR-11 | Family/Team Account Management | Low | Social Features |
| FR-12 | Offline Content Access | Medium | Data Management |

**Detailed Functional Requirement Descriptions**

**FR-01: Waste Item Scanner and Classification**

This is the core functionality where the user is enabled to input or select waste items from an accessible and searchable database. The system shall instruct classified suggestions for recyclable, landfill, compost, or hazardous waste categories. This is the primary feature for the interface, which works as a guide by the help of AI recognition capabilities integrated with it to sort waste.

**FR-02: AI-Powered Waste Recognition**

Image processing is used for automatically identifying and also classifying waste items through advanced machine learning algorithms. Deep learning models are utilized in the system, trained on extensive waste datasets to achieve high accuracy rates in real-time recognition, it improves continuously through user feedback and validation.

**FR-03: Voice Interaction Assistant**

This functionality allows users to ask questions about waste classification through natural language processing. While being provided hands-free operation during waste sorting activities, the feature enhances accessibility for elderly users and children.

**FR-04: Augmented Reality (AR) Waste Sorting Guide**

To guide users through proper waste sorting visually, the Interactive AR overlaying is used in their device camera pointing at items. 3D bin representations and instructions for sorting is directly shown on the device screen by the system to create an immersive educational experience.

**FR-05: Barcode Scanner for Packaged Items**

Retrieves material composition and disposal information from product databases by the help of automated scanning capabilities. The sorting process for complex package materials and provides accurate disposal guidance is streamlined by this feature.

**FR-06: Educational Quiz Mode**

Learning module through a game featuring interactive multiple-choice questions about waste sorting practices. User progress is tracked by the system, immediate feedback is provided and points awarded for correct answers to encourage continued engagement.

**FR-07: Personalized Learning Recommendations**

An AI-driven suggestion engine and ML learning model will be used to analyze user behavior patterns and learning preference profiles so that the system can not only provide customized educational content but can also make sorting suggestions. The system will adjust to users need and at the same time progressively increase in difficulty levels.

**FR-08: Real-time Waste Tracking and Analytics**

The collection of a complete set of data and an analysis system, which not only observes users' sorting of waste activities but also gathers information about environmental impact metrics, and provides performance reports. This capability empowers individuals to keep track of their achievements and make an informed decision about their contribution to the sustainability targets.

**FR-09: IoT Integration for Smart Bins**

The core of this project is connecting with IoT-driven garbage bins that would oversee the condition of a bin by checking its fill levels, tracking patterns of waste disposal, and recommending the best time for collection. In addition, this endeavor will provide a moment-by-moment status of the bin and will allow for a more proactive manner of waste management.

**FR-10: Recycling Center Locator with GPS**

Another service based on location that detects local recycling centers, drop points, and specialized disposal facilities. The system will also offer guidance on directions, opening hours, and accepted materials to the public to help them properly dispose of their waste.

**FR-11: Family/Team Account Management**

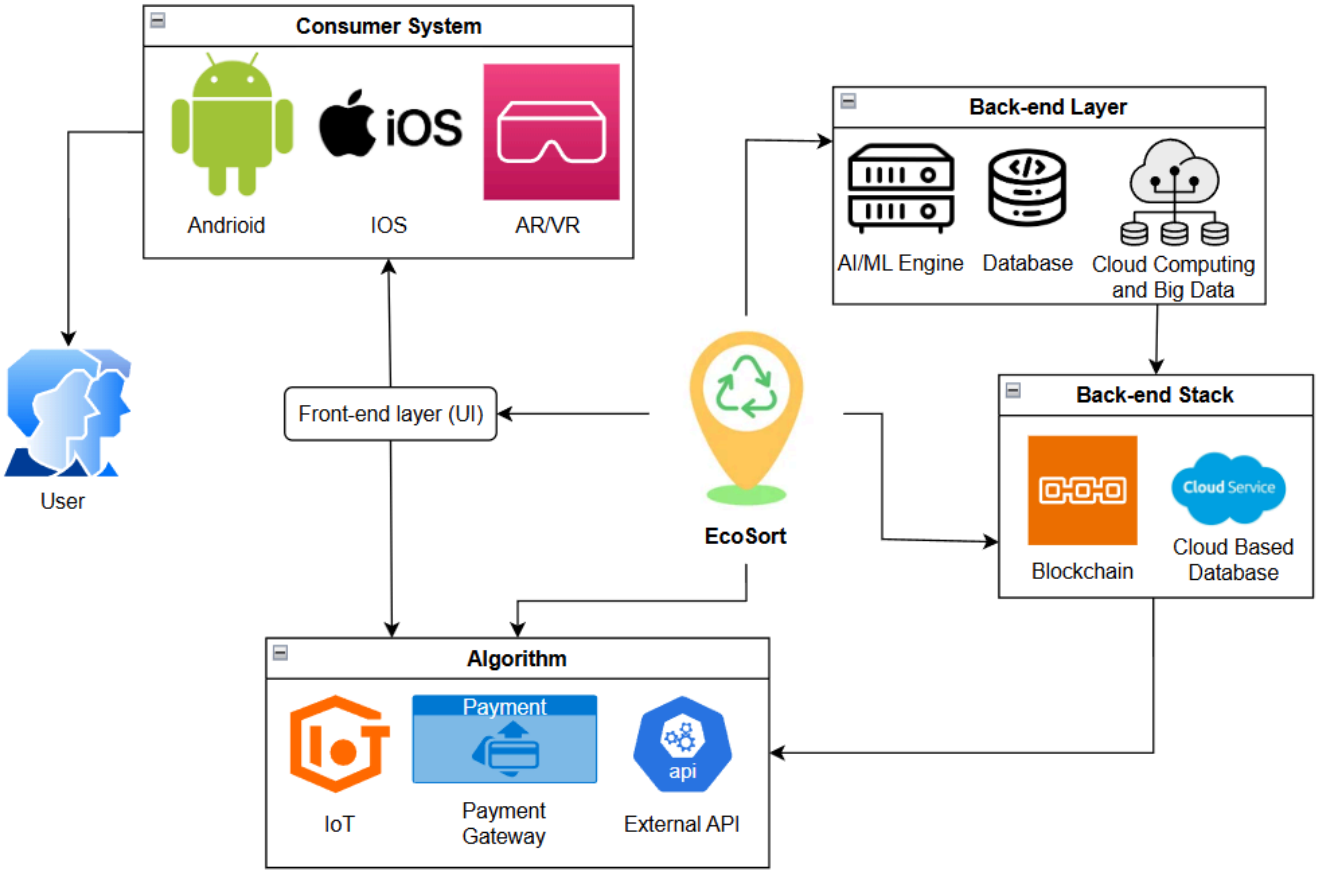
Multi-user account management system which can enclose the family and set them up for team challenges. Such a function of the service as joint goal-setting, sharing of progress, and friendly competitions that encourage the mind of all household members to be good stewards of the environment.

**FR-12: Offline Content Access**

The single source of truth for functionality will be end-user devices with ability to access local storage for sustainability education irrespective of the network availability and preserving the user experience. Essential waste sorting guidelines, item databases, and educational content are the examples of offline content that the users will be able to get. The approach supports the idea of a consistent user experience.

# 4. System Architecture

**Software Architecture Diagram**




**Overall System Architecture**

**System Workflow from Start to Finish**

EcoSort works with an end-to-end real-time architecture to deliver a flawless and intelligent user experience. This architecture can be segmented into six major phases:

**Input: Data Capture Layer**

The user interacts directly through Camera scanning, Voice commands, Barcode scanning, and GPS locating.

Sensors in smart bins monitor weight, fullness, and disposal patterns.

Offline triggers permit users to check on saved content or take quizzes even with no internet connection.

**Pre-processing Layer**

Image/audio data will be cleaned and resized into formats supporting AI processing.

Barcode/QR information will be validated against databases (for example, OpenFoodFacts).

Voice data will be converted into commands matching user intent via NLP.

**Processing Layer**

**The AI/ML Core**

Image classification into waste categories per CNN model.

Mapping of voice commands into application actions via the intent engine.

Learning paths and quiz difficulty will be updated by the recommendation engine.

**Cloud Storage & Database Layer**

User data is stored in Firestore in real-time.

Cloud Storage includes media files and AR assets.

Smart bin information stored for analytics and alerting purposes.

**Server Application Logic Layer**

Access control, eco-points calculation, and user ranking system;

Reward logic: daily streaks, badges, team competitions.

The Server Application Logic Layer forwards the received information to the analysis dashboard for visual reports.

**Output - Presentation Layer**

User performance in the app's UI with AR visuals and information on sorted waste.

Notifications on nearby recycling events or bins reaching full level.

Users are sent environmental tips periodically

**Security and Privacy Design**

Security is critical, especially with the system handling:

Voice data

Recycled personal records

Eco-points with potential financial value

**Security Mechanisms**

OAuth 2.0 / Firebase Authentication : For secure login by users (email, Google, or Apple ID)

End-to-End Encryption: HTTPS for all API and Firebase traffic

Token-based session management

Data access controls: Roles for admin, user, and partner organizations

Real-time database rules: To prevent unauthorized writes

Anonymization of environmental behavior data for analytics

Nielsen Principle: Help users protect their data-simple settings in sharing, permission, and privacy control.

**Scalability & Maintainability**

The system was designed for the horizontal scalability and modularity of components. As the user adoption increases, the architecture accommodates:

**Auto-scaling cloud functions**

Multi-tenant Firebase architecture for different institutions

Plug-and-play support for additional smart bin types

Future upgrades: Support gesture recognition; Coordinate waste pickup with drones

This guarantees system growth with minimum technical debt.

**Societal and Environmental Impact**

EcoSort not only showcases advanced technical integration but also brings about real-world impact:

Reduces recycling contamination due to better classification

Educates the public on eco-habits using gamification

Advocates family sustainability with team progress dashboards

Provides data-driven recycling metrics to local governments or NGOs

Metrics of Impact Tracked:

% by mass of correctly sorted waste

Average households completing the quiz

Eco-points earned over time

Rank on the community leaderboard

Alerts on bin overflow.

**Future-Proof Technologies & Innovations**

EcoSort is built with a flexible backbone to integrate emerging technologies:

| Technology | Future Potential Use Case |
|---|---|
| Quantum Machine Learning | Optimize sorting recommendation accuracy on a massive dataset |
| 5G Network | Ultra-low latency for real-time AR rendering & remote AI inference |
| Edge Computing | On-device inference for smart bins in low-connectivity areas |
| Blockchain DAO | Let eco-points be governed by a decentralized green community |
| Green AI | Optimize AI training to reduce carbon impact (sustainable training) |

**Integrated Technologies and Value Delivery**

The strongest point of the proposal for the EcoSort project is its deep integration of cutting-edge IT technologies towards three objectives: waste classification, education for the environment, and community mobilization. The intelligent ecosystem of human-machine-environment interaction is a system that is not just technology.

The first of these is the Artificial intelligence and machine learning systems that deliver intelligent recognition and personalized services to users. Users are able to get accurate waste sorting advice just by taking a photo or speaking to the device through image classification models like the Convolutional Neural Network (CNN) and natural language processing (NLP). In addition, users' behaviors are continually learnt by ML algorithms to optimize the recommendations given and thus deliver tailored educational tasks and classification guidance, according to each user's cognitive level.

Secondly, Augmented Reality (AR) creates an immersive experience for users about waste sorting guidance. Whenever a user is confused on how to sort a certain item, the AR module shows through camera view digital sorting cues superimposed on the real object and gives a visual path to the correct bin. In addition to providing the right answer, this teaches long-term wrong behavior learning from doing action.

Further, the system can connect with physical smart bins through the Internet of Things (IoT) technology. Every bin has sensors and communication modules for real-time status information, such as filling level, disposal behavior, and usage pattern. These data points are sent to the cloud, which then sends alerts to the users, for example, "this bin is full, please find another nearby one." In addition, these insights inform analytical reporting that could be useful by local governments or recycling service providers.

Beyond these three core technologies, EcoSort makes use of cloud computing and real-time databases to deliver inter-operable seamless, cross-platform data synchronization. Whether a user is on mobile, or web, recycling history, eco-points, and household performance can be accessed instantly. Offline access is also provided by the system, so that users can complete educational content or view records without connection to a network, which will be synced in real-time when they reconnect.

For security, EcoSort employs strong encryption protocols, access control, and user authentication to secure such sensitive information as voice inputs, behavioral records, and point balances. In the future, it could introduce blockchain technology to bring about a tamper-proof and transparent eco-point reward ledger, thereby improving users' confidence and system credibility.

From the end user perspective then, each of the different technologies integrated into EcoSort resonates with or taps into one or more of the core values such as usability, educational empowerment, and environmental impact. AI makes the system smarter. AR makes it more intuitive. IoT connects the digital to the physical world. Meanwhile, cloud services keep the data safe to ensure scalability, security, and reliability for the entire system.

In sum, the EcoSort structure constitutes a model of integration in technology for maximum effect, marrying cutting-edge innovation alongside meaningful public good. Not just an intelligent waste sorting app, this is a change driver and an important instrument in the engineering of a greener future.

# 5. Prototype & Design

**Design justification**

The EcoSort garbage disposal application aims to help users sort garbage more accurately through an intuitive, intelligent and auxiliary user interface, thereby enhancing environmental awareness. During the UI/UX design process, we strictly adhere to the ten usability design principles proposed by Jakob Nielsen to ensure that the system offers an efficient, user-friendly and friendly interactive experience.

**Visibility of System Status**

EcoSort provides immediate feedback throughout the entire operation process. For example, when using the AI scanning function, the interface will display "Recognition in progress..." Check the animation progress and clearly prompt "Recyclable" after the recognition is completed. On the synchronization page of the smart trash can, the system will display the connection status to ensure that users can always keep track of the current system operation status.

**Match Between System and the Real World**

The application interface uses concepts and symbols consistent with reality, such as the color of the trash can that is consistent with the real world (blue represents recyclable, red represents hazardous, etc.). The AR classification guidance function superimposes virtual trash cans on the real environment, allowing users to immediately understand the operation target. The classification names should use common terms to avoid a sense of unfamiliarity with the terms.

**User Control and Freedom**

Users can interrupt or cancel at any time during the operation process, such as by providing a "Cancel" button during scanning or AR recognition. If the system classifies incorrectly, users can manually modify the classification and feed it back to the system, thereby improving the accuracy of the AI model. The entire interaction process emphasizes user-led rather than passive acceptance.

**Consistency and Standards**

The entire application adopts a unified design language and interaction standards: each module has the same top navigation structure and bottom function bar, with ICONS, fonts, and button styles remaining consistent, allowing users to switch between different interfaces without having to relearn the interaction methods.

**Error Prevention**

When users perform operations that may lead to errors (such as deleting records, modifying categories, or exiting answers), the system will pop up a confirmation prompt to prevent accidental operations. At the same time, the terms and ICONS for garbage classification have been clearly distinguished, visually reducing cognitive confusion.

**Recognition Rather Than Recall**

The application uses a large number of visual ICONS and tags (such as "Scan", "Voice Assistant", "Nearby Recycle Bin", etc.), and users do not need to remember instructions. For existing users, quick entry points such as "Recent Recognition Records" and "Continue Learning" will be displayed at the top of the home page to enhance the efficiency of task recovery.

**Flexibility and Efficiency of Use**

Quick features have been designed for skilled users, such as: Long-pressing the home screen icon can quickly open "Start Recognition" or "Voice Query". The system recommends learning content based on users' past behaviors and personalizes the improvement of usage efficiency.

**Aesthetic and Minimalist Design**

The interface design adopts soft tones (mainly eco-friendly green and grayish white), presenting only a single task on each page to avoid information congestion. Using linear ICONS, clear buttons and high-contrast text, the visual burden is minimized while maintaining a professional and technological feel.

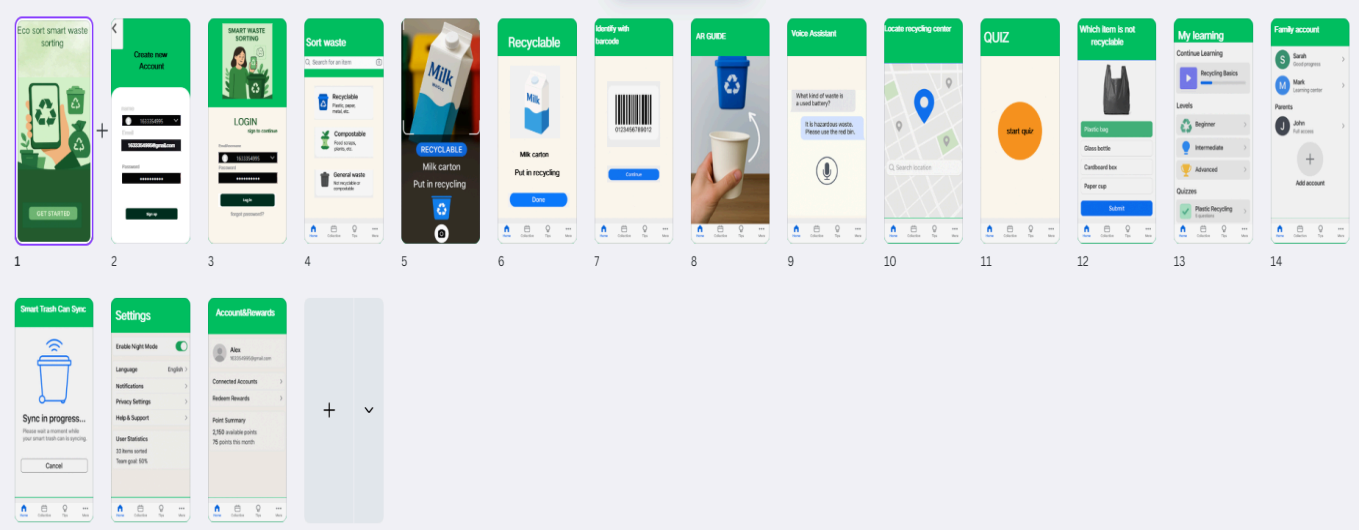
**Help Users Recognize, Diagnose, and Recover from Errors**

When recognition fails, the system will pop up a friendly prompt: "Failed recognition. Please try to take a new photo or switch to barcode recognition." Provide buttons such as "Try Again" and "Manual Classification" to help users quickly return to the correct process.

**Help and Documentation**

The application is equipped with a "Help Center", which includes illustrated teaching modules (such as "How to Use AR" and "Garbage Classification Guide"). Voice assistants can also be used to explain basic operations and enhance accessibility for the elderly or visually impaired users.

## UI storyboard and UI Design Prototype (High Fidelity)




Alex Carter is a college student who is very concerned about environmental issues. Recently, the school launched a garbage classification activity. Alex downloaded the EcoSort app to help him sort garbage on a daily basis and enhance his awareness of recycling.

1. Alex was resting in the dormitory when he received a notice from the school on his phone, recommending the use of EcoSort. Out of curiosity, he searched for and downloaded this App in the app store. The app opened with a clean animated startup page.


**EcoSort Onboarding Screen**

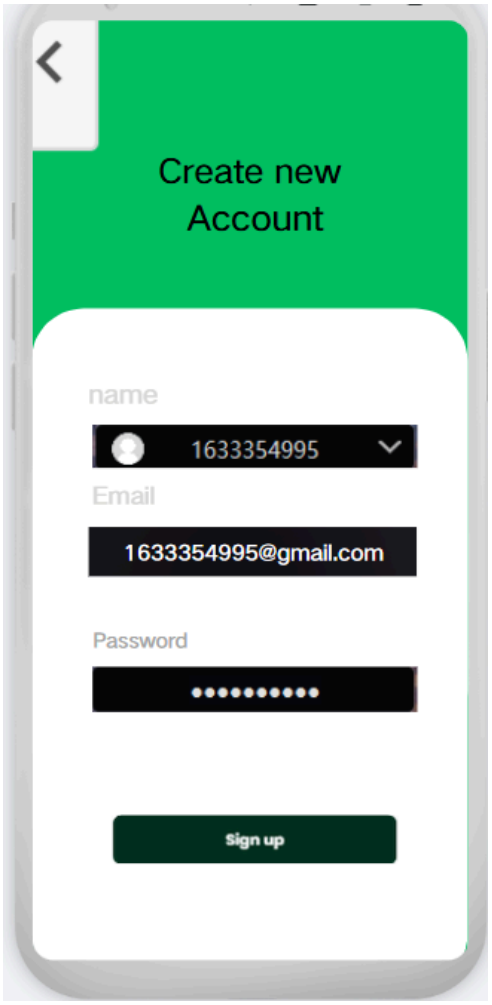
The onboarding screen for the EcoSort app appears immediately upon launching the application and acts as the initial interaction point between the user and the app. Functioning similarly to a splash screen, it serves as a brief welcome interface while the system initializes the core components of the app in the background. This ensures a smooth and seamless transition from launch to usage, minimizing perceived loading time and maintaining user engagement.

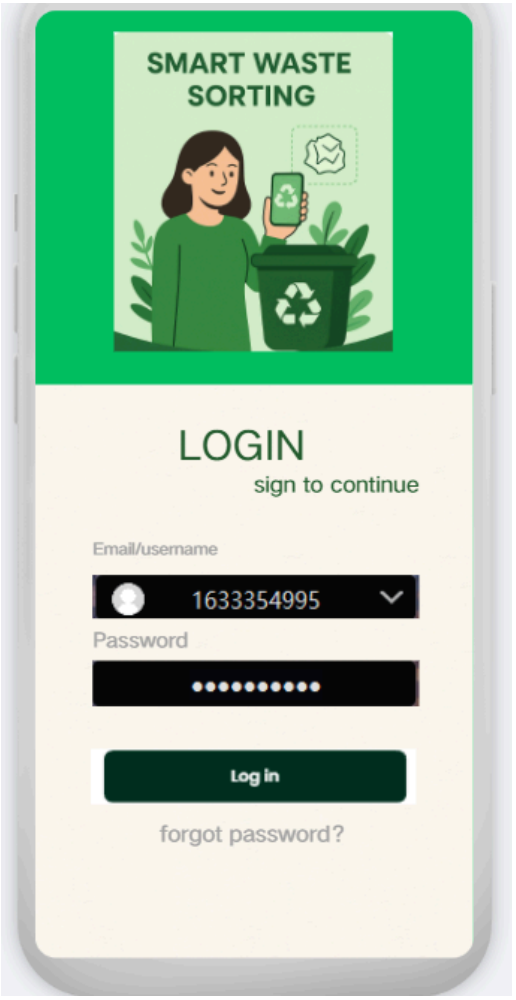
Visually, the screen uses calming green tones, reinforcing EcoSort's brand identity as a sustainable, eco-conscious platform. The central image, a hand holding a smartphone displaying the universal recycling symbol, clearly communicates the app's core purpose: smart waste sorting through digital tools. Surrounding elements like a recycling bin, garbage bag, and plant pot further emphasize themes of environmental care, waste management, and responsible disposal.

The “GET STARTED” button is prominently displayed, encouraging users to begin their journey. This invites users into the app, setting a welcoming tone and guiding them toward the next steps.

Overall, this screen is not only functional, it reassures the user that the app is working correctly while establishing a consistent visual identity and mission. It reinforces the app’s value proposition from the very first moment, contributing to a more immersive and mission-driven user experience.

2. After the startup page, Alex saw a welcome interface with clear options. He clicked "Register" and quickly completed the registration via email.




**Authentication Screens – Login & Sign-Up**

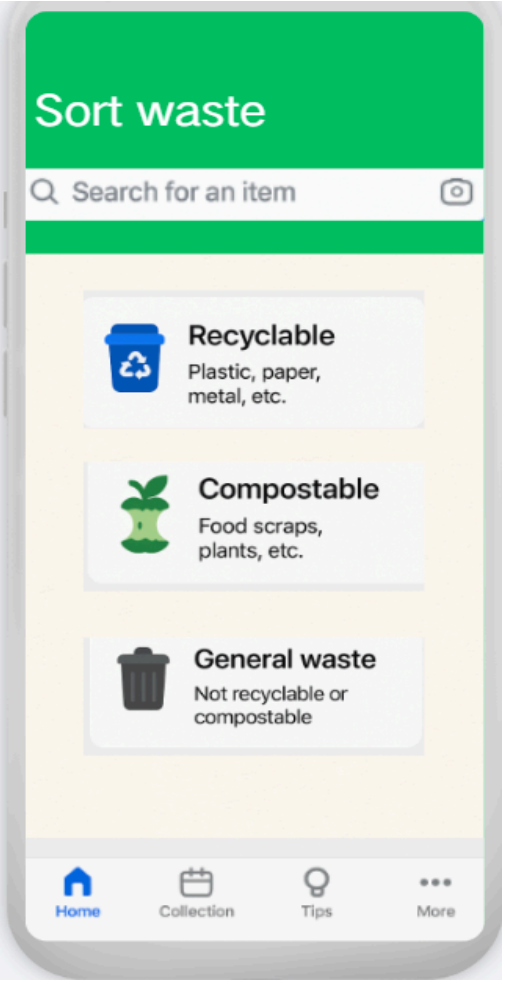
EcoSort's user authentication module is designed with simplicity, accessibility, and clarity in mind. The app uses a central root node to manage the sign-up and login flows, ensuring smooth and secure access for users. These screens form the foundation of the user experience, allowing for quick account creation and secure session management.

On the login screen, returning users can easily access their accounts by entering their email/username and password. For added convenience, the screen includes a "Forgot password?" option, allowing users to initiate recovery in case they forget their login credentials. The overall layout is minimal and clean, with contrasting text and buttons to guide users through the process intuitively. The addition of a visual header with smart waste sorting graphics reinforces the purpose of the app and sets the tone for sustainable behavior right from the start.

The sign-up screen provides new users with the ability to create an EcoSort account using their full name, email address, and password. It is designed to be simple and quick, reducing friction for first-time users. Input fields are clearly labeled, and the flow is optimized for mobile interaction. While this version shows traditional sign-up via email, future iterations may also include social logins (e.g., Google, Facebook) to streamline onboarding.

Both screens maintain consistent branding with the use of EcoSort's green color palette and rounded interface elements, offering a welcoming and eco-friendly look and feel. Overall, these screens are user-centric, responsive, and essential for enabling secure, personalized access to EcoSort's core features.

3. After logging in, Alex entered the main page and saw several main functional modules, such as "Garbage Scanning", "AR Classification Guidance", "Voice Assistant" and "Ranking List".




**Waste Sorting Interface – Main Categorization Screen**

The "Sort Waste" screen in the EcoSort app is the central feature designed to assist users in identifying and categorizing their household waste quickly and accurately. This intuitive screen serves as the starting point for users to understand how different items should be disposed of based on their material and decomposition properties.

At the top of the interface, a search bar with an integrated camera icon allows users to either manually search for a waste item or utilize image recognition to identify items through the phone's camera. This integration bridges AI and user convenience, offering an enhanced and intelligent sorting experience.

Below the search bar, users are presented with three clearly labeled and color-coded waste categories:

- Recyclable – Identified by a blue icon, this category includes plastics, paper, metals, and other commonly recycled materials.
- Compostable – Displayed with a green apple core icon, this section guides users to dispose of food scraps, plant materials, and organic waste in a compost-friendly way.
- General Waste – Marked by a black bin, this category includes items that cannot be recycled or composted.

Each option includes a brief description, reinforcing user understanding and helping reduce sorting errors. The interface is minimal, visually clean, and organized vertically for ease of scrolling, especially on mobile devices.

At the bottom, a navigation bar offers quick access to other core features such as Collection schedules, Tips, and More settings, ensuring that the user is never more than one tap away from essential functions. The currently active screen (“Home”) is highlighted to guide users effortlessly through the experience.

This screen reflects EcoSort’s core mission, to simplify waste management through user-friendly tools, backed by smart design and clear educational cues. It promotes informed decision-making and encourages better recycling behavior through an approachable, well-structured UI.

4. He clicked on the "Garbage Scan" function and pointed his phone's camera at an empty milk carton. The App immediately identified this as "recyclable" and suggested putting it in the corresponding trash can.


**Garbage Scan**

This screen demonstrates the real-time waste classification feature using camera input, where the user points their phone at a waste item, like a milk carton and receives instant feedback. The interface identifies the item as a “Milk carton,” classifies it as “RECYCLABLE,” and instructs the user to “Put in recycling.” The visual design reinforces this with a blue label and a recognizable recycling bin icon, making the guidance intuitive.

This AR-enhanced scanning feature combines computer vision and user-friendly interaction, lowering the barrier for correct waste sorting. It creates an educational moment at the point of disposal, helping users build environmentally responsible habits. The live camera interface and clear visual cues not only simplify decision-making but also provide immediate gratification, reinforcing sustainable behavior in a practical and engaging way.

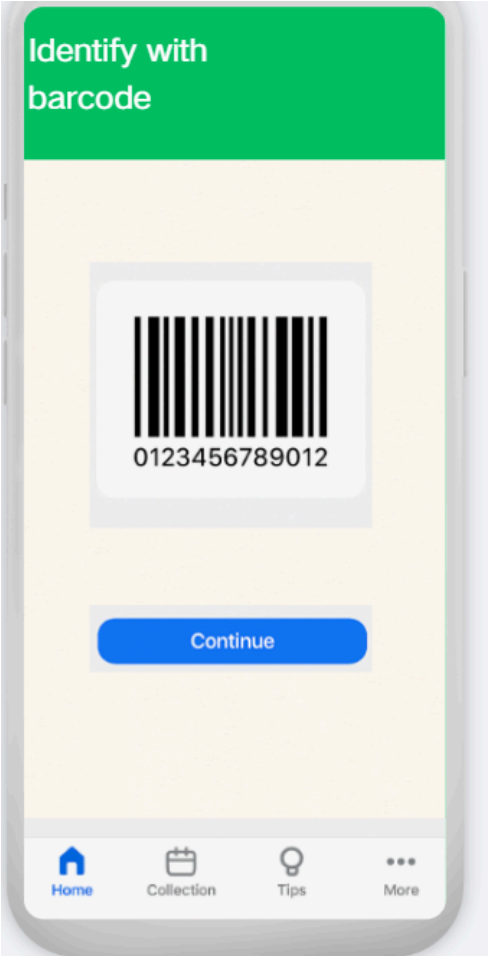
5. The system provides more guidance, such as the need to rinse and flatten milk cartons before processing.


**Guidance Screen**

This screen in the EcoSort app takes the user experience a step further by providing detailed disposal instructions after identifying the item. In this case, once the system classifies the milk carton as recyclable, it offers additional guidance to ensure proper recycling. The app advises users to rinse and flatten the milk carton before placing it in the recycling bin—an important step often overlooked in waste sorting.

This additional layer of instruction not only improves recycling quality by preventing contamination but also educates users on best practices. The clear and concise language, paired with visual indicators, makes the process straightforward. By offering more than just a classification, EcoSort encourages more responsible behavior and reinforces proper disposal habits, supporting its broader mission of environmental education and sustainable living.

6. Alex scanned the barcode of a package of plastic snacks. The system identified the packaging ingredients and provided classification suggestions for each part.




**Barcode Scanner**

This screen introduces the barcode identification feature within the EcoSort app, offering users an alternative and highly efficient way to classify waste. By scanning a product's barcode, the system can access a product database to identify its packaging materials and automatically provide classification suggestions for each component.

This feature is especially valuable when dealing with multi-material items or unfamiliar packaging. It eliminates the guesswork by breaking down the product into parts and guiding users on how to responsibly dispose of each. The use of barcode technology enhances accuracy, accessibility, and speed, allowing users to make environmentally informed decisions without needing to visually analyze the product themselves. This screen highlights EcoSort's dedication to practical, user-centered innovation in everyday waste management.

7. Out of curiosity, he clicked on "AR Classification Guidance", and the camera was activated. A 3D trash can was superimposed on the screen, and the real-time display of the placement animation was shown.


**AR Classification Guidance**

This screen introduces the AR Classification Guidance feature, where the app leverages augmented reality to provide a highly interactive and intuitive disposal experience. Upon activation, the device's camera opens, and a 3D trash or recycling bin is superimposed onto the real-world environment. As users hold their item in view, the app plays a real-time animation demonstrating the correct disposal method—whether to recycle, compost, or throw away the item.

This AR functionality not only enhances clarity but also transforms waste sorting into a more engaging and educational activity. By visualizing the proper placement of items, users can build confidence in their sorting habits and better retain sustainable practices. The experience is immediate and immersive, bridging the gap between digital guidance and physical action, an important step in encouraging consistent eco-friendly behavior in daily life.

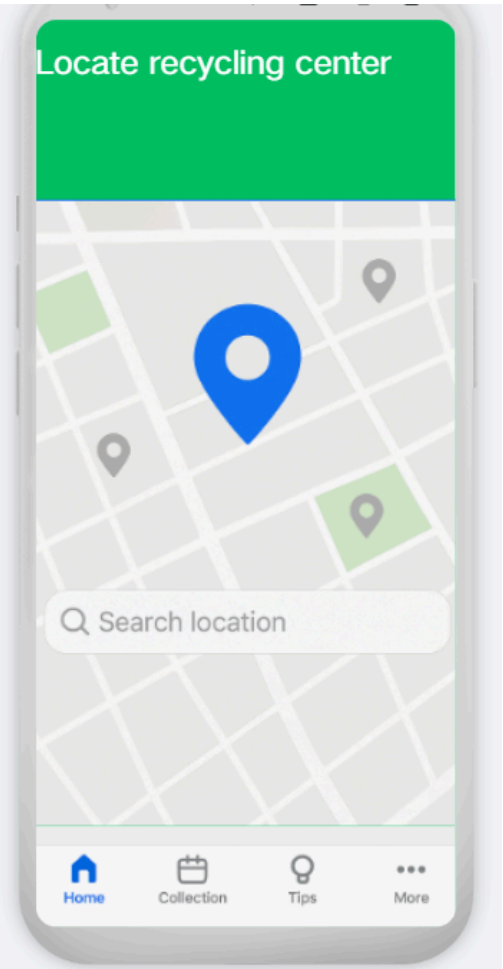
8. He clicked on the voice assistant and said, "How should used batteries be dealt with?" The system replied: "It belongs to hazardous waste. Please put it in the red trash can."


**Voice assistant**

This screen showcases the voice assistant feature, which enables users to interact with the EcoSort app through natural voice commands. In this instance, the user asked, “How should used batteries be dealt with?” and the system promptly responded with, “It belongs to hazardous waste. Please put it in the red trash can.”

The voice assistant adds a layer of accessibility and convenience, especially for users who may prefer hands-free interaction or have difficulty navigating screens. It also supports quick learning by providing immediate, spoken answers, making waste sorting more approachable and responsive. This feature demonstrates how EcoSort uses conversational AI to personalize the experience and assist users in making responsible disposal decisions in real time.

9. To deal with an old keyboard, Alex turned on the "Recycle Bin Locator" to look for nearby electronic waste recycling points.

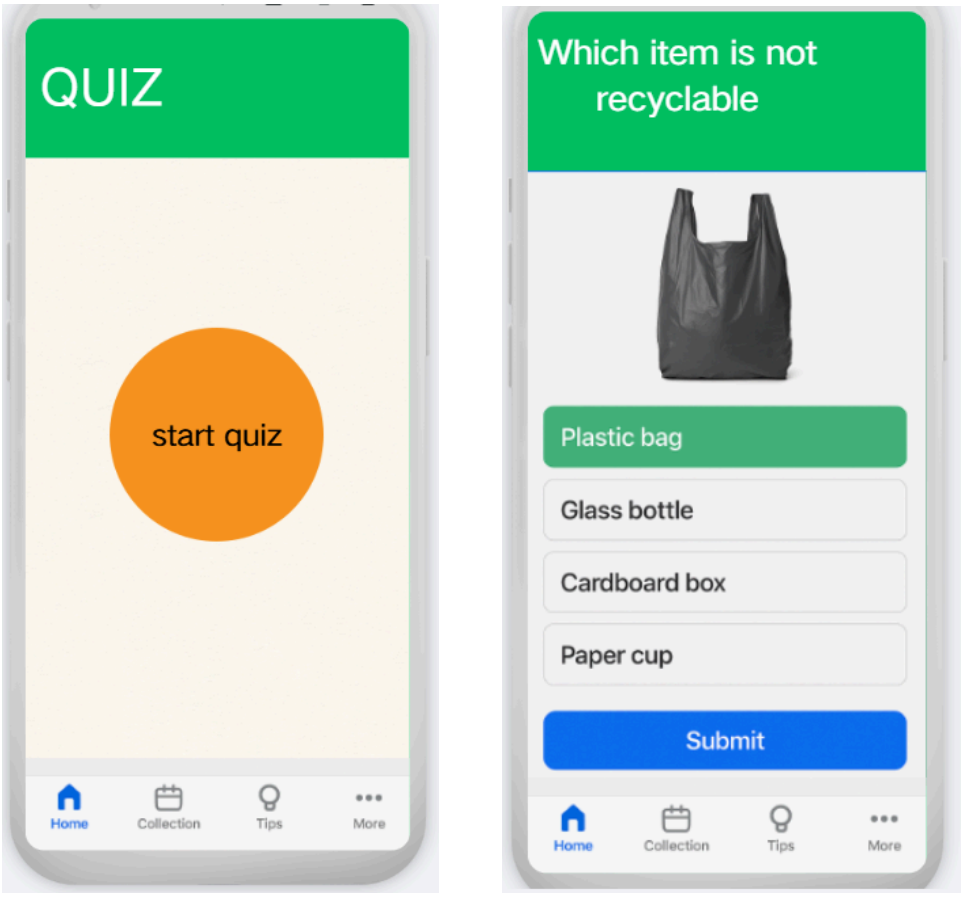



**Recycle Center/Bin Locator**

This screen highlights the “Recycling Center Locator” feature, designed to help users find appropriate disposal locations for items that require special handling, like electronic waste. In the scenario shown, Alex wants to dispose of an old keyboard responsibly. By activating the “Recycle Bin Locator” the app pinpoints nearby electronic waste recycling points using GPS and integrated local data.

This tool bridges the gap between knowledge and action by offering a practical solution for hard-to-dispose-of items. It ensures that users aren’t just informed about proper disposal methods but are also empowered to carry them out with ease. Features like this strengthen EcoSort’s mission to make sustainable living both accessible and actionable at a community level.

10. To enhance his knowledge of garbage classification, he entered the "answering mode", completed interactive questions and received points as rewards.

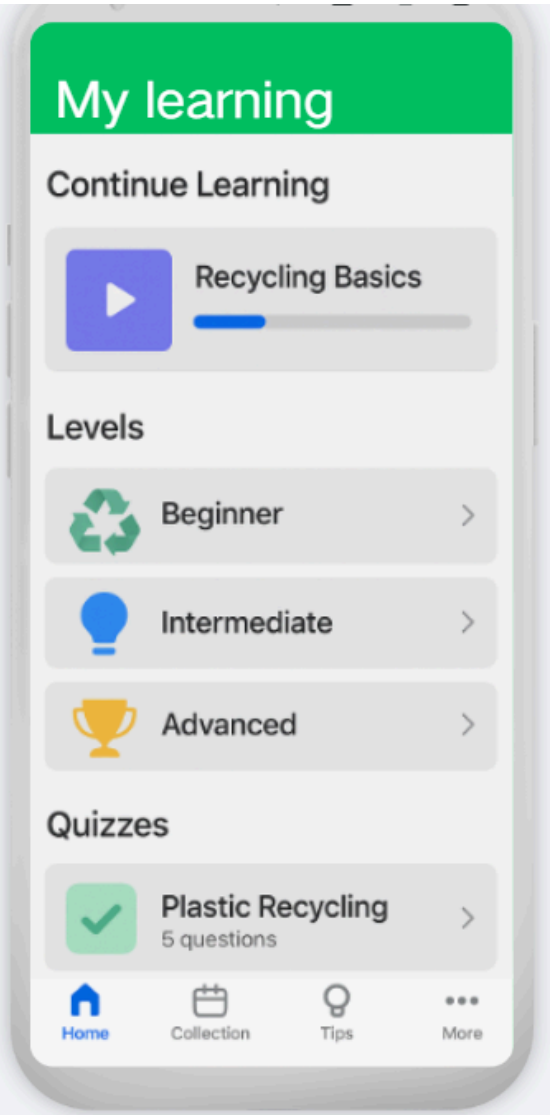



**Quiz Screen**

These screens represent the app's Quiz Mode, a gamified feature designed to reinforce users understanding of proper waste classification. In this scenario, the user enters "answering mode" by tapping the bold orange "Start Quiz" button. The next screen presents a question, "Which item is not recyclable?" along with visual and textual options to choose from.

By selecting the correct answer and submitting it, users not only test their knowledge but also earn points as a reward. This educational feature transforms learning into an engaging experience, encouraging consistent interaction with the app. It helps users internalize complex recycling rules through active participation, contributing to long-term behavior change toward more sustainable habits.

11. Based on his past misclassification records, the system suggested that he learn a short tutorial on "mixed material packaging".

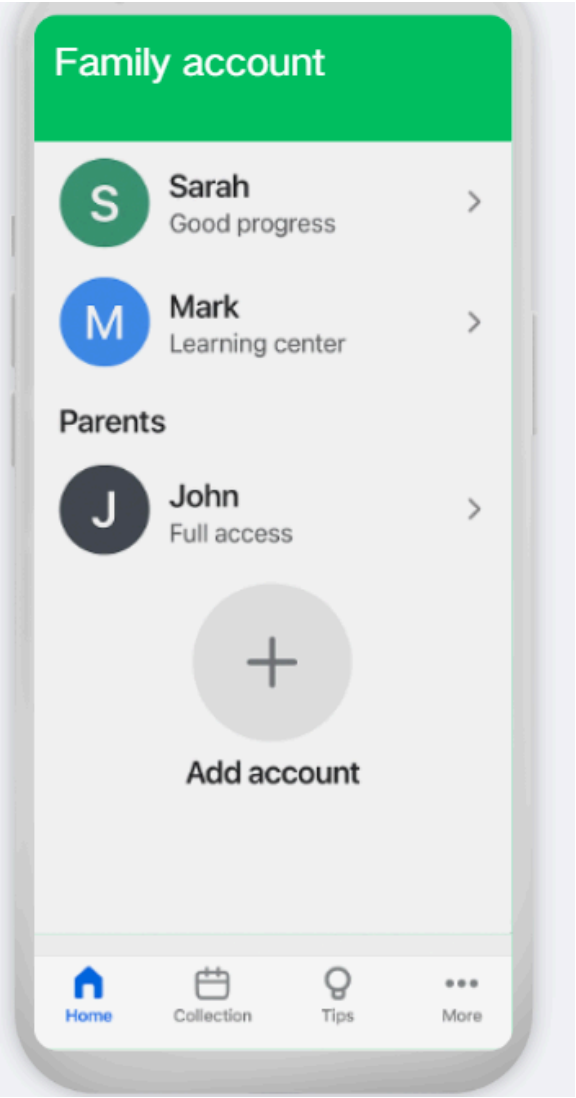



**Learning Screen**

The app's personalized learning hub, titled "My learning." , tracks the user's progress and organizes educational content into structured levels, Beginner, Intermediate, and Advanced. A "Continue Learning" section lets users pick up where they left off, in this case, on the "Recycling Basics" module.

Here, the system has intelligently responded to the user's prior misclassification behavior by recommending a targeted tutorial on "mixed material packaging." This personalized nudge supports better decision-making by addressing common pain points, ensuring that users improve their recycling accuracy over time. At the bottom, a record of completed quizzes like "Plastic Recycling" shows how the app integrates learning and self-assessment to reinforce concepts.

12. Alex added his dormitory roommates to a shared "family account", where everyone can record their progress together and earn team points as rewards.

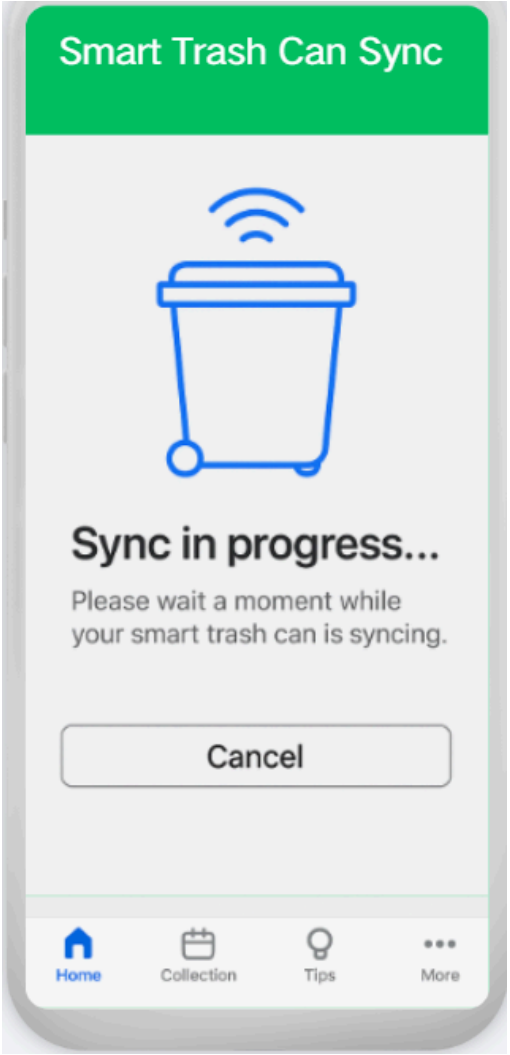



Family Account

The “Family account” feature, allows multiple users within a household to participate in the app collaboratively. Each family member has a separate profile, like Sarah, Mark, and John with distinct progress tracking and access levels. For instance, Sarah is marked as making “Good progress,” Mark is actively engaging with the “Learning center,” and John has “Full access,” likely indicating a parent or administrator role.

The system fosters a team-based learning environment where everyone’s recycling knowledge contributes to shared team points. This not only boosts motivation through friendly collaboration but also turns sustainability into a family goal. The “Add account” option at the bottom encourages further participation, making it easy to bring more members into the learning journey.

13. The school has newly installed smart trash cans. EcoSort shows the real-time capacity of the trash cans and simultaneously presents Alex's personal placement statistics.

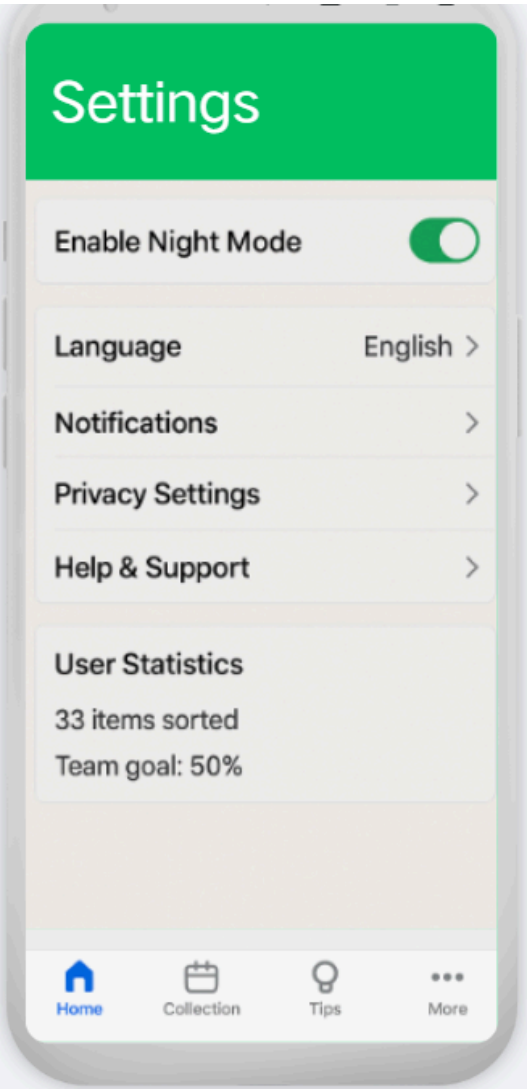



**Smart Trash Can Sync**

This screen shows the “Smart Trash Can Sync” feature in action. As part of a school sustainability initiative, smart trash cans have been installed and are being linked with the EcoSort app.

During the syncing process, the app connects to the smart trash can system to retrieve real-time data. Once connected, it can display the current fill level of each trash bin on campus, helping users make informed disposal decisions. At the same time, it updates individual user stats, like Alex’s by logging his contributions (what he disposed of, how accurately, and how often), enabling personalized insights and further gamified motivation.

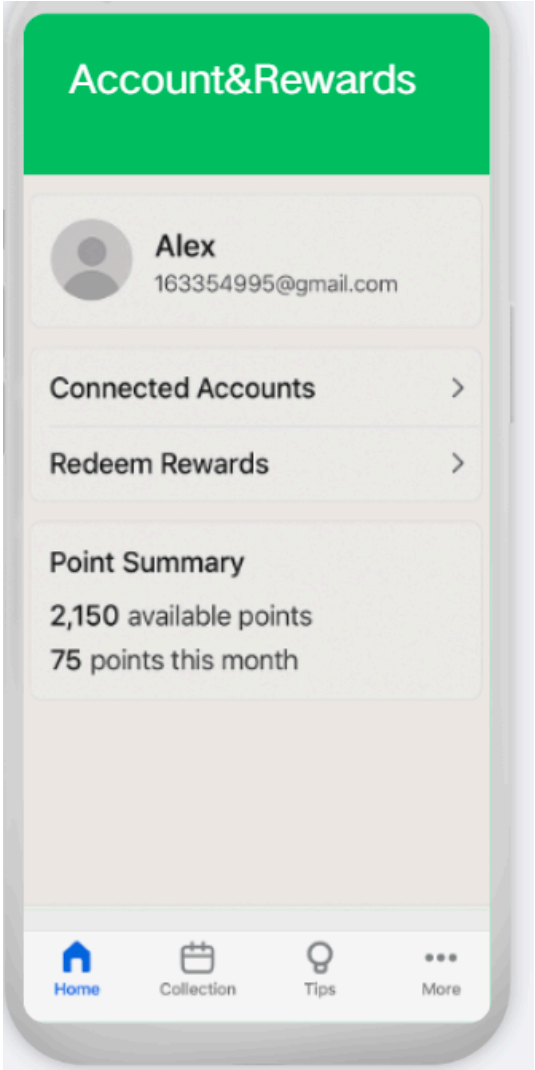
14. He went to the Settings page, switched to night mode, and enabled multilingual support for international friends to use.




**Settings**

This screen displays the general Settings interface of the EcoSort app. Users can personalize their experience by enabling Night Mode for improved visibility in low-light conditions and selecting their preferred language for multilingual support. Additional options include managing notifications, adjusting privacy settings, and accessing help and support. At the bottom, the interface provides user statistics, such as the number of items sorted and the current progress toward a team goal, encouraging ongoing engagement and collective achievement in waste sorting.

15. Finally, he visited his personal homepage to check his current points. As one of the top ten users, Alex is proud of his contribution to environmental protection.




**Settings**

This screen is the Account & Rewards page of the EcoSort app. It provides users with an overview of their personal account information, including linked email, connected accounts, and access to reward redemption options. A point summary is prominently displayed, showing the total number of available points as well as points earned within the current month. This gamified approach encourages sustained participation and recognizes individual contributions to proper waste sorting and environmental responsibility.

**Design Rational**

**Strengths and Weaknesses of the Final Design**

One of the primary strengths of the final EcoSort design is its accessibility and ease of use. The application is structured into intuitive modules such as “Quiz,” “My Learning,” “Family Account,” and “Smart Trash Can Sync,” each with a clear function and minimal cognitive load. Visual consistency, such as the persistent bottom navigation bar, supports user navigation across screens. The use of color-coded categories, gamified progress tracking, and family engagement features make the app appealing to a wide range of users, from children to adults. The integration of AR and voice assistant features adds an interactive and educational dimension, helping users identify correct disposal categories in real-world contexts.

However, some weaknesses were also identified in the final design. While features like AR classification and smart bin sync are innovative, they rely heavily on hardware availability and may not function equally well in all contexts or devices, especially lower-end models. Additionally, the quiz and reward system, although effective in encouraging participation, could benefit from a broader range of incentives or personalization. There is also room to improve the scalability and flexibility of the interface, especially as more content types are added. In terms of known issues, certain areas such as privacy settings and language support are relatively shallow and might need to be expanded to accommodate more international users and stricter privacy standards in future releases.

**Alternative Design Ideas That Were Considered**

During the early stages of development, the team explored a centralized dashboard design instead of the modular, screen-by-screen approach used in the final version. The dashboard would combine personal stats, family scores, recent activity, and recommended content in a single homepage. However, this structure was ultimately rejected due to concerns over information overload, especially for younger users. User testing revealed that segmenting tasks into dedicated screens made the experience more manageable and goal-oriented. It also allowed each feature, like syncing with a smart bin or accessing quizzes, to be refined and function independently.

Another design consideration involved implementing a chatbot or conversational UI from the beginning, intended to guide users through tasks like sorting waste or completing challenges. While conceptually appealing and aligned with modern app trends, this approach was postponed for future development. Early prototypes showed that a full conversational interface could slow down common actions and frustrate users looking for quick access to information. Instead, chatbot interactions are being reserved for optional help features and future enhancements, such as voice-driven search or real-time feedback. Likewise, a card-based feed structure was tested but discarded, as it conflicted with the educational intent of the app and introduced complexity into what is ideally a simple, goal-driven experience.

# 6. Group Analysis

Our project team was composed of five members, all from a Computer Science background. While this provided a solid foundation of technical skills and shared understanding of key concepts, it also meant that our approach tended to be more task-oriented than collaborative. Communication was infrequent and mainly task-focused, and we struggled with coordinating schedules effectively. We rarely held meetings, and most of the project progressed through isolated efforts. While this affected team cohesion, what held the project together was the strong sense of leadership responsibility and clearly assigned roles.

The absence of regular interaction meant we often lacked alignment on progress and faced issues during the integration phase. Time management was another major weakness. Deadlines were often approached at the last minute, and some tasks overlapped or were rushed due to poor planning and coordination. Team members also did not show that good level of ownership over their assigned responsibilities, which hindered time to complete the project within the required timeframe, but still completed in time, even if not as smoothly as we had hoped.

**Strengths**

Clear Role Division and Ownership

One of our biggest strengths was that we clearly defined each team member's responsibilities early in the project. Everyone had a designated role, such as UI/UX, survey, documentation, or architecture designing. This clear division helped avoid major duplication of work and allowed each member to focus on their area without too much interference. It also gave each person a clear sense of task ownership, which helped us meet core deliverables despite weak communication.

**Weaknesses**

**Poor Communication and Collaboration**

One of the biggest issues we faced was poor communication throughout the project. Team discussions were minimal and usually limited to quick messages, without any structured planning or team check-ins. This led to misunderstandings about task requirements and created gaps in how different components of the project came together. The lack of a collaborative environment also reduced the opportunity for creativity, feedback, and shared problem-solving.

**Weak Time Management**

Another clear weakness was time management. Because we didn't establish a clear timeline with milestones, many tasks were delayed or left until the last minute. This resulted in rushed work and a lack of time for proper testing or revision. Misaligned schedules made it even harder to coordinate, especially when we needed input from multiple members at the same time. Without a structured workflow or shared calendar, we often found ourselves scrambling to complete tasks near the deadline.

**Lessons Learned**

**Communication is Essential for Team Success**

A major takeaway from this project is that communication should be a top priority, even in a group of individually capable members. In future projects, we would implement structured team meetings, weekly updates, or even quick daily check-ins. These small efforts would help avoid confusion, improve integration, and ensure that everyone is on the same page.

**Manage Time Better**

We also learned that early planning and realistic scheduling are crucial. Without a clear roadmap, we lost valuable time and added pressure during the final days of the project. In the future, we would develop a shared timeline with agreed milestones and buffer periods for revisions. Time should be managed proactively, not reactively. By planning ahead and sticking to deadlines, we can avoid stress and ensure the final output is more polished and cohesive.

In conclusion, while individual dedication and clear role allocation helped us reach the finish line, the project highlighted major areas for improvement, especially in communication, teamwork, and time management. With better coordination and early planning, we could have achieved even stronger results as a unified team.

# 7. Future Enhancement & Conclusion

**Future Enhancement**

**Smart Waste Sorting through Image Recognition**

One of the advancements for EcoSort is the implementation of image recognition using AI and computer vision. This feature would allow users to simply take a photo of an item, and the app would instantly classify the type of waste and suggest the appropriate disposal method. By incorporating pre-trained machine learning models and a growing dataset of local packaging types, the accuracy and responsiveness of the classification can improve over time, making the sorting process faster, smarter, and more convenient.

**Carbon Impact Feedback and Insights**

To reinforce positive behavior, a future version of EcoSort will include a carbon footprint feedback module. This feature will estimate the environmental impact of the user's waste disposal habits, showing metrics like estimated $CO_2$ savings from proper recycling or landfill avoidance. Users will receive weekly sustainability reports, encouraging them to adopt even better habits through actionable tips, comparisons with peers, and visual progress tracking.

**Integration with Local Authorities and Recycling Centers**

In collaboration with municipal agencies and licensed recyclers, EcoSort aims to support real-time pickup schedules, location-based sorting rules, and event alerts. This integration will enable the app to dynamically adapt its guidance based on the user's current location, municipal laws, and updates from local authorities. Additionally, partnerships with recycling centers and eco NGOs can open up functionality such as drop-off locator maps, bin status updates, and QR-based reward systems.

**Voice Assistant Integration for Accessibility**

Accessibility and ease of use remain central to EcoSort's mission. Future versions will support voice-based commands and responses via integration with digital assistants like Google Assistant. This allows users to ask questions like, "Where should I throw this plastic wrapper?" or "Can I recycle this?" using natural speech, making the app more inclusive for users with visual impairments, motor limitations, or language barriers.

**Educational Modules for Schools and Families**

To promote long-term behavioral change, EcoSort will launch a series of interactive educational modules tailored for schools, families, and community programs. These modules will include age-appropriate quizzes, interactive AR games, and progress certificates. EcoSort could be embedded into schools as a digital sustainability learning companion, strengthening its role as both a tool and a teaching aid in environmental education.

**Conclusion**

EcoSort is more than just a waste sorting application, it is a catalyst for behavioral change, built on the foundation of sustainability, education, and accessibility. The challenge of responsible waste disposal cannot be addressed through information alone. It requires tools that empower individuals to make environmentally sound choices with confidence and consistency.

From our user research and technical development, we have identified that digital platforms like EcoSort can effectively bridge the gap between awareness and real-world action. Through features like AI-driven classification, personalized eco-feedback, gamification, and community incentives, EcoSort promotes the daily practice of sustainability in a way that is engaging and practical.

Looking ahead, we envision EcoSort growing into a central digital companion for environmentally conscious individuals and families, offering not just guidance but inspiration and a sense of impact. With continued feedback from users, collaboration with local governments, and the evolution of mobile technology, EcoSort is well-positioned to contribute to a cleaner, smarter, and more sustainable world.

# 8. Appendices

**Canva Link**

https://www.canva.cn/design/DAGs8xHbEAw/2ZAVOcHu-0jMIopskHf2KQ/edit?utm_content=DAGs8xHbEAw&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton

**Working Web UI Design**

https://github.com/HansAndre22/HCI-G45-UI-Working (file has to be downloaded and opened as HTML)

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# 10. Plagerism Report

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# Assessment Declaration Form

Hans Andre

**Taylor's University / Taylor's College**

## ASSESSMENT SUBMISSION DECLARATION FORM

| | |
|---|---|
| **Module Code:** | ITS63504 |
| **Module Name:** | Human Computer Interaction |
| **Assessment:** | Assessment 1 |

| | |
|---|---|
| **Student Name:** | Hans Andre Bin Azwan Rasyid |
| **Student ID:** | 0354227 |
| **Semester/Year:** | Semester 5/April 25 |

Dear Students,

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| | Type | Acknowledgement |
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| | Use Gen AI to polish language before further modification for final submission | I acknowledge the use of to improve the academic tone and accuracy of language, including grammatical structures, punctuation and vocabulary. I have also provided the prompt used, the output generated by the Gen AI tools, how the output was modified further to better represent my tone and style of writing.<br><br>*Note: Please modify the above as per your lecturers' needs* |
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**Declaration**

I confirm that:

a) I understand what constitutes academic integrity violations, including plagiarism, collusion, fabrication, falsification, contract cheating, and improper use of Gen AI.
b) I confirm that my work or any part of this assessment has neither been previously and is not concurrently submitted for any other programme at Taylor's University or any other institution, save except when re-use of the same work is permitted by the module leader.
c) I acknowledge that using Gen AI or any external assistance without proper attribution constitutes academic misconduct and may be sanctioned accordingly.
d) I understand that if there are indications of academic integrity breaches, including improper Gen AI use, my work will be subject to investigation.
e) This assignment is my own work, and I have properly acknowledged all sources, tools, and external contributions, including the use of Gen AI where applicable.
f) I acknowledge and authorize the submission and/or storage of my work in a database for the purpose of verifying its originality and/or conducting tests using artificial intelligence software, and I hereby consent to this process.
g) I acknowledge that this submission is subject to Taylor's University/College Academic Integrity Procedure (THE-ACA-PROC-AINT) and all applicable university regulations.

| | |
|---|---|
| **Name & Student ID** | Hans Andre Bin Azwan Rasyid (0354227) |
| **Signature** |  |
| **Date** | 2/6/2025 |

HU XIAO XIANG

Taylor's University / Taylor's College

# ASSESSMENT SUBMISSION DECLARATION FORM

| | |
|---|---|
| **Module Code:** | **ITS63504** |
| **Module Name:** | **HUMAN COMPUTER INTERCTION** |
| **Assessment:** | Assessment 1 |

| | |
|---|---|
| **Student Name:** | **HUXIAOXIANG** |
| **Student ID:** | **0377752** |
| **Semester/Year:** | **Semester 2** |



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| | |
|---|---|
| Name & Student ID | HUXIAOXIANG 0377752 |
| **~~Signature~~** | 胡潇祥 |
| **Date** | 2025/6/2 |

Arifin Islam Rafeen

TAYLOR'S

**Taylor's University / Taylor's College**

# ASSESSMENT SUBMISSION DECLARATION FORM

| | |
|---|---|
| **Module Code:** | ITS63504 |
| **Module Name:** | Human Computer Interaction |
| **Assessment:** | Assessment 1 |

| | |
|---|---|
| **Student Name:** | Arifin Islam Rafeen |
| **Student ID:** | 0359455 |
| **Semester/Year:** | 6 |

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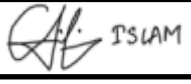
| | |
|---|---|
| **Name & Student ID** | Arifin Islam Rafeen |
| **Signature** |  |
| **Date** | 02/06/2025 |

Mashnoon Mazumder

**Taylor's University / Taylor's College**

# ASSESSMENT SUBMISSION DECLARATION FORM

| | |
|---|---|
| **Module Code:** | ITS63504 |
| **Module Name:** | HUMAN COMPUTER INTERCTION |
| **Assessment:** | assessment 1 |

| | |
|---|---|
| **Student Name:** | Mashnoon Mazumder |
| **Student ID:** | 0366445 |
| **Semester/Year:** | 4/2 |

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You are allowed to use Gen AI tools in any way you find appropriate for the task, provided you acknowledge and explain their usage. This emphasises transparency, critical engagement, and ethical practices.

**Use of Gen AI is not applicable**

Assessment is conducted under controlled environments (final exams, practical assessment without written assignment etc). Students are to complete the task independently, without the assistance of Gen AI tools.

Where Gen AI tools have been used, you must attach your chat history and an appendix listing the prompt used, the output generated by the generative AI tools, how the output was used and the pages where the AIgenerated content can be found as per the table below:

| AI Tool Used | Prompts | Outputs | How the output was changed for use into the assignment | Specify the page(s) in the assignment where the output is used |
|---|---|---|---|---|
| Example : ChatGPT | "Describe principles of marketing in 30 words" | The principles of marketing focus on understanding customer needs, creating value, building relationships, targeting specific markets, using effective promotion, ensuring product accessibility, pricing strategically, and fostering long-term loyalty and satisfaction. | The principles of marketing, as outlined by Kotler and Keller (2016), emphasize the importance of understanding customer needs, creating value, and building strong relationships. Key elements include targeting specific market segments, implementing effective promotional strategies, ensuring product accessibility, employing strategic pricing, and fostering long-term customer loyalty and satisfaction through a customer-centric approach (ChatGPT, 2024). | Page 1 |

The Gen AI-generated content must be appropriately cited and referenced. Any work submitted using AI tools without proper citation and referenced will be treated as though it was plagiarised.

## INFORMATION ON PENALTIES RELATING TO ACADEMIC MISCONDUCT

Any student found to have engaged in academic misconduct, including but not limited to plagiarism, falsification, contract cheating, or improper AI usage, will be subject to disciplinary action. Penalties may include but are not limited to plagiarism, falsification, contract cheating, or improper AI usage, and will be subject to disciplinary action. Penalties may include but are not limited to:
The penalties that can be imposed on a student who is found to have engaged in academic misconduct include, but not limited to:

- Counseling or cautioning.
- Awarding zero marks for the assignment.
- Failing the module.
- Suspension from enrollment at Taylor's University/College.
- Expulsion from Taylor's University/College.

For full details, refer to the Student Handbook (link)

## INFORMATION ON INVESTIGATION PROCESS REGARDING SUSPECTED MISUSE OF GENERATIVE ARTIFICIAL INTELLIGENCE TOOLS

If an assignment is suspected of improper AI use or other academic integrity violations, the university will follow the official Academic Integrity Investigation Process, which includes:

a) **Initial Assessment-**The lecturer assesses inconsistencies in writing style, AI detection reports, or academic dishonesty concerns.

b) **Filing of Report** -A Report on Academic Misconduct (THE-ACA-FORM-AINT) is submitted to the Academic Integrity Officer (AIO).

c) **Review & Evidence Collection** – The AIO compiles relevant materials, including previous submissions, Turnitin reports, and AI usage logs.

d) **Student Explanation** – The student may be required to provide additional evidence of their work process, including drafts and source materials.

e) **Disciplinary Review** – The Student Disciplinary Committee (SDC) will determine penalties if misconduct is confirmed

f) **Final Decision & Notification** – The student receives formal notification of the decision, and records are updated accordingly.

For full details, refer to the Student Handbook (link)

## SECTION 2: STUDENT ACKNOWLEDGEMENT AND DECLARATION

*(*This section is to be completed by students. Students must submit the completed and signed copy of this form together with their assessment)*

**Acknowledgment by the student**

When Gen AI is allowed to be used, acknowledgement of how Gen AI is used can be included as follows: ✓ (Place a tick ' ' in the checkbox where relevant)

| | Type | Acknowledgement |
|---|---|---|
| | Gen AI is allowed but student chooses not to use it | I did not use any Gen AI tools for this assignment. |
| | Generate content which is modified in the final assessment submission | I acknowledge the use of to general materials such as ……. in this assessment. I have also provided the prompt used, the output generated by the Gen AI tools, how the output was used and the pages where the Gen AI-generated content can be found. |
| | Use Gen AI to polish language before further modification for final submission | I acknowledge the use of to improve the academic tone and accuracy of language, including grammatical structures, punctuation and vocabulary. I have also provided the prompt used, the output generated by the Gen AI tools, how the output was modified further to better represent my tone and style of writing.<br><br>*Note: Please modify the above as per your lecturers' needs* |
| | I attached Appendix in this assignment the chat history, including all the prompts that I used and the output from the Gen AI tool(s) for this assignment. | |

The use of GenAI has to be referenced appropriately according to the referencing style as required:

| Referencing Style* | In-text citation | Reference |
|---|---|---|
| APA | … (AI platform, year) | Company. (year). *Platform Used* (version) [model]. URL<br><br>***Example:***<br>OpenAI. (2023). *ChatGTP* (Mar 14 version) [Large language model]. https:chat.openai.com/chat |
| MLA | …. ("prompt"). | "Description of prompt" prompt. *Name of AI tool,* version of AI tool, Company, date text was generated. URL.<br><br>***Example (Text):*** "Identify the themes in Mcteague by Frank Norris" prompt. ChatGPT, 21 November version, OpenAI, 4 Dec. 2023. https://chat.openai.com/share/2f2be19d-eadd-4151-8ceb0785319074b3 |

| | | |
|---|---|---|
| | | ***Example (Image):*** Fig. 2. "Create impressionist painting of a cat using neutral colors" prompt. DALL-E, version 2, OpenAI, 27 Nov. 2023. https://labs.openai.com/ |
| Harvard | … (AI platform year) | There is no guideline for Harvard style on referencing the use of AI. The following format is recommended by most universities.<br><br>Name of AI (Year of communication) Medium of communication. Receiver of communication, Day/month of communication.<br><br>***Example***<br>OpenAI ChatGPT (2023) ChatGPT response to Mary Jane, 25 January 2024 |

*Please refer to the latest referencing style.

**Declaration**

I confirm that:

a) I understand what constitutes academic integrity violations, including plagiarism, collusion, fabrication, falsification, contract cheating, and improper use of Gen AI.
b) I confirm that my work or any part of this assessment has neither been previously and is not concurrently submitted for any other programme at Taylor's University or any other institution, save except when re-use of the same work is permitted by the module leader.
c) I acknowledge that using Gen AI or any external assistance without proper attribution constitutes academic misconduct and may be sanctioned accordingly.
d) I understand that if there are indications of academic integrity breaches, including improper Gen AI use, my work will be subject to investigation.
e) This assignment is my own work, and I have properly acknowledged all sources, tools, and external contributions, including the use of Gen AI where applicable.
f) I acknowledge and authorize the submission and/or storage of my work in a database for the purpose of verifying its originality and/or conducting tests using artificial intelligence software, and I hereby consent to this process.
g) I acknowledge that this submission is subject to Taylor's University/College Academic Integrity Procedure (THE-ACA-PROC-AINT) and all applicable university regulations.

| | |
|---|---|
| **Name & Student ID** | Mashnoon Mazumder 0366445 |
| **Signature** |  |
| **Date** | 02.06.25 |

Zhaojunyi

**Taylor's University / Taylor's College**

# ASSESSMENT SUBMISSION DECLARATION FORM

| | |
|---|---|
| **Module Code:** | I TS63504 |
| **Module Name:** | Human computer interaction |
| **Assessment:** | Assessment 1 |

| | |
|---|---|
| **Student Name:** | Zhaojunyi |
| **Student ID:** | 0370624 |
| **Semester/Year:** | Sem 4 |

Dear Students,

Taylor's University/College upholds the highest standards of academic integrity. Students must complete their work honestly and ethically, ensuring that all submitted assessments reflect their own understanding and efforts. Any form of academic misconduct, including but not limited to plagiarism, collusion, contract cheating, falsification, and unauthorised use of Gen AI tools, is strictly prohibited and will be subject to disciplinary action in accordance with university regulations.

In this form, there are two (2) sections namely: **Section 1 Instruction on the use of Generative Artificial Intelligence** (to be completed by the module leader) and **Section 2 Student Acknowledgement and Declaration** (to be completed, signed and submitted by the students together with their assessment).

Students are responsible for properly acknowledging all sources, tools, and external contributions in their work. Misuse of AI-generated content, failure to attribute sources, or engagement in dishonest practices may result in penalties ranging from warnings to expulsion, as outlined in the **Student Handbook** (link).

This Assessment Submission Declaration Form is attached to the assessment brief. **Students are required to complete the Assessment Submission Declaration Form in any piece of work submitted** at Taylor's University/College, except for assessments completed and submitted in controlled environments. **For group assessments, each member of the group must complete an Assessment Submission Declaration Form**.

## SECTION 1: INSTRUCTION ON THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE FOR THIS ASSESSMENT

*The section below is to be completed by the module leader, i.e. module leader is to put a ' v' in the relevant checkbox.*

☐ **Guided use of Gen AI**

Students are allowed to use Gen AI as stipulated by lecturers in the assessment brief:

1. Use lecturer-approved Gen AI tools only for certain parts of an assessment (e.g. brainstorming, proofreading etc.) or the entire assessment.
2. Use Gen AI for specific purposes only, such as generating drafts, refining language, or conducting exploratory analysis, but not for creating final outputs or core analytical tasks.

☐ **Flexible use of Gen AI**

You are allowed to use Gen AI tools in any way you find appropriate for the task, provided you acknowledge and explain their usage. This emphasises transparency, critical engagement, and ethical practices.

☐ **Use of Gen AI is not applicable**

Assessment is conducted under controlled environments (final exams, practical assessment without written assignment etc). Students are to complete the task independently, without the assistance of Gen AI tools.

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- Counseling or cautioning.
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| | I attached Appendix in this assignment the chat history, including all the prompts that I used and the output from the Gen AI tool(s) for this assignment. | |

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| APA | … (AI platform, year) | Company. (year). *Platform Used* (version) [model]. URL<br><br>***Example:***<br>OpenAI. (2023). *ChatGTP* (Mar 14 version) [Large language model]. https:chat.openai.com/chat |
| MLA | …. ("prompt"). | "Description of prompt" prompt. *Name of AI tool,* version of AI tool, Company, date text was generated. URL.<br><br>***Example (Text):*** "Identify the themes in Mcteague by Frank Norris" prompt. ChatGPT, 21 November version, OpenAI, 4 Dec. 2023. https://chat.openai.com/share/2f2be19d-eadd-4151-8ceb-0785319074b3<br><br>***Example (Image):*** Fig. 2. "Create impressionist painting of a cat |

| | | |
|---|---|---|
| | | using neutral colors" prompt. DALL-E, version 2, OpenAI, 27 Nov. 2023. https://labs.openai.com/ |
| Harvard | … (AI platform year) | There is no guideline for Harvard style on referencing the use of AI. The following format is recommended by most universities.<br><br>Name of AI (Year of communication) Medium of communication. Receiver of communication, Day/month of communication.<br><br>***Example***<br>OpenAI ChatGPT (2023) ChatGPT response to Mary Jane, 25 January 2024 |

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g) I acknowledge that this submission is subject to Taylor's University/College Academic Integrity Procedure (THE-ACA-PROC-AINT) and all applicable university regulations.

Zhao Junyi

| | |
|---|---|
| **Name & Student ID** | Zhaojunyi 0370624 |
| **Signature** | |
| **Date** | 2025.6.2 |

## 3.0 Marking Scheme

| Criteria | Marks (10 marks for each criterion below) | | | |
|---|---|---|---|---|
| | **Excellent (10-9)** | **Good (8-7)** | **Average (6-4)** | **Poor (3-1)** |
| 1.0 Vision, mission and problem definition, proposed scenario, target audience selection | | | | |
| 2.0 Solution and innovation, social impact, conclusion and future enhancement | | | | |
| 3.0 Technical diagram on the overall system architecture, and integration with at least 3 latest IT technologies | | | | |
| 4.0 Scope definition and functional requirements | | | | |
| 5.0 Presentation - Language and Delivery<br>✔grammatical accuracy<br>✔fluency<br>✔pronunciation<br>✔intonation<br>✔volume and pace | | | | |
| 6.0 Expression and Body Language Delivery<br>✔confidence and enthusiasm<br>✔ positive non-verbal body language (eye contact, poise and gestures)<br>✔connection with audience | | | | |
| 7.0 Discuss your design rationale - Strengths and weakness of the final design, and alternative design ideas | | | | |
| 8.0 Group analysis - strengths and weaknesses of the project team, and lessons learnt about teamwork | | | | |
| 9.0 Design and develop a user interface that incorporates visual and audio techniques used for a local organisation using a standard Application Programming Interface (API), e.g. OpenGL, etc. | | | | |
| 10.0 Software prototype (high fidelity alpha version prototype is required) | | | | |
| **SUB-TOTAL (100 marks)** | | | | |
| **Total Marks (40 marks)** | | | | |
| Lecturer's Feedbacks: | | | | |

**All the best!**