

Infosys Springboard Virtual Internship 6.0 Completion Report

Team Details

Batch Number: 04

Start date: 06/10/2025

Names: Venkata Ashok Kumar Reddy Dumpa

Internship Duration: 8 Weeks

1. Project Title

Web Application for Smart E-Waste Collection and Management.

2. Project Objective

The main goal of the project was to establish a **Web Application for Smart E-Waste Collection and Management**. This platform was meticulously designed to **streamline the collection and disposal** of electronic waste. It achieves this by providing an **interactive interface for users to submit disposal requests** and equipping administrators with an **efficient mechanism to manage and schedule pickups**, thereby ensuring a **seamless and reliable e-waste collection process**.

3. Project description in detail

- **Authentication & Security** The system secures user access using **Spring Security with JWT** for session handling and requires mandatory **password encryption**. It defines two primary roles: **User** (for submitting and managing requests) and **Admin** (for overall management and scheduling).
- **Request Submission** The intuitive interface allows registered users to log in and submit detailed requests via the **E-Waste Submission Form**. Details collected include device type, quantity, address, brand, model, and condition. Verification is supported by the submission of **multiple uploaded images**.
- **Admin Workflow** the **Admin Dashboard** is the central hub for managing requests. Admins can view and filter all requests and perform key actions: **Accept, Reject, or Schedule Pickup**, which involves assigning the specific date, time, and personnel for collection.
- **Automated Communication** The system incorporates an **automated email notification system (via Spring Boot Mail/SMTP)**. This ensures that users are **instantly alerted** when their request is approved, rejected, or scheduled with pickup details.
- **Real-World Impact** The platform promotes environmental responsibility by securing user data through **certified data erasure protocols** (Milestone 4 enhancement) and actively **contributing to the recovery of high-value materials** from disposed electronics.

4. Timeline Overview

Week	Activities Planned	Activities Completed
Week 1	Milestone 1: User Authentication and Profile Management	Completed secure user registration, login, and profile update functionality. Implemented JWT session handling and password encryption
Week 2	Milestone 1: User Authentication and Profile Management	Completed secure user registration, login, and profile update functionality. Implemented JWT session handling and password encryption
Week 3	Milestone 2: E-Waste Request Submission Module	Developed and tested the fully functional E-Waste Submission Form. Requests are stored in the ewaste_requests table with status tracking.
Week 4	Milestone 2: E-Waste Request Submission Module	Developed and tested the fully functional E-Waste Submission Form. Requests are stored in the ewaste_requests table with status tracking.
Week 5	Milestone 3: Admin Request Management and Scheduling	Developed the Admin Dashboard with request filtering and detailed viewing. Implemented the Schedule Pickup logic, assigning dates and updating status to "Scheduled".
Week 6	Milestone 3: Admin Request Management and Scheduling	Developed the Admin Dashboard with request filtering and detailed viewing. Implemented the Schedule Pickup logic, assigning dates and updating status to "Scheduled".
Week 7	Milestone 4: Testing, Review, and Documentation	Completed Unit, Integration, and API testing (JUnit, Mockito, Postman). Finalized API and User documentation, and generated the final project report.
Week 8	Milestone 4: Testing, Review, and Documentation	Completed Unit, Integration, and API testing (JUnit, Mockito, Postman) . Finalized API and User documentation, and generated the final project report.

5a. Key Milestones

Milestone	Description	Date Achieved
Project Kick-off	Defined modules, technology stack, and established development environment.	13/10/2025
Prototype/First Draft	Milestone 2 Completion: Working User Registration, Profile Management, and E-Waste Submission Form.	28/10/2025
Mid-Term Review	Milestone 3 Completion: Functional Admin Management, Scheduling, and Email Notification System.	11/11/2025
Final Submission	Final testing and preparation of all required documentation and source code.	25/11/2025
Presentation	Final project demonstration to mentor/review panel.	Yet to be conducted

5b. Project execution details**1. User Onboarding and Profile Management (Milestone 1)**

- **Secure Registration & Authentication:** A new user registers by providing essential data (name, phone number, email ID, address, password). The user then logs in with their credentials, granting them access to the dedicated User Dashboard.
- **Authentication Security:** This phase establishes secure authentication and session handling using technologies like **Spring Security with JWT**.

2. E-Waste Request Submission (Milestone 2)

- **Request Initiation:** The authenticated user submits a new e-waste request via the intuitive submission form.
- **Item Specification:** The user enters detailed disposal information, including device type (Laptop, Mobile, TV, Printer, etc.), quantity, condition, and the preferred pickup address.
- **Visual Verification:** The system requires the user to **upload multiple images** of the items to facilitate Admin review.

3. Admin Request Management and Scheduling (Milestone 3)

The admin manages logistics, communication, and decision-making for all requests.

- **Verification and Review:** The Admin accesses the dashboard to **verify** the acceptability of the user's submitted items, using the **previewed uploaded images** for quality and suitability assessment.
- **Decision and Action:**

- **Acceptance & Scheduling:** If acceptable, the admin **accepts the request**, assigns a specific **pickup date and time**, and **assigns a pickup agent**. The request status is updated to "**Scheduled**".
- **Rejection:** If unacceptable, the admin can **reject the request**.
- **Automated Notification:** Regardless of the decision, the user is immediately **notified via an automated email** detailing the admin's decision and the logistics.

4. Pickup Execution and Confirmation (Operational Flow)

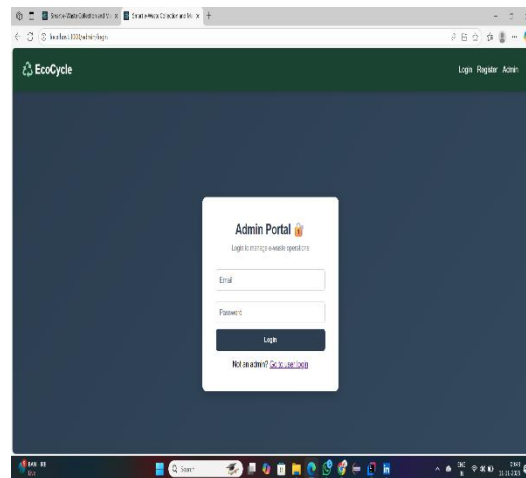
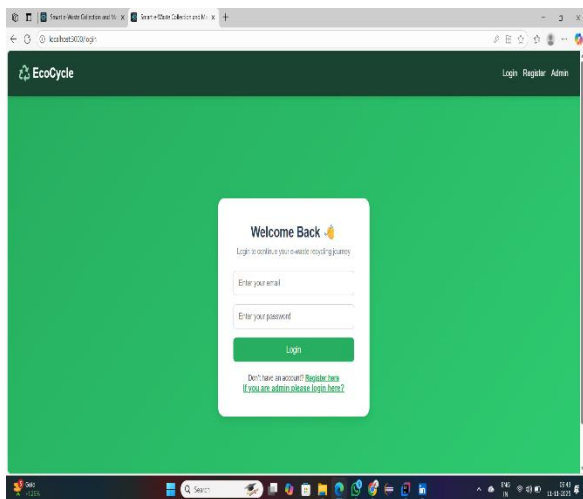
This phase ensures the secure physical collection and confirmation of custody transfer.

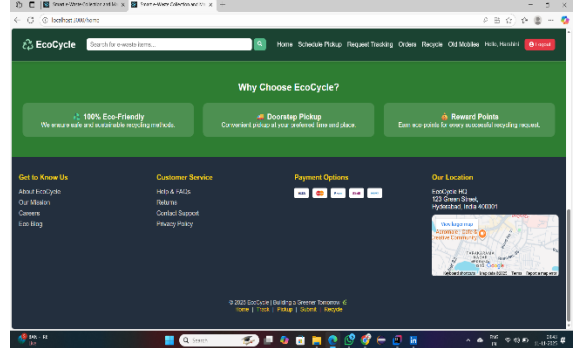
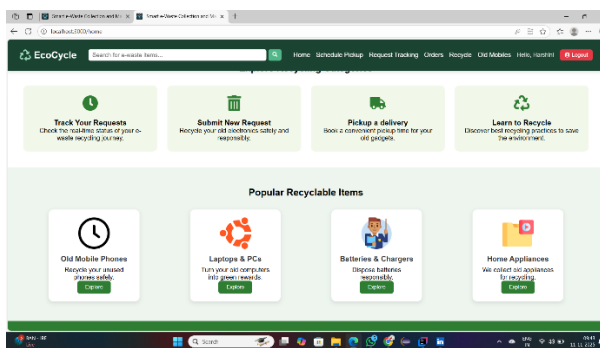
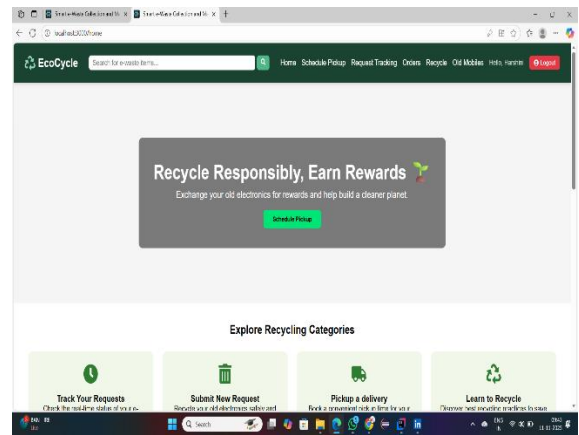
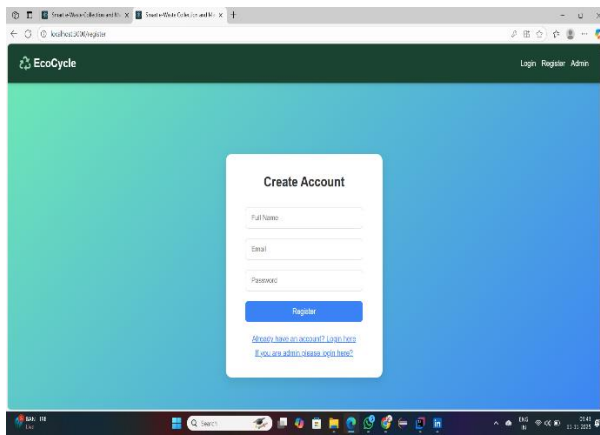
- **Assignment and Collection:** The assigned pickup agent accesses their dashboard to view assigned pickups, tracks the user's location, and collects the items.
- **Security Verification (OTP):** The system automatically sends a **One-Time Password (OTP)** via email to the user. The pickup agent obtains this OTP and enters it into their system.
- **Final Confirmation:** Successful entry of the email OTP serves as the **final confirmation** to the admin that the product has been secured, completing the chain of custody verification.

The project successfully delivered a complete, functional e-waste management system by establishing **secure user authentication** and a detailed **Request Submission Module**. Key success factors included the robust **Admin Scheduling Module** and the reliable **automated Email Notification System**. This integrated execution fulfilled the project's core mandate: ensuring a seamless, traceable, and reliable e-waste collection process.

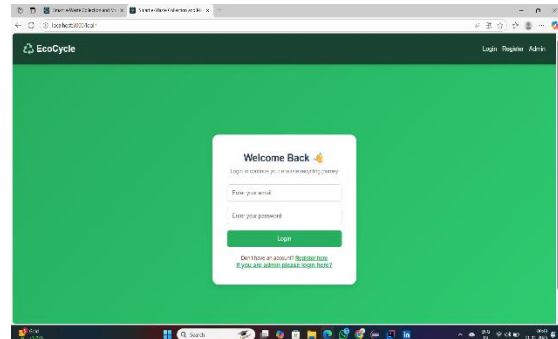
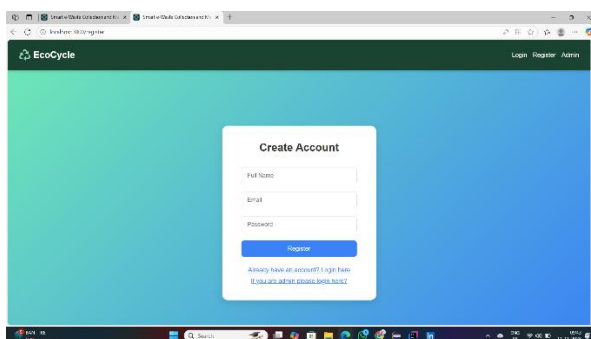
6. Snapshots / Screenshots

Landing page:





Login and Register:



User Dashboard:

Schedule an E-Waste Pickup

Search for e-waste items...

Home Schedule Pickup Request Tracking Orders Recycle Old Mobiles Help Feedback **My Cart**

Email:

Device Type:

Brand:

Model:

Quantity:

Upload Image:

Pickup Address:

Additional Remarks:

Your Pickup Orders

Track your e-waste recycling journey through various orders.

Search by device or date

Request #3

Device: TV
Brand: Apple
Model: 16 pro
Condition: Working
Quantity: 1
Pickup Address: Hyderabad
Requested On: Not available
Expected Pickup: Not available

Request #7

Device: TV
Brand: Apple
Model: 16 pro
Condition: Working
Quantity: 1
Pickup Address: Hyderabad
Requested On: Not available
Expected Pickup: Not available

Request Tracking

Search for e-waste items...

Home Schedule Pickup Request Tracking Orders Recycle Old Mobiles Help Feedback **My Cart**

Request #3

Device: TV
Brand: Apple
Model: 16 pro
Condition: Working
Quantity: 1
Pickup Address: Hyderabad
Requested On: Not available
Expected Pickup: Not available

Request #7

Device: TV
Brand: Apple
Model: 16 pro
Condition: Working
Quantity: 1
Pickup Address: Hyderabad
Requested On: Not available
Expected Pickup: Not available

Request Tracking

Search for e-waste items...

Home Schedule Pickup Request Tracking Orders Recycle Old Mobiles Help Feedback **My Cart**

ID	Full Name	Email	Phone	Pickup Address	Additional Notes
1	Ashish Kumar	ashish@example.com	9876543210	123 Green Street, Mumbai	Please arrive between 10 AM - 12 PM

Admin Dashboard:

EcoCycle Admin

Welcome, Admin

Dashboard Users Requests Orders Reports Settings Help Admin **My Cart**

Total Requests: 10 Active Users: 5 Completed Pickups: 15 Pending Requests: 5

Quick Actions

Manage Users
View or remove registered users

Manage Requests
Track and approve or reject any order

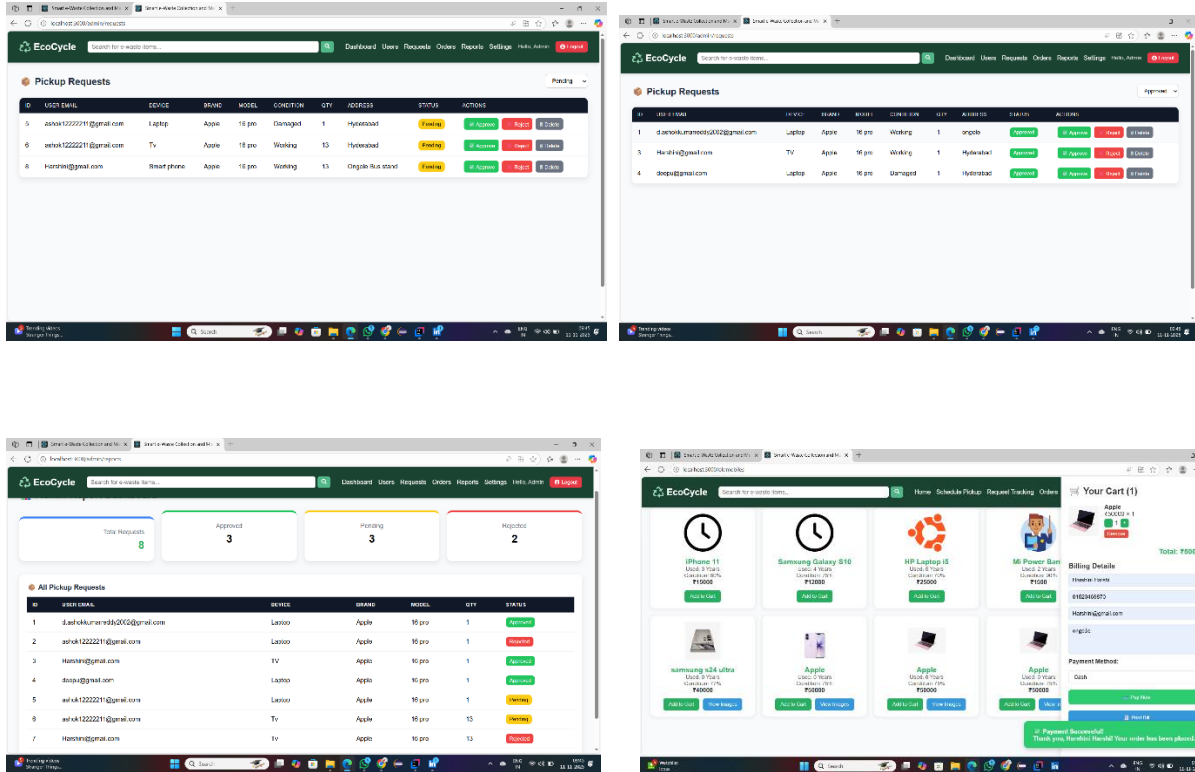
Generate Reports
Analyze system performance

© 2023 EcoCycle Admin Dashboard

Pickup Requests

ID	Device Name	Device	Brand	Model	Condition	Qty	Quantity	Status	Location
1	Laptop	Apple	16 pro	Working	1	1	1	Approved	Hyderabad
2	Laptop	Apple	16 pro	Damaged	1	1	1	Approved	Hyderabad
3	TV	Apple	16 pro	Working	1	1	1	Approved	Hyderabad
4	Laptop	Apple	16 pro	Damaged	1	1	1	Approved	Hyderabad
5	Laptop	Apple	16 pro	Damaged	1	1	1	Approved	Hyderabad
6	TV	Apple	16 pro	Working	1	1	1	Approved	Hyderabad
7	TV	Apple	16 pro	Working	1	1	1	Approved	Hyderabad
8	Smartphone	Apple	16 pro	Working	1	1	1	Approved	Hyderabad

Pickup Dashboard:



7. Challenges Faced:

1. Secure Authentication and JWT Management

Implementing a robust security framework was complex, involving:

- **Challenge:** Successfully integrating **Spring Security with JSON Web Tokens (JWT)** for authentication and establishing secure session handling for both the User and Admin roles.
- **Technical Difficulty:** Ensuring the correct generation, validation, and refresh mechanisms for JWTs to maintain continuous and protected user sessions without security flaws.

2. Real-Time Status Synchronization

Maintaining immediate data consistency across different user dashboards was a significant technical hurdle:

- **Challenge:** Ensuring that the **User Dashboard** instantly reflected status updates (e.g., changing from 'Pending' to 'Scheduled') initiated by the Admin.

- **Technical Difficulty:** Implementing reliable mechanisms (like efficient database polling or WebSocket's) to synchronize request status across the system without introducing lag or performance issues.

3. Secure Chain of Custody Verification

The operational requirement to verify product transfer added a critical security layer:

- **Challenge:** Developing the system for **email OTP verification** at the point of pickup, where the admin is confirmed of the custody transfer only after the agent enters the user-provided OTP.
- **Technical Difficulty:** Creating the secure API logic to instantly trigger the OTP email upon pickup initiation, validate the agent's OTP entry, and accurately update the final "Done" status.

4. Image Handling and Admin Verification

Managing visual data for decision-making required robust file handling:

- **Challenge:** Handling the storage, retrieval, and display of **multiple uploaded images** (up to 5 per request) from the E-Waste Submission Form.
- **Technical Difficulty:** Ensuring image files were stored securely, efficiently linked to the correct request ID in the database, and quickly loaded for the admin's verification preview.

5. Automated Notification Reliability

Integrating external services introduced dependencies and reliability challenges:

- **Challenge:** Implementing and thoroughly testing the **automated email notification system** to guarantee immediate and accurate delivery of status changes (Approved, Rejected, Scheduled) to the user.
- **Technical Difficulty:** Configuring the **SMTP setup** (Spring Boot Mail) correctly, handling potential external service failures, and ensuring that email content was dynamic and accurate for each status change.

8. Learnings & Skills Acquired

- **Security & Backend Development:** Mastered **Spring Security and JWT** implementation for building secure, role-based **REST APIs**.
- **Database Management:** Gained expertise in **Relational Database Design (ER Diagramming)** and optimizing performance through **SQL queries and indexing**.

- **Quality Assurance (QA):** Developed comprehensive skills in **end-to-end testing** (Unit, Integration, and API testing) utilizing tools such as **JUnit, Mockito, and Postman**.
- **Automated Services:** Acquired practical experience in implementing critical **automated services**, including reliable **email notifications** using **Spring Boot Mail**.
- **Technical Documentation:** Enhanced proficiency in creating professional project documentation, specifically **API documentation** using **Swagger/OpenAPI**.

9. Testimonials from team

Successfully developed and deployed a **fully functional, secure three-role system** (User, Admin, and Pickup Personnel). The greatest achievement was the implementation of the **fully automated scheduling and notification workflow**, which demonstrated significant **real-world operational efficiency and compliance**.

10. Conclusion

The internship successfully culminated in the deployment of a **fully tested and validated Web Application for Smart E-Waste Collection and Management**. By systematically achieving all four core milestones—ranging from the foundational secure user authentication to the final comprehensive project documentation—I gained invaluable, hands-on experience. This experience encompassed **full-stack development, stringent secure coding practices, and implementing scalable, enterprise-level application features**. Crucially, this project strongly aligns with my academic specialization in **secure software engineering**, establishing a robust foundation for my career goals in developing and maintaining complex enterprise applications.

11. Acknowledgements

I wish to dedicate this section to acknowledging the indispensable support received during my virtual internship with Infosys Springboard.

My foremost gratitude is extended to my esteemed mentors, **Srinadh Sir** and **Nikhil Sir**. Their expertise, meticulous guidance, and sustained constructive feedback were fundamental to the successful development and rigorous validation of the **Web Application for Smart E-Waste Collection and Management**. Their technical direction was crucial in ensuring the project adhered to secure and professional standards.

Furthermore, I am sincerely appreciative of the opportunity and resources provided by the entire Infosys Springboard team, which enabled a highly structured and professionally enriching learning experience throughout the program's eight-week duration.