

# Project Title:

## Saving the World: Smartly Dealing with Ewaste

**Project Charter Date:** *Feb 19, 2025 (Note: The sponsor did not respond/meet with our group; the first availability for the sponsor dates Feb 21, 2025)*

**Project Start Date:** Feb 18, 2025; **Projected Finish Date:** May 10, 2025

**Project Manager:** Robert Ke

### Project Vision:

PC/Laptop Identification using scene text detection and recognition (STDR)  
Incoming Sort and Categorization  
Predictive Analysis on Market and Commodity Pricing

### Project Goals and Tasks:

1. Meeting schedule with Sponsor and within group meeting
  - a. Kickoff Meeting – Feb 21, 2025
  - b. Within group meetings (weekly)  
To discuss the role, responsibility, individual technical details, achievement, drawbacks, and future goals  
Meeting with the sponsors?
  - c. Mid-term presentation – Present the STDR classification achievement and significance in the field of electronics hardware recycling (Planned date: 03/19/2025))
  - d. Final presentation - Present the STDR model and the predictive models; how do these technological achievements boost the efficiency of E-waste processing (Planned date: 04/30/2025)
2. Write a Project Charter and get it approved by the sponsor.
3. Timeline

#### Weeks 1-2: Target Identification & Dataset Collection

- Define classification accuracy metrics for PC/laptop sorting.
- Gather diverse images of devices (functional, semi-functional, scrap).
- Label key attributes (model type, condition, serial numbers) for dataset structuring.

#### Weeks 3-4: Annotation & Dataset Optimization with Roboflow

- Implement Scene Text Detection & Recognition (STDR) for enhanced labeling.
- Optimize dataset quality by refining annotations and reducing noise.
- Conduct exploratory data analysis (EDA) to assess dataset balance and distribution.

#### Weeks 5-6: Model Benchmarking & Initial Training

- Evaluate YOLO family, HOG, R-CNN, RetinaNet, EfficientDet for:
  - Accuracy, speed, and cost-efficiency.
  - Performance on labeled dataset.
- Select top-performing models for further tuning.

#### Weeks 7-8: Hyperparameter Tuning & Model Optimization

- Optimize key parameters (batch size, learning rate, augmentation).
- Train the best model with improved precision and throughput.
- Compare post-tuning performance and finalize the best model.

#### Weeks 9-10: Real-Time Pipeline Development

- Design an automated sorting pipeline for real-time classification.

#### Weeks 11-12: System Testing & Optimization

- Conduct pilot testing to validate real-world performance.
- Identify processing bottlenecks and refine the pipeline.
- Improve real-time decision-making for increased accuracy.

#### Weeks 13-14: Performance Metrics & Validation

- Measure improvements in speed, accuracy, and scrap reduction.
- Compare AI-assisted classification with baseline manual sorting.

**Preliminary Milestones:** *(You should have at least 5 milestones. You may have more. Milestones are written in past tense and always have a date. Milestones are the date you accomplished something. (Like your graduation date.)*

|  | Date:     |
|--|-----------|
| 1. Milestone 1: Created Project Charter Presented to Sponsor           | 2/19/2025 |
| 2. Milestone 2: Collected dataset, performed exploratory data analysis | 3/3/2025  |
| 3. Milestone 3: Developed baseline model and evaluated initial results | 3/12/2025 |
| 4. Milestone 4: Optimized model and implemented feature engineering    | 3/26/2025 |
| 5. Milestone 5: Deployed final model                                   | 4/30/2025 |

## Project Deliverables:

The Project Charter Document.

Weekly reports tracking progress and recording challenges met.

Typical code artifacts written in Python or Tableau workbooks or spreadsheets.

Mid-time presentation tracking our progress on the project so far and future expectations.

A solution to classify electronic components for recycling purposes.

Final report that includes the approach to investigate the problem with your findings.

A final (business) presentation of your project.

**Budget Information:** *(This item relates to the time you are investing in the project. There are 4-5 students and your project's sponsor. Each student's time and the sponsor's time should be documented for the project. Do not worry about financial/cost information!)*

| Student/Sponsor | Time per Week     | Exceptions |
|-----------------|-------------------|------------|
| Robert Ke       | 10 hours per week | N/A        |
| Jason Wang      | 10 hours per week | N/A        |
| Rong Gu         | 10 hours per week | N/A        |
| Jerry Wang      | 10 hours per week | N/A        |
| Yujun Sun       | 10 hours per week | N/A        |
| D3-Engineering  |                   |            |

**Success Criteria:** *(This is what the sponsor considers a successful project.)*

- Improve efficiency by reducing reliance on manual sorting
- Enhance consistency in identification and classification
- Optimize the extraction of valuable materials
- Strengthen the ability to anticipate market trends for commodities and used components

**Approach:** *(This is the technical approach to address the problem. This is similar to your mini-project where you use some kind of technique (random forest, clusters, seasonality, etc.) to work the problem.)*

**PC/Laptop Identification using scene text detection and recognition (STDR)**

- Target PC/Laptop identification to enhance classification accuracy, increase reuse, and reduce scrap.
- Use Roboflow for scene text detection and recognition (STDR) annotation, improving dataset quality and minimizing misclassification.
- Evaluate object detection models (YOLO family, HOG, R-CNN, RetinaNet, EfficientDet) for accuracy, speed, and cost-efficiency.
- Train the best-performing model with optimized parameters for higher precision and throughput.
- Deploy an automated real-time pipeline to streamline sorting, boosting throughput and lowering costs.
- Assess improvements in speed, accuracy, and scrap reduction, showing increased efficiency, profits, and sustainability.

**Roles and Responsibilities:**

| Name      | Role/Stakeholder | Contact Information  | Signature |
|-----------|------------------|----------------------|-----------|
| Robert Ke | Data Scientist   | lke3@u.rochester.edu |           |

|  |                       |                          |  |
|--|-----------------------|--------------------------|--|
| Jerry Wang   | <b>Data Scientist</b> | ywang383@u.rochester.edu |  |
| Yujun Sun  | <b>Data Scientist</b> | ysun83@u.rochester.edu   |  |
| Rong Gu  | <b>Data Scientist</b> | rgu7@u.rochester.edu     |  |
| Jason Wang   | <b>Data Scientist</b> | swang149@u.rochester.edu |  |
| <b>Comments:</b><br><i>We will abide by all the academic honesty protocols and will deliver materials on time with perfection.</i> |                       |                          |  |