**Project Charter Document**



**Project Name:** Waste Contamination Detection and Mitigation

**Department:** Environmental Engineering

**Focus Area:** Computer Vision

**Product/Process:** Artificial Intelligence



**Prepared By**

|  |  |
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| **Document Owner(s)** | **Project/Organization Role** |
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**Project Charter Version Control**

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| --- | --- | --- | --- |
| **Version** | **Date** | **Author** | **Change Description** |
| 1.0 | 17/12/2023 | Kallipalli Yogeshwar Sai | Document created and being modified in the local host |
| 1.1 | 26/12/2023 | Kallipalli Yogeshwar Sai | Identified goal and objectives |
| 1.2 | 04/01/2024 | Kallipalli Yogeshwar Sai | Annotation, Augmentation and Preprocessing |
| 1.3 | 18/01/2024 | Kallipalli Yogeshwar Sai | Model Building and Deployment |
| 1.4 | 20/01/2024 | Kallipalli Yogeshwar Sai | Show case and review, Final Presentation and documentation, Handover and KT |

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# PROJECT CHARTER PURPOSE

The project charter defines the scope, objectives, and overall approach for the work to be completed. It is a critical element for initiating, planning, executing, controlling, and assessing the project. It should be the single point of reference on the project for project goals and objectives, scope, organization, estimates, work plan, and budget. In addition, it serves as a contract between the Project Team and the Project Sponsors, stating what will be delivered according to the budget, time constraints, risks, resources, and standards agreed upon for the project.



# PROJECT EXECUTIVE SUMMARY

* Project goals
* Objectives
  + Data prepossessing
* Scope
* Assumptions
* Risks
* Costs
* Timeline
* Approach
* Organization



# PROJECT OVERVIEW

The increasing concern for environmental sustainability and waste management has prompted the initiation of a project aimed at leveraging deep learning techniques for the detection and prevention of waste contamination. With the rise in improper disposal practices and the potential environmental impact, this project aims to develop an intelligent system capable of identifying contaminants within waste streams



# PROJECT SCOPE

## Goals and Objectives

|  |  |
| --- | --- |
| **Goals** | **Objectives** |
| * Develop and implement a deep learning system for the automated detection of waste contamination in various waste streams. | * Train a robust deep learning model capable of accurately detecting and classifying various types of waste, including identifying contaminants. * Improve the model's accuracy and precision in waste detection to minimize false positives and negatives, ensuring reliable contamination identification. * Investigate and implement a multi-modal approach by integrating data from different sources such as images, sensor readings, and textual information for comprehensive waste analysis. * Implement real-time monitoring capabilities using edge computing to enable immediate detection of waste contamination events and trigger timely alerts for intervention. * Account for the variability in waste types and contamination patterns, ensuring the model is adaptable to different waste scenarios and evolving contamination types. * Implement online learning strategies to enable the model to continuously adapt and improve its performance over time as new data and contamination patterns emerge. * Incorporate a human-in-the-loop system where domain experts can provide feedback to the model, improving its accuracy and addressing any challenging contamination scenarios. * Ensure the development and deployment of the model adhere to privacy regulations and ethical standards, considering the potential impact on communities and individuals. * Develop a solution that is cost-effective to implement and maintain, considering factors such as hardware requirements, scalability, and operational expenses. * Create comprehensive documentation for the developed deep learning model, its implementation, and maintenance procedures. Facilitate knowledge transfer to relevant stakeholders. * Assess the environmental impact of the waste contamination detection system, considering factors such as energy consumption, waste reduction, and overall sustainability. |

## Project Deliverables

|  |  |
| --- | --- |
| **Milestone** | **Deliverable** |
| * Identifying Constraints and design the project architecture, explore various public forums to collect relevant data, Data Preparation. | * Deliverable 1.1—Identifying Constraints and design the project architecture. * Deliverable 1.2—Explore various public forums to collect relevant data. * Deliverable 1.3— Data Preparation |
| * Preprocessing and Model Building | * Deliverable 2.1— Preprocessing and Augmentation * Deliverable 2.2— Model Building for Association (Fuzzy Algorithm) and Recommendation |
| * Model Evaluation, tuning and insights, Deployment | * Deliverable 3.1— Model Evaluation, tuning and insights. * Deliverable 3. 2— Deployment |
| * Show case and review, Final Presentation and documentation, Handover and KT. | * Deliverable4.1 – show case and review * Deliverable4.2 – Final Presentation and documentation * Deliverable4.3 – Handover and KT |

## Deliverables Out of Scope

* designs

## Project Duration (start date: 15/12/2023 End date: 20/01/2024)

|  |  |  |  |
| --- | --- | --- | --- |
| **Project Milestone** | **Date Estimate** | **Deliverable(s) Included** | **Confidence Level** |
| * Identifying Constraints and design the project architecture, explore various public forums to collect relevant data, Data Preparation. | [18/12/2023]  -  [26/12/2023] | * Deliverable 1.1—Identifying Constraints and design the project architecture. * Deliverable 1.2—Explore various public forums to collect relevant data. * Deliverable 1.3— Data Preparation | [High] |
| * Preprocessing and Model Building | [04/01/2024]  -  [16/01/2024] | * Deliverable 2.1— Preprocessing and Augmentation * Deliverable 2.2— Model Building for Association (Fuzzy Algorithm) and Recommendation | [High] |
| * Model Evaluation, tuning and insights, Deployment | [16/01/2024]  -  [18/01/2024] | * Deliverable 3.1— Model Evaluation, tuning and insights. * Deliverable 3. 2— Deployment | [High] |
| * Show case and review, Final Presentation and documentation, Handover and KT. | [20/01/2024] | * Deliverable4.1 – show case and review * Deliverable4.2 – Final Presentation and documentation * Deliverable4.3 – Handover and KT | [Medium] |



# PROJECT CONDITIONS

## Project Assumptions

* Work on data which is extracted from public sources.
* Can create a web API by using flask or streamlit.
* Cloud deployment should be done.
* **Robust Tested:** Application should be tested for noise data also.

## Project Issues

**Priority Criteria**

1 − High-priority/critical-path issue; requires immediate follow-up and resolution.

2 − Medium-priority issue; requires follow-up before completion of next project milestone.

3 − Low-priority issue; to be resolved prior to project completion.

4 − Closed issue.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Date** | **Priority** | **Owner** | **Description** | **Status & Resolution** |
| 1 |  | High |  |  |  |
| 2 |  | High |  |  |  |

## Project Risks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **#** | **Risk Area** | **Likelihood** | **Risk Owner** | **Project Impact-Mitigation Plan** |
| 1 | [Project Risk] | [High/Medium/Low] |  |  |
| 2 | [Project Risk] | [High/Medium/Low] |  |  |

## Project Constraints

|  |  |
| --- | --- |
| Budgetary Constraints | The project must operate within a predefined budget, limiting the resources available for hardware, software, and data acquisition. |
| Technological Limitations | Availability of suitable hardware and software may be limited by current technological capabilities, potentially affecting the speed and efficiency of the deep learning models. |
| Data Accessibility | Limited availability of labeled training data for deep learning models could constrain the ability to develop accurate and robust detection algorithms. |
| Regulatory Compliance | Adherence to local, national, or international regulations regarding waste management and data privacy may impose constraints on the implementation of the project. |
| Time Constraints: | The project may be subject to tight deadlines, especially if there are legal or environmental requirements for swift waste contamination detection and response. |
| Human Resources | Availability of skilled personnel, including data scientists and domain experts, may be limited, impacting the speed and quality of model development and deployment. |
| Environmental Conditions | External factors, such as weather conditions or specific environmental settings, may affect the deployment of sensors or other detection mechanisms. |
| Integration Challenges | Integration with existing waste management systems or infrastructures may be challenging, leading to delays or additional complexities. |
| Ethical Considerations | Adherence to ethical guidelines in the collection and use of data may impose constraints on certain methodologies or approaches. |



# Project Structure Approach

The approach for managing the project on Waste Contamination and Detection using Deep Learning will follow a systematic and phased structure. The primary goal is to efficiently leverage deep learning techniques for accurate waste contamination detection while ensuring effective collaboration among team members.

* 1. Phased Approach:

The project will be divided into distinct phases, each focusing on specific aspects of the waste contamination detection process. The key phases include:

|  |  |
| --- | --- |
| Phase 1 - Project Initiation | Objective:  Establish project goals, define scope, and assemble project team.  Activities:  Conduct project kick-off meetings, define roles and responsibilities, and set up communication channels. |
| Phase 2 - Data Collection and Preprocessing | Objective:  Gather diverse datasets for training the deep learning model.  Activities:  Identify sources of waste data, curate and preprocess datasets for model training. |
| Phase 3 – Model Development and Training | Objective:  Develop and train deep learning models for waste contamination detection.  Activities:  Select appropriate deep learning architecture, perform model training, and optimize for accuracy. |
| Phase 4 - Integration of Sensor Data | Objective:  Integrate sensor data for real-time monitoring.  Activities:  Implement models on edge devices, ensuring real-time detection capabilities. |
| Phase 5 - Continuous Improvement | Objective:  Implement continuous learning strategies for model improvement.  Activities:  Evaluate model performance, address issues, and incorporate feedback for ongoing enhancement. |

6.2 Collaboration and Communication:

Effective communication and collaboration are crucial for project success. The following strategies will be employed:

|  |  |
| --- | --- |
| Regular Team Meetings | Weekly team meetings to discuss progress, challenges, and upcoming tasks. |
| Collaboration Tools | Utilize project management tools, communication platforms, and version control systems for seamless collaboration. |



6.3 Quality Assurance:

Quality assurance measures will be implemented at each phase to ensure the reliability and accuracy of the waste contamination detection system.

|  |  |
| --- | --- |
| Testing Protocols | Develop and implement testing protocols for model validation and verification. |
| Stakeholder Feedback | Solicit feedback from stakeholders to identify areas for improvement and refinement. |

6.4 Flexibility and Adaptability:

Recognizing the dynamic nature of deep learning projects, the approach allows for flexibility in adjusting strategies based on emerging technologies, data patterns, and stakeholder feedback.

6.5 Milestones and Deliverables:

Define clear milestones and deliverables for each phase to track progress and ensure alignment with project goals.

# Project Team Organization Plans

|  |
| --- |
| * Deliverable 1.1— * Deliverable 1.2— * Deliverable 1.3— |
| * Deliverable 2.1— * Deliverable 2.2— |
| * Deliverable 3.1— * Deliverable 3. 2— |
| * Deliverable4.1 – * Deliverable4.2 – * Deliverable4.3 – |



# PROJECT REFERENCES

|  |  |
| --- | --- |
| **Milestone** | **Deliverable** |
| [ |  |
|  |  |
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# APPROVALS

**Prepared by** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Project Manager

**Approved by** Sharat Chandra M\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Project Sponsor

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Executive Sponsor

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Client Sponsor



# APPENDICES

## Document Guidelines

## Project Charter Document Sections Omitted

