**Project Design Phase-II**

**Solution Requirements (Functional & Non-functional)**

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| Date | 15 May 2023 |
| Team ID | NM2023TMID13277 |
| Project Name | Intelligent Garbage Classification using Deep learning |

**Functional Requirements:**

Following are the functional requirements of the proposed solution.

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| **FR No.** | **Functional Requirement (Epic)** | **Sub Requirement (Story / Sub-Task)** |
| FR-1 | Image Upload and Preprocessing | Develop a user interface to allow users to upload images of garbage for classification. Implement a system to preprocess the uploaded images by resizing, normalizing, and enhancing quality. Ensure compatibility with various image formats (JPEG, PNG, etc.) |
| FR-2 | Deep Learning Model Training | Design and implement a deep learning architecture for garbage classification. Train the model using a labeled dataset of garbage images. Tune hyperparameters, such as learning rate and batch size, for optimal model performance |
| FR-3 | Garbage Classification | Develop an algorithm to classify garbage images into different categories. Integrate the trained deep learning model with the classification algorithm. Ensure high accuracy in classifying garbage items. |
| FR-4 | Real-time Classification | Enable real-time classification of garbage images. Optimize the classification process for fast and efficient results. Handle multiple image uploads and simultaneous classifications. |
| FR-5 | Result Visualization | Display the classification results to the user. Provide a clear and intuitive visualization of the garbage categories. Include additional information or recommendations for proper waste disposal |
| FR-6 | User Feedback | Implement a feedback mechanism for users to provide input on the classification accuracy. Collect user feedback to continuously improve the deep learning model. Analyze user feedback to identify areas for enhancement and refinement |
| FR-7 | Model Maintenance | Develop a system to periodically update the deep learning model with new garbage samples. Implement an automated retraining process to improve the model's performance over time. Ensure seamless model updates without disrupting the classification functionality |

**Non-functional Requirements:**

Following are the non-functional requirements of the proposed solution.

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| **FR No.** | **Non-Functional Requirement** | **Description** |
| NFR-1 | **Usability** | The system should have a user-friendly interface that is intuitive and easy to navigate, allowing users to interact with the garbage classification system effortlessly. |
| NFR-2 | **Security** | Security The system should ensure the confidentiality and integrity of user data, employing secure data transmission protocols and protecting against unauthorized access or data breaches. |
| NFR-3 | **Reliability** | Reliability The system should be highly reliable, minimizing errors or misclassifications in garbage identification, and providing consistent and accurate results. |
| NFR-4 | **Performance** | The system should have low latency, capable of processing and classifying garbage images in real-time, ensuring quick and responsive results. |
| NFR-5 | **Availability** | The system should be available and accessible to users at all times, with minimal downtime for maintenance or updates, ensuring uninterrupted usage. |
| NFR-6 | **Scalability** | The system should be scalable, capable of handling a large volume of garbage images and accommodating an increasing number of users without compromising performance or accuracy. |