**Slide 1: Project Overview**

Good [morning/afternoon], everyone. Today, I'll be presenting our project on developing an intelligent waste sorting system using advanced convolutional neural networks, or CNNs. We aim to address the growing global challenge of waste management by creating a system that can accurately and efficiently classify waste into recyclable, compostable, and landfill categories. Let's dive into the details.

**Slide 2: Introduction & Objectives**

Our world faces a pressing challenge: the growing volume of waste, particularly in urban areas, is leading to environmental degradation and serious health risks. Traditional waste sorting methods are not only labor-intensive but also prone to errors, leading to inefficiencies in waste management. To address this, we are developing a solution that leverages advanced CNN architectures to automate waste sorting, ensuring high accuracy in classifying waste.

Our objectives are clear: First, we aim to develop a robust system that accurately classifies waste into three main categories—recyclable, compostable, and landfill. Second, we will implement and compare different CNN models, including ResNet50, MobileNet V3, and EfficientNet B0, to determine the most effective model for this task. Finally, by enhancing the accuracy of waste sorting, we hope to significantly improve recycling rates and reduce the environmental impact. The first image shows input images being classified by the computer vision model into recyclable, compostable, and landfill categories.

**Slide 3: System Design**

To achieve our objectives, we've designed a system that integrates multiple convolutional layers, pooling layers, and fully connected layers—hallmarks of CNN architectures. The system begins with input images, which are processed through several convolutional and pooling layers to extract features. These features are then passed through fully connected layers to make the final classification decision.

We’ve experimented with several CNN models—ResNet50, MobileNet V3 Large, EfficientNet B0, and MobileNet V2—each offering unique advantages in terms of accuracy, speed, and computational efficiency.

The second image shows the layered architecture of the CNN model. Here, the workflow starts with Data Collection and Annotation of waste images into categories (recyclable, compostable, landfill), followed by Data Cleaning, Analysis, and Visualization. Data Preprocessing includes resizing, tensor conversion, and normalization. The dataset is split into 80% training and 20% validation/test sets. During Model Training, the model is trained with set hyperparameters. After training, the model’s performance is evaluated and optimized using the validation set. Finally, the model’s real-life efficiency is tested with the test set to produce the final classification output.

**Slide 4: Implementation & Results**

"Our implementation involved several critical steps, starting with data collection and preprocessing, followed by model training and evaluation. After rigorous testing, we evaluated each model’s performance, focusing on metrics such as accuracy, precision, and recall. The results were promising, with our selected model achieving [mention key performance metric] in classifying waste into three categories.

Our system is now ready for real-world application, offering a scalable solution that can significantly improve the efficiency and accuracy of waste management processes."

The third image shows the model training workflow and the selected CNN model and the test results of it. Here, the Smart Waste Sorting system uses CNN models to classify trash images by extracting features through convolutional layers, reducing dimensions with max-pooling, and sorting waste with the output layer. Testing results reveal EfficientNet B0 as the top performer with the lowest test loss (0.1549) and highest accuracy (95.78%). Other models tested include ResNet50 with 94.30% accuracy, MobileNet V3 Large with up to 95.42% accuracy after 10 epochs, MobileNet V2 at 94.86%, and MobileNet V3 Small at 94.55%.

**Slide 5: Conclusion & Future Work**

In conclusion, our project successfully demonstrates the potential of using CNNs for automated waste sorting. By improving the accuracy and efficiency of waste classification, we can make a significant impact on recycling rates and overall environmental sustainability.

Looking ahead, we plan to expand the system's capabilities by incorporating additional waste categories and further optimizing the models for deployment in diverse environments.