**Project Design Phase**

**Solution Architecture**

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| Date | 16 June 2025 |
| Team ID | LTVIP2025TMID41917 |
| Project Name | Smart Sorting: Transfer Learning for Identifying Rotten Fruits and Vegetables |
| Maximum Marks | 4 Marks |

**Solution Architecture:**

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

* Find the best tech solution to solve existing business problems.
* Implement a transfer learning-based AI model (e.g., using pre-trained CNNs like MobileNet, ResNet, or VGG) to accurately classify fruits and vegetables as fresh or rotten.
* Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
  + The system consists of:

-Data input layer: Camera or image capture system

-Preprocessing unit: Image resizing, normalization, and augmentation

-Model layer: A pre-trained deep learning model fine-tuned with fruit/vegetable datasets

-Output layer: Classification result (Fresh / Rotten) for sorting mechanism

-User interface (optional): Dashboard for monitoring classification performance

* Define features, development phases, and solution requirements.
  + Phases:

-Phase 1: Data collection and preprocessing

-Phase 2: Model selection and transfer learning adaptation

-Phase 3: Training and validation

-Phase 4: Integration with physical sorting hardware

-Phase 5: Testing, deployment, and maintenance

Key Features: Real-time classification, high accuracy, lightweight model

for edge devices

* Provide specifications according to which the solution is defined, managed, and delivered.
  + Specifications:

-Accuracy target: ≥ 90% on test data

-Latency: Real-time or near-real-time (under 1 second)

-Hardware requirements: Compatible with edge devices (e.g., Raspberry Pi, Jetson Nano)

-Scalability: Support for multiple fruit/vegetable types

-Maintainability: Model retraining pipeline for new categories or data drift

**Example - Solution Architecture Diagram:**

