India's No.1 E-School Challenge is back!

SHAPING INDIA'S TECHSCAPE

1st Slide - Team Intro

Title: Smart Vision Technology Quality Control (Robotics Track)

Team Name: SABARI132005

Team Members:
- Sabari – Team Leader
- Kamal – Member
- Uvarajan- Member
- Sarathi- Member
- Kaviarasu- Member

College/University: Manakula Vinayagar Institute of Technology

Date: 20-10-2024

Github Link: https://github.com/Sabari2005/FlipKart-Grid_6.0

Executive Summary:

- **OCR to Extract Details from Image/Label:**
  - Implemented a custom OCR model based on **EasyOCR with transfer learning.**
  - Enhanced input images using **normalization, denoising, and thresholding**.
  - Extracted product details (**brand name, product name, net quantity, MRP**) through **text segmentation**.

- **Using OCR to Get Expiry Date Details:**
  - Specialized the OCR model for **expiry date extraction** using **template matching**.
  - Applied NLP for **data cleaning** and **format validation** of extracted dates.

- **Image Recognition and IR-based Counting:**
  - Developed an custom object detection model using YOLOv8, trained on 25,000 images with polygon annotations.
  - Utilized non-maximum suppression (NMS) for **duplicate detection reduction**.

- **Detecting Freshness of Fresh Produce:**
  - Utilized a custom **instance segmentation** model with YOLOv11 to classify fruits and vegetables.
  - Evaluated quality using visual indicators (**defects, cracks, wrinkles**).
  - Implemented **shelf-life prediction algorithms** and **decay models** to estimate remaining freshness.

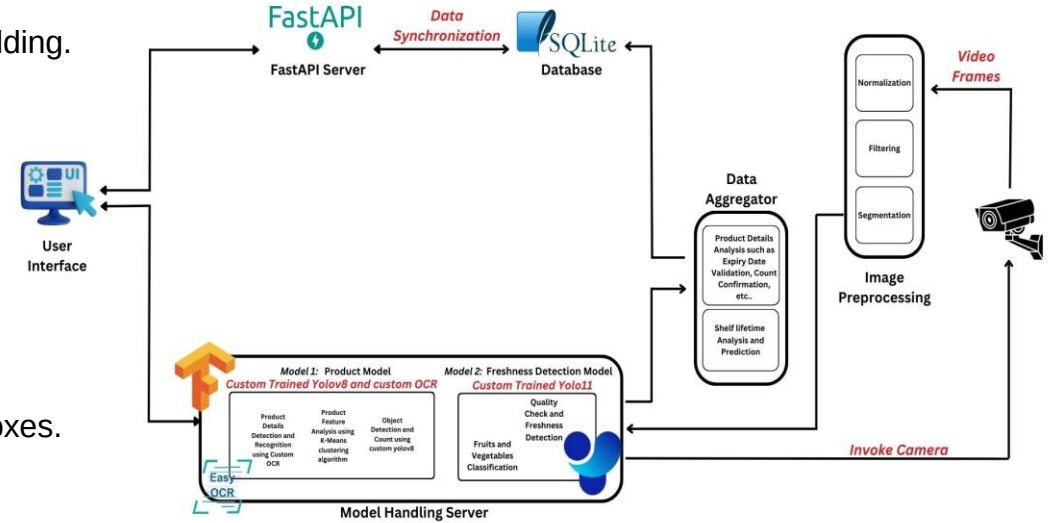
Technical Approach:

1. OCR for Detail Extraction
- Model: Custom OCR (EasyOCR).
- Transfer Learning for enhanced accuracy.
- Preprocessing: Normalization, denoising, thresholding.
- Extraction: Text segmentation, rule-based post-processing.

2. Expiry Date Extraction
- Enhancements: Targeted OCR for expiry date.
- Template Matching: Locate expiry formats using OpenCV.
- NLP: Regex for data cleaning and validation.

3. Image Recognition and Counting
- Model: YOLOv8.
- Training: 25,000 labeled images with bounding boxes.
- NMS: Non-Maximum Suppression for duplicates.
- Counting: Real-time product counting.

4. Freshness Detection
- Model: YOLOv11.
- Classification: Assess defects, cracks, wrinkles.
- Shelf-Life Prediction: Use decay models for freshness.
- Data Aggregation: Analyze freshness metrics.



Hardware Specifications

1. Computing Unit

•**CPU**: Intel Core i7 or AMD Ryzen (6+ cores)
•**GPU**: NVIDIA GeForce RTX 3060 or higher
•**RAM**: 16 GB (32 GB preferred)
•**Storage**:
- **SSD**: 512 GB+
- **HDD**: 1 TB+

2. Imaging Equipment

•**Camera**: HD Webcam or DSLR (1080p)
•**IR Sensors**: For object counting

3. Networking

•**Network Adapter**: Gigabit Ethernet
•**Wireless**: Wi-Fi 6 (optional)

4. Power Supply

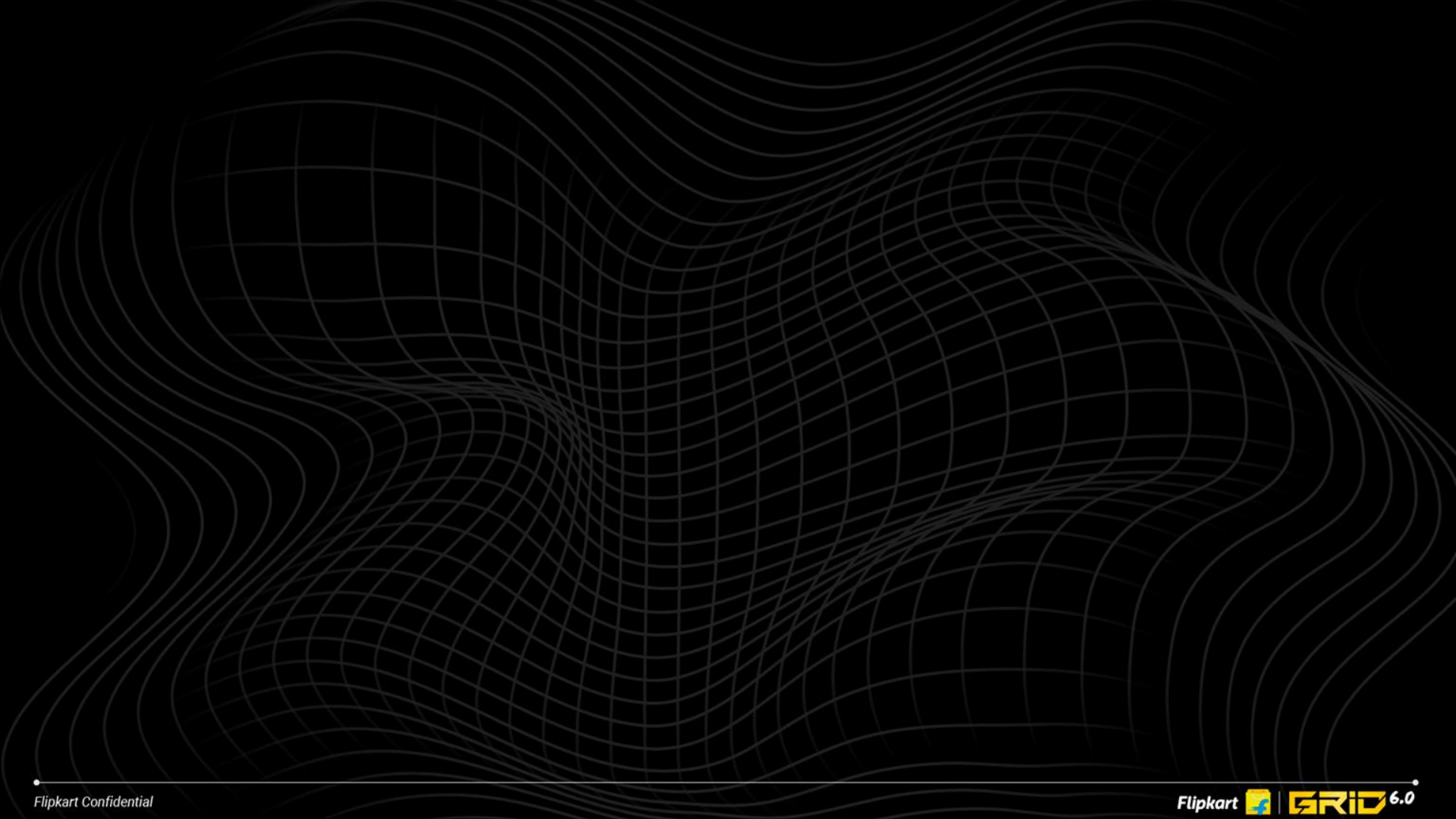
•**UPS**: Uninterruptible Power Supply

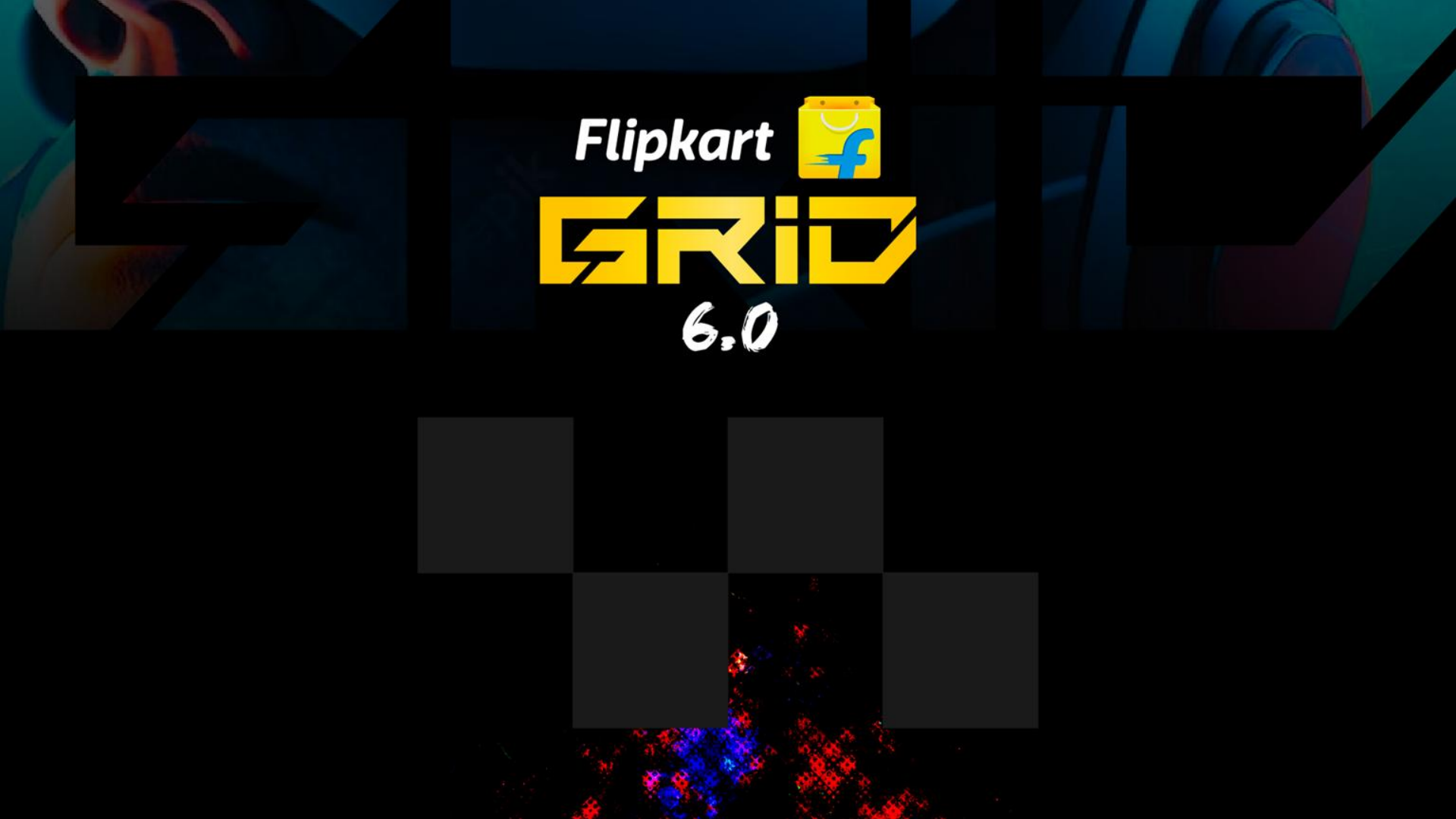
5. Peripherals

•**Monitor**: 24” Full HD (1920x1080)
•**Keyboard/Mouse**: USB or wireless

6. Development Environment

•**OS**: Windows 10/11 or Ubuntu 20.04
•**Software**: Python 3.x, OpenCV, PyTorch, EasyOCR, FastAPI, SQLite

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