Project Plan Presentation
Personalizing the Culinary Experience

The Capstone Experience

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Project Sponsor Overview

- Sponsor Overview
  - Global household appliance manufacturer
  - HQ: Benton Harbor, MI
  - Strong emphasis on user-centric design
  - Committed to being the best global kitchen and laundry company, in constant pursuit of improving life at home
  - 61,000 global employees
  - $20 Billion in sales
Project Functional Specifications

• Utilize a machine learning algorithm to identify patterns and preferences in user's interactions
• Generate and refine personalized user profiles based on the analyzed interaction data
• Offer customized recipe suggestions, cooking settings/cycles, and food cooking characteristics to users
Project Design Specifications

• Track user interaction and learn user preferences
• Create synchronous experience between app and HMI
• Provide the user with personalized culinary experience
The appliance stays on the idle screen until the user opens the appliance door or interacts with the screen.
Screen Mockup: Home screen

The home screen has the basic cooking modes, and options for auto cook and favorites.
Once the user selects the recipe, they’ll be redirected to the cooking instructions screen.
Screen Mockup: Cooking screen

The cooking screen shows the progress of the cooking cycle
The recommendations will be shown based on the users interactions and preferences.
Screen Mockup: Mobile App

- Home screen
- Notification Screen
Screen Mockup: Data Dashboard

Back end access dashboard

Session name: test1

Session data
User ID: username
Oven Temp: 325 deg.
Food in oven: Yes
Door open: No
Cooking progress: 35%

Edit user preferences
Send user notification
Adjust doneness progress
Adjust preheat time progress
Project Technical Specifications

• Data Dashboard
• Vision HMI
• Vision Mobile App
• Backend
  ▪ Database Server
  ▪ Transformer (ML Model)
Project System Architecture

- Vision HMI App: Flutter
- Backend: FastAPI, PyTorch
- Real time Database: MongoDB
- Vision Mobile App: Flutter, iOS, Android
- Study Data Dashboard: Next.js
Project System Components

• Hardware Platforms
  ▪ Oven - HMI App integrated with a physical oven
  ▪ Pixel 3A – To develop and test our Android app
  ▪ iPad – To develop and test our iOS app

• Software Platforms / Technologies
  ▪ Flutter – For front-end development
  ▪ FastAPI – For back-end development
  ▪ React – For developing the dashboard
  ▪ MongoDB – Our database management system
Project Risks

• No training data: How do we train our model
  ▪ We are tasked to create an ML model but have no training data to train the model.
  ▪ We will have to simulate our training data
• Cold start problem: What to recommend to new users
  ▪ We do not know the best way to recommend new users
  ▪ Work with clients and develop a strategy to best recommend new users with no history.
• Connecting the HMI and Android applications
  ▪ We do not know how to seamlessly integrate HMI with Android apps, ensuring efficient communication for a unified user experience
  ▪ We will analyze HMI-Android communication, select compatible tech, and design a flexible, modular architecture for scalability.
• How do we avoid overfitting in our machine learning model:
  ▪ Our model may perform well on training data but generalize poorly to new, unseen data
  ▪ We will use techniques like cross-validation, regularization, and early stopping to prevent overfitting.
Questions?