MICHIGAN STATE UNIVERSITY

Project Plan Presentation

mFuel Application Development and Dispenser Integration

The Capstone Experience

Team Meijer

Jai Bollampally
Alia Fatima
Mehak LNU
Ram Patel
Muhib Siddiqi

Department of Computer Science and Engineering
Michigan State University

Spring 2026

From Students…
…to Professionals

Project Sponsor Overview

- Meijer is a family-owned supercenter chain headquartered in Grand Rapids, Michigan, operating as a one-stop-shop for groceries and general merchandise.
- Meijer is credited with pioneering the modern supercenter concept in 1962 with its first "Thrifty Acres" store, which merged grocery and department store shopping.
- Beyond their 200+ supercenters, Meijer operates numerous Meijer Express gas stations.
- A comprehensive customer loyalty program used for personalized digital coupons, rewards, and secure payment at Meijer.

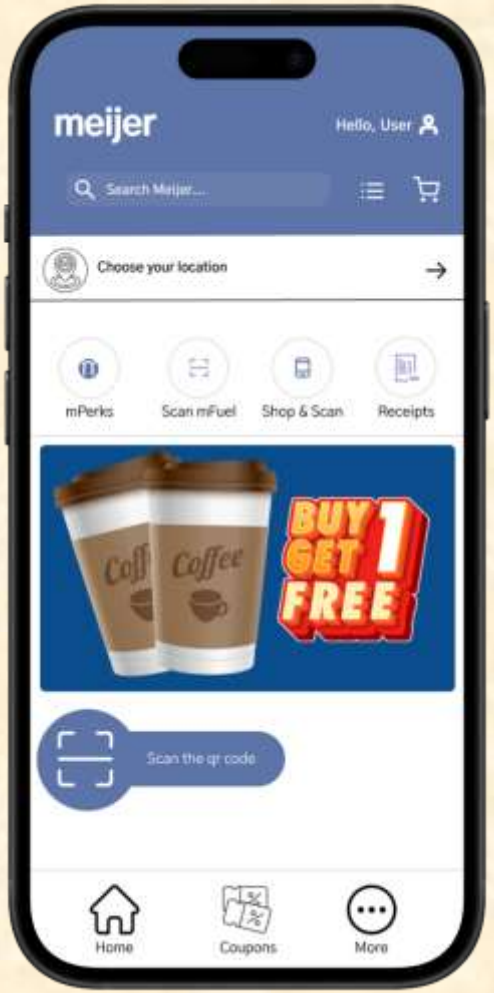
Project Functional Specifications

- The mFuel project is a comprehensive modernization of the Meijer gas station experience.
- It focuses on creating a high-speed, contactless interface between the customer's mobile device and the physical fuel dispenser.
- The current fueling process requires customers to manually enter their mPerks ID and PIN at the pump to access discounts.
- Our solution replaces manual entry with a secure QR code scanning system. The project delivers a standalone mobile app that authenticates users via existing mPerks credentials, integrates with the store's fuel controller, and uses a personalized recommendation engine to display time-sensitive in-store offers while the customer is fueling.
- We are transforming the Meijer Express fueling experience by eliminating manual data entry through a secure 'Scan-and-Fuel' mobile solution.
- By integrating mPerks loyalty data directly with the pump interface, we provide a faster, more secure payment process while simultaneously driving in-store sales with personalized, real-time promotions.

Project Design Specifications

- Prominently displayed QR scanner button
  - Streamlined payment process
- Recommended products
  - Shown before selecting payment method
  - Products at convenience store
- Personalized Offers
  - Ads shown on the fuel dispenser screen
- Similar theme to the Meijer app

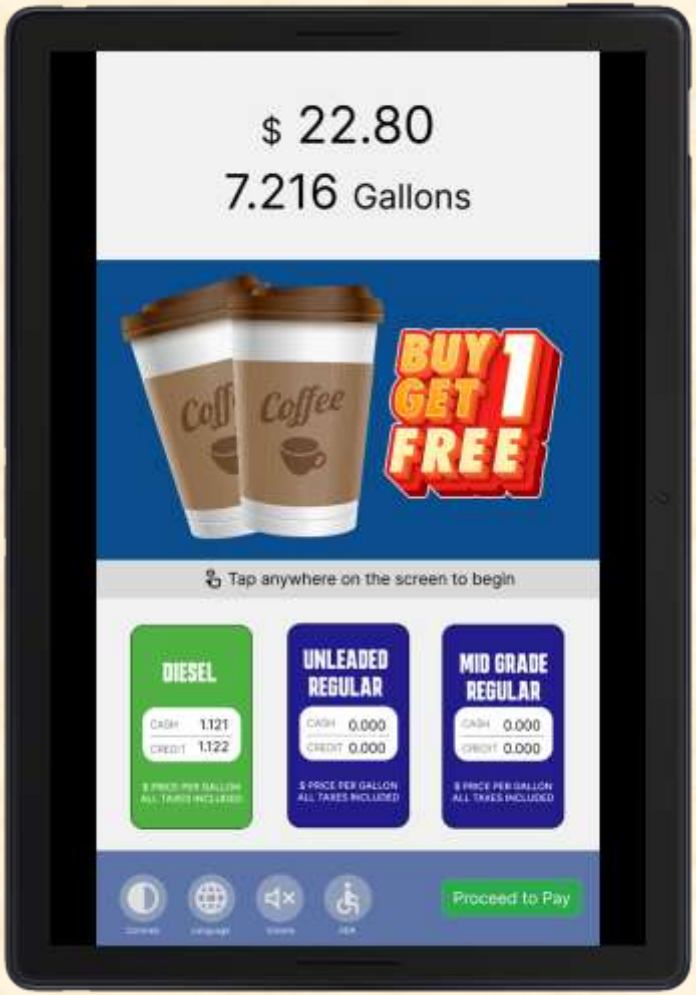
Screen Mockup: Home Page



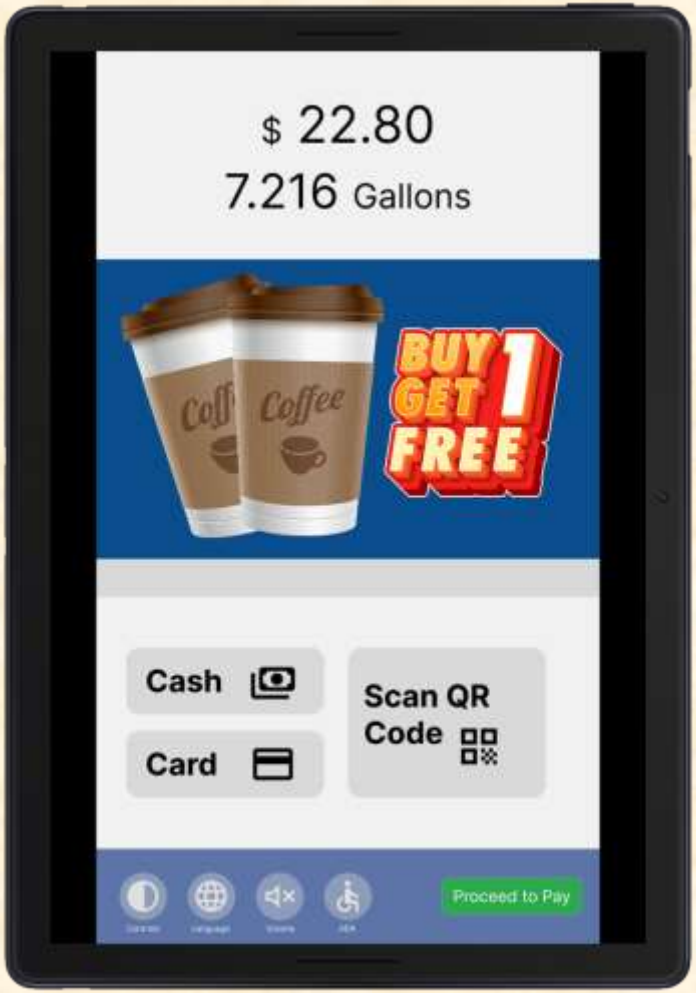
Screen Mockup: Scan & Fuel



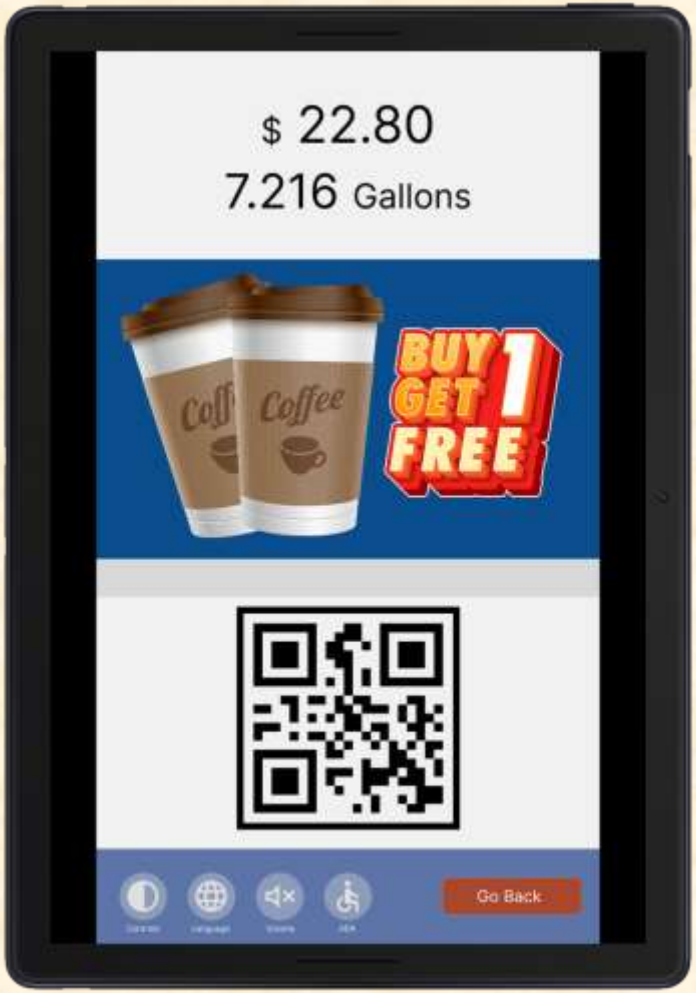
Screen Mockup: Fuel Dispenser



Screen Mockup: Fuel Payment



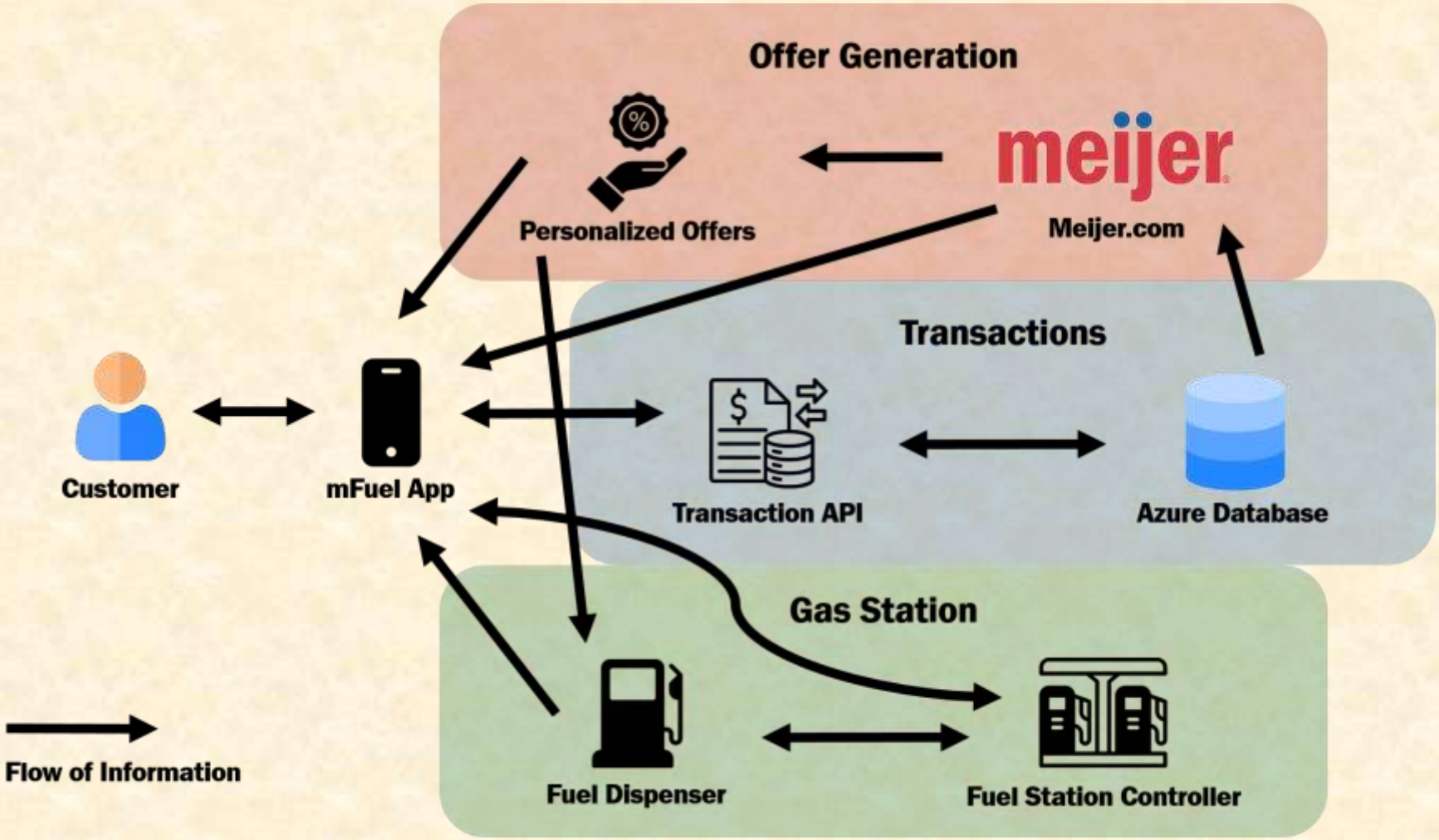
Screen Mockup: Fuel QR Code



Project Technical Specifications

- Backend
  - Framework: ADO.NET (C#)
  - Hosting: Azure App Service
  - Roles: User & Payment Auth
- Frontend
  - React Native w/ Expo
  - Platforms: iOS & Android
  - Roles: UI, API Usage, Client Side validation
- Database
  - Hosting: Azure SQL Database

Project System Architecture



Project System Components

- Hardware Platforms
  - Mobile Devices (iOS/Android smartphones)
  - Gas Dispenser Touchscreen/Kiosk Display
  - Backend Server Infrastructure (Cloud-hosted)
- Software Platforms / Technologies
  - Mobile Application (mFuel App)
  - React Native + Expo Framework
  - Dispenser UI Software
  - Payment Processing & Tokenization (PCI-compliant)
  - Offer & Recommendation Engine
  - Database Systems (SQL-based)
  - QR Code Generation & Scanning Technology

Project Risks

- Risk 1: Gas controller emulator has limited information from client
  - Client can't give out proprietary information, like gas controller info
  - Team will have to account this in basic system design
- Risk 2: Ensuring smooth user operation
  - The user has to interact with two devices simultaneously
  - Creating multiple iterations of the prototype, getting feedback from users.
- Risk 3: Client database complexity unknown
  - Client can't give out proprietary info, like account info, payment info, etc.
  - Team will have to simulate most systems after client approval.
- Risk 4: Integrating new design into existing architecture
  - Team does not have access to the existing codebase
  - Adopt a micro service architecture for easy integration into the existing design.

Questions?

