MICHIGAN STATE UNIVERSITY

Project Plan Presentation

Guided Recipe Augmentation

The Capstone Experience

Team Whirlpool

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From Students…
…to Professionals

Project Sponsor Overview

Global manufacturer of home appliances

Based in Benton Harbor, MI

Fortune 500 company with over 69,000 employees

Founded in 1911 by Louis Upton as Upton Machine Company

Project Functional Specifications

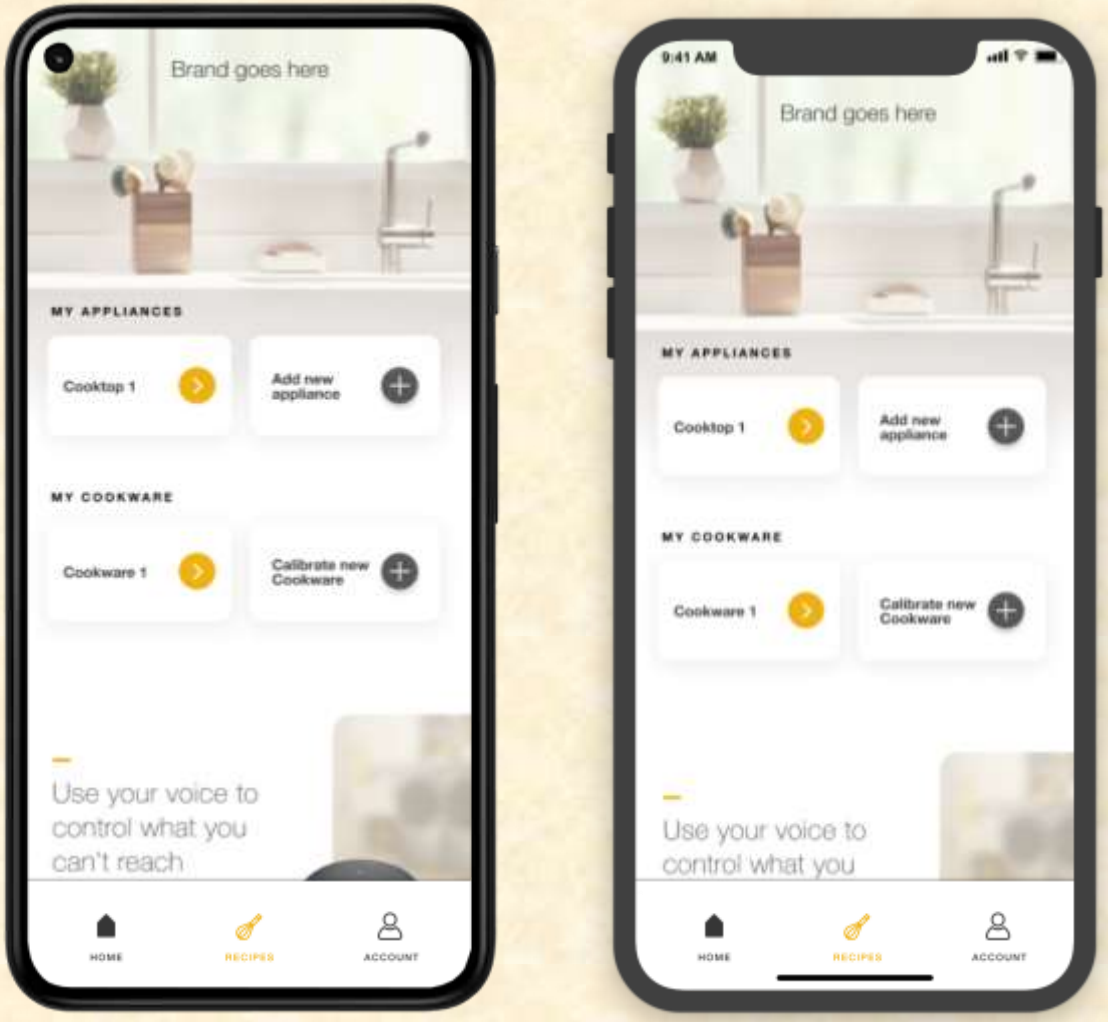
- The problems:
  - Typical stovetop recipes are not one-size-fits all
  - Variances from kitchen-to-kitchen can cause hang-ups
  - Following a recipe on phone (or paper) is not the best experience

- A cooktop-integrated mobile app to improve user experience
  - Cooktop to phone integration with slew of expanded, intuitive controls
  - Eliminates guesswork through customized, calibrated step-by-step cooking process
  - Entirely hands-free recipe control through voice and gesture recognition
  - Easily-browsable gallery of Whirlpool-curated recipes

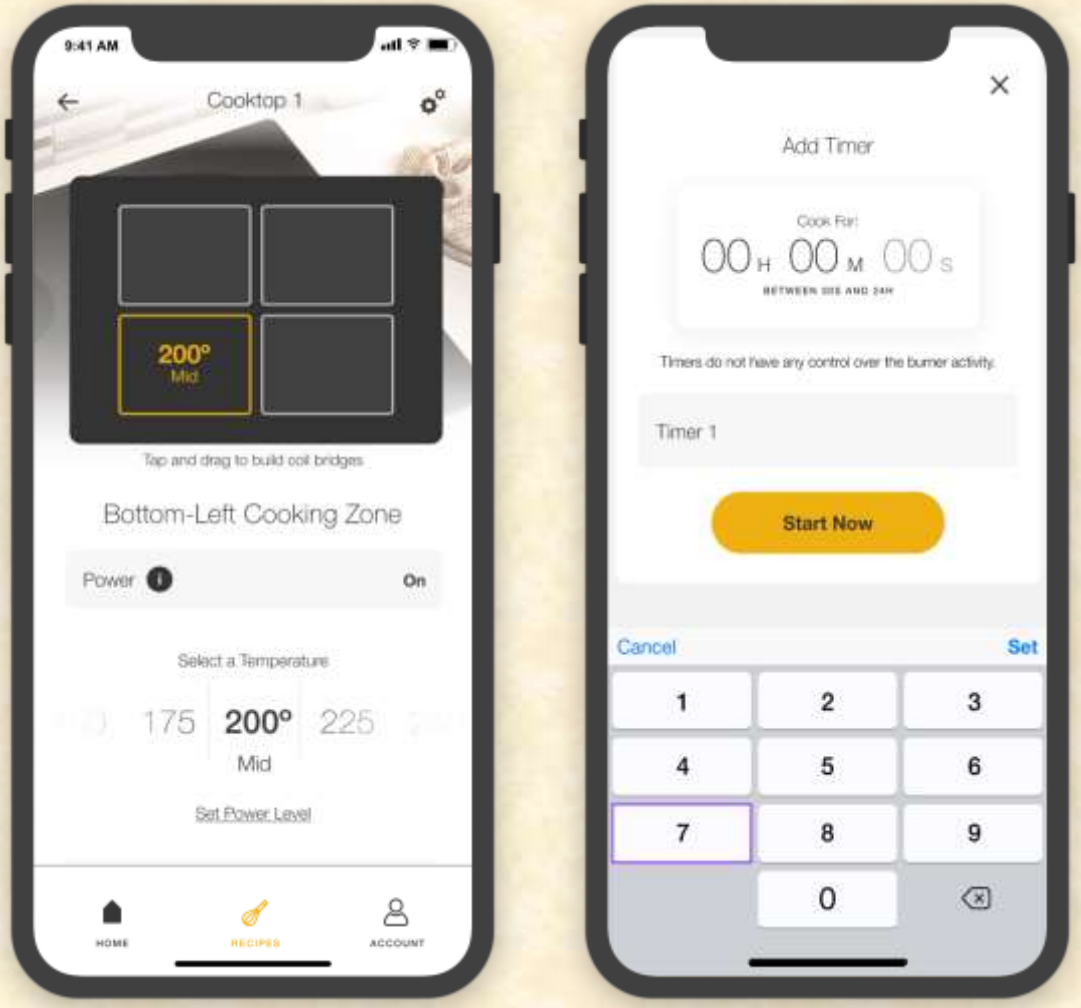
Project Design Specifications

- Home Page
  - Upon start-up, the user is greeted by the Cooktop Home screen.
  - This screen contains two major sections:
    - My Appliances: Contains synced Whirlpool cooktops
    - My Cookware: Contains synced cooking utensils
- Recipes Page
  - Recipe Selection: A wide variety of recipes are displayed in a table list view
  - Step-by-step instructions: Users follow along and mark steps as completed
- Account Page
  - Contains user settings and preferences

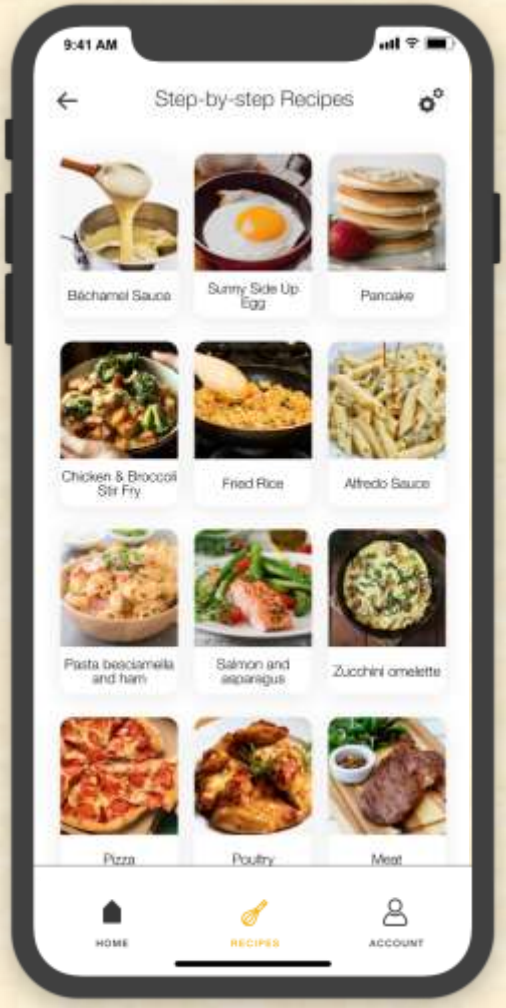
Screen Mockup: Home Screen

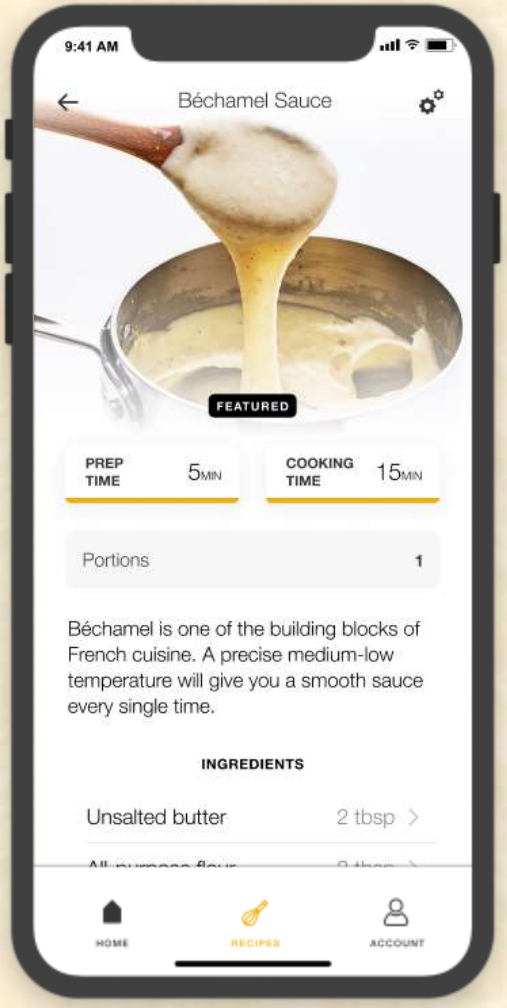


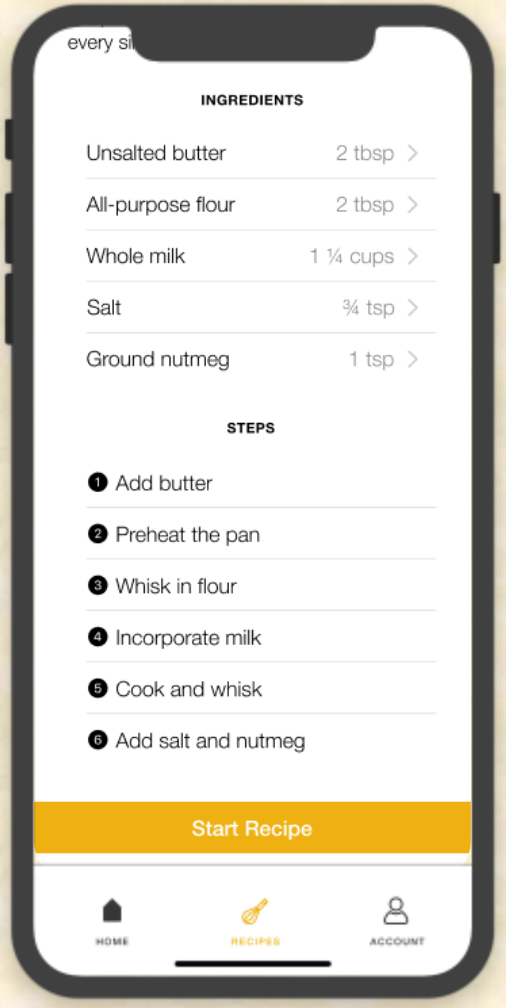
Screen Mockup: Manual Cooktop Control



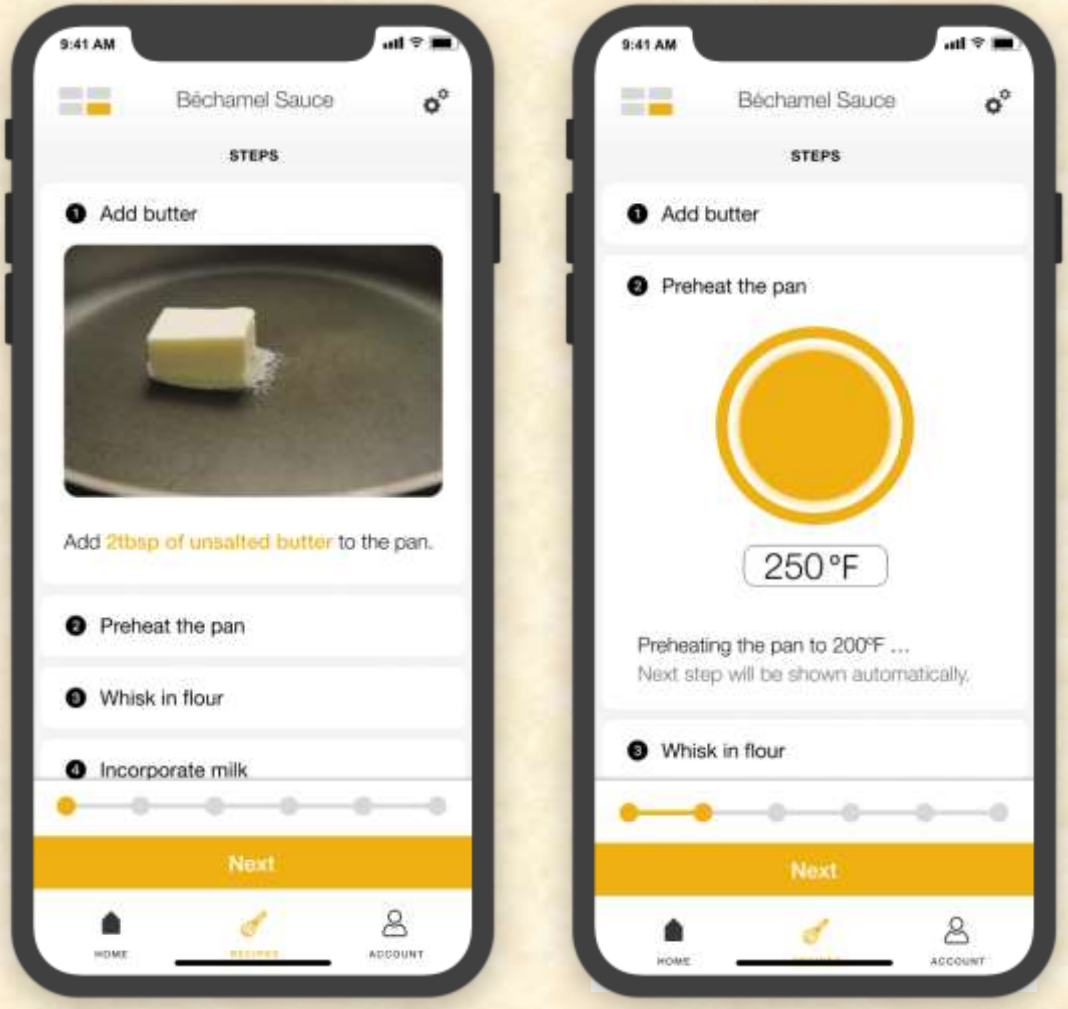
Screen Mockup: Recipe Selection and Overview







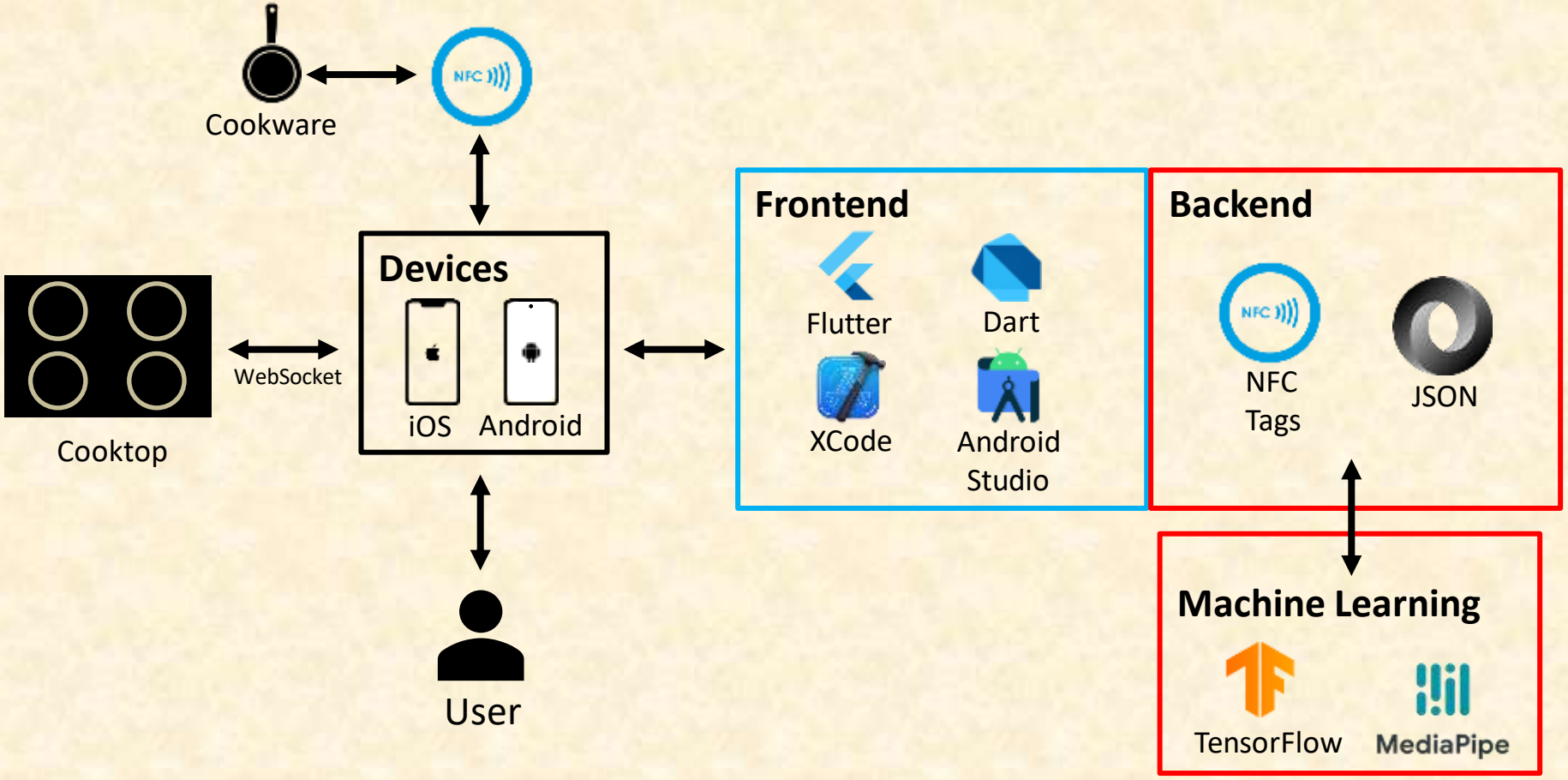
Screen Mockup: Cooking View



Project Technical Specifications

- Mobile Applications
  - Flutter Mobile SDK
    - Simultaneous development of Android and iOS
    - Easy widget layout and design
  - Dart
    - Programming language used in Flutter
    - Widget and state-based
- Machine Learning
  - TensorFlow
  - MediaPipe
  - Flutter's shared packages
    - speech_to_text, flutter_hand_tracking_plugin, …etc
- NFC Tags
- Whirlpool Internal Development Board

Project System Architecture



Project System Components

- Hardware Platforms
  - Smartphones, iOS and Android
  - Whirlpool integrated cooktop controller
  - NFC Tags (high temperature resistant)

- Software Platforms / Technologies
  - Flutter / Dart mobile application
  - WebSocket Protocol
  - TensorFlow and MediaPipe (Voice and gesture recognition)

Project Risks

- Testing our ACT app using a real Whirlpool induction cooktop
  - A major portion of our application is controlling an induction cooktop so having the ability to live test our application is crucial
  - We have worked with our team manager and our sponsor and have worked out a solution to have just the control board of the induction cooktop which will be sufficient for testing purposes
- Accessing native software elements through Flutter
  - We may not be able to access native software elements such as Siri when creating our codebase using Flutter
  - If this is the case, we will need to seek alternative methods of voice recognition such as Amazon's Alexa
- Voice and gesture recognition learning curve
  - Voice and gesture recognition are new technologies to our team, and we predict an extensive learning curve
  - Mitigation: We will be using TensorFlow and MediaPipe libraries to create prototype apps in Flutter, before integrating with the rest of the app
- Apple developer access
  - Apple developer IDs are required for deploying to iPhone devices
  - Our sponsor has been able to add an ID that we have created for our team to their developer license

Questions?