



FridgeBridge: Connecting Users to their Refrigerator via an Application

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Project Overview:

IoT in home appliances is advancing and incorporating technology to help connect users to their homes in real-time. Our project aims to upgrade smart refrigerators by using machine learning, image recognition, and weight sensors to aid the user in tracking their food and nutrition facts on the go.

Design and Implementation:

A Raspberry Pi Zero Computer will be used to take and process the inputs of both the camera and load sensors.

Weight Sensor:

The Load Cell sensor is placed underneath each shelf to support and measure the weight of the shelf. This helps provide accurate nutritional facts.

Image Recognition:

The Raspberry Pi camera takes pictures inside of the fridge and analyzes the image using Google Cloud Vision.

Database:

Firebase's realtime database is used to store the USDA Nutritional Facts API output cross referenced with the Image and Weight Sensor results.

Android App:

Pulls data from Firebase and displays it to user.



Figure 1: Raspberry Pi connected with a Load Cell Amplifier

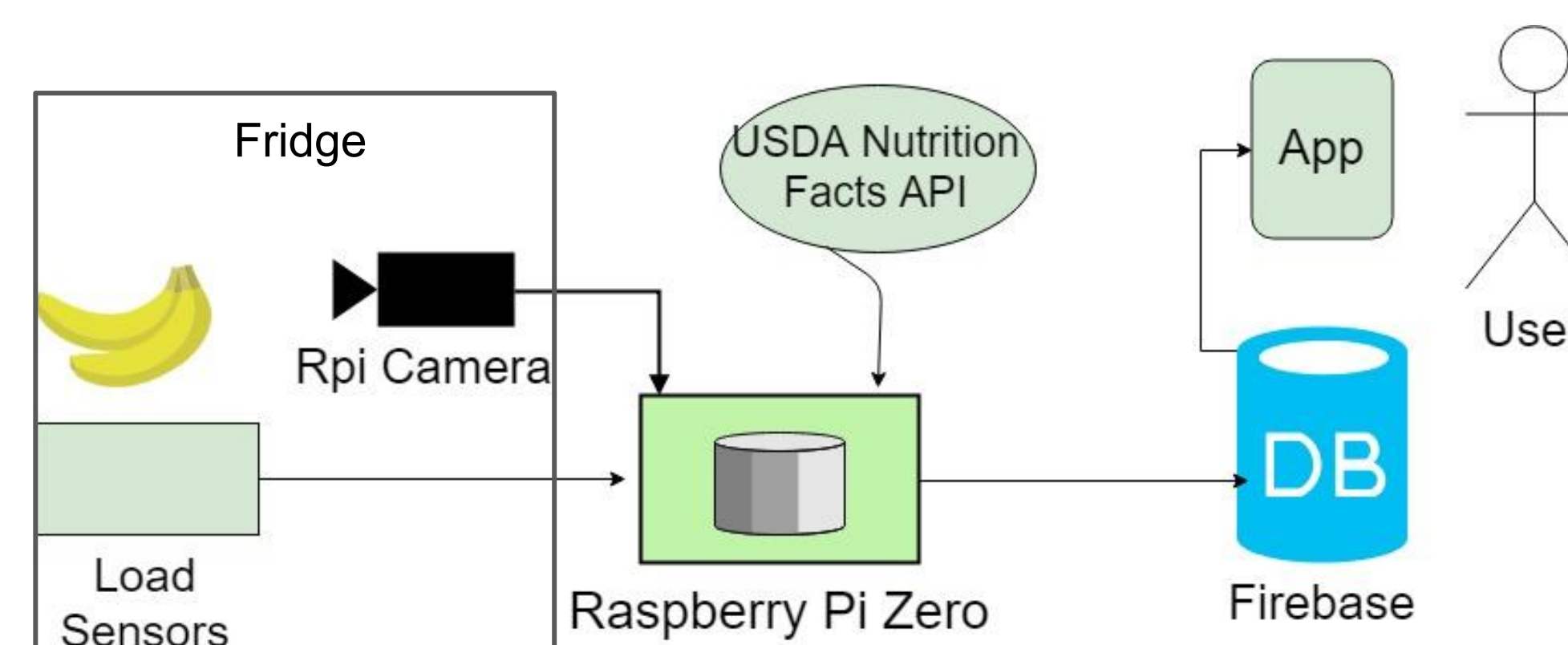


Figure 2: Hardware & Software Architecture

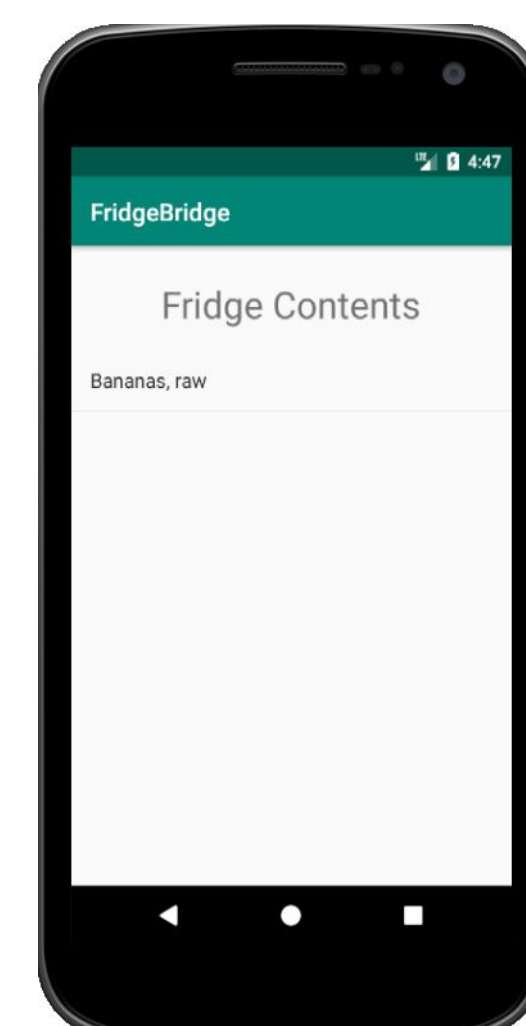


Figure 3: Home Screen of FridgeBridge Application

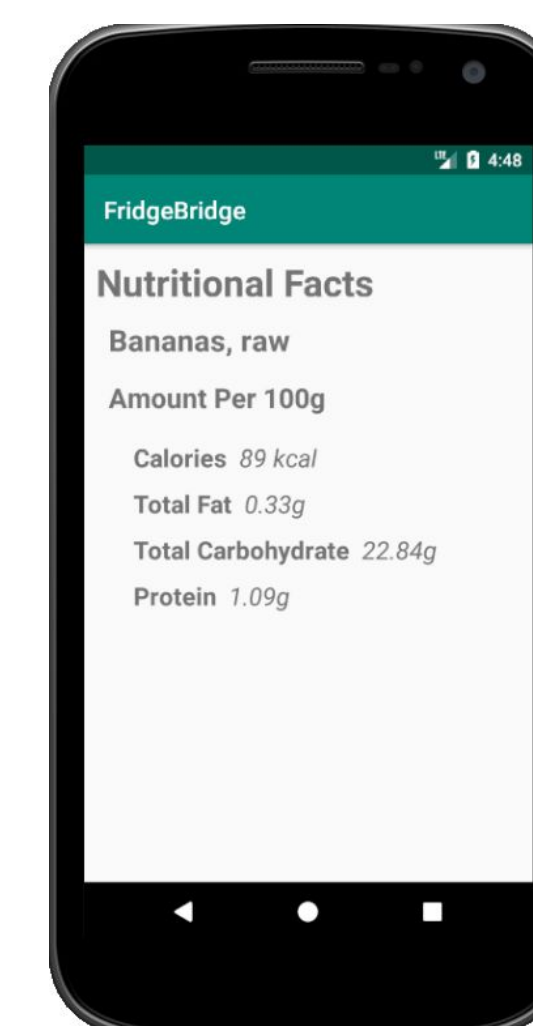


Figure 4: Food Nutrition Facts

Results:

- Image Recognition connected with Google Cloud Vision for multiple food recognition with at least 80% accuracy
- Load sensor integration with self and RPI Zero
- App connectivity for Nutrition Facts
- Database retrieving relevant Nutritional Facts of food

Challenges:

- Faulty equipment
- Integrating Firebases and the sensors with RPI Zero
- Connecting Android App with Firebase
- Distinguishing old items from newly added items
- Selecting the appropriate food item from the USDA Nutritional Facts' many unique variations of food

Future Applications:

- Health/Diet monitoring from accurate, weight based Nutritional Facts of food
- Recommended recipes for existing foods in fridge

References:

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