College of Engineering | Computer Science

binsight.ai

Food Waste Interface

Explore the codebase by accessing the binsight.ai app Github repository

PROJECT OVERVIEW

In the face of an escalating climate crisis, finding more effective food waste disposal methods remains a pressing challenge in the field of sustainability research. To contribute valuable data to efforts in this field, the **binsight.ai team** pioneers one approach that is aimed at expanding our understanding of food and organic waste at the household and consumer level.

Our project supports a countertop **Smart Compost Bin** equipped with sensors that capture images of food waste and many associated data points. These include bin internal temperature and humidity, IAQ, CO_2, the weight of composted food items, thermal imaging depth maps, and VOCs.

As a part of this larger project, we created the mobile **binsight.ai app** to provide a reliable and seamless connection between users and their smart compost bins during a field study planned for Summer 2024.

OBJECTIVES

Design a cross-platform mobile app with the following features and capabilities:

- Wi-Fi configuration and connection with Bluetooth bridge to successfully connect the bin to its MongoDB Cloud database.
- Image annotation tools that enable users to outline and label food waste items in order to build a novel dataset.
- A dashboard with data visualizations and analytics to support food waste goals, and increase user engagement.

APP ARCHITECTURE

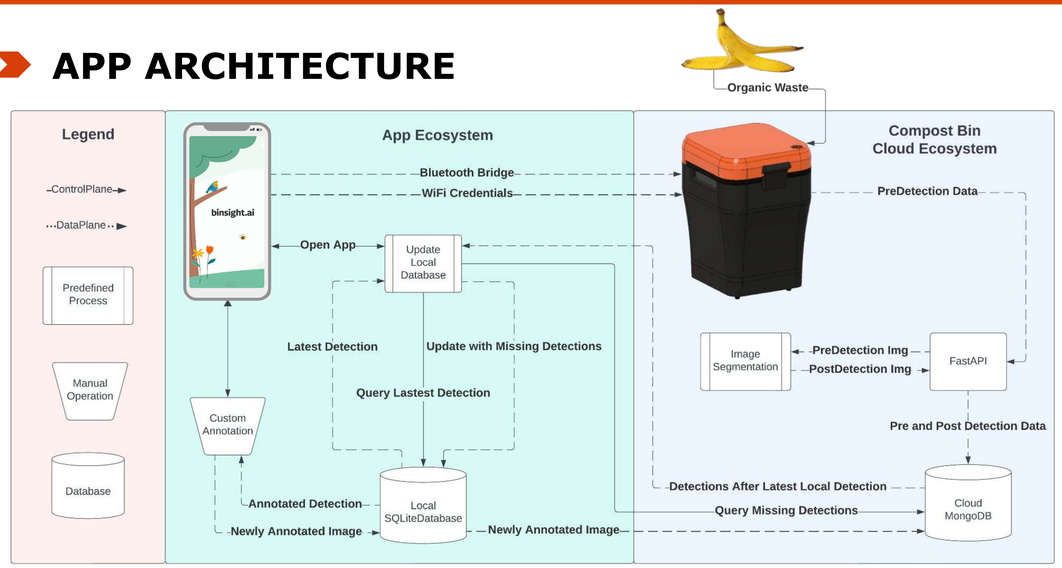

Figure 1: binsight.ai architecture diagram

IMPLEMENTATION

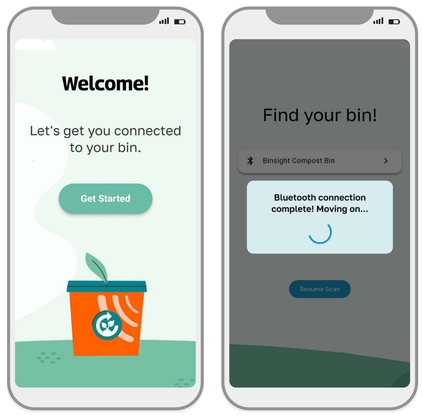

Figure 2: Screenshots of Wi-Fi connection sequence

WI-FI / BLUETOOTH CONNECTION

Design logic flow to onboard users and walk them through the Wi-Fi bin connection process. Layer several Flutter libraries together to meet the Bluetooth pairing demands of both Android/iOS operating systems and the Raspberry Pi 5, which powers the bin and its data collection sensor array.

IMAGE ANNOTATION

Build custom Dart modules to bring an interactive user interface to life. Enable users to annotate images with object outlines and food labels. Cache new data in an embedded SQLite Database and update dashboard visualizations before posting the segmentation data to the remote database with FastAPI.

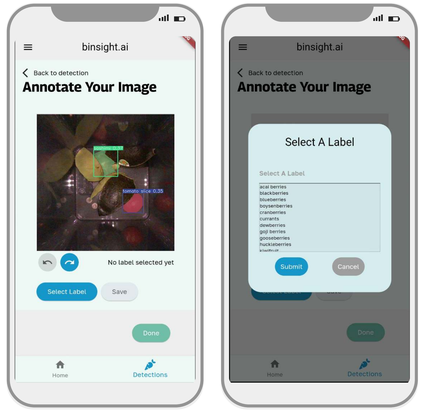

Figure 3: Screenshots of app annotation tools

NEXT STEPS

- Support a field study, Summer 2024
- Train a new computer vision model using the novel image dataset collected by the compost bin along with the user annotations gathered from **binsight.ai app**

TEAM




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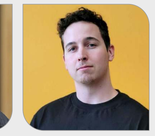

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ACKNOWLEDGEMENTS

The **binsight.ai app** supports a research project that was funded by the Foundation for Food & Agriculture Research and The Kroger Co. Zero Hunger | Zero Waste Foundation.

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