# SmolKat: A Smart Kitchen Assistant

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## Product Pitch

Our project involves building a smart kitchen assistant that tracks the user's available items in their fridge and based on the available items and user's preference, suggests a specific recipe to the user. SmolKat will then guide the user to different items in the refrigerator that need to be picked out to make the recipe. The full scope of our implementation involves computer vision to track the standard items in the refrigerator(85.7% Accuracy, 1.3s Latency), speech-to-text functionality to interpret user's preference(81% Accuracy, 1.5s Latency), a software recommendation database of recipes and ingredients required(100% Correct Recipe), and a physical guide (LEDs, 100% Correct Grid Lightning) that will direct the user to the appropriate items to complete the recipe.

## System Architecture

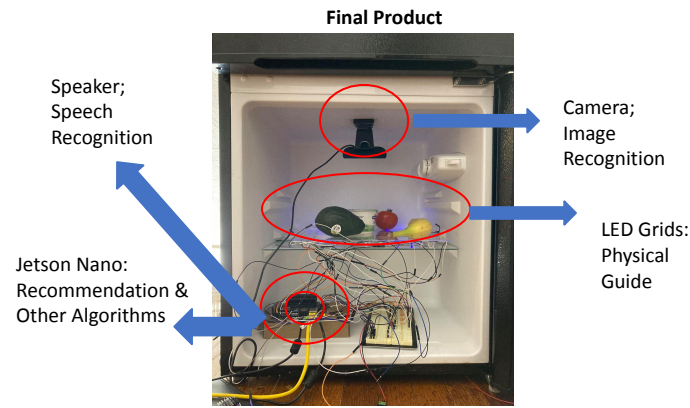**Implementation Diagram (Hardware & Software)**
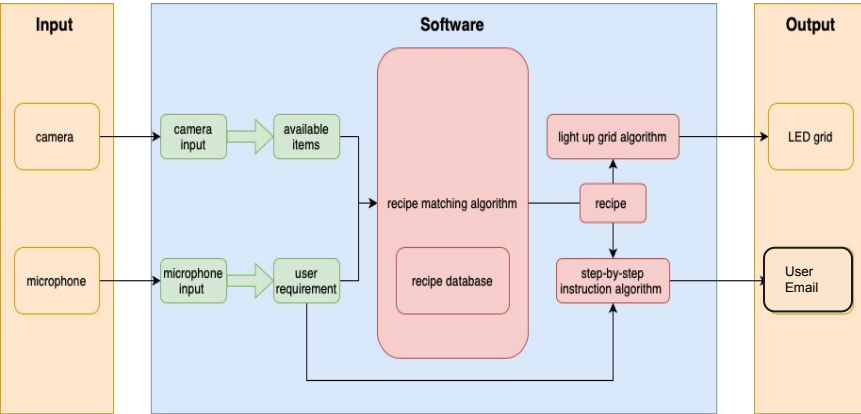


## System Description

**Speech Recognition:** Convert user speech input to words (requests, like "vegan", "non-dairy")

**Image Recognition:** Camera takes pictures as input, return recognized ingredient names("beef", "squash", "banana") and object locations

**Recipe Recommendation:** Takes the processed requests and ingredients list as input, filter out the appropriate recipes with instructions as output, and send instructions to user email

**LED Grids:** The grids that holds the corresponding ingredients will light up for user to find them easily

**Final Product**



Speaker; Speech Recognition

Camera; Image Recognition

LED Grids: Physical Guide

Jetson Nano: Recommendation & Other Algorithms

## System Evaluation

| Requirement | Result | Expectation |
|---|---|---|
| Speech Recognition Accuracy | 81% | 90% |
| Selected Ingredient Recognition Accuracy | 100%(Single)/85.7%(Multiple) | 90% |
| Ingredient Located Grid Correctness | 10/10 Tests with Correct Grids Lightened | 100% Correctness |
| Speech Request Latency (95th percentile) | 1.489s | 2s |
| Image Recognition Latency (Average) | 0.806s(Single)/1.302s(Multiple) | 2s |
| Processing Time for Recommendation | < 0.001s | 1s |
| Correctness of Recommended Recipes | 20/20 Correct recommendations | 100% Correctness |

### Trade-off Between Latency and Accuracy For Image Recognition