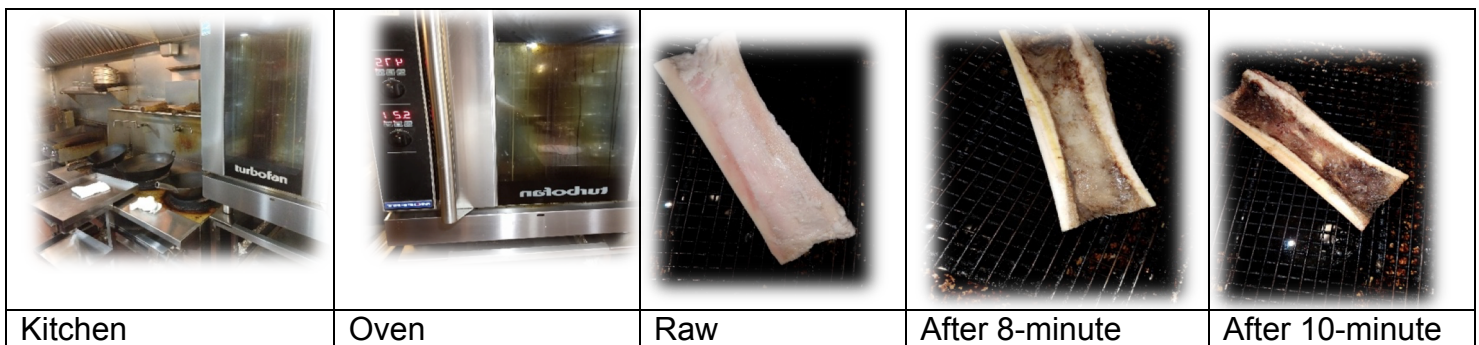


Smart Chef Assistant

Our Goal: We aim to design a smart chef assistant device that can assist the chefs with their oven usage. The device by itself recognizes the food material, records the time needed for cooking, tracks the time of the food that have been put in the oven, and reminds the chefs to take the food out of the oven. We envision the use of this device will eliminate the undercooked and overcooked mistakes and assist the time management on oven use.

Motivation: As chefs, we concerned about the speed of delivering food and the quality of food we provide to our customers. Among all the cooking processes, the use of a kitchen oven is the most critical part as it takes time and the time of use needs to be very accurate. Look at the following five pictures. The first and second pictures show the kitchen environment. The third image shows raw bone marrow; the fourth picture shows the well-done material after 8-minute in the oven; and the fifth picture shows the over-cooked food after 10-minute in the oven. One line cook usually needs to operate the kitchen oven while taking care of other cooking processes. The cook has to remember all the different food he put into the oven and take the food in and out from the oven at a very accurate time. However, most ovens can have multiple trays but only one timer. In a high-pressure and fast-paced kitchen situation, mistakes always happened; the food is overcooked or undercooked if the food stays in the oven too long or too short. In reality, the cook frequently checks the food to prevent over-cooking, which wastes a lot of time.



Detail implemented functions:

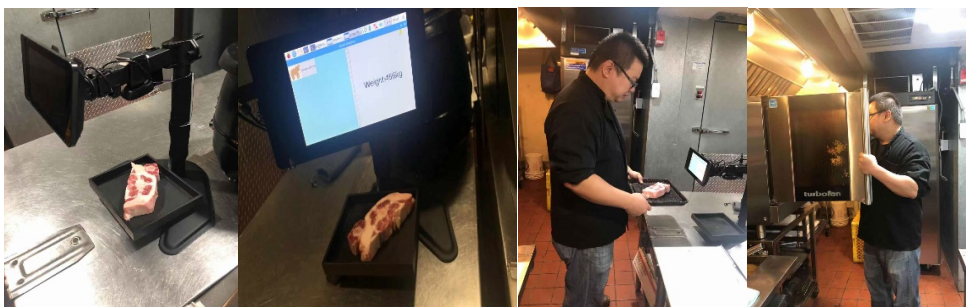
1. Measure the weight of the food
2. Recognize the food
3. Calculate the time and auto set timer
4. Remind the line cook to take the right tray out when the food is done



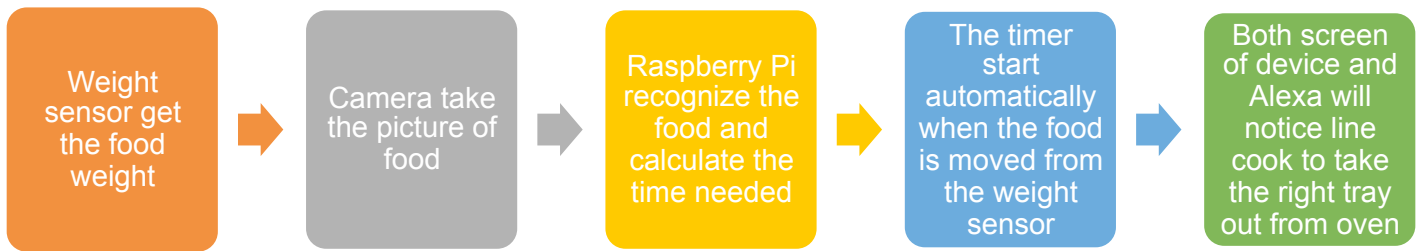
Hardware: 1. Raspberry Pi; 2. Arduino; 3. HX711 weight sensor; 4. Raspberry Pi touch screen; 5. Camera; 6. Screen Case; 7. Monitor stand; 8. Trays with number

Software: 1. Python; 2. OpenCV; 3. AWS lambda; 4. Alexa; 5. MySQL

Chenjun is using this device in his Kitchen!



Working flow:



Evaluation in our kitchens:

1. Performance:

- The device worked as expected at 100% accuracy, i.e., recognize all food on the menu.
- The cooking time was calculated by the device according to the weight and type of food.
- The device reminded via screen the chef to take out the food at a proper time from the oven.
- The device improved chef's work efficiency and reduce the chances of making mistakes.

2. Weakness:

- The time calculated by device sometimes was not accurate because of the texture of food.
- The device was designed for a specific restaurant only, which has limited food choices.
- The device offered limited help to the experienced chef when the kitchen is not busy.

Extended functions:

- Using machine learning to recognize more types of food.
- Using a bigger database to give suggestion of cooking food for non-experienced home user.
- Using cutting edge computer vision technology to recognize the texture of the food and estimate a more accurate cooking time.
- Designing a customized button for special menu.
- Enabling connection with smart oven to control the temperature.