“Knowing Your Food Better, Keeping Your Body Healthier” Project Proposal

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Title

Avoiding Contaminated Foods

Abstract

Today, foodborne illnesses are some of the major health problems and often times can lead to fatality or the development of other diseases. Many restaurants try to prevent contaminated foods by personal hygiene practices, regular food inspectors, and safe food storage; but they lack in frequently testing their foods for any major bacteria, viruses, and parasites. There are technical devices with biosensors that can detect bacteria such as salmonella and e. coli; we plan on developing a hand-held device that will detect bacteria in foods that includes a food testing strip, scanners, videos, and sensors. We plan on testing our solution on various daily foods such as eggs, milk, chicken, cereal, and more in order to determine the limits and usefulness of our product. This product will benefit all individuals especially restaurants, grocery stores, and households.

Introduction

According to ScienceDaily.com, more than 75 million people per year become ill from food poisoning in the United States, 325,000 are hospitalized, and 5,000 of them die from pathogens like Salmonella and E. coli. For example, recently, there were 42 kindergartens at a public school in China rushed to a nearby hospital because they were showing symptoms of diarrhea and fever. A test of the kindergarten’s food and water showed the sickness was caused by bacteria infection(food poisoning). Many of the students were released within a few days, but four remained in the hospital for more treatment. Personal hygiene practices, safe food storage, and food inspectors are great ways to help prevent your foods from becoming contaminated, but it doesn’t reveal whether or not your food is already contaminated right before consumption. It is very important to thoroughly check your foods for any kind of harmful contamination.

We intend to create a hand-held device that will include sensors and scanners. The sensors will be able to sense any bacteria such as salmonella and e. coli in the user’s foods. We will categorize the different bacteria, parasites, and viruses by certain features, and the device will show the user any bacteria found in his/her food. The device will give a detailed description of any bacteria in the food and its harmful effects. The scanner along with the scanner will help detect the expiration date of the food. Additionally, we will have a temperature sensor that will inform the user if his/her food is being stored at the right temperature along with images to show the different appearances of the food in various environments. Another extra feature that we plan on adding to the device is a detailed description of the ingredients in the user’s food because many times people know the ingredients in their foods, but they do not know the meaning behind the ingredients.

Background/Review of Past Work
Each year, 1 in 6 Americans (or 48 million people) gets sick from and 3,000 die of foodborne diseases. Reducing foodborne illness by just 10% would keep 5 million Americans from getting sick each year. Preventing a single fatal case of *E. coli* O157 infection would save an estimated $7 million.[1]  

Causes of illness in 1,565 single food commodity outbreaks, 2003–2008

People wonder why they still can get sick even though they’re buying food from inspected food handlers. However, whether the foods have passed the inspection from USDA in the first place, the foods, especially the raw foods, might still get contaminated over time before selling. In addition, bacteria might survive, reproduce or in some cases form a toxin in the food. Thus, there is no doubt that unsafe foods are life threatening for every household in today’s society. And food safety is also a big issue all over the world. Food safety is an increasingly important public health issue. Governments all over the world are intensifying their efforts to improve food safety. These efforts are in response to an increasing number of food safety problems and rising consumer concerns.
whole foods market recipes
foodspotting
fooducate, ltd.
food network nighttime
foodspotting, inc
fish food frenzy free
food on the table
television food network g.p.

food safety at home
food safety news app
cmo food safety & quality app
food safety pro exam prep
food safety test
By searching from 3 most popular mobile device market, if food is mentioned, most people/developer will concentrate on diet or save money when purchasing. From the screen cut above, we can see that android apps connect to food safety is rated only by less than ten people. Apple app store has the same issue. Windows phone market is even worse, like the second picture, the only thing that I can find relevant to food safety is songs.
iFeelFood is an apple app about food safety, it do gives out lots of information about food safety, but it’s structure is more like a self-study machine, really a dull way to do things.
Another app called ShopWell focus on food purchase, it give out Ingredient and nutrition information about food, and it provide a way for customer to scan or enter UPC code. But it does not provide information about expiry date. And even given Ingredient and nutrition is not that helpful to common people.
Two apps called Food Safety Pro Exam prep and Food Safety Test focus on help pass exam. Much worse, a few people will use in order to pass the exam, force people to learn, and expensive.
FoodSafety@Home target on house hold, which is good. We can see it have a very good catalog in many aspects of food safety and health. The problem is, again, too much information in words, almost on picture. And the information are not live, cannot change based on different environment.

The AgriLife Food Safety app is a handy resource for food handlers, processors, growers, and kitchen staff. Developed by the extension experts at Texas A&M’s AgriLife Extension Service, this app is a must-have for those who grow, process, or consume meat, poultry and produce.
Name(s): *Escherichia coli* O157:H7, *E. Coli*

Description: The species *E. coli* is commonly found in the intestine of warm-blooded animals and although most of *E. coli* organisms (> 200 types) are harmless, there are pathogenic types. Of the

This app called AgriLifeFoodSafety is doing better, it adds many pictures. Also have a web site to provide more detailed information.

Android apps:
This one called food safety, very good function on expiry data, but as we can see, restrict on registered food. No any browsing/searching feature. And UI is not well designed.
E629
Calcium guanylate
flavour enhancer

vegetarian  vegan

Origin
Calcium salt of guanylic acid (E626), a natural acid, which is part of RNA, one of the genetic carrier molecules in the cell. It is thus part of all cells in all living organisms. Commercially prepared from yeast extract or sardines.

Characteristics
Flavour enhancer. Guanylic acid and guanylates do not have the specific umami taste but strongly enhance many other flavours, thereby reducing the amounts of salt needed in a product.

Side Effects
Asthmatic people should avoid guanylic acid and its derivatives. Asthmatics are most allergic to.

E629
Calcium guanylate (flavour enhancer)

7  8  9
4  5  6
1  2  3
0  C

Calc  List  Info
Description

Have you ever looked at a food label and not known what some of the ingredients were? Shopping was easy when most food came from farms. Now, factory-made foods have made chemical additives a significant part of our diet. Chemical Cuisine, from the Center for Science in the Public Interest, features a searchable and filterable list of food additives, their descriptions, and safety ratings to help you make healthy decisions. Learn about a new additive every time you start up the app on the Home screen. When CSPI updates or adds new information about a food additive, the Chemical Cuisine app will let you know by displaying a badge on the additive.

-- Over 130 food additives with detailed entries and expert evaluation.
-- No internet connection required to use!
-- Automatically updated anytime you have an internet connection with latest entry updates.

ACESULFAME-K
Artificial sweetener

Baked goods, chewing gum, gelatin desserts, diet soda, Sunette.

This artificial sweetener, manufactured by Hoechst, a giant German chemical company, is widely used around the world. It is about 200 times sweeter than sugar. In the United States, for several years ascesulfame-K (the K is the chemical symbol for potassium) was permitted only in such foods as sugar-free baked goods, chewing gum, and gelatin desserts. In July 1998, the FDA allowed this chemical to be used in soft drinks, thereby greatly increasing consumer exposure. It is often used together with saccharine (see...
These two apps focus one food additives. Looks pretty good in this specific area.

As a conclusion, There are some apps on food safety. But a new app or device with food test function and well designed UI, which do not require customer to study food safety knowledge, save time and efforts for every household and prevent contaminated food causing foodborne diseases will be welcome.

**Target Users**

**Primary Users: Individual Householders**

Household interviews of approximately 10-20 people were conducted on food safety issues. Respondents were interviewed about their awareness of safe food handling, food poisoning, refrigerator and thermometer safety. The majority of respondents reported a fairly high knowledge of safe food handling practices; however, more than half displayed strong concerns about how to tell exactly the shelf-life of a certain type of food was expired or not before serving other than just depending on the printed expiration date since sometimes foods turned bad before the printed date. Also, some of them had a misunderstanding about as long as the foods were storing in the refrigerator they would be fine for a while which also led to a problem that most of time they just forgot when they stored the food in the refrigerator. Mostly, for the food poisoning issue, almost every respondent showed his/her concern about how to identify if the food especially the animal foods contained bacteria or toxin in it besides just observing the appearance or the smell from the food because people could still get sick even from the "looks fine" foods.

**Proposed Solution**

In our project, one of the functionalities is measuring the foods’ latest condition and quality by using our magic (chemical) liquid for a sample of the to-be-checked food. Then use our app embedded with biosensor which is installed in smartphones to scan the test paper of the liquid. After the successful scanning process, if the food does not pass the test, our app will trigger our bacteria and toxin of foods database in order to match what type of bacteria or toxin the food contains and finally display some useful suggestions back to the user. If the user wishes, he/she also can choose to display the up-to-date calendar to show the expiration date of the scanned food from our food date database. On the other hand, for the refrigerator and thermometer safety concern, the user just needs to record the date of a certain food he/she places in the refrigerator into our app, and then our app will automatically remind the user what kind of food in the refrigerator will be most likely getting bad in a certain days. Moreover, our app has a build-in wireless sensor which connects to the refrigerator thermometer and kitchen thermometer in order to warn the user if the temperature inside or outside of the refrigerator is not setting correctly, which also provides a way to help user to eat healthier.

1. **Secondary Users: Restaurants, Grocery Stores**

Mostly, the restaurants and the grocery stores have the same concerns like the individual household besides they are dealing with thousands of times of foods more than the individual household. Thus, they are more serious about the food safety issue since it will directly impact on their reputation and business.

**Proposed Solution**
Besides the functionalities we have described for the individual household users, our app can be also placed inside of RFID to measure the foods’ quality and expiration date based on our database.

**Scenario Walkthrough**
This product could and should be used by people everywhere in their day to day lives. An easy example is that of someone cooking dinner for a guest with a food allergy, such as peanuts. Without the use of our product, they currently have to go by dates on the products to determine if the food is good. Then, reading each label, they determine that peanuts are not a part of the ingredients to cook. After all this time that is wasted, they then cook the food and hope for the best. With this product, the user could enter a recipe to determine immediately if it has any peanut products integral to its use. It would check the inventory of food purchased to make sure that the food items were both “in stock” as well as nearing any expiration dates. The temperature of the refrigerator would be monitored at all times so that if anything were to have warmed and had the potential to turn bad, so the freshness is assured. Any food that may be on the path to rottenness can be checked, and worst case scenario tested for pathogens with the detection kit.

Another simple example is that of a chef at a restaurant. The kitchen staff is constantly in and out of the refrigerator, and not always cognizant of how long the door is open. The foodstock is in constant flux as well. There is still a lack of a proper system to tell when food is going bad except for stickers with the date received written in a black permanent marker, in many places. With this product, the executive chef can track shipments of food and know when new ones are set to arrive, maintain a better inventory than before, and determine what foods need to be replaced. He already knows what ingredients go into the recipes, he made them. But he can have better control over the freshness of the food and know more about when the food is bad. Further, should something exceed its date, he can test not only the food that is beyond expiration, but also the food nearby, helping to limit cross contamination.

**References**


**Appendix**
Unsafe foods cause an estimated 6.5 to 81 million illnesses and 9,100 related deaths
each year in the United States [1]. Among those cases, foodborne illness has been considered as the major health issue facing Americans [2]. People wonder why they still can get sick even though they buying food from inspected food handlers. However, whether the foods have been passed the inspection from USDA in the first place, the foods, especially the raw foods, might still get contaminated over time before selling. In addition, bacteria might survive, reproduce or in some cases form a toxin in the food. Thus, there is no doubt that unsafe foods are the life threatening for every household in today’s society. Since the USDA inspection only can check the foods quality before transport to stores, in this project, I propose a new type of common foods bacteria detection device for households. Instead of worrying about the foods are still safe or not for consuming, the bacteria detection device will double ensure that the foods is not contaminated before cooking since the foods sometimes turn bad quickly even though they were good before. Also, the foods bacteria detection device will provide an up-to-date expiration date when every time using it for checking foods quality so that people can avoid eating expired foods. Finally, the device will essentially minimize potential food hazards and bring a healthier food environment to every household.

We have added several additional features to our project beyond our original elevator pitch. We have proposed two different tasks for users to become more aware of their foods’ expiration date which includes a updated calendar and temperature sensors. The updated calendar will inform users when they’re foods are becoming close to their expiration date. The device will contain a wireless temperature sensor that can detect the refrigerator temperature and tell whether or not the temperature is harmful to the foods inside the refrigerator by causing the foods to expire rapidly. The device will have biosensors, liquid base testers, and sample testing strips that will detect any contamination in the user’s foods. Also, we will include extra features on detailed descriptions of recipes, ingredients, and the healthy appearances of foods.