

Food for Hunger: An IoT Aided Charity

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Abstract - In this era of technology development, everything requires supervising and controlling. Our project proposes an IoT framework for facilitating food monitoring for redistribution of the food, so that it would help the people in need. In present scenario, the work is done manually but automated alternatives are not present. The proposed solution analyses temperature, moisture as these factors affect durability of food items and makes the analysis results accessible to the user via a web page. A web server is used for storage of data values in real time. User is alerted with location of the smart box whenever an emergency for food occurs. In this solution, sensors for various domains are employed for sensing the condition of food. The data values along with the images that is captured are displayed in the web page so that the data can easily be used for further analysis and the user could be notified if a change in parameters values above a threshold is observed.

Key Words: Internet of Things(IoT), Excess food, Sensors, Webpage, Data base, Server, Redistribution

1. INTRODUCTION

Food wastage is an alarming issue in India. The streets, garbage bins, landfills have abundant proof to prove it. Weddings, canteens, hotels, households, social and family functions, spew out so much food. One third of the globally produced food is wasted which equates to approximately 1.2 billion tons of food we eat. According to the United Nations Development Program, 40% of the food produced in India is wasted by throwing away the excess food. Roughly 21 million tons of wheat are wasted in India and 50% of all food across the world meets the same fate and never reaches the needy. In actual fact, according to the Agriculture Ministry, food worth 50 thousand crores INR produced, is wasted every year in the country.

In India, bigger the wedding the more colossal the waste. According to estimates, 15-20% of food is wasted in such functions. Without a doubt, weddings and feasts are a huge

source of food wastage, but restaurants and hotels also contribute to food wastage on a bulky scale. Some restaurants in India employ food regulators to check food spoilage. The others donate it to their staff and other personnel, and smaller restaurants, offer it to the orphanages. Food scraps like vegetable and fruit peels, egg shells, bread, coffee grounds, etc. which can be utilized for composting is being thrown into garbage bins.

1.1 Literature Survey

By conducting a surveying at Upahara Darshini, KIMS, Bangalore, Karnataka the obtained details are tabulated as shown in the Table 1.

Table -1: Survey Statistics at Upahara Darshini

Place	Upahara Darshini, KIMS, Bangalore
Date	23-10-2019
Time	3:30 pm
Quantity of food wasted	6 Kg
No. Of people the food can be consumed	50 people
Total cost of excess food	Rs. 450

2. PROBLEM STATEMENT

- One third of the food produced globally is wasted and that equates to 1.3 billion tons of food we eat.
- The excess food waste is something that regularly occurs at hotels, family functions, parties etc.
- To gain an understanding of the scale of the problem, the excess food we waste has a large impact on various environmental factors.
- 28% of world's agricultural areas are utilized for the production of food that goes waste.
- Excess food wastage is considered as global problem because of the number of people who are suffering from starvation in the world.

3. OBJECTIVES

- The aim here is to reduce the loss by redistributing the excess food from the resources such as hotels, family functions etc. to the people in need thereby minimizing the number of people suffering from starvation[1].
- An area of improvement in donating the unused food which can significantly reduce the amount of waste.
- A transparent approach is needed within the supply chain to redistribute the unused food.

4. IMPLEMENTATION

- Our project proposes to build a smart container with inbuilt sensors which helps to check the quality of the food before redistribution.
- The excess food from the hotels or any other sources can be placed in the smart container. The smart container checks the quality of the food.
- After the food quality is analyzed, the information will be uploaded to the web page.
- If the food is edible, the volunteers will be notified with the location of the smart container and the destination location where the food must be delivered.

5. METHODOLOGY

5.1 Smart Container

A sensor unit is built-in the smart container and is the main building element to monitor various parameters affecting the food such as temperature, humidity, alcohol content. The Sensor unit as shown in Fig 2, consists of Raspberry Pi interfaced with various sensors such as Temperature and Humidity Sensor, MQ3 Sensor, Load cell with Weight Sensor, Distance sensor. The ambient storage condition for the food placed in the smart container is monitored using atmospheric factors like Humidity and Temperature using DHT11 Sensor. The alcohol gas detector (MQ3 sensor) provides information about the food spoilage by detecting the alcohol content produced in the food when it starts to decay. The presence of ethanol vapors in food is a sign of decay. By using the above mentioned parameters, we can decide if the food is edible for human consumption[2].

The weight of the smart box is measured using the load cell integrated to weight sensor. A Pi Camera is installed, to acquire the images of the food placed in the smart container.

A GPS Module is also integrated to the sensor unit to locate the position of the smart container. The purpose of using Distance sensor is to check if the lid of the box is sealed. This ensures that the food is not vulnerable to spoilage due to external factors.

The excess food from apartments, hotels, is placed in this smart container integrated with sensor unit to monitor various parameters. The sensed data is stored in the data base and displayed on the web page.

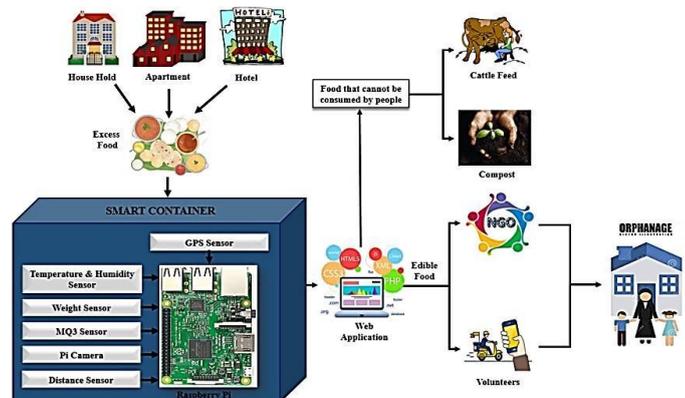


Fig 1: Block Diagram of Food Redistribution System

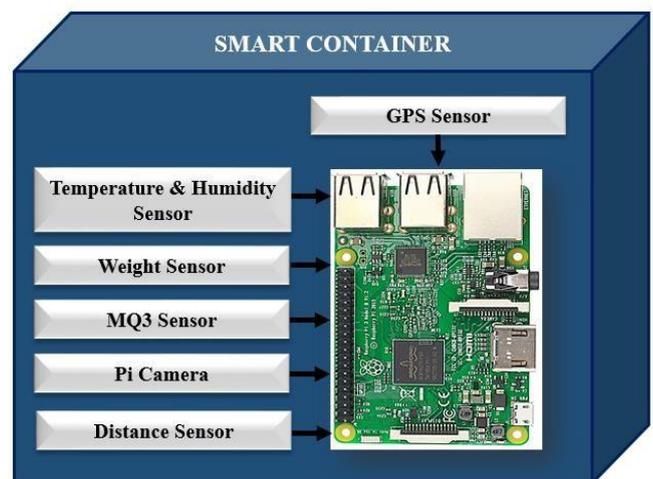


Fig 2: The Smart Container embedded with sensor unit

6. SOFTWARE DESCRIPTION

6.1 Apache2 server

Apache is a elementary piece of application software. Apache is the most widely used Web Server application in Unix-like operating systems but can be used on almost all platforms such as Windows, OS X, OS/2, etc. Apache is a web server, where the software that runs on this server. This is used to establish a connection between the server and the browsers of the website users. They also deliver the files back and forth between the client and the server. Since raspberry Pi

has Unix Operating system, Apache was the most efficient server and was easy to configure.

6.2 XAMPP server

XAMPP is a free and open-source cross-platform web server consisting mainly of The Apache HTTP Server, MariaDB database and Interpreters for scripts written in the PHP & Perl programming languages. Officially, XAMPP's designers intended it for use only as a development tool, to authorize website designers and programmers to test their work on their own computers without any access to the Internet. Since most actual web server deployments use the same components as XAMPP, it makes transitioning from a local test server to a live server possible and this makes it more efficient in building a website using XAMPP server.

6.3 PhpMyAdmin

PhpMyAdmin is a software tool which is written in PHP, designed to handle the operation of MySQL over the Web. phpMyAdmin assist a wide range of operations on MySQL and MariaDB. It is the intuitive web interface. The operations such as managing databases, tables, columns, indexes, users can be performed via the user interface. The data of the Sensor interfaced with Raspberry Pi, is made to store in their respective databases and the tables.

6.4 MySQL server

MySQL server is a relational model database server otherwise called as SQL complaint Server. The MySQL server provides not only the database management system with querying and connectivity capabilities, but also the potential to have remarkable data structure and integration with various different platforms. It reliably handles the large databases and provides quick responses in high demanding production environment. The MySQL server also enables the function such as its connectivity, speed, and security thereby making it suitable for accessing databases.

6.5 Cron jobs

The software tool cron is time based utility job scheduler in Unix like Operating system. The user will set up and maintain the software environment and cron is used to schedule the jobs which runs periodically at fixed intervals. Here, the cron job was setup on each sensor being interfaced with Raspberry Pi which runs at every 2 minutes interval thereby monitoring the smart container throughout the day efficiently.

7. RESULTS

The recorded data from all the sensors are saved in the data base and displayed on the web page. The smart container is also equipped with a Pi camera to capture the real time images of the food in smart container and displayed in "Gallery" on the web page. The contributor is expected to fill the contributors form on the web page asking him to enter details such as name, contact

information, approximate quantity of food, number of people the food can feed and expected time of expiry. The web page is designed to assist the user (volunteers in charge of the food delivery) about the availability of excess food in the smart container. The volunteer can book the food from the "Food Menu" by filling the volunteers form. After effective booking of food by the volunteer, the exact location of the smart container and the route of delivery will be available.



Fig -3: Home page of Food For Hunger Website



Fig -4: Sensor values displayed in the Website

The values recorded while testing the temperature and humidity sensor is as shown in the Fig 5.

```
pi@raspberrypi:~/Desktop/dht11-raspberrypi $ sudo nano dht11_example.py
pi@raspberrypi:~/Desktop/dht11-raspberrypi $ python dht11_example.py
Temp: 30 C Humid: 47 %
Temp: 30 C Humid: 48 %
Temp: 30 C Humid: 49 %
Temp: 30 C Humid: 48 %
Temp: 30 C Humid: 48 %
```

Fig -5: DHT11 sensor values recorded during testing

7. CONCLUSIONS

The project is designed to redistribute the excess food for the people in need thereby utilizing the food efficiently thereby preventing it from getting waste . The end user will be notified about the food parameters , location and the estimated time for its expiry of the excess food. The smart container will be able to monitor the food throughout and all the data is made available to the user via web application. The website consists of several webpage making it user friendly and is designed to provided the information for user in order to make the efficient food redistribution.

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