

# SMARTPHONE BASED WASTE FOOD SUPPLY CHAIN FOR AURANGABAD CITY USING GIS LOCATION BASED AND GOOGLE WEB SERVICES

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## Abstract

Smartphones are increasingly integrated with everyday uses. It utilize for various activities like e-commerce, social media, a messaging, a chart and map location application. A problem of waste food becomes a critical issue and it affect the social and environmental problem. Every time food is wastage the other sources water, energy, time, manpower, land, fertilizer, packaging and mainly money is also wasted. Food waste is big problem in India and it directly affect to the financial benefits. When huge quantity of food goes wasted instead of hungry mouths, it ends up in landfill means ultimately contributing to global warming by releasing methane gas. According to survey 40 percent of food is wasted from hotels and restaurant, marriage function, family function and household estimated that millions of rupees food is wasted every year in a country. Yet millions of people are hungry and in need of nourishment to overcome this problem we are proposing to new idea to facilitates the exchange in web based services here charity can easily find, secure and then deliver food to those who need it. This is the client-server GIS and Smartphone application for the hunger free city. At the client side App provide facility to donate food to the charity for the help of hungry people. Donors enter basic information like quantity of waste food and type of waste along with latitude and longitude value and contact number. Charities can pick up that waste food and deliver food to hungers. Charities can mapped onto Google map with the help of GIS location based services using GIS coordinate (latitude and longitude) value. Completion of registration will placed onto server database where charities can store the entries of donor in table format and shows the optimal path between donor locations to nearest charity along with direction. So wastage food can easily deliver to hungry people within a time.

**Keywords:** PhoneGap, GIS, Waste Food, API, LBS, Google Map, GPS

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## 1. INTRODUCTION

The cascade of wireless technology and Mobile devices are creating an impact on our lives. Smartphones are assumed to be the first communication and computing media for any real time task. With uses of social media, "netizens" are now pleasant with very often updating their current going activities or social profiles with their locations [1]. This new reference of information, signals from social micro blog programme, has been found to be principally useful in relief operations and disaster management. According to a report from researchers and survey, Smartphone or mobile applications are used by huge number of user globally. Whatever you are, a retailer, businessman or commerce e-web site, Smartphone is easier to access it than anything else. Smartphone market enormously grows over past decade and still growing, with these it is new frame for internet. It is like missing major market opportunity over available smartphone resources. Smartphone adoption has accelerated like never before [2].

Smartphone's have various functions to support different user intersects. GPS in Smartphone's offer location geo-

position and this will be helpful for waste food supply chain. In this research paper the tools are useful for managing the waste food and can easily find, secure and deliver food to those who need it. App provide web based cum geo-location based services to provide large quantity of waste food from hotels, marriage and family function, canteens, household to the hungry people in a city through the charity [3]. As a food donor you can post the amount of excess food you have to available and time required to pick the food up. The charity can request the food. Afterword's, the charity will be held responsible for picking up the food in a seamless and efficient manner.

The food waste in India is a critical problem it directly affect to the social, environmental and mostly financial benefits. According to the survey, near about 40 percent food is wasted, which would be through to feed 300 millions of hungry people in India per year. Stats studied by ministry of agriculture India, food worth 50k crore was wasted annually. Municipal Solid Waste report that higher percent of waste food going in municipal landfills. India was ranked 78 hungriest country, comprehensively worse than SAARC countries surrounding to India. Though India GDP had

improved and also bring good life style changes– its index of Hunger has improved to 21.3 (2013) over 32.6 (1990). UNFAO states that one-sixth citizen of India could not able to get food. Instead, one-fourth global below-nourished population belongs India, more than in all of Sub-Saharan Africa. More painful, 35 % of the global population between 3-16 years age group are malnourished endemic in India. UNICEF stats that, approximately half population Indian between 3-16 years age group have below BMI (Body Mass Index) weight.

Location based services are mobile IP-capable application. Information related to devices (mobile, car, missile etc.) location is fetched by location based services from defined coordinates. Location Based Services could be managed to provide information via mobile application with options like Restaurant, Hotels, Cinemas, Bus stands, railway station, Airport and main landmarks in city with either query based search or direct selecting already provided options described above with nearest one and distance from current position of device. They may be also in push based with coupons delivery or other marketing options within application frame for particular geo-location for customers [6]. Important and necessary components of LBS are the service provider's software application, a mobile network to transmit data and requests for service, a content provider to supply the end user with geo-specific information, a positioning component and the end user's mobile device. Location-based services must be permission-based [7]. In LBS end user must compromise his devices with software application to share own device location.

The satellite image of Aurangabad city is utilized to extract the field of interest in current research paper, but user can use this application at any city. As it uses Google places API as a spatial data so that mapped placed information extracted from it and used as for waste food management purpose. For demonstration, we consider Aurangabad city as a study area to facilitate services to the organization [8]. Motive of this paper is to allocate services for hungry people, by using Smartphone technology time required to find the donor place with precise geo-location determination. Smartphones geo-locationing manage to collect food from donor location and deliver food to distribute among hungry people within time before food perish.

## 2. RELATED WORK

Section include examination of existing methods and current system methods for no food waste. The waste management mainly deals with calling the charity to get wastage of food and serve to needy peoples, but the amount of time required to do the procedure is more. Proposed no food waste supply chain is for the urban Areas city with coordinates 19.88°N 75.32°E [9]. the related work is divided into two parts (a) current methods used in Aurangabad city (b) Available different methods for no food waste management's.

### 2.1 Existing Method

**Aurangabad waste in a city:** Senior citizen group and city-based NGO joined thirty party organiser, to donate

excessive food, which usually got waste to admitted patients with their relatives outside the town. NGO already made these food available for 500 and more population free-of-cost who can't prepare their food by themselves. After initiation, NGO has been capable to serve 1k population. Every day serving by this organisation include home baked food comprising all essential parts of meal. Serving both lunch and dinner both they are contributing too much for society. Parcels for patients who are under-treatment also made available [10].

## 2.2 Different Method For No Food Waste

### 1) No Food Waste:

A registered mobile based solution in the form of mobile application "No Food Waste" provide management of excessive food. The process of food management include collection from enthusiastic donor, sorting out the food, packaging the food and finally deliver food to the needy before it perish. The user can share the food to available registered Charity. User can find Charities near to the location and can deliver them self, user will get the root map assistance to charity which will easy to reach desired location. Otherwise all the user need to do is to upload the food images in the app and immediately all the volunteers will get notification and will contact you to pick up the food and serve to charity, the user can also track the status of food up to delivery. Those who ready to act as a volunteer can register as a volunteer in the app itself and can collect food from different donors and serve to Charity. [11] [12]. No food waste mobile app perform on following operation.

- Call Us: Request a pickup of leftover food.
- Quality Check: Once we reach your pickup point, we check for food quality.
- Locate Needy: We reach our spotted places such as ashram, slums, age care for food distribution.
- Deliver Food: Deliver excess food to needy place securely.

### 2) Waste No Food:

Waste no foods technology platform endorsed by the city of San Jose, Silicon Valley Talent partnership allowed excessive food to collect from the industrial manufacturer of food to charities who are qualified and genuinely providing food to hungrier one. About all 31% food is perished or dumped, from various sources including farms, grocery stores, bakery and restaurant. Reason for that is improper grouping of excessive food producer and impractical methods to donate it to Californians and Americans hungrier population. Smartphone based application Waste No Food is that platform for donors. Signing up by person on this application, provides efficient ways to donate their excessive which rather tends to dump, decomposed or perished. A registered qualified charities near vicinity of donors who have been verified by this application, could claim the food. Handling and Transporting of food is solely depend on respective registered charities [13] [14].

### 3. METHODOLOGY

The development part is divided into different sub module depending on client-server system. Those interdisciplinary sub module includes development of steps like client application development, server application development and the environment used, technologies used, database server with platform to be used in all mobile operating systems ranging from android, blackberry, IOS etc.

#### 3.1 Proposed Methodology

Proposed methodology can be classified into two part client side and another is server side methodology.

##### 1) Client Side Methodology:

Client side application workflow shown in fig.1. It divided into three part. Donor can firstly register on app then login it. After completion of login there are three option donate food, charity and about us. First phase are donate food select the donate food option enter the whole information like food type, food quantity, latitude and longitude value, donor name and contact number. Data are saved on to the web server application then charity checks for the verification. After find the food deliver to the hungry people. Secondly click on charity it shows the list of charity and mapped charity on Google map select the nearest charity from donor location. Last is about us can provide the information about the application.

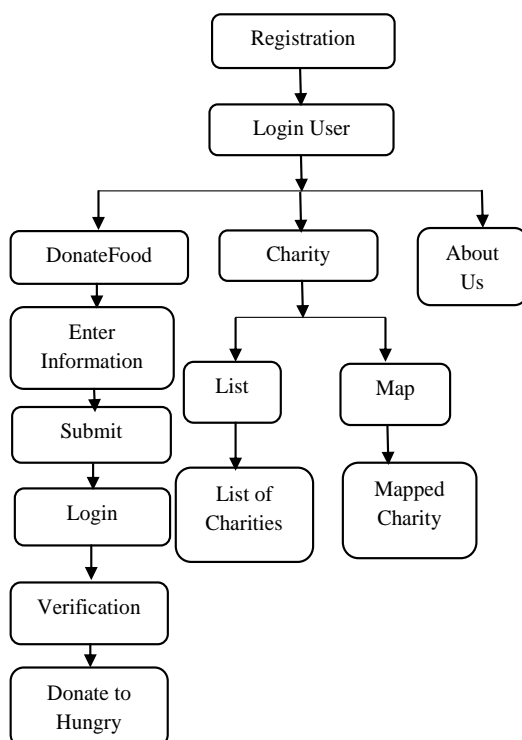


Fig -1: Workflow for Client-Side

##### 2) Server Side Methodology:

Server side application workflow shown in fig.2. On server side it stored the list of donor by date wise so we can easily analysis which type of food is more wastage and from where so it is beneficial for the future requirement. Secondly it is

more important to shows the optimal distance between donor to charity and donor to needy. Charity can contact to the donor and needy resp. and take responsibility for transportation and deliver to needy securely.

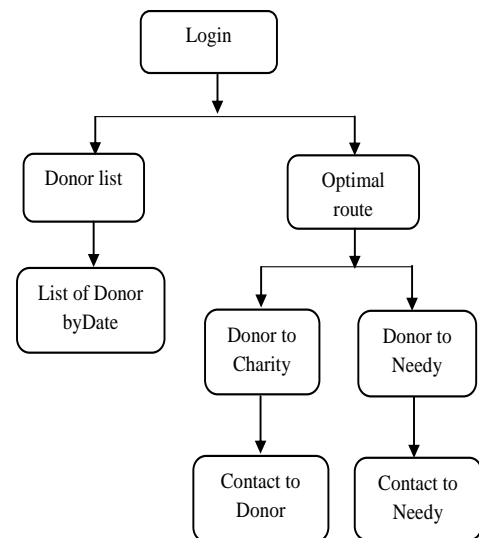


Fig -2: Workflow for Server-Side

#### 3.2 System Overview

The system architecture is divided into 3 parts, the development of the client side which is cross- platform Smartphone app which consist of by food donation part. Firstly they register and provide the information and submit. The Google web services used for getting the nearby search charities from the current location of donor in Smartphone app which provide mapping of the nearby charities on to the Google mobile maps along with fetching required information that user wants at the time of donate food such as geo-location of place, mapping facility to see on to the Google maps. Different technologies were used to make waste food application, those are JQuery, PhoneGap (Apache Cordova), Html 5, JavaScript, CSS for the development of the client side waste food supply chain App. Html5 provide great platform to developed cross- platform mobile applications by using PhoneGap technology. All platforms support Html5 so that we can make web application as a mobile one. AJAX is used to connect client and server for storing database waste food supply chain using MYSQL server on server side along database with server scripting PHP. The haversine equation is used to compute the distance between donors to charities and donors to needy geo-location by using geo-coded address form donor search current address and provide all services under required distance. Integrated steps involved to design the system are as follows.

##### 1) Smartphone User Interface:

Waste application consists of cross-platform PhoneGap app which can run in all major operating system such as Android, iPhone, Windows. App consist of providing supply chain facility such as quantity of waste food. Web based services allowing quantity of waste food to be donated from

the donor location (eg. Hotel, restaurant, wedding halls etc.) to charities. GIS location based services search nearest charities from the donor's location. Then Charities can easily find, secure and deliver food to those who need it.

## 2) Configuration of Map on Device using Google Web Services:

To use nearest location Google facility on to the Smartphone, we register onto the Google console, which provide different web services such as for used Google maps on to the mobile we need to generate server-key from console and used onto the device. To display maps onto the device we need to use Google maps followed by key and type of quantity of food charity wants too used.

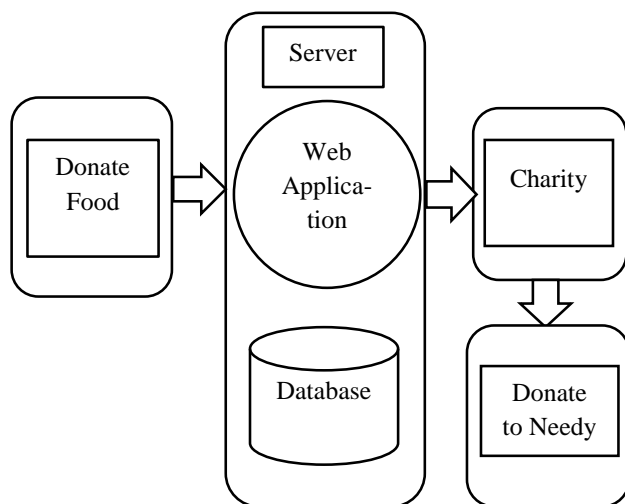


Fig -3: System Architecture

## 3) Build Web Server:

The PHP and MYSQL are used to design the web application server which is used to display all the donor information are registered and submit to the charity. Web mapping Facility (WMS) is used to point all charities from the Google maps web services and GIS location based services are for displaying addresses from client position onto the maps.

## 4) Build Client-Server Intermediate:

JSON (JavaScript Object notation) is an insubstantial data exchange format along with AJAX request helps to make web service connection in between client and server [15]. After the requirement is completed, the charity volunteer have been visited in place of donor person and deliver food to needy.

## 3.3 Technologies Used

Under this study several technologies were used for the development of supply chain client-server application with all the necessary technologies works in their original form. It is important to remember that some technologies are present only in the client (PhoneGap, SQLite, JQueryMobile), some only in the server (PHP, MYSQL) and some are found on both (JSON).

## 1) PhoneGap:

The idea for the client was similar to the Java motto, "write once, run anywhere", pursuing to overcome the handicaps of different programming languages and very heterogeneous systems for today's mobile devices [16].

PhoneGap is a software evolution structure by Adobe System, which is utilize to develop Smartphone applications. To utilize apps using PhoneGap, the developer does not require having knowledge of mobile programming language like for android we need knowledge of Java Programming, for IOS app development objective C++ knowledge is necessary, but only web-development and design languages like, CSS, HTML and JavaScript. PhoneGap utilizes and developed apps for all popular mobile OS platforms such as iOS, BlackBerry, Android and Windows Mobile OS etc.

With the help of apache cordova (Adobe software, previous PhoneGap) in visual studio 2015 Enterprise we develop cross-platform application for waste food supply chain.

## 2) JQueryMobile:

JavascriptQueryMobile [17] is JavaScript libraries for developing mobile application and it is also a user interface structure based on JavaScript Query that works across all popular phones, desktop platforms. Based on services and universal entrance in mind, it follows responsive web outline and HTML5 markup-design configuration makes to learn easy using JQueryMobile.

## 3) HTML5SQL:

Transactions have been done using the html5sql library [18]: a module coded in JavaScript, implementing the Web SQL [19] API that eases the work with HTML5 Web Databases. The API is supported by the major web browsers (Chrome, Firefox, Opera, Safari...) including those available on the smart phones.

To create local storage of dataset we used HTML5SQL Technologies, in this paper for saving nearest location search places, favorites places are stored locally, also if user wants to add information before emergency situation occur, he can also add his details and saved locally, when emergency occurs, he can directly send information which is saved already on local database, in this paper information at the time of donate food consist of name of the user, contact number and quantity.

## 4) AJAX Technology with JSON:

AJAX [21] is acronym of Asynchronous JavaScript and XML. AJAX is a new skill for creating better, efficient, faster, and more user friendly web applications with the help of Extended Markup Language, HTML, Cascading Style sheet, and Java Script. this is the web browser technology autonomic of software. Any data that is updated using Asynchronous JavaScript and XML can be stored using the JavaScript Object Notation format on the web server. AJAX is necessary and used so that JavaScript can fetch these JSON files when necessary, parse them, and execute one of the following operations:

- Accumulate the parsed utilities in the variables for further procedure before displaying them on the website page.
- It immediately allocates the data to the Document Object Model elements in the website page, so that they are mention on to the website.

Example: A Nearby Search request is a Hypertext Transfer Protocol Uniform Resource Allocator of the following form: <https://maps.googleapis.com/maps/api/place/nearbysearch/output?parameters> where output may be either of the following values:

- **JSON** specify the execution in JavaScript Object Notation (JSON).
- **XML** specify the execution of Extended Markup Language.

Parameter consists of latitude, longitude, API-key (server-key) etc.

**Table -1: Donate Food Information**

Sr. No.	Field	Description
1	Food Type	Type of food (Breakfast, lunch, dinner)
2	Quantity	Amount of dishes
3	Location Data	Latitude and Longitude GPS co-ordinates to get current location of donor
4	Donor Name	Name of donor (Hotel owner, House owner)
5	Contact Number	Contact Number of Donor
6	Time	Food Donation Time

### 5) GIS Location based Services:

Comprehensively there are number of elements in services based on location for applications on different platform. Elements collectively form the services based on location comprises of Google Maps™, Geo-locationing Information services and system, geo-location data collection services with LBS (Location Based Services) as specific application subcomponent. For current or a known geo-location LBS considered as best application platform which is supported by map based on electronic platform/ framework. Information regarding latitude and longitude coordinates for geo-locationing can be acquired by mobile network and world/global navigation system (GPS) [19]. It facilitate modified and defined services to stationary and mobile customers with respect to their current position using global navigation satellite system, geographical information system (GIS) [20], wireless communication (WC) technology platform.

Location based service (LBS) provides data according to user's present geo-location, consider examples like nearest food court, motels & restaurant. These all data is extracted or recovered from the LBS server within spatial databases stored on it. Location Based Services are one among all execute task for separate Smartphone users. It also play a major role in disaster management services, quick response

medical services, traffic emergencies, police investigation agencies. With an increasing amount of mobile devices featuring built-in Global Positioning System (GPS) technology, LBS have enormous increased applicability over past decade onto the Smartphone users [16].

### 6) Google Places API Web services:

The Google Places Application Programming Interface Web Service that details information about searched geo-locations expressed within API(Application Programming Interface) as points of interest and established geo-location using Hypertext Transfer Protocol requests.

The following requests for available places are as below:

- Place searches: it returns list of places from user's current location after placed strings in user query.
- Place details: it provides more detailed information including review of users, rating, posts and distance from current geo-location of specific place.
- Place Add: allows users to supplement the contents in Google's Places database with data from the user's application.
- Place Photos: It gives users to access to the millions of geo-location related photos stored in Google's Place database.
- Place Auto complete: it is used automatically to fill in the name and address of a place as you type.
- Query Auto complete: It is used to provide a query prediction service for wording-based geographic searches, by returning recommended queries as you type.

Each service is accessed as an HTTP request, and returns either a XML or JavaScript Object Notations response [22]. All requests to a Places service have to use the <https://> protocol, and add an Application Programming Interface key. The Google Places Application Programming Interface Web Service uses a place ID to uniquely associate a place. For details about the appearance and usage of this recognize across the Google Places API Web Service and other API.

## 4. EXPERIMENTAL WORK

### 4.1 Data Collection

The GPS data (geospatial locations) of charities and the needy place is collected by the field survey. The database of charities and needy place consist of various fields like name, address, quantity of requirement, area, pin and phone number. This database also consist of location information in the form of map coordinate as well as attribute data. Location of standard data was collected using handheld GPS monitoring device.

### 4.2 Working Flow Of GUI

We design GUI for waste food supply chain to the hungry people with exact geo-location (latitude and longitude) using GIS Location based service technology.

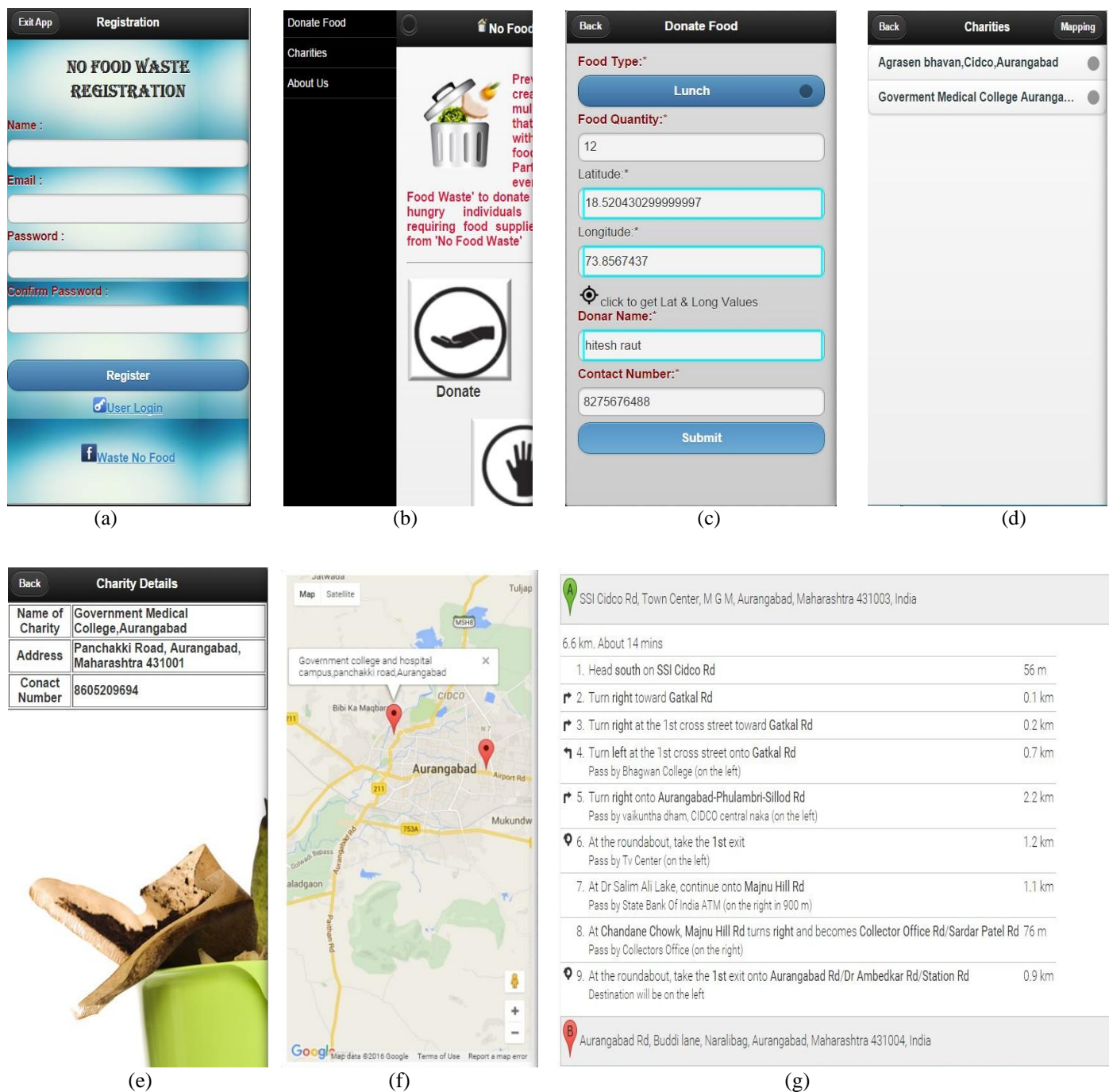


Fig -4: GUI of Smartphone Waste Food Supply Chain App

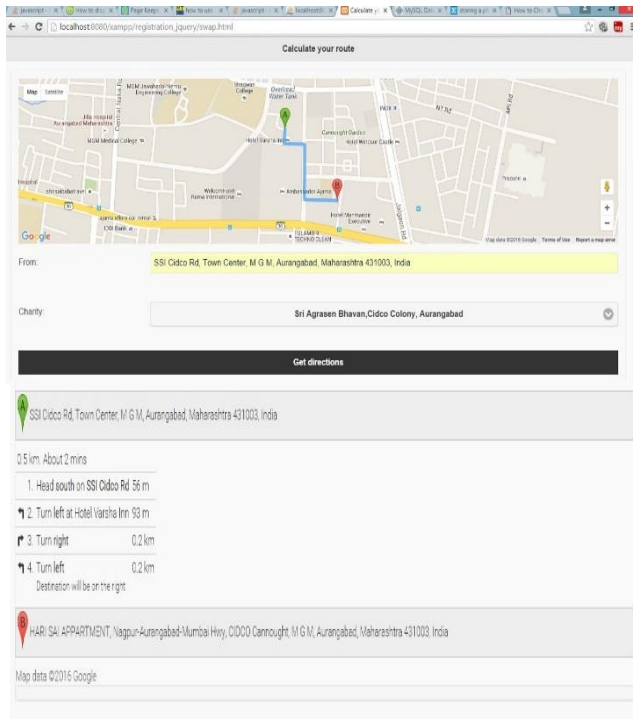
- Register: Donor request a pickup of leftover food through app.
- Locate Donor: locate the optimal route between charities to donor.
- Quality Check: once we reach your pick point we check for food quality and deliver food to needy place.
- Locate Needy: we reach our spotted places like city slum area, medical hospital, ashrams, temples etc.
- Deliver Food: we then distribute the food pack to hungers and insist them not to waste food.

### 4.3 Result Analysis

The GUI of application contain the physical address in the form of visual map loaded on window of application, so user could pick up address of concern party. The location of both parties was accessed by maps in attributed and coordinates form. To access and identify the address a reverse geocoding algorithms was used with coordinates. The address of user location get in text frame box in GUI form. Now it's on registered charity organisation to choose places where food need to be deliver. Required information was fetched from the database on the server as per the demand by the service application with charity name and distance of order from present location in GUI form [22]. Then willing



donator could choose any registered charity organiser name as his ease to access them or according to order. After that application provide details information of nearest route with the direction as shown in fig.5. So it is easy for charity to collect waste food as much as possible within a time and deliver to the needy.



**Fig -5: Routes in Detail with Distance Information**

## 5. CONCLUSIONS

1. This paper gives an idea about new waste food supply chain system using GIS Location based and Google web services using Smartphone's by providing the help by charity. It responds to hungry in our city and food waste management fulfils the requirement of ad-hoc communication between donor and charity.
2. Waste management never comes with prior information, using this location and GIS integrated mapping system we can automatically detect precise location (latitude and longitude) of the donor and needy and provide services from charity team.
3. In this paper, we add another option for communication using mobile and web technologies for waste food supply chain and response. This will help for fast and efficient to deliver food to those who need it. Our goal is not just create supply chain and response protocol, in modern day we have enlarge the use of Smartphone's which a source act like a medium and to help peoples , save their lives and make our city hunger free.
4. In future, we can make more precise client-server application to help peoples by analysing from the previous database records and make predications on how much waste food is generated in a day and how much people are hunger in day. Even further we can make the provision of sending the pictures of waste food supply chain situations with geo-tagged images.

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