Project proposal
Service Oriented Software Engineering SOSE

Medical Web Service

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Abstract

Recently, human relies on the internet more than any time. Web services are the solution for every aspect in our lives. Messenger, social media, e-shopping and much more activities depending on internet to be achieved. And to cope with the recent activities, more web services are created to ease the human lives. In this proposal we will introduce a Medical Service MS. MS helps patients in case of emergency to reach the closest hospital based on his location. The composition of Google place, Geolocation and nexmo web services is done in order to achieve the purpose. It locates the closest hospital around the patient then inform his family that he should go to this hospital. More details is provided in the description bellow.

1 Introduction

Always in case of emergencies, everyone needs his family to be with him. Related to that, in this application, we look for implementing a medical service MS. This service provide a quick communication with family member, so when there is a need to go to the hospital, this MS will find a list of closer hospitals, and when the user click on the wanted hospital, this service also send an automatic message to his emergency contact to inform him about our user.

This proposal will introduce a new web service to reduce the patient confusion in case of emergency to locate the hospitals in his area and contact his closest family member as registered earlier. Is this system we have the following main classes which is used in different scenarios as explained later in section 1.1.

1. GPS: which takes in the IP address of the user, then extract some useful information about the user location.

Figure 1.1: The GPS WS representation

2. Google maps will provide us the location of the nearest hospital in case of emergencies. When the location of the patient is provided. Therefore, Google map will give a list of closest hospitals. When the closest hospital is decided.

Figure 1.2: The Google WS representation

3. The Nexmo API, This API is used to send an automatic SMS to special person in case of emergencies.

Figure 1.3: The Nexmo WS representation

1.1 Proposed Scenarios

As we were thinking about the project, we thought of two main scenarios, which are:

1. Case 1 "Web consumer": In case of emergency, when the blood pressure, heart rate or blood sugar measured to be high, this will invoke the GPS API to know the location of the patient. The result will be input to Google API to find the closest hospital within the range of the patient area. When the hospital is found, The patient will select the preferable hospital within his area. Also a message will send to a relative to let him know that this user is going to hospital.

Figure 1.4: First scenario

2. Case 2 "Mobile consumer": In case of emergency, when the blood pressure, heart rate or blood sugar measured to be high, Google API to find the closest hospital within the range of the patient area. When the hospital is found, The patient will select the preferable hospital within his area. Also a message will send to a relative to let him know that this user is going to hospital.

Figure 1.5: Second scenario

2 The objectives

We can summarize our objectives as the following:

1. Designing a composition web service that will be an added value to other composition web services.

2. Reusing of existing web services such as Google places map, GeoLocation and Nexon API.

3. Composite service publishable as a web service.

3 Description

The patient will measure the blood pressure and sugar level in blood, if one of these values exceeds the normal range, this will invoke an alarming system by displaying available hospital based on the users location (latitude and longitude) related to Google places API. Google API will show the hospitals within the patient location. Then the patient will select his preferable hospital from the shown list. At this point an automatic SMS will be his emergency contact. The message will be "I am going to hospital xxxx", where xxxx is the name of selected hospital.

4 Data Flow

Indeed, implementing a medical service needs to pass data among services to provide requiring inputs for the next service.In this project, in response to an incoming data from patient

measurement, we have to invoke GeoLocation to decide the patient location, then Google place service according to the patient location return a list of nearby hospitals. And according to the patient preferable hospital, which is known by clicking on the hospital name. At this moment, SMS will be sent to a relative to tell that this patient is going to the selected hospital.
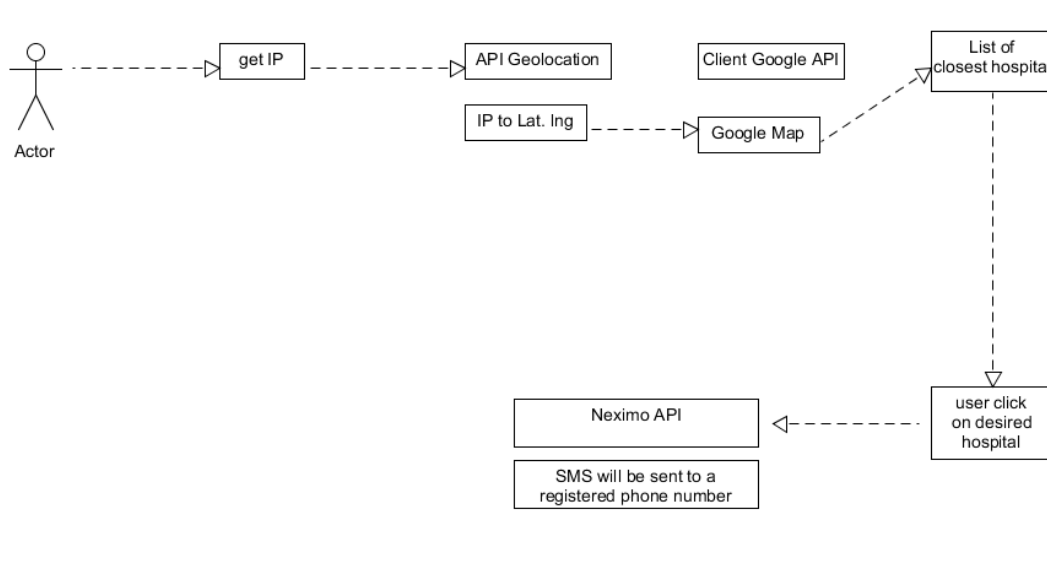

Figure 4.1: The flow of data in this web service composition
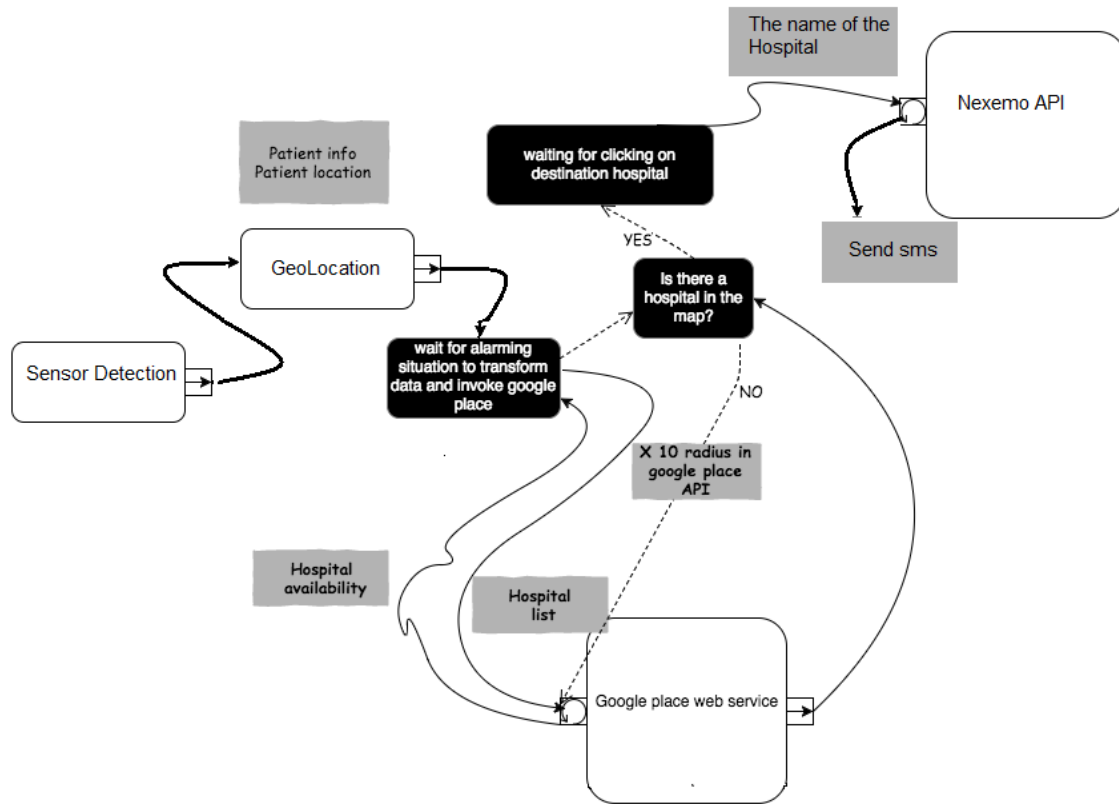
5   The structure of the web Composition service

Figure 5.1: The structure of the web Composition service

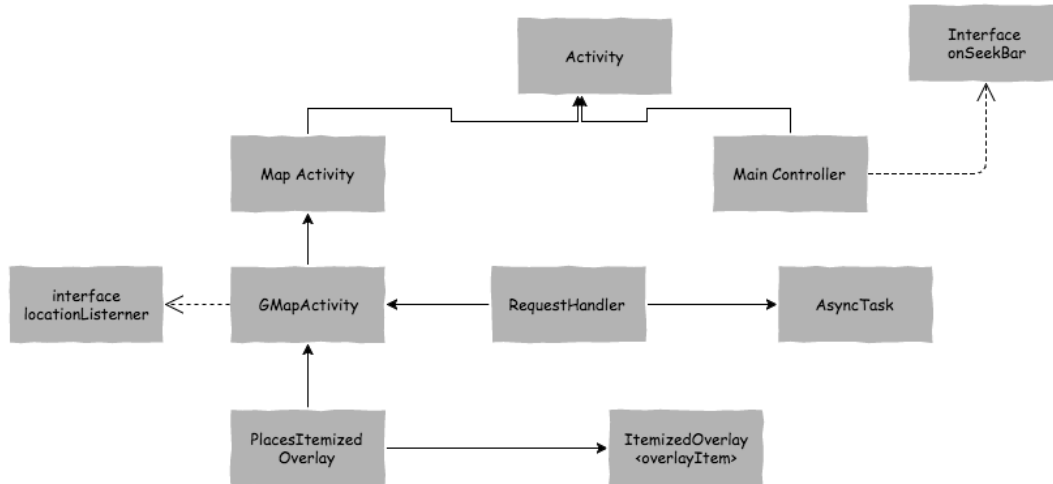# 6 Class Diagram

6.1 Class diagram of Google place

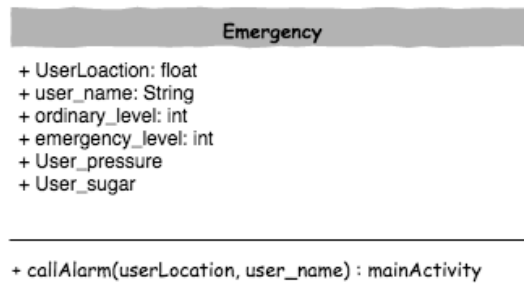Figure 6.1: The class diagram of the Google place

6.2 Emergency

Figure 6.2: The class diagram of emergency
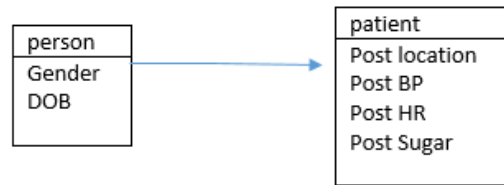
6.3   Person

Figure 6.3: The class diagram of the person class

7   Technologies

In this project we will create the basic HTML structure that hold our web app. And also we will use the following technologies:

1. Swagger RESTful API Documentation Specification. is a project used to describe and document RESTful APIs.

   The Swagger specification defines a set of files required to describe such an API. These files can then be used by the Swagger-UI project to display the API and Swagger-Codegen to generate clients in various languages. Additional utilities can also take advantage of the resulting files, such as testing tools.

2. Larveal: is regarded as one of the most popular PHP frameworks, we have chosen it because it is free, open source and powerful framework. It also was easy to be learned. Developers who need a simple and elegant toolkit to create full-featured web applications and utilities that aid in application deployment and maintenance use Laravel. So we have used it to composite our services by implementing an implicit Controllers by defining a single route to handle every action in the controller. We define it in route.php file with Route:controller method as shown below.

   Route::get('sendSMS/{mobile_no}','SendSMSController@sendSMS');
   Route::get('gps', 'SendSMSController@getGPS');
   Route::get('map','SendSMSController@getMap');
   The method name of the controller should start with HTTP verb like get or post. We start it with get, it will handle only get request. After the HTTP verb we can give any name to the method but it should follow the title case version of the URI.

```php
namespace App\Http\Controllers;

use Illuminate\Http\Request;
use Nexmo;
use GuzzleHttp\Client;

class SendSMSController extends Controller
{
    public function sendSMS(Request $request , $mobile_no)
    {

        $message = Nexmo::message()->send([
            'to' => $mobile_no,
            'from' => 'Shopping Light',
            'text' => 'I will go to the hospital : current location of the patient' . $this->getGPS($request)['city']
        ]);
    }

    public function getGPS(Request $request)
    {

        $client = new Client();

        $res = $client->request('GET', 'http://ip-api.com/json');

        $stringData = json_decode($res->getBody(), true);

        return $stringData;

    }
    public function getMap(Request $request)
    {
        $client = new Client();
        $res = $client->get('https://maps.googleapis.com/maps/api/place/nearbysearch/json?location='.$this->getGPS($request)['lat'].','.$this->getGPS(
            request)['lon'].'&radius=35000&types=hospital&name=cruise&key=AIzaSyAruSAj9XPFSf2aDMUag39O-81FnLeP_A0');
        $data =  json_decode($res->getBody(), true);
        return $data['results'];
    }

}
```

Figure 7.1: Medical service controller

3. All the data will be represented in json.

8   Implementation & Discussion

We used Laravel, which is a PHP framework for dynamic web application, which stands to be MVC framework (model for maintaining data , view as interface to interactive and controller for writing the business logic in order to handle coordination between model and view. Fig8.1 shows the topology of our laravel project since we do not have database in our project so model view controller does not contribute on project process.
Next, we will show the steps of installing laravel:

1. Install Xampp

2. Install composer as modular framework each laravel project depends on wide range of code packages which all handle with composer as dependency manager for PHP.

3. Create a new laravel project inside htdocs folder using composer.
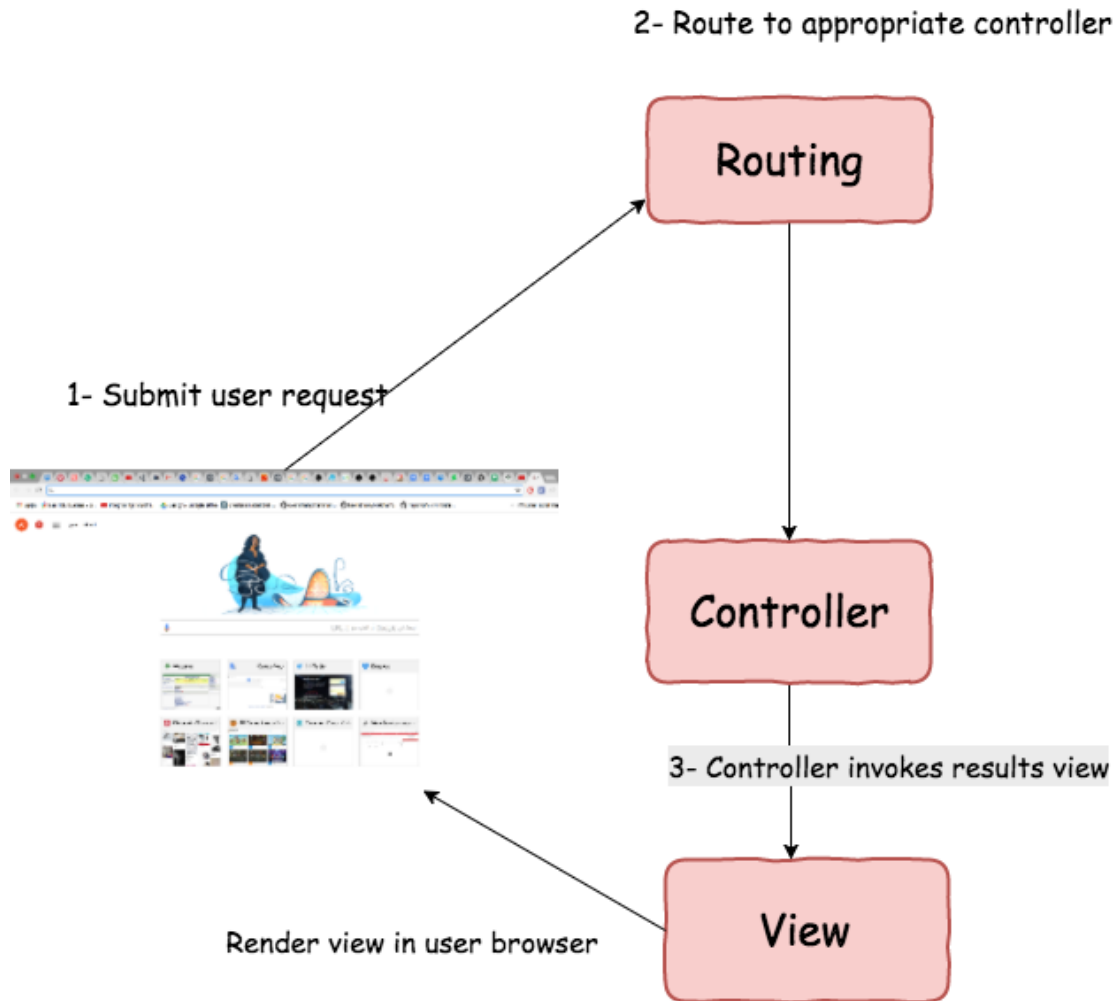
4. Install sublime text editor.

Figure 8.1: The topology of our laravel project since we do not have database in our project so model view controller does not contribute on project process

In web routes, we identify the API URL addresses for three web services for route to appropriate controller based on user request:

1. sendSMS get http request.

2. gps get http request.
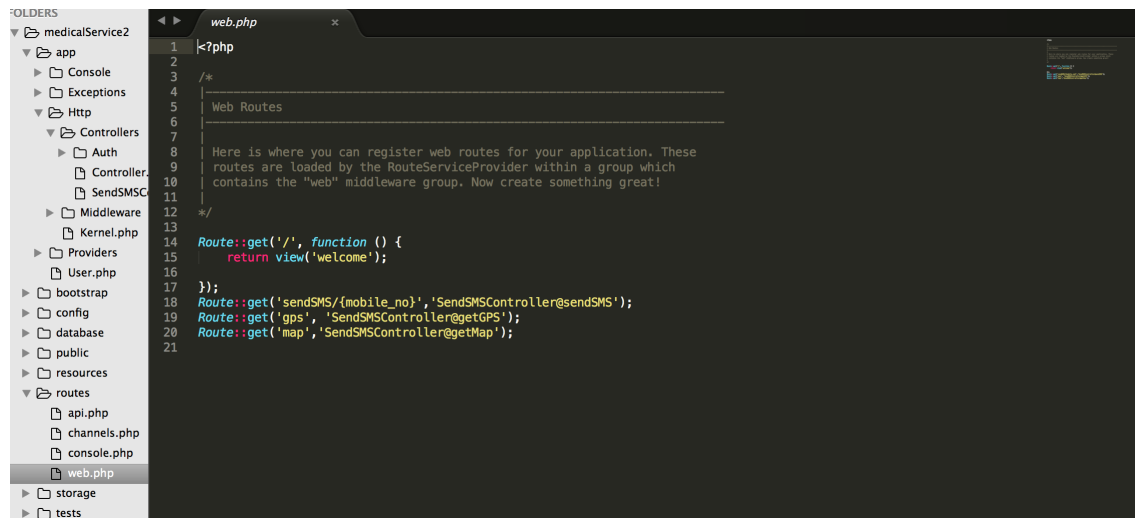
3. map get http request.

Figure 8.2: Identify the API URL addresses for three web services used in our web service

Controller for controlling business logic with one controller sendSMSController, we identify three functions to handle with each single route. We would like to mention that getGPS method is embedded in getMap method but we allow user to get request from http://medservice.pe.hu/gps to make him sure that he will get request based on his location. And the implementation is as shown in fig7.1.

9 Future Enhancements

Starting from the current interest in medical Web services, we explored the web service composition for medical web service for the industrial approach. In future we would like to add smooch API web service which gives the abilities for adding messaging features in medical web services to keep in touch between the doctor and his patients. Moreover, for increasing the security we may add Sift Science API to monitor website's traffic and events and protect site from fraud users and general spamming.
In addition, we can include another web service in order to arrive the patient to the wanted destination. We can include another service like "Uber" which is a good taxi service to be used in this context, but we have not included it in this release of composite service because it is not free. Our plan suppose when we have the patient coordination, his location will be provided to the google map and the uber. The taxi will harry to the patient address. And depending on the list of closest hospitals given by google map. The address of the chosen hospital will be provided as destination to the taxi driver to move the patient as harry as possible.

10 The Client Implantation

10.1 Clent from another team

We have implement the client within html page to consume the service provided by team four, their service is Program Directory which is targeted the Tawjihi students, as we have many universities in Palestine, that considered potential choices for the students finished the tawjihi level, and planning to join one which they think it is the best for them according to the student grade and each university academic programs and other related information compared to other universities. So this service help students save time and effort in exploring the specialists available for them in different universities by just entering their seat number and tawjihi year.

Regardless of the technology they have used in implementing their service, or of how many and which different services they have composed to produce the final one. We have develop a client for this service using .net, get method in a web page using jQuery, Css3, Bootstrap.
Depending on the interface
URL they had provided, and the JSON file. url: 'http://ec2-35-166-183-83.us-west-2.compute.amazonaws.c
Input: seat number and the year.
Output: a set of records include these information in each: university, branch,description, program_type, title and mingrade .

10.2 Client for our web service

So depending on the current location, the patient click on find hospital. In other words, to test our service, we used javascript. So when we click the button of find hospital, this will run our code which will convert the IP into GeoLocation and give back a map of the closest hospitals.

So our implementation is processed through these steps:

1. Click on the button of "Find hospital", to find the closet hospital within the same area.

In order to test our service, we used javascript. So when we click the button of find hospital, this will run our code which will convert the ip into GeoLocation and give back a map of the clossest hospitals.

Find Hospital

Figure 10.1: Our first step to test the service, to click on Find hospital

2. A map of the local hospitals will be shown on the map. As shown below in fig10.2.

Figure 10.2: The list of the hospital shown in local area of Nablus

3. When you move the cursor beside the hospital name. It shows the name on the map as shown in fig10.3. If the patient decide that this is the needed hospital, he should click on it.
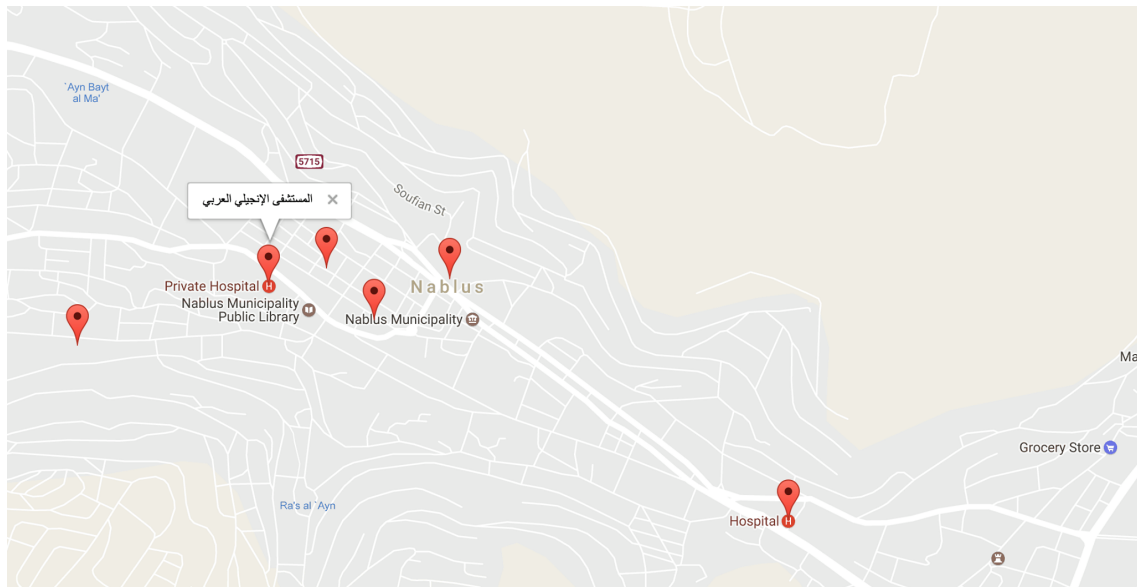

Figure 10.3: The name of the hospital shown on the map.

4. When the patient click on the needed hospital, sms will be sent to his relative cellphone, to tell that he is going to this hospital
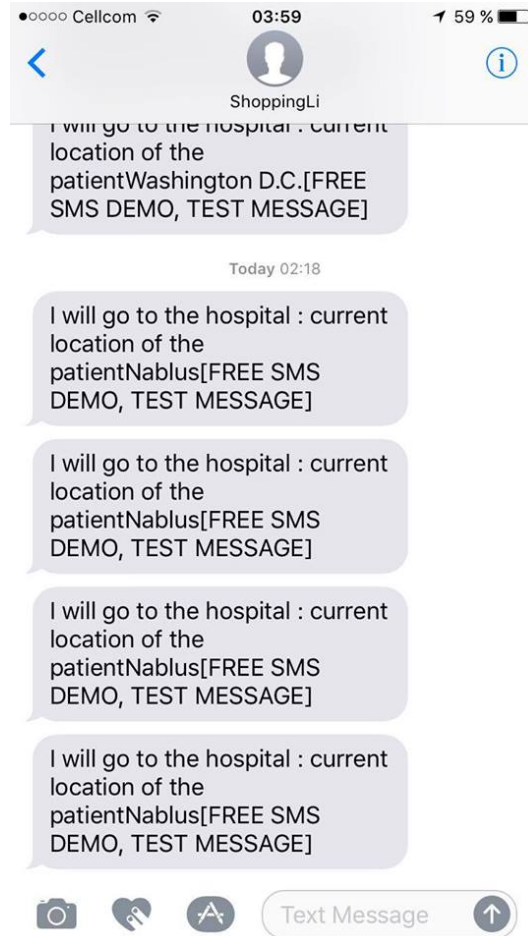
Figure 10.4: The sent message to mobile using Nexmo Web Service.

11 Conclusion

In this proposal, we implement a web service using three public web services through applying the composition logic principle and concept. By implementing MS, patients -especially in case of emergencies- will be less worried about being alone at hospital. MS will provide address of the closest hospital and will send a message to one relative as well.

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