Health InSys (Health Inspection System)

Halima Khamis Salim Al Kahhali,
Student, Muscat College,
P.O.Box:2910,
PC 112, Ruwi,
Muscat, Sultanate of Oman,

S.Hameetha Begum
Assistant Professor, Muscat College,
P.O.Box:2910,
PC 112, Ruwi,
Muscat, Sultanate of Oman,

ABSTRACT

This project title Health InSys (Health Inspection System) is a project to help the Municipality staff during their health inspection visit. Commercial shop visits can be streamlined on a monthly, weekly or daily basis and avoid creating havoc and round trips. Municipality is responsible to check by visiting the shops & the properties that its activities involve in foods and public health to insuring the application of hygiene conditions in Oman. I have used Microsoft .Net Framework, Microsoft Visual Studio 2012, Android SDK, Eclipse and MySql Database to develop my project. Here, I have two modules Inspector Module and Administrator Module according to the requirements. Inspector Module will use the Android based Mobile to update the Inspection details and Establishment details. In addition to that they can view the Inspection schedule list, Establishment List and Inspection List. Administrator Module will use the web based application through which they can add, update, view and delete all the Information and they can able to take necessary reports.

Keywords
Android, Health Inspection, Web API, ASP.Net MVC

1. INTRODUCTION
This project title Health InSys (Health Inspection System) is using Android Mobile based application to help the Municipality staff during their health inspection visit and Web based application to do all administrative task. The project is designed to assist this process, at the same time it helps in creating a uniform and systematic operation of these inspections. The inspectors will be able to update the system with current information; Top level management can take appropriate actions accordingly. This is extremely useful for users also for understanding the situation and taking actions in an easy manner.

1.1 Background and Context
Municipality monitors the successful operations of commercial shops with regards to health and safety. Their services include controlling the food and preventing cheating in the foodstuff through the following actions:

- Carrying out visiting & inspection for commercial shops that deal with food & public hygiene.

- Monitoring commercial shops that prepare or rendering food to the public.

- Writing minutes of violation, instructing the violating places to present before the concern authority at the municipality.

- Closing the violating shop & stop practicing the activity.

- Seizing the foodstuff doubtful of in its validity.

- Supervising destruction of bad food stuff at the dump site

- Destruction of the invalid food during periodical official visit.

1.2 Scope and Objectives
The aim of the Health inspection system is to help the inspectors to do their commercial visit activities with the specific login to the system that ensures the secured access to the users and provide more user friendly GUI by using the mobile devices.

The overall objectives of this project are as follows:

- ✓ To check the Quality process of the Commercial shops on Inspector Field visit.

- ✓ To be able to schedule the Inspector's route.

- ✓ To be able to receive updates for inspectors on each inspection.

- ✓ To identify the license expiry of the commercials and give warnings for the same.

- ✓ To provide secure access to the user.

- ✓ To be accessed remotely by mobile devices.

Final System is capable of doing the following operations.

- ✓ Helps in Quality checking process of the Inspector on the field

- ✓ To update the details of Establishment

- ✓ Checks the Validity of Registration

- ✓ Gives the details of the previous visit to the commercial shops.

- ✓ Inspector's route is streamlined.

- ✓ Helps to view the Inspector Schedule, Inspector Visit details and Inspection details report

2. LITERATURE REVIEW
2.1 Inspect2GO3[1]
This system is mobile based (android & iPad), and depends on a server for actually processing the data. It runs a variety of templates for inspections and is very agile. Inspect2GO offers environmental health and safety (EHS/DOH) audit software designed for municipal health inspections. Standard and custom versions are available. This Health Inspections includes Retail Food Establishment, Temporary Food Service , Consumer Health, Playground, Childcare, Property, Pool, Pest, Wholesale Food, Food Processing and Nursing Homes [1].

2.2 TTS Systems – Health Inspection Department Software [2]

TTS Systems provides advanced Health Inspection Software that can be also utilized with their other software offering. This system is windows based and supports a wide array of requirements. This system is extensive. This Health Department Inspection Software is specifically designed for Public Health Departments. It helps to manage all aspects of Health Department's Day To Day Operations [2]

2.3 InspectHub[3]

Similar to TTS Systems, It provides smart and easy way to manage the establishment Inspections. Every day new establishments are auto-magically scheduled for each inspector. Each establishment type can have its own inspection form regardless if its a pool, restaurants or hospitals. Events and festivities can be loads of fun, with the help of scheduler.It helps reduce the time spent on managerial duties and here less time means less users[3].

The development approach to the design and implementation of the project can be explained with the following steps: Analyze the system requirements, Design the project requirements, Selection of appropriate technology, Design database, Implementation and Testing.

3. METHODOLOGY
3.1 System Study

During my System Study in Municipality, I have identified they are currently doing these commercial visit activities by using HTC application for doing health inspection activities.

3.1.1 Drawbacks of Existing System

This Existing system which lacks integration and still partially relies on the paper based system for information collection. The inspectors are not updated immediately. The current system wastes resources and Municipality staff felt that this is not appropriate for their requirement. They need a new system with advanced facility and portability. Hence, they would like to develop this system by using android application which is so popular now in all over the world and it will be very convenient to use. Android applications are usually developed in the Java programming language using the Android Software Development Kit, but other development tools are available. As of October 2012[update], more than 700,000 applications have been developed for Android, with over 25 billion downloads. The Android platform has also grown to become a favorite among mobile developers. A June 2011 research indicated that over 67% of mobile developers used the platform, at the time of publication. In Q2 2012; around 105 million units of Android smart phones were shipped which acquires a total share of 68% in overall smart phones sale till Q2 2012[4]

3.2 System Design

The primary users of the system are

- Inspectors
- Supervisors /Administrators

Inspector will use the Android based mobile phone to update the inspection details, Establishment details, to view the schedule and they can able to view the and Supervisors/Administrators will use web based system to manage all the activities of Health inspection system such as Edit, View, Delete and Print option. Structure chart of the

Health inspection is as shown in the below mentioned Figure[1].
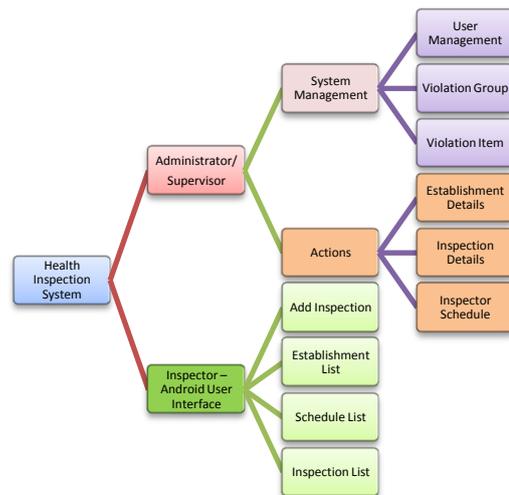

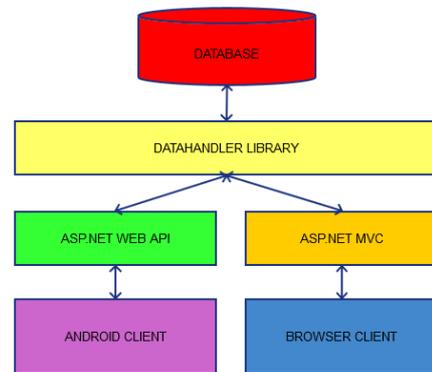**Figure 1. Structure Chart of Health Inspection System**

3.3 Architectural Design
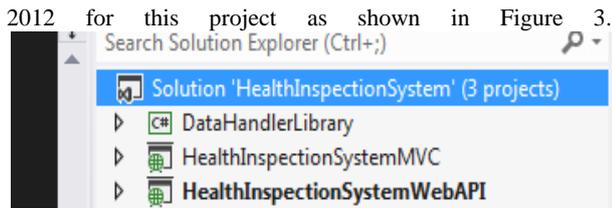

Figure 2. Architectural Design

3.4 Software Used

The Health InSys project was developed using the following software:

Technology:	Microsoft Visual Studio 2012
	Microsoft .Net 4.5 Framework
	Microsoft IIS Web Server
	Android SDK
	Java JRE/JDK
	Eclipse IDE
	Notepad ++
Backend	MySQL
	MySQL Workbench

3.4.1 Microsoft Visual Studio 2012

I've used Microsoft Visual Studio 2012 to develop the Administrator Web System. I also utilize the use of Entity framework into handling and managing my database transactions. There a three projects that I developed using VS

2012 for this project as shown in Figure 3.

Figure 3.   Solution Explorer of Visual Studio2012

3.4.1.1   DataHandlerLibrary

This module is in-charge of handling all the database query transactions. I used Entity framework and MySQL in this part. The main purpose of this module is to act like a central repository in getting and saving database records.

3.4.1.2   HealthInspectionSystemMVC

This module will serve as the main administration or back office module in creating users, viewing and editing of establishments, checklists, and reports. This is creating using ASP.NET MVC framework.

3.4.1.3   HealthInspectionSystemWebAPI

This module serves as web service into providing data services to the Android application. It uses the latest Microsoft ASP.NET WEB API. The transactions are almost similar to MVC except that instead of sending Views (HTML), it communicates using JSON String.

3.5   Module Description

Health Inspection System (Health InSys) has two main modules:

- ✓ Inspector Module - Android Mobile User Interface
- ✓ Administrator/Supervisor Module – Web Administration System

Inspector should use the android mobile user interface to update the Inspection details of any Establishment. Administrator/Supervisor will use web based application to add, edit, delete and print the entire operation. Inspection details will update through web API. Inspector should give a user name and password.

3.6 Inspector Module – Android Mobile User Interface

Android Mobile user interface is used by the inspectors, those who are incharge of inspection process. This System is highly protected by having user name and password. Inspector in charge of this unit play a key role in the proper functioning of the system, and through this the Inspector should add the inspection details according to the violation option given by the administrator. Inspector should click on Health Inspection Apps as shown below in Figure 4

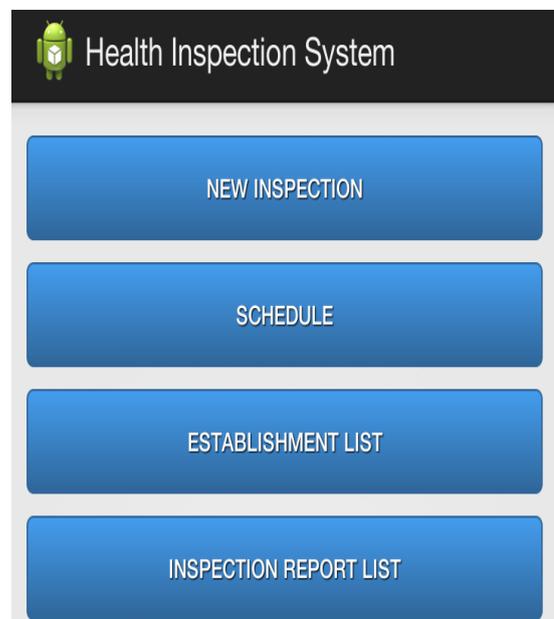**Figure 4.   Health Inspection App in Android Mobile**

3.6.1 Login

After clicking the Apps, The system will ask for username and password for Authenticated user. The system will be able to authenticate the users and forward them to their respective access pages for the required functions. This system will require the user to give a registered username and password. If the credentials are incorrect then the user will be informed of the same.

3.6.2 Inspector Menu in Android User Interface

After entering the valid user name and password, a screen will appear for the health inspection system and this system contains four main options as following as shown in Figure 5:

- New Inspection- To do the New Inspection.

- Schedule – It will display the Schedule available for the concerned inspector

- Establishment List – It will display the Establishment list available in the database

- Inspection Report List- It will display the inspection report date wise.

Figure 5.   Health Inspection System Menu for Inspector

3.5.2.1 New Inspection
Inspection Type

When we press new inspection option in the main menu, the following screenshot in Figure 6 will appear for various inspection types such as:

- Routine Inspection- For Routine checking of any Establishment

- Reinspection – For Reinspection of any Establishment

- Preoperational – For Preoperational Inspection for any establishment
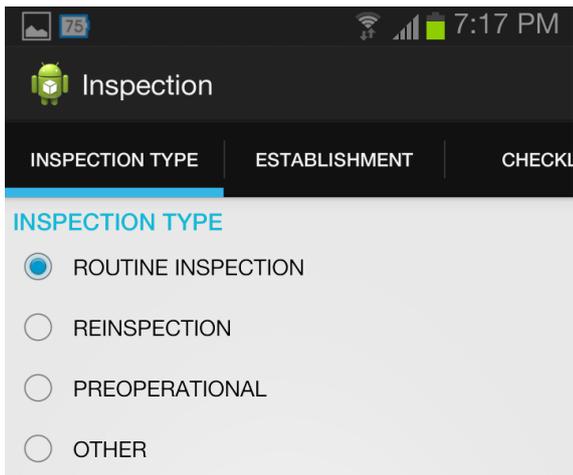
- Other (Any other types)

Figure 6.   Inspection Types

3.5.2.2 Establishment

Inspector should select one of the options according to the requirement as shown in Figure 7. After selection the Inspection type. When you drag the health inspection page, screen will appear to select the establishment from the list and it will display current date and time in the screen. Inspector should check the Permit/License Checklist.
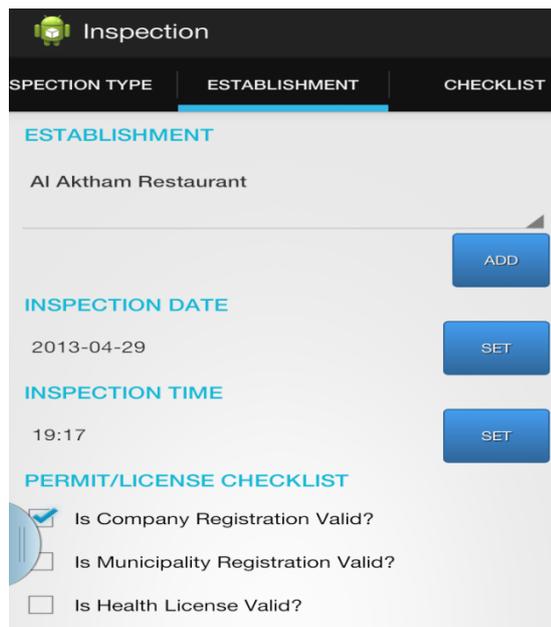

Figure 7.   To Add Inspection Details of Particular Establishment

When Inspector want to select the particular establishment, should click on establishment as shown in the Figure 6., It will list all the names of Establishments available in the database. Inspector can add Establishment from his mobile phone and it can be added in the database by using this add button.

3.5.2.3 Checklist

Checklist contains a violation group and violation items. Sources of Food, Food Protection, Personnel , Cleanliness, Etc., are some examples of Violation group.   Approved source, wholesome ,non-adulterate , Unwrapped or potentially hazardous food not reserve , Holds Valid ID Card , etc., are Violation items. During the Inspection process, Inspector

should click the violation option as shown in the Figure8, if the establishment violates the checklist. For example, AL Aktham restaurant. Under the Personnel Violation, if the personnel doesn't have the valid Id card, Inspector should check that option. Here, inspector has the place to write the additional Comments. Then the system will calculate the demerit score of the establishment .

Figure 8.   Violation Checklist

If the Inspector want to generate the report, he should the Generate button to create a report on Inspection. After Clicking the generate option, Inspector will get the following screenshots to review the report as shown in the Figure 9.
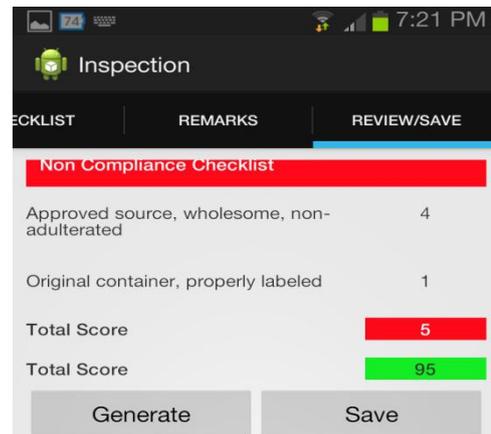

Figure 9.   Screenshots of Review/Save

3.7   Administrator/Supervisor Module – Web Administration System

This module handles the duties of the system administrator who is controlling the overall project and system. The module is highly protected through the use of password given to the limited number of the system administration people. Administrator is responsible for adding, deleting, and updating the establishments' details to the system. Even though system is fully automatic one, administrator has a key role in the proper functioning of the system. In the case of any functional problem of the system, administrator can play a crucial role. Administrator can view all the details of by login using his password such as checking the appointment details, establishments' list details, registration details and login details.

After that, a Screen will appear for the Administration Modules of health inspection system and this system contains two main options as follows :

1)   Actions: Inspection, Establishment List ,Schedule

2)   System Management: Violation Group ,Violation Items, User Management

14

3.7.1 Inspection List

Supervisor can view the inspection details list in the grid view with the details of Inspection as shown in Figure 10. for example Document No , Establishment Name / Department , Date/Time , Demerit score   , Status and there is a option to print and Delete. So administrator can view the inspection list and can delete but he can 't edit details of any inspection .

Figure 10.   Inspection List

**Figure 11.   Inspection Report of Particular Establishment
-Inspection List**

3.7.1 Establishment List

Here in Establishment List view, the details are shown in the table with the following details Establishment Name , Operator Name , Status and there is two options to Edit and Delete. Establishment

Here in Establishment List view, the details are shown in the table with the following details Establishment Name , Operator Name , Status and there is two options to Edit and Delete

3.7.2 Violation Group List

To create violation group list , user should click on create new and if they want to edit or delete, should click on the appropriate option available on the screen

3.7.3 Violation Item List

Violation Items can be listed in this form. Here user have a option to edit, delete and it will be displayed in the Inspector andorid mobile phone to do checking process.

Figure . 9. Create Violation Item

Figure 10. Violation Item listed for Inspector

4. CONCLUSION

4.1   Evaluation

The system was developed to ease the work of municipality staff especially for Inspector and supervisor. I have concentrated on using the appropriate tools to develop this system as per the user's requirements. The system was designed and implemented to satisfy user's requirements. Because it can be easily modify according to the user's changed requirements to ensure their satisfaction and system quality. This system has been evaluated by the computing department in the Municipality and they stated that it is a well-designed system

4.2   Future Work

Health Inspection System is a broad in nature. Here, I have concentrated on only the Establishment Inspection. This can be extended to all other areas of inspection. We can develop this project to show the map of Inspector route in the mobile for the future work. Inspector schedule is not integrated with the inspection process. This can be done for the future work. Uploading documents such as pictures or certifications can also give clear picture to all users.

5. ACKNOWLEDGMENTS

6. REFERENCES

[1] Inspect2go Website Home Page, http://www.inspect2go.com, April 2013

[2] TTS Systems Website, http://www.ttssystems.com/contentpage.aspx? Page = Health Department InspectionSoftware, April 2013

[3] Inspecthub Website, http://www.inspecthub.com/ April 2013

[4] Wikipedia Website, http://en.wikipedia.org/wiki/Android_software_development, April 2013

[5] Filehippo Website , http://www.filehippo.com/download_dotnet_framework_4/, April 2013

[6] Wikipedia Website, http://en.wikipedia.org/wiki/Eclipse_(software), December 2012

[7] Wikipedia Website, http://en.wikipedia.org/wiki/Java_platform#Edition , December 2012

[8] Webpedia Website, www.webopedia.com/TERM/M/MySQL.html ,April 2013

[9] Mysql Website, http://www.mysql.com/products/workbench/ ,April 2013

[10] Muscat Municipality Website, http://www.mm.gov.om/tabid/56/language/en-US/Default.aspx , December2012

[11] Make use of Website, http://www.makeuseof.com/tag/write-google-android-application/ ,December 2012

[12] W3School Website, http://www.w3schools.com/ , December 2012

[13] W3School Website, http://www.w3schools.com/aspnet/default.asp, December 2012

[14] http://keith-wood.name/uiDatepickerValidation.htmlmber ,December 2012

[15] Android Website, http://developer.android.com/index.html, December 2012

[16] Code Project Website,http://www.codeproject.com/Articles/102065/Android-A-beginner-s-guide, December 2012

[17] Code Project Website, http://www.codeproject.com/Articles/213138/An-Example-to-Use-jQuery-Validation-Plugin, March 2013

[18] Code Project Website, http://www.codeproject.com/Articles/588909/ASP-NET-WEB-API-Basics-MVC-4, March 2013

[19] Code Project Website, http://www.codeproject.com/Articles/344078/ASP-NET-WebAPI-Getting-Started-with-MVC4-and-WebAP, March2013

[20] Code Project Website, http://www.codeproject.com/Articles/549152/Introduction-to-ASP-NET-Web-API, March 2013

[21] Code Project Website, http://www.codeproject.com/Articles/173121/Android-Menus-My-Way, April 2013

[22] Apress Pro Android 4 (2012)