



Android Based Complaint Management System: People's Corner

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ABSTRACT: In many countries we have civic bodies that are the local governing bodies that help maintain and run cities. These governing bodies are mostly called MC (Municipal Co-operation). Also addressing to the complaints of the citizens is a prime factor that can ensure trust of respective citizens. In order to do this, the MC may need to install sensor cameras and other surveillance devices to ensure the city is running smoothly and efficiently. It is very important for an MC (Municipal Co-operation) to know the shortcomings happening within the city. Thus we know that maintenance of a large may need some kind of surveillance 24/7. As of now this can only be practically possible by installing sensors /cameras etc. or allowing citizens to directly address them. An easy mechanism to lodge and receive complaints is the need of the hour. At present citizens use the following methods to lodge complaints a) a person may visit the ward office where another person working for the ward hears it out and makes a note of it, b) through a web portal, c) through some contact center over the telephone. In this paper we propose a mobile interface which can make lodging of a complaint much easier and simple. The main idea and motivation behind this proposition is to create a user friendly, naturally English enabled mobile interface that can be used in conjunction with the presently existing web portal infrastructure [6]. This system will help the common man to lodge complaints and seek redressal for the same.

KEYWORDS: municipal co-operation; sensors; cameras; web portal infrastructure; mobile interface.

I. INTRODUCTION

A lot of research has been conducted to include e-services for the use of Municipal bodies governing a city [9]. Citizens should be aware of the services and the reliefs that can be provided by a particular municipal body hence various researches has suggested making use of e-services[9]. The basic idea is to keep a citizen satisfied. There have also been studies [1] which address the usability perspective of e-services for physically challenged citizen segment. While e-services have been in use in Europe for a while, they have been catching up in India in a big way in large cities, only recently. Through our research we have found that the municipal head of Mumbai is one of the most techs savvy MC present in the whole of India. There are many departments of the MC which are used to handle different aspects of cities upkeep. To make things more easy these departments are further divided into wards. Each ward within a city helps to handle complaints of a particular issue. Currently Mumbai has about 24 wards. Each ward has a ward officer who has authority to handle complaints relating to or originating from that particular ward. In case the complaints belonging to a ward gets diverted to another ward then this in cause a major delay in the redressal of that complaint. Active citizen participation is like a fuel that keeps the municipal body running. Due to active citizen participation, a MC can witness efficient functioning of all the utilities and services in the area under it. Active citizen participation can occur when an MC will allow them to voice their problems, complaints and so on. Also it will become much better and faster if the complaint is properly delivered to a proper ward else it will not be handled well and will be time consuming and will only frustrate the citizen. Thus complaints should be promptly handled by the concerned departmental authority or ward. The process is explained as follows: once the complaint gets registered a department from the MC is notified about it, the person complaining is notified and kept updated about the status of the complaint. Currently the chief modes of complaining are a) a person may visit the ward office where another person working for the ward hears it out and makes a note of it by taking down personal information and converts it into an electrical form which is stored in a centralized database for future access and reference, b) through a web portal infrastructure [6] where a user is asked to fill in his/her details by logging into the website, c) through some contact center over the telephone

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where the call center agent types out the complaint onto their system. In all cases every ward is notified about the complaints and tries to redress them accordingly. In this process the ward officer can update the status of the complaint i.e. a status showing if it is resolved or not. The user is timely notified about these events simultaneously the status of the complaint is available 24 * 7 anyone who needs to know about it. So the above mentioned methods are already implemented, but there has been poor user participation in case of a) and c). This implies that user's desire for a faster complaint lodging system. The web portal (See Figure 1) has significantly had a large number of users even though computers usage is relatively rare in India. On the other side, mobile phones are widely used in India on a large scale, each and (assuming) every person has one mobile phone to begin with. Each day the number of people using mobile phone is on the rise [7]. Thus it can be highly beneficial to provide an easy to use mobile interface. One of the most straightforward ways to enable use of mobile devices to file complaint is to port the web interface into Wireless Markup Language (WML) so that it can be searched/browsed by the WAP browser on the mobile phone. While this is not difficult, it is expensive in two ways (a) WAP enabled mobile phones are more costly and (b) citizens need to pay the telecom operator for being on-line (accessing the complaint registration system through their phone). These are dampeners for active citizen participation. It is however important that active citizen participation is evoked only if the citizens are given an easy, cheap and yet effective mode of lodging their complaints. In this paper we propose a new type of interface on a mobile phone to enable citizens to register complaints and seek redressal from MC. The advantage of this system is (a) it requires no change in the already existing web portal to lodge complaints, (b) doesn't require the citizen to remember any specific information to lodge their complaint and (c) the mobile channel makes active citizen participation possible because of the higher penetration of mobile phones in India. In Section II we describe the web based system and describe its short comings, Section III describes the proposed system, and we conclude in Section V.

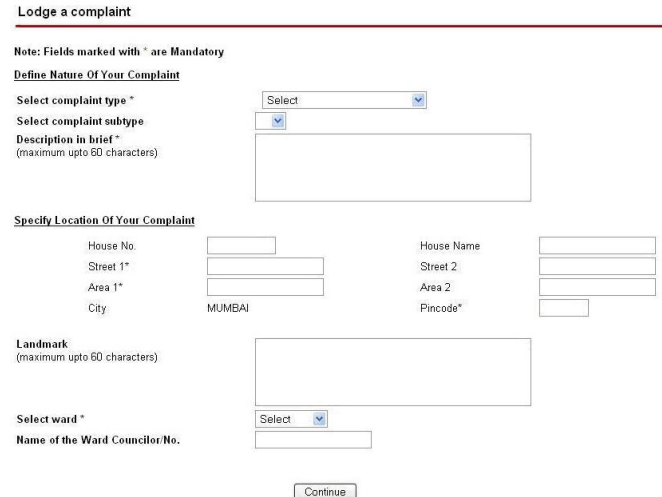


Fig.1 Snapshot of the current portal available

II. RELATED WORK

In this section, we briefly examine the impacts of mobility on information services and applications, and the new paradigms of client-server computing needed to deal with these impacts. A categorization of these computing paradigms is given below. This examination should facilitate our analysis and review of the various proposed techniques for mobile information access. Existing research on mobile client server computing can be categorized into the following three paradigms: (1) mobile-aware adaptation, (2) extended client-server model, and (3) mobile data access. The dynamics of mobile environments and the limitations of mobile computing resources make adaptation a necessary technique when building mobile systems and applications. The paradigm of mobile-aware adaptation covers various strategies and techniques in how systems and applications respond to the environmental changes and the resource requirements. It also suggests the necessary system services that could be utilized by mobile-aware applications.



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Full Client Architecture: Mobile clients must be able to use networks with rather unpleasant characteristics: intermittence, low bandwidth, high latency, or high expense. The connectivity with one or more of these properties is referred to as weak connectivity. In the extreme case, mobile clients will be forced to work under the disconnected mode. The ability to operate in disconnected mode can be useful even when connectivity is available. For example, disconnected operations can extend battery life by avoiding wireless transmission and reception. It can reduce network charges, an important feature when charge rates are high. It allows radio silence to be maintained, a vital capability in military applications. Thus using Android we tend to combine information from the web with data on the phone such as contacts or geographic location to create new user experiences. The SDK helps us to run the Android application, including a true device emulator and advanced debugging tools.

Through our studies we found that the web portal infrastructure [6] is a recently launched initiative that provides a better mechanism to launch complaints. We see from the interface the following information a) text box where user is required to fill complaints and other details (See Figure 1), b) a drop down menu where a department needs to be selected before user registers a complaint. The interface appears to be user friendly which appears to show the following fields needed to be filled by the user who needs to register the complaint. The fields are mandatory and are as follows:-

- Department-wise login,
- Users Landmark,
- Users Location,
- Details of the complaint and the complaint type.
- Ward (here the user is required to know the ward name else the complaint will be routed in a wrong ward).

The optional inputs required by the system are (a) name of the person lodging the complaint, (b) address of the person lodging the complaint, etc. Once all the mandatory fields are filled up the system generates a complaint number and displays on the web page. This complaint number can be used to query the status of the complaint at a later date. The web portal while allowing the user to lodge complaints has some serious constraints. The user is restricted to choose from among the list of pre-defined drop down menus list. Sometimes a complaint can be more than one type. This poses a major problem in the sense that the user tries to fit his complaint into one of the predefined type. This results in a wrong fit and the complaint being directed to the wrong department which in turn affects the time taken to resolve the problem. The second major constraint is the need for the user to be aware of the ward number, additionally the user needs to have access to a networked computer. The mobile interface system proposed in this paper tries to overcome these issues to provide an easy to use interface. The need for a networked computer is removed by facilitating lodging the complaint through a mobile phone; the need to know the ward number is removed by the system determining the ward number based on the location and landmark details entered by the user. More recently, we have provided a provision for the user to send in the photograph captured using their mobile phone camera. This however requires a higher end phone with camera facility plus an ability to download a small application (in Android) on to the phone.

III. SYSTEM DESCRIPTION

People's Corner can be divided into three parts as follows:

- WebApp- People's Corner application is developed in Microsoft asp.net using the Vb.net as server side language. In the WebApp (see Figure 2,3,4,5,6) the admin of the application can create access various departments. Admin is provided the department login to each department. Because of that each department can login to their department and see the various complaints related to their department. The department can take the various steps related to complain. In this application we save the data in the Microsoft sql server 2005. The Microsoft sql server is Database management software. In this we save the data.
- ClientApp- in the ClientApp we create the Mobile based Android application. We used the Android version 4.0 to develop the android application. To register the complaint using the android application the user can capture the image of location and send to the respective department. Here we can track the location of the particular image by using the Google API. In the Android platform we have built-in location packages which help fetch the location automatically when the user sends in the complaint is saved in the Microsoft sql server.
- Web service- In our system we use the web service to share the data between the Android based mobile to .net based web application. When user capture the image and send to the web application we use the web service.

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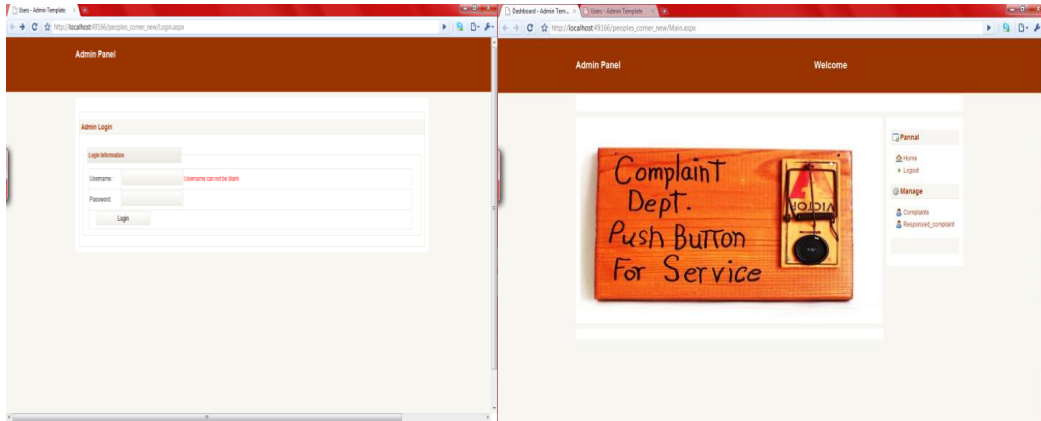


Fig.2.Portal to register complaint

Fig.3.When user launches website application

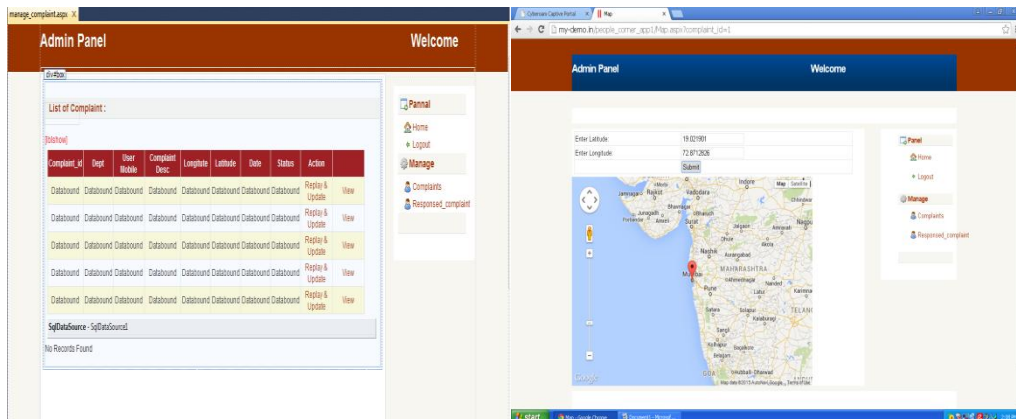


Fig.4. List of complaints saved on database server

Fig.5 Location of user can be seen

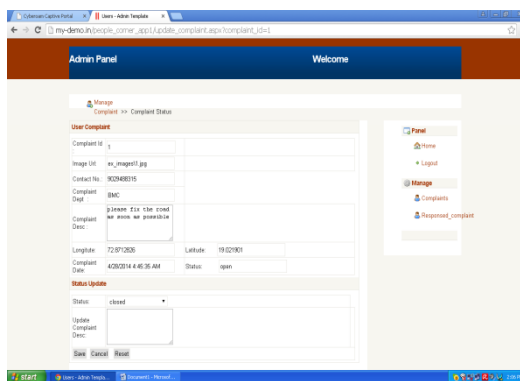


Fig 6.Admin can check the complaint

People's Corner has a natural language based interfacesystem the functionality of the web portal based complaint filing system. The users use the mobile phone and do not need to access the web portal interface directly to file their complaint. The user downloads an application onto his mobile phone. The user runs the application on his phone to get a welcome screen (see figure7). The system allows the user to compose his complaint in 160 characters only. The complaint is routed to departments/wards (see Figure8). The NL based complaint processing system then

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interprets the users complaint using natural language processing (NLP) techniques to determine the nature of the complaint (the Department and the Complaint Type) and other details (location, land mark, ward number) which are mandatorily required to lodge a complaint . Once this information has been inferred by the system, it sends the information to the MC complaint handling system in a compatible format (as a HTTP request). The system makes use of the already available web portal interface to complaint filing platform and assist citizens to file their complaint using their mobile phone. The system enables the user to send his complaint in English along with some native words. The system internally analyzes the complaint text using a set of natural language processing techniques to determine if the complaint has all the information required. If yes it sends the information in a form understandable by the MC complaint portal. The information received from the portal is then sent back to the user; the application intelligently generates queries and gathers the required information from the user interactively. The user responds to the system generated queries. This interaction can happen more than once. All the information gathered, in addition to the free form complaint sent by the user is used to lodge the complaint with the web- based MC complaint registering portal and the generated complaint number is sent back to the user for his reference and tracking of his complaint in the future. The response of the MC complaint handling portal is fetched and is parsed to determine the complaint number. This complaint number is then received by the user on his mobile phone. In the event the complaint is incomplete in the sense of not having all the information that is mandatorily required to generate a complaint number at the MC portal; the system gets into an interaction mode. In this mode, the system generates a set of dynamically generated queries to seek the required information from the user through menu choices or as a text input. Once the system has all required information, it sends to the MC complaint handling.



Fig. 7 Welcome Screen of People's Corner

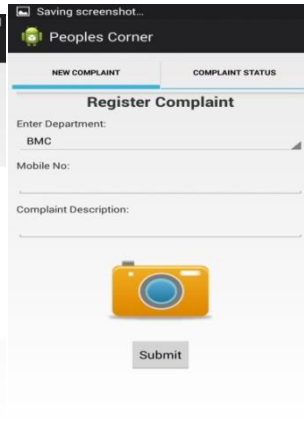


Fig.8 Registration Page

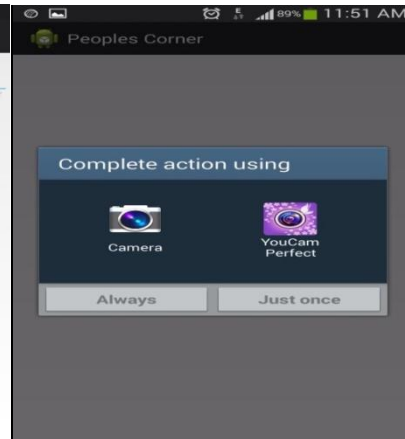


Fig.9 Option while selecting camera

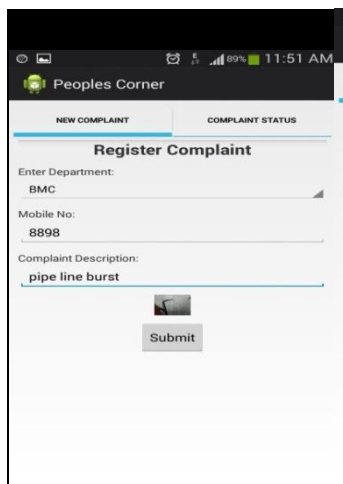


Fig.10 after inserting photo

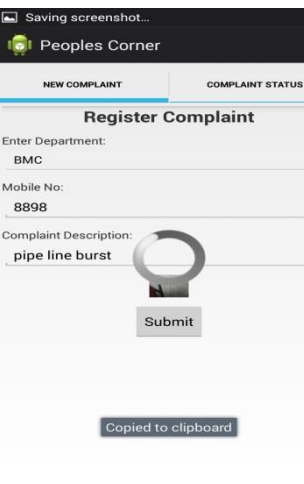


Fig.11. After submitting complaint with photo

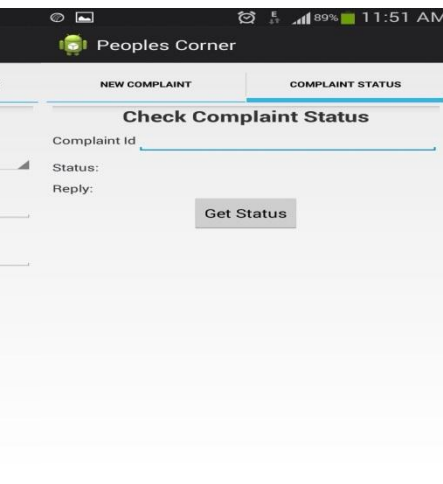


Fig.12. When user needs to check status



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A. Functional System

- User can take a snap shot of the activity i.e.: water leakage(see Figure 8,9,10)
- The application will augment the current position of picture taken(see Figure 5,11)
- The priority of the complaint would be raised if the numbers of the same complaint are considerably more in an area(see figure 4)
- Statistical information is maintained such as the no. of complaints received ward wise, no. of them solved (see figure 4).
- The pictures are also displayed to the general public on a discussion forum where they can post their comments (see Figure 4).
- Also Display this location on Google map(see Figure 5)
- Users can also status of the complaints (see Figure 12, 13, 14).

B. Advantages of People's Corner

People's Corner application is based on Android platform for mobile phones as well as a web site to help citizens lodge complaints. The complaints are then transferred to respective wards and later handled by the admin managing the complaints. This helps citizen waiting time and money to lodge complaints without manually handling them. People's Corner removes the limitation that has been put by the current complaint managing systems for the user.

a) Capacity: Multiple users can register complaints and also review them effectively.

b) Efficiency: Mobile phones with android enabled platforms are quite cheap in the market hence can be very efficient for every common man.

c) Availability: Availability is not an issue as mobile phones are highly portable. Cellular network connectivity is made available in almost all parts of India.

d) Security: Once citizens enter his/her details, all information is highly confined and viewed by authorized personnel only.

C. Disadvantages of People's Corner

The only demerit of this complaint managing system is constant internet connectivity throughout the user's time spent with the application i.e. without internet connectivity the application cannot function.

IV. EXPERIMENTAL RESULTS

When we completed our proposed system, we asked a group of 10 people to test the functionality of this system. Also we asked them to give us their experience with our system in terms of usage, compatibility and efficiency. The feedback thus collected was used to refine the functionality of our system further (See Figure). During this experimental phase, we asked them to file a number of complaints through our mobile interface. The users were asked to fill initial details (see Figure 8) and also fill in their first query. It was noted that only the first interaction by the user on our mobile interface required initial details to be filled(see Figure),later on no such information was needed to interact with our systemhis is understandable that the user leaned what the system needed and accordingly gave sufficient information to enable a non-interactive single query to file their complaint. Thus with the help of a person not involved in building our system, we performed performance analysis of our system which was 98% . We also found that users had a tendency to write complaints with native language words such as in Hindi and Marathi for e.g. khara for garbage, gadi for truck etc. This shortcoming has been successfully overcome in our system and the user is free to use all kinds of languages he pleases.

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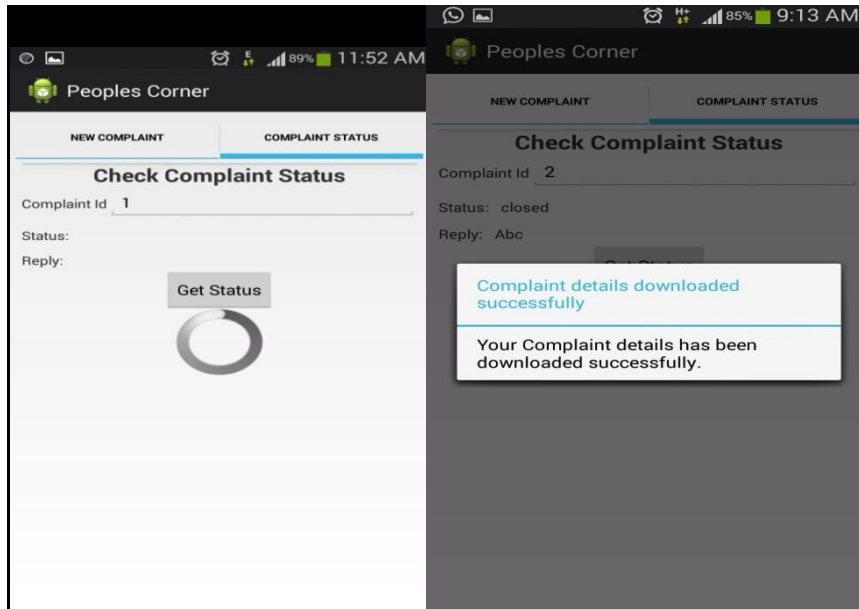


Fig.13 while checking complaint status.

Fig 14 .after receiving complaint status.

V. CONCLUSION AND FUTURE WORK

Even before we decided our platform, our aim was to develop an application that assisted citizens with better utilization of services provided by the Municipal Corporation within a particular area. The Android mobile platform seemed the logical choice, due to the popularity and prevalence of the mobile Operating System among people.

Android is a software stack for mobile devices that includes an operating system, middleware, and key applications. The Android SDK provides the tools and libraries necessary to begin developing applications that run on Android-powered devices. The process of learning the basics of Android application development was simplified by the various books and developer assistance and learning websites, which are available in abundance. The Eclipse IDE provides a very simple development environment for Android. The entire planning and development process over the last few months has been a learning experience. It has not only enhanced our programming knowledge, but also our understanding of the various processes involved in software proposed system development.

In our proposed system user can take a snapshot of the particular activity i.e. water leakage, power cabling hanging, and tree fall, unsocial activity etc. The application will augment the current position where the picture is taken. The above augmented picture is sent to the concerned authority. The priority of the complaint would be raised if the number of them is considerably more in an area. Statistical information is maintained such as the no. of complaints received ward wise, no. of them solved, a graph to provide The pictures are also displayed to the general public on a discussion forum, where they can post their comments. On a whole, we are exceptionally pleased with the level of implementation we were able to achieve over the last few months. This entire proposed system, application and our learning and understanding of Android has exponentially grown over the last few months. However, our mission of providing an on-the-go complaint lodging tool cannot end here. In Future we can develop IOS app for Apple phone users.

VI. ACKNOWLEDGMENT

We would like to share our gratitude to all the people who have helped us in compiling and gathering information for this paper. We would like to acknowledge our proposed system guide Prof. Martina Rodrigues for her guidance and support throughout this paper. Without her, this initiative would be rather incomplete. We would also like to thank our families, our college staff, faculty and friends who supported us in the course of writing this paper.



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BIOGRAPHY

Melina Fernandes is currently a final year student studying Information Technology from Xavier Institute of Engineering affiliated to the University of Mumbai, Maharashtra, India. This paper is one of her first technical research paper which is related to a working proposed system which includes a mobile interface as well as a web portal and has already been developed using Android and ASP.Net. Since this is her first proposed system and technical work, she has high expectations from it going national and accepted.

Merika Britto is currently a final year student studying Information Technology from Xavier Institute of Engineering affiliated to the University of Mumbai, Maharashtra, India. This paper is one of her first technical research paper which is related to a working proposed system which includes a mobile interface as well as a web portal and has already been developed using Android and ASP.Net.

Festo Francis is currently a final year student studying Information Technology from Xavier Institute of Engineering affiliated to the University of Mumbai, Maharashtra, India. This paper is one of his first technical research paper which is related to a working proposed system which includes a mobile interface as well as a web portal and has already been developed using Android and ASP.Net.

Martina Rodrigues is currently an Asst. Prof from the Department of Information Technology from Xavier Institute of Engineering affiliated to the University of Mumbai, Maharashtra, India.