

# E-government information exchange mechanism and smart grievance redressal system

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**Abstract**—E-governance is an emerging method of the modern governance. This provides many facilities, information about many policies and schemes implemented by the government to the citizens and make the governance run smoothly and with a less overhead than the existing systems. E-governance is an application of ICT and delivers government services, information exchange, communication transactions, and integrates many stand-alone systems. The e-governance is responsible for exchanging various required information and communication between government and citizen/organization. It also deals with the redressal of various consumer grievances. So, as a whole picture, E-governance provides all the government services to the citizens just at an expense of a click.

**Index Terms**— E-governance, information exchange, grievance redressal, communication.

## INTRODUCTION

E-governance is an application of ICT (Information and Communication Technology). It delivers the government services, exchanges information and redresses citizen issues and grievances. In other words, e-governance is carrying out the functions and achieving results of the governance using ICT. This governance is implemented in an electronic form. Information exchange mechanism deals with the communication mechanism between the government organizations and the citizen. This information exchange involves of sharing and updating information about various government schemes, policies and government projects. This also includes of the feedback provided by the citizen and officials on the various implemented projects or on the projects that are to be implemented in the near future.

Grievances are nothing but the complaints. These complaints are registered by any user who is a citizen. These complaints are only to be registered by an authorized user of the system. Grievance redressal deals with the solving and correcting of the registered grievances or complaints. The redressing mechanism in the current system is not capable enough to redress the complaints smartly. This can be done in a smarter way. Thus, the name Smart Grievance Redressal System.

Smart GRS deals with these grievances in a smarter way by implementing many NLP and Automation algorithms. The GRS also provides semi-automated grievance redressing of the complaints. The currently existing systems are unfortunately not effective and capable enough of providing these facilities in an efficient manner as there is a lot of human intervention. Almost every task needs manual help which increases the over-head and ultimately reduces the efficiency of the system. The Smart GRS deals with the citizen query handling, grievance redressing. Thus, the project aims at designing an e-government system which is not just informative, but also interactive with citizen.

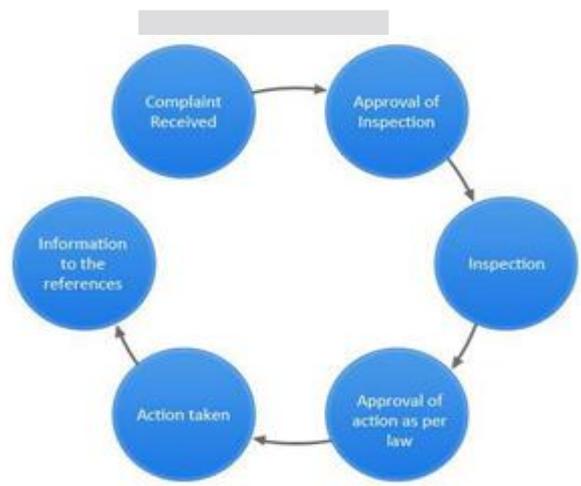


Fig. 1: Grievance Redressal System

## II. RESEARCH AND FINDINGS

E-Governance is the latest development in the governance field which enhances the ease of reach to the citizens for the government. Various systems exist which provide the E-Governance facility. Some of the best examples are [pcmc.gov.in](http://pcmc.gov.in), [mahadbt.gov.in](http://mahadbt.gov.in), etc. These systems are mostly exist as a one way communication paradigm. Also different systems are meant to either information and statistics providers or grievance management systems but not both. In the in-formation providing systems the responsible personals for providing information insert the information into the systems where the users or citizens can read the information with little interaction with the systems. In case of different information categories a number of sites need to be visited for obtaining the information. In the grievance management systems the citizens submit their grievances on an online portal. These grievances are then forwarded to the respective departments and solved by the responsible authorities. These systems also exist on a state or central level. The JSP (Jana Sampark Paripadi) [8] is an example of such a system developed by the Kerala Government in 2011. Some systems that provide governance on a local level exist but they too have the above mentioned two problems. A need for a system that provides both information statistics and grievance management is seen. Promotion of more interaction between the citizens and the authorities is needed. A system that manages information and grievances of citizens enhances the interaction of authorities and citizens on a local level are needed. A ward level based system will well suit for the above mentioned needs.

## III. SYSTEM ARCHITECTURE

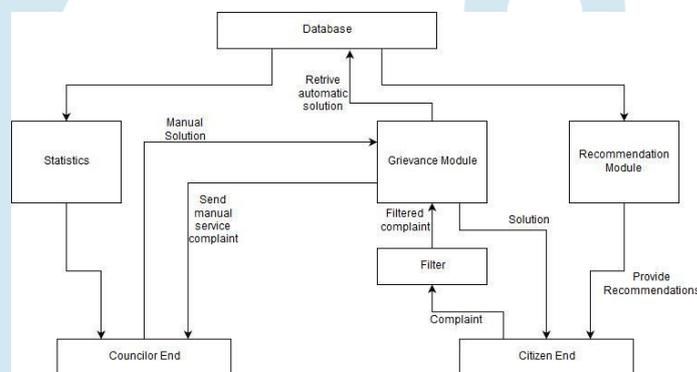


Fig.2: Project Architecture

## IV. SYSTEM FUNCTIONING

The system functioning begins with the citizen or user registering himself/herself with the system. A small number of initial details about the user are obtained. These are the most essential details to identify a citizen. These details entitle citizen to obtain the bare minimum functionality offered by the system that is the grievance submission and redressed service. Once the citizen has registered he/she gets an option to provide further details which may entitle him/her to obtain more services from the system. This is achieved by using an update profile function which gets all the required details. The Citizen end consists of an interface with which the citizens can interact with the system and the councilor end consists of a similar interface for interaction.

The proposed architecture consists of 2 main interfaces for interaction. The Citizen end and the Councilor end. The citizen end is to be used by the citizen for interaction. A verified citizen can submit his/her grievances to the counselor. The citizens have to create their profile on the portal and verify it using their government ID's. Through this they can submit their content. The complaints or grievances pass through a text filter which removes any inappropriate content from the complaint. These complaints are separated as automatic addressing and manual addressing. The automatic addressing complaints are processed by the computation server. These complaints are analyzed using NLP techniques and attributes are extracted from them. The solutions to these complaints are found using NLP and the solution is provided to the citizen using the citizen end. The manual addressing complaints are sent to the counselor to the counselor end where he can see the complaints and provide the solution to them. The counselor can use the statistics module to gain an insight in the available citizen data.

### A. Citizen and Councilor end

Highly functioning web application is used as the interface for the citizen and Councilor end. The web application is developed by making use of latest web technologies like HTML5, Bootstrap, AngularJS, PHP, Slim framework.

HTML5 and Bootstrap is used to design the webpages. Use of these technologies make the webpages very interactive, user-friendly and provides responsive-UI. Unlike traditional HTML, HTML5 provides better and efficient form-handling, advanced and built-in tags.

Angular JS is used for form data validation and event handling. Angular JS helps in making single page application. It provides better data binding with HTML. Slim framework is used for coding APIs and web applications. It provides fast and powerful HTTP routing which is used for designing SEO-friendly URLs. It also provides HTTP caching in order to improve website performance and use less cache. PHP is used in order to implement the Slim Framework. User or citizen data is provided as a input to the system using HTML5 forms. This data is validated using Angular JavaScript functions and navigation is done in the form of states and views thus making it a single page application. This data is inserted in the database via slim framework by using specified APIs. These APIs are written in PHP. Querying on the database is done using APIs on the Slim framework.



Fig. 3: UI Design

## B. Grievance Module

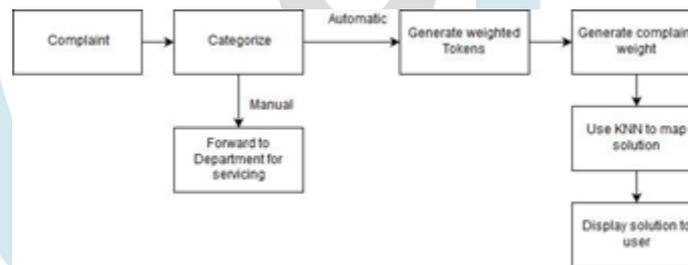


Fig. 4: Grievance Module

The Grievance module is responsible for handling the citizen grievances. The citizen submits his/her grievances through the citizen end. These grievances are of two types:

- 1) Automatic redressal complaints or information com-plaints
- 2) Manual redressal complaints

The automatic redressal complaints or information com-plaints are information queries of the user. These can automatically be serviced by the system and provide the solution for the complaint using solution database. The manual redressal complaints require attention of human personal as they cannot be serviced automatically. The grievances or complaints are first passed through a language filter and then received by the grievance module. The grievance module categorizes these complaints as manual and automatic complaints. For the automatic grievances the grievance module uses NLP to generate tokens the received complaint. The module checks a file for the presence of the obtained tokens. A predefined weight present in the file is assigned to these generated tokens which are present in the file and the complaint. A mathematical function is applied to these weighted tokens to generate a complaint weight. This complaint weight is used to find the solution to the complaint using the solution database. Solutions have been divided into categories according to their department. A range of values have been assigned to each if these categories. Each solution has a particular value related to it termed as solution value and various solutions in a category have different values. The weight that was generated for the complaint is used as input for a KNN algorithm which generated the solution. The KNN maps the complaint weight with the closest solution weight and generates this as the solution for the complaint. In this case the KNN generates only one nearest neighbor as only one solution for the complaint is present and needed. As for the manual redressal complaints, the complaint is forwarded to the respective department for further servicing.

Each complaint that is forwarded for manual servicing will have a priority related to it. This priority depends on the real world seriousness of the complaint. Higher the priority faster the complaint will be handled and serviced by the authority. A priority

assigning algorithm assigns this priority to each complaint stored in the database. This priority depends on numerous factors which are taken into account by the algorithm when assigning priority to the complaint.

#### C. Filter

A text complaint submitted by any citizen may contain some profane words that are unethical and not needed. These profane words need to be managed before complaint servicing. A filter is used for this purpose. When any citizen submits a complaint it first goes through a filter. This filter uses NLP to generate tokens from the complaint. The generated tokens are matched with the known profane words. These matched profane tokens are masked with a masking string which eliminates the profane words. Many times the user may cleverly try to pass the profane words with changed format of the word by inserting spaces in between the letters or shuffling one or two letters of the word. This is handled by the filter by the use of a function that generates all the possibilities of the combinations of the letters of a word and checking if any of the combination generates a profane word. If detected then the word is treated as profane word and masked.

#### D. Recommendation module

Each citizen using the system has an account with their details on the account. Using these details citizen specific recommendations are provided to each citizen. These recommendations are generated using the profile details of the citizen. The details are analyzed and most appropriate recommendations are generated.

The generated recommendations are displayed to the citizen using the recommendations tab in the citizen end interface. Availing these recommendations is optional for the citizen. The generation of the recommendations depends on the profile updating of a citizen. If updated then recommendations are generated. If the citizen wishes not to update his/her profile then these recommendations will not be generated.

#### E. Statistics

At times the councilor or the authority may want to know the numerical information about their ward. The statistics module will enable them to obtain such information about their ward. This module will display the data about the ward in various types of representations like pie charts, bubble charts etc.

### V.RESULTS

As per the architecture of the system stated previously, the system handles user complaints in an automated manner. The system categorizes the complaints into manual or automatic service. This provides information access and complaint servicing in a single system to the user. As the information complaints are handled automatically the human efforts to go to a particular office and obtain the information are reduced. Each type of information is available on a single system. As in case of manual servicing, proper forwarding of complaint automatically reduces human effort. The announcements service of the system allows the authorities to convey updates to the citizens thus reducing the human efforts and intervention. Also a recommendation module recommends a diverse amount of content to the users or citizens. This contains mostly the schemes that government implements thus ensuring efficient conveying and usage of the scheme. Thus as a whole the system proves to be an efficient and better way for providing e-governance.

### VI. CONCLUSION

In an era of electronic technology, a system that promotes citizen interaction with the government and provides an efficient way of e-Governance with less human intervention has been successfully implemented. With growing technology the system has an immense future scope for E-Governance

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