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Rural Electrification Using Gram Jyoti Doot, Mobile, And Web-Based Application

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***Abstract*—**'Pradhan Mantri Sahaj Bijli Har Ghar Yojana' – Saubhagya is a Government Scheme to achieve 100% household electrification in the country in rural as well as urban areas by 31st March 2019. GramJyotiDoot, developed in collaboration with Jammu and Kashmir Power Development Department (JKPDD)is a well-organized and consistent approach to support Saubhagya. GramJyotiDoot comprises an android application and web-portals for Junior Engineers (JEs) and Assistant Executive Engineers (AEEs). The objective of GramJyotiDoot is to eliminate the cumbersome procedure of filing the documents for obtaining a new electricity connection and making the procedure simple by going digital. This expedites the process of registration of new connections and electrification of unelectrified households. The new connections in the rural areas of Jammu and Kashmir are being released using GramJyotiDoot.

***Keywords*—**Rural Electrification, Saubhagya, Android Application, Junior Engineer, Assistant Executive Engineer, Electricity, Electric Connection, Electricity, Digital Connections

I. INTRODUCTION

In today's ever progressing world that is headed towards being more digital day by day, it is important that whatever you do is based on digital grounds. A man struggles to make life easier and easier. This is the life thatwe now live on our computers and mobiles. Every little thing is reachable at the touch of a finger. We want everything to be quick, to be available at the touch of a finger or available at our doorsteps.

One may be able to pay their electricity bills online without much hassle but the procedure to apply for an electricity connection is still exhausting and, in the end, there still are chances that you don't get your connection.

To apply for an electricity connection, people have to go to offices to get the respective form, fill the form, attach required documents, visit the office again to submit the form and then the forms are kept in files that pile up. After that, the files are sent to the Junior Engineer(JE) for verification who can either reject or approve the form. If rejected the respective person is denied of the electric connection, and if the JE approves the form, it is forwarded to the Assistant Executive Engineer (AEE). AEE then goes through the forms approved by the JE and takes the final call. AEE can also either reject or approve the connection. If he rejects the connection, the request is denied,and if he approves the connection, the request is accepted, and further processing is done by the department.

The purpose of this project is to provide paperless and fast electricity connections to every household.

The project comprises of three parts:

1. The Android Application [1]
2. The Web Portal [2]
3. The Website

This paper is organized in the following manner. Section I starts with the description of GramJyotiDoot- the Android and web-based application. Section II describes the problem and the need that led to the creation of GramJyotiDoot. Proceeding ahead, Section III provides the details of the methodology of the project and the underlying research behind the project. Section IV describes the technologies used in various parts of the project and the hierarchy of the process. Finally, Section V concludes the project and Section VI describes how the project can be enhanced further to serve better.

II. PROBLEM DEFINITION

According to data derived from extrapolation of census 2011 data with decadal CAGR and actual electrification did during 2011 to 2017, out of 17.23 lakhs households only 14.53

households are electrified in villages of Jammu and Kashmir. This leaves around 2.70 lakh households still unelectrified. Hence, measures needed to be taken to speed up the process of electrification to achieve 100% household electrification in Jammu and Kashmir by 31st March 2019 under "Saubhagya[1]". The Saubhagya scheme is a project undertaken by the Government of India that focuses on to provide electricity to all households. The project was announced in September 2017 by the Prime Minister Narendra Modi.

III. METHODOLOGY

The collection and use of accurate and comprehensive data related to how the process of providing electric connection works is very important to provide better solutions and management for the same. This necessitateshavinga better understanding of the chain of events and the hierarchy that goes on in the electricity department.

To begin with our research, we contacted the Power Development Department, Jammu and Kashmir(JKPDD) to get in-depth information on what goes inside the department and how an electricity connection is released. What is the hierarchy of work and authority, what procedure is followed by the people in the department, etc.? We also did some research online about the electrification statistics in Jammu and Kashmir,and it was shocking to see how in the developing country like India we have almost 90 villages just in J&K (Jammu and Kashmir) which are still unelectrified. Based on the facts, factors and information we came across in our research we developed our project named "GramJyotiDoot" which comprises of an android application, a website and web portals. The application is used as a substitute to the procedure that goes along while a form is submitted, as filling the form and submitting documents, the website contains the information about the project, the application apk link, and the links to access the web portals, the web portals are used by the JE and AEE to access their respective dashboards.

This made the procedure for applying for and processing the electricity connection easy.

The android application makes it easier for the user to log in and fill in all the required details and upload images of required documentation proof that one needs or fills while filing a request for a new electricity connection. This user could be a lineman or a meter man, who goes to the villages and fill in the details for every household. This makes the process a lot faster and easy which otherwise would have been cumbersome.

The further steps are carried out by the JE and then AEE from the department. Every JE and AEE of respective rural areas have their login credentials for the JE and AEE portals. The newly filed request via the app appears in the new entries section of JE, and he gets to reject or accept the request by verifying the details filled in the person's form. If he accepts the request, the request is forwarded to AEE, and if he accepts the request, then the connection is released. If either JE or AEE finds the details incomplete, they can turn the request to a defaulter request. If the applicant rectifies and completes the form and formalities, then they can accept the request and proceed. Otherwise, the request is deleted from the database.

The website is from where the applicant can download the application. JE and AEE can access their portals from there.

The Jammu and Kashmir Power Development Department has already put the project to use in their field, and the application is proven successful in real time use as well. Till May 2018, 500+ connections have already been released using the application. Figure 1, explains the working of the application and the data flow between various entities in the process.

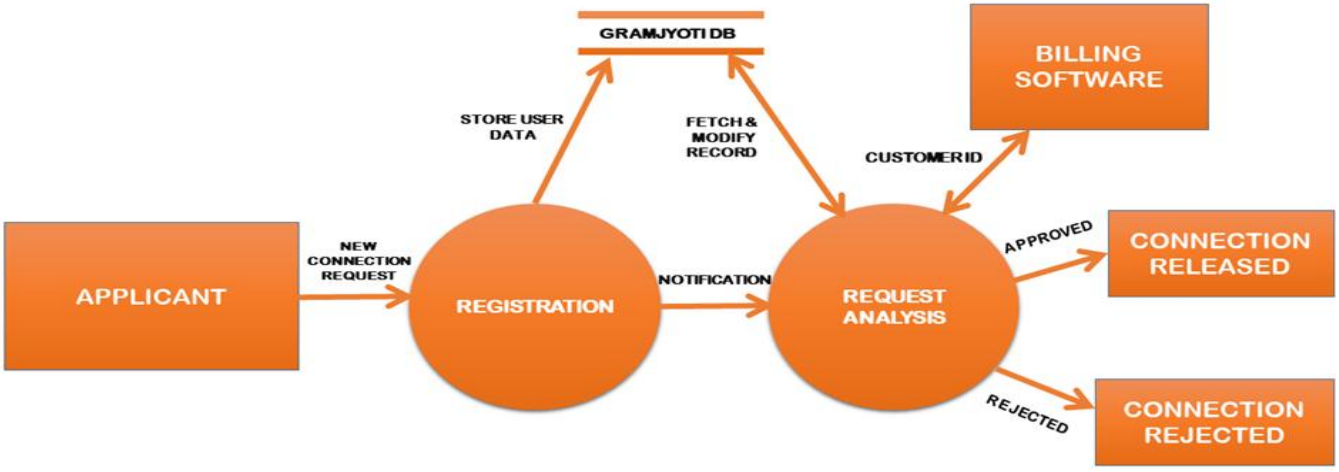

Figure 1. This figure explains the working of the application

IV. TECHNOLOGIES USED

GramJyotiDoot is a software project that enhances the process of rural electrification. It is a mobile and web-based application. The project mainly comprises of two parts, the application, and the web portal and website. Every part serves a different purpose and the people or user interacting with each part is different. The basic hierarchy of the process is that the electricity connection request is generated by the phone application that is sent to a JE. He accesses this request on his dashboard and takes the required decision according to the authenticity of the request. If the request is accepted then it moves to the higher authority in the hierarchy, that is the AEE who either accepts or rejects the connection. If he accepts, the connection for that request is released, and the department does the further needful after that like installing the meter,etc.

Various technologies have contributed to the different phases.These technologies are listed below.

Android Application

The login credentials are filled by the user on the app, as shown in Figure 2. These credentials then get encoded into JSON(JavaScript Object Notation) and then a PHPfile is called for authentication. It checks for the authentication with the credentials present in the database. If the credentials are authentic, then the user is logged in and reaches the registration form. Usually, this user is a Lineman or Meter Man assigned by the Power Development Department. For RPC (Remote Procedure Calls) [3] AsyncTask is used. The images uploaded for documentation proof are converted to BITMAP [4] and encoded. The details filled in the registration form are then converted to JSON format and submitted to be sent to the database. The record then gets stored in the corresponding database of the respective zone.

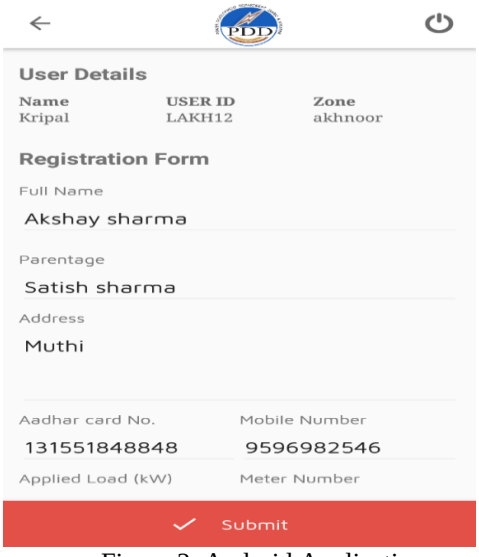

Figure 2. Android Application

Web Portal

Figure 3 shows the login portal for the JE. The authenticity of login credentials filled by JE and AEE at their respective web portals is checked with the database. If the credentials are authentic, then they are directed to their respective dashboards, as shown in Figure 4. Both JE and AEE can check new records in new entries section, verified records that are accepted by them in the verified records section; defaulter section is also present in their dashboard that contains the records of people marked as defaulters by them. The details sent by the user over the phone application saved in the database is fetched. AsyncTask fetches data every time the page loads and using MySQLquery; the data is displayed in respective tables. The Admin Portal is the master portal that has control over creating a user, removing a user, adding new zones, removing zones, etc. using AJAX, JQUERY, AsyncTask, etc.

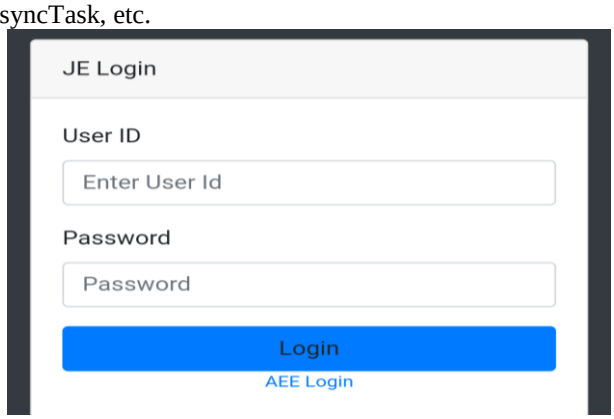

Figure 3. JE Login Portal

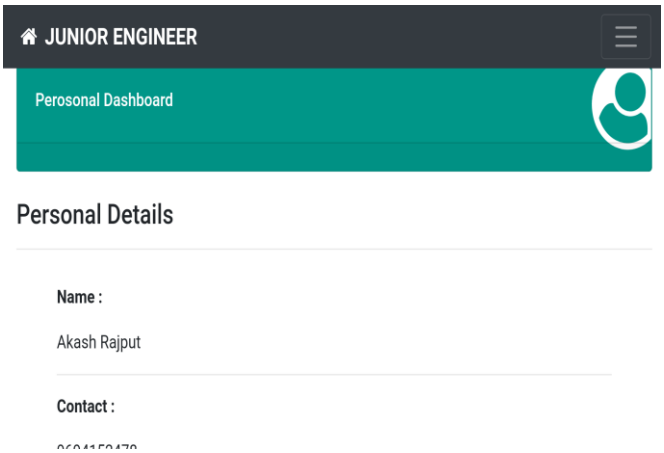

Figure 4. JE Dashboard

Website

The website is designed using HTML5, CSS3, Bootstrap Framework [5]. The website, as shown in Figure 5, is used to access the JE and AEE dashboard via the login portal. The website contains the information about the project of how it works, reviews from the people from the Jammu and

Kashmir Power Development Department, JKPDD and the download link of the android application.

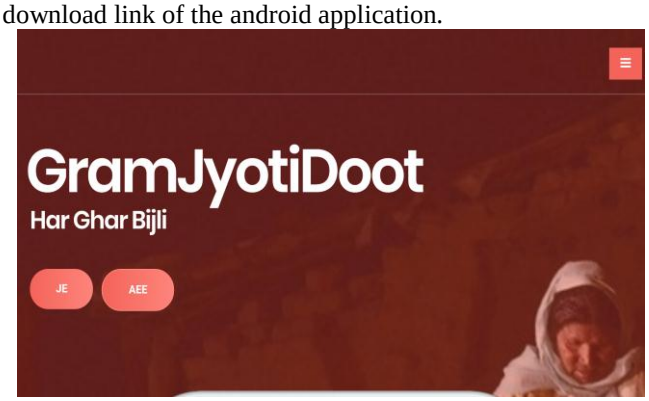

Figure 5: GramJyotiDoot Website

Applications

1. It helps the PDD to release connections at a faster rate.
2. The citizens do not have to wait for months to get their connection released. The process with the app and web portal is just matter of some minutes.
3. The process is all digitized hence no paperwork is required.
4. The procedure is very user-friendly and easy to understand.
5. One can easily apply for electricity connections without visiting offices and from far off locations.
6. This will help the country to take a step further towards 100 percent electrification before 31st March 2019.

V. CONCLUSION

GramJyotiDoot is successfully running in various zones of Jammu and neighboring areas. GramJyotiDoot already stands communicated to the JKPDD for its further effective and widespread usage. It is fast, effective, paperless procedure, with easy installation right on the android phones. It would surely be a boon for the rural areas by overcoming the shortcomings of the traditional methods.

VI. FUTURE SCOPE

Currently, the research and implementation only extend to certain areas in Jammu and neighbors, but this implementation can grow and can be scaled to state and then at national level. GramJyotiDoot could also be extended not just to release connections in the rural areas but in the urban areas as well. Currently, the application is accessible to the representative of the Power Development Department, but this could be extended to be used by the general public without any hassle. The application can further be linked to the database of Aadhaar. This would not only be beneficial for the citizens but to the J&K Power Development Department as well. As the efficiency of the department improves, the country will reach the goal of 100% electrification of every household before 2019.

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