Automatic Electricity Meter Reading & Bill Generating Android Application

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Abstract- *Meter reading and billing are complex tasks of electricity, water and gas supplier companies. The current technology of billing process uses manual process of meter reading, updating the server with reading and billing customer. We are suggesting a technology that includes android application and web application to get reading, updating server and inform consumers about bill units and amount. Android application is used to get the readings from the meter automatically by simply capturing the image of the meter and then performing the OCR technique on the captured image in android app which is nothing but optical character recognition. The output of OCR is meter reading from image which is then send to the server. The customer will receive a mail regarding the bill as soon as the photo is been clicked. With the help of web application customer can view his bill and make payment online, customer can also lodge complaint if any. New features are also added that will reduce workload on company and their employees.*

Keywords- Grayscale Conversion, Binarization, Erosion , Dilation, OCR Operation.

I. INTRODUCTION

The current procedure followed by companies for billing process has maximum part of manual process and only for calculating bill an automated process is used. Manual tasks that are included in current procedure are writing the reading in a book, updating that reading into server. The meter reader sometimes has a difficulty in identifying the location of meter through known address. The current procedure which add lots of burden on employees and time consuming process can be turned into less burden, fast and complete automated process by using available technologies. Before this solution Another solution was proposed to improve current procedure, in which meter reader clicks image of the meters and submits all images to the administrator were after performing operation of text extraction from images on desktop computers bill has been generated. The drawback of this solution was that it was a time consuming process and required high configured desktops so this solution was not practically applicable. However, to eliminate the problems related to current manual process a practically applicable solution was required it is suggested to use android device. The proposed technology includes android application and web application. This technology eliminates most of the manual tasks, makes the process fast and completely automated. Android application automates the process of meter reading and updating server with meter reading. Web application improves the interaction of customers with companies.

II. SYSTEM ARCHITECTURE

Here the architecture shows who the system is going to work:

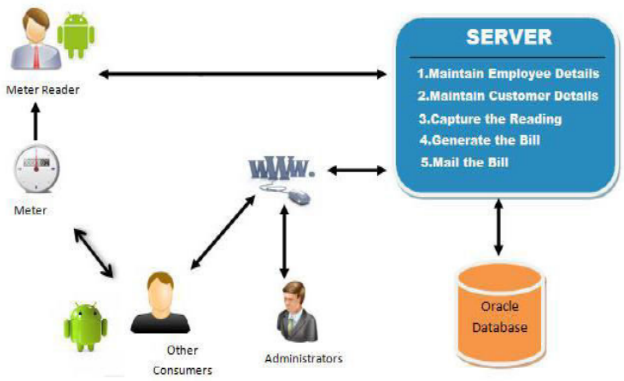


Fig1: Architecture of the system

II. USER INTERFACE OF METER READING

Android Based Meter Reading application is very easy to work. This application require only internet connection and android mobile phone. This application installation is very easy. After installing this application on your android mobile or tablet you have to follow the very few steps.

After starting this application, first user have to fill his/her profile by selecting new registration after that he/she login into page using valid email ID or user name and password.

After that new screen will generate contain upload photo, add meter, view bill, view meter using this categories you can follow process.

User Login:

This is the login page using this user can login here. This is first step after installation of application on your mobile. In this login page through Email id and password user do the login in Meter Reading Application. If user is new user then they have do registration using Register button. If in case user forgot a password then through Forgot Password they achieve new Password by Email.

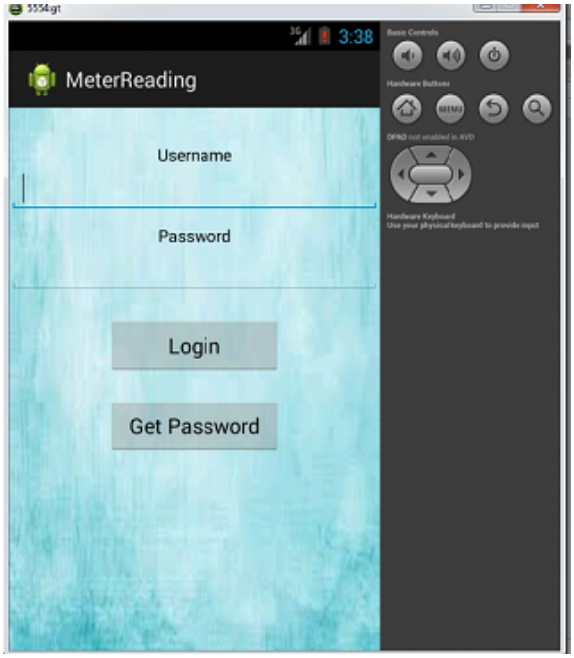


Figure 2: User Login

User Registration:

This is the user registration page using this new user can fill details of himself and create new account. There are different contents are available and that contents user have to fill, these contents like as user's name, Email id, Mobile Number, Gender, Date of birth, Password

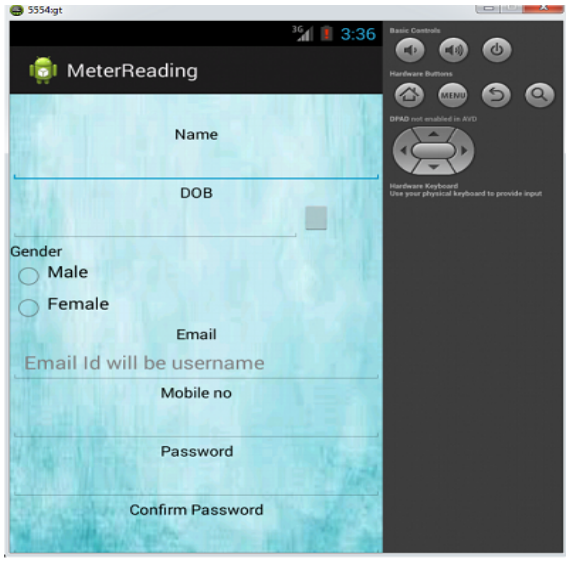


Figure 3: User Registration

Explore:

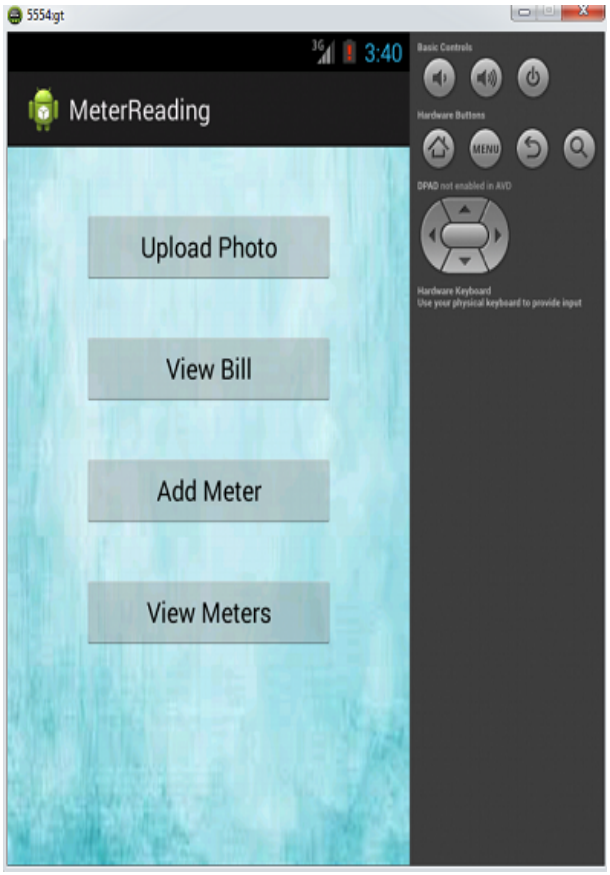


Figure 4: Explore

This is the explore page here user will be able to see the bill of current month or remaining month if user uploaded the image of meter if not then user has to upload the image first by clicking on upload button. user can have more than one meter so that user can add meter by clicking on add meter or he can select the meter by clicking on view meter.

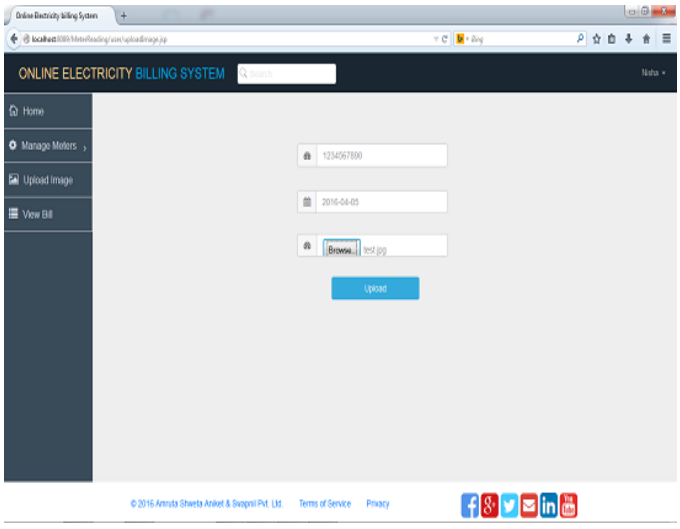


Figure 5: Upload Photo

This is the upload photo's page showing the meter number, date of the month and uploading image. In this user can browse the image of meter and upload. If image is valid then it shows true otherwise false

View Bill

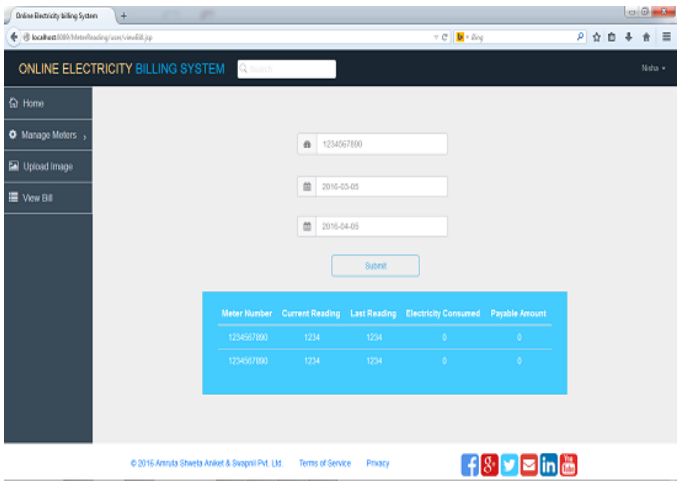


Figure 6: View Bill

This is a view bill window. In this window meter number, date of previous month, date of current month are available. user can select the date from which he wants to calculate the bill. After selecting the date user has to click on 'submit' button.

Add Meter:

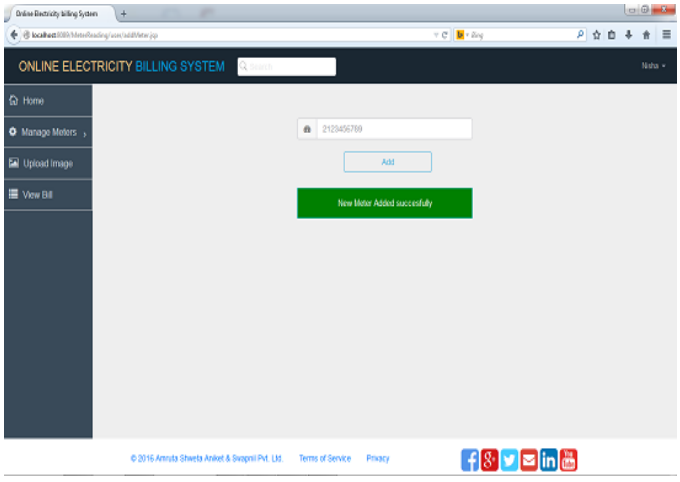


Figure 7: Add Meter

User can add the meter numbers using add meter window. one user can have more than 1 meter number so user can add the number of meter numbers after adding, he get the message as new meter added successfully.

View Meter:

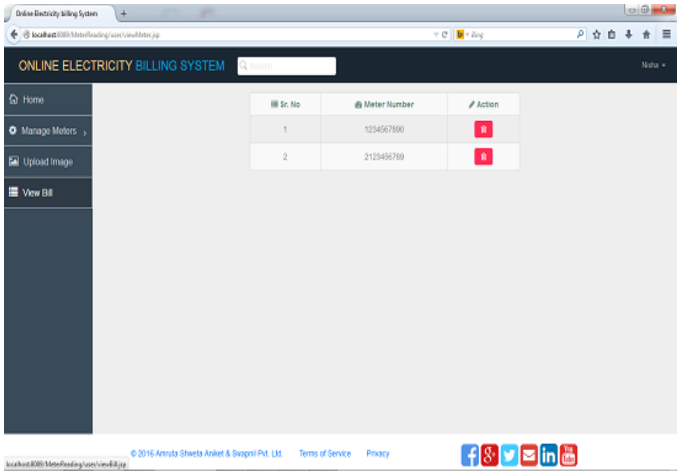


Figure 8: View Meter

User can easily see his meter numbers in the window of view meter which are successfully added in the add meter.

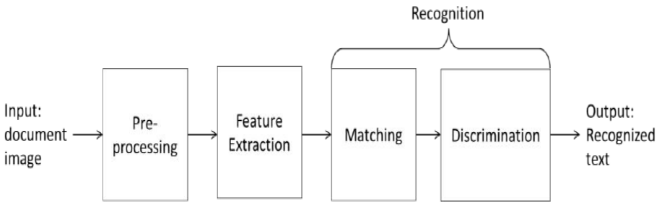
He/ She can perform operations (Edit, Delete, Modify, etc.) with the help of view meter.

OCR

Optical character recognition is an electronic analysis of image to identify textual information area and extract text from it. Following are phases of OCR:

3.1 Pre-processing

This phase is used to produce data for OCR system to operate accurately. It improves Recognition rate. It consist of following techniques:



3.1.1 De-skew

The document was not aligned properly then it may need to tilt in order to make text perfectly horizontal or vertical.

3.1.2 Binarization

The process of converting colour or grayscale image into black and white image is called as "Binarization". The

Otsu Thresholding method is used in binarization This algorithm consists of following steps:

a) Draw the histogram for the gray scaled image.
b) Assume some threshold value and calculate Weight, Mean and Variance for foreground and background.
c) Calculate within class variance.
d) Calculate final value using sum of weighted variance.

3.2 Feature Extraction:

It scans the input image and select the set of features that classifies and identify the character. This phase will maximize the recognition rate.

3.3 Recognition:

This phase is divided into two sub phases: Matching and Discrimination.

3.3.1 Matching

Extracted features are matched with Template character.

3.3.2 Discrimination

The matched features are converted into character code.

IV. CONCLUSION AND FUTURE WORK

Android based Meter Reading using OCR technology suggests the solutions to address the problems related to manual electricity, gas and water billing process. In current technology of billing process the customers complaint about incorrectness of bill, this is because the assumption of reading when not available and leads to major problem of current technology. Our solution is given for the meter reader so that workload on him is reduced and to make the process of collecting the reading from meter, updating this reading to system and billing to customer is made easy and accurate process.

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