RESEARCH ARTICLE

Android Based Meter Reading Using OCR

Rohit Dayama, Anil Chatla, Heena Shaikh, Medha Kulkarni

PVPP College of Engineering, Sion, Mumbai, India

Email: nda12374@gmail.com, anilchatla7777@gmail.com, skheena.azmi@gmail.com, medha.kulkarni@yahoo.com

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: Meter reading, Optical Character Recognition

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.   EXISTING SYSTEM

The suppliers of electricity, water and gas use a manual process for billing purposes because they think that it is an easy process and don't require any skills. These companies cannot invest a huge amount of money for a new solution. However, the customer has to face many problems with the current procedure used by these companies to calculate Bills. According to meter reader

there is difficulty in finding all the houses were meters are situated and mostly to identify meters that are located in rural areas. Complaint about meters that are not working cannot be made by meter reader at the same time. According to customer point of view there is no facility provided by company of knowing their current consumption units or calculating it manually. There is also no facility to compare the previous month's consumption units with the current month. Customers are facing difficulty in contacting with companies to make any complaints about incorrect bill or device failure. Finally from company's point of view, all these process are manually maintained which is a big burden for them. Companies doesn't have proper communicating channel to broadcast information about power failure and power consumption to the customers.

Problems in Existing System:-
- Highly Person dependant.
- Human errors cannot be avoided.
- Billing done mainly on estimated/ monthly average basis.
- Billing cycle requires excessive time.
- Accessibility of meters in rural/ Agricultural zones.
- Inability to monitor and control discrete loads.
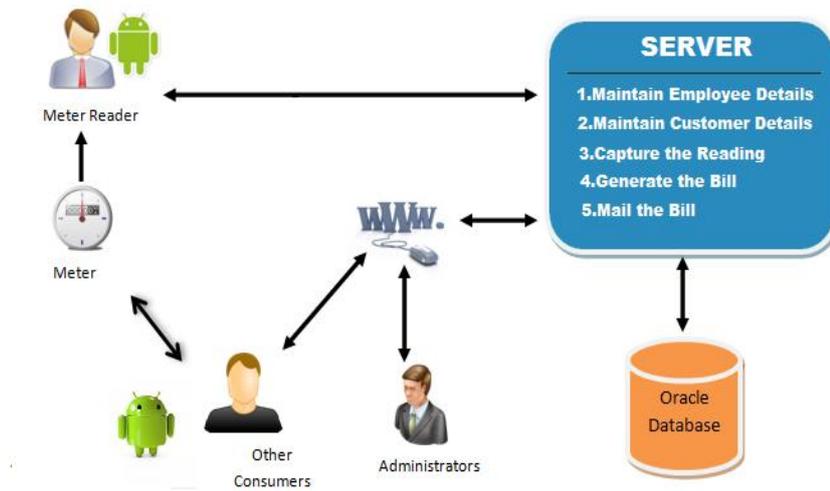
III. PROPOSED SYSTEM

The android based meter reading using OCR suggests: Android application and a Web application. Android app is for meter reader for reading the meter. This solution gives best benefits to meter readers. Meter reader from start of the day carries android device having android app in it which enables a route map called customer meter map(figure 1) which has the route of customer houses that he has to read the meters within a day. Once the meter reader reads the meter the color of pointer on map is changed so that reader can know the meters that are read. This is very helpful for new meter readers for reading the meter.
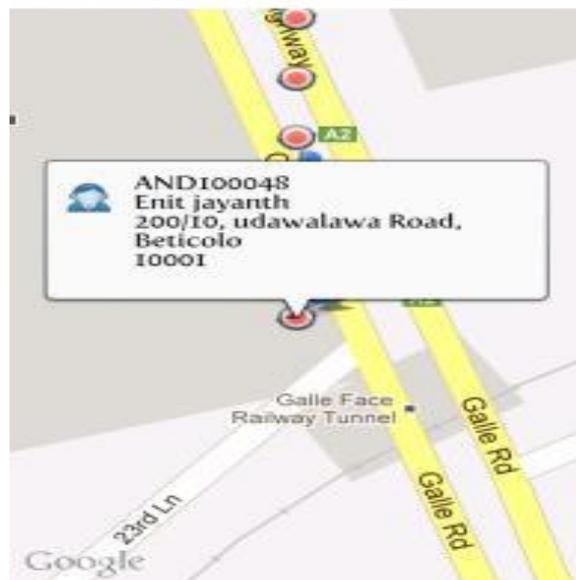
Figure1 Walk meter map

All that needs to be done is to capture the image then android app will perform operation of extracting the meter reading text from image and send to the server. Then the server does the calculation and proceed bills are sent to the relevant consumers via email at the same instance. Whenever a fault device is seen or an illegal power usage is spotted by meter reader. In such a case, an image of that particular meter can be sent to the server.

Using website a customer can view bill having all details related to any of particular month in a graphical form for easy comparison with previous month consumption. Along with that he also has an option to make payments online. Customers can use website to lodge any complaint of incorrect bill and meter device failure. The web application built was used for administrative purposes. An administrator can assign meter readers with a particular route having list of customers using this system and can add new employees or customers in database. Administrator can broadcast any news related to power failure during certain time and of power consumption information on web application.

Figure2 The Architecture of Proposed System

IV.   TECHONOLOGIES & CONCEPTS

A. OCR

Optical Character Recognition deals with the problem of recognizing optically processed characters. Optical recognition is performed off-line after the writing or printing has been completed, as opposed to on-line recognition where the computer recognizes the characters as they are drawn. Both hand printed and printed characters may be recognized [1], but the performance is directly dependent upon the quality of the input documents.

A typical OCR system consists of several components. In figure 3 a common setup is illustrated. The first step in the process is to digitize [2] the analogy document using an optical scanner. When the regions containing text are located, each symbol is extracted through a segmentation process. The extracted symbols may then be pre-processed, eliminating noise, to facilitate the extraction of features in the next step. The identity of each symbol is found by comparing the extracted features with descriptions of the symbol classes obtained through a previous learning phase. Finally contextual information is used to reconstruct the words and numbers of the original text.
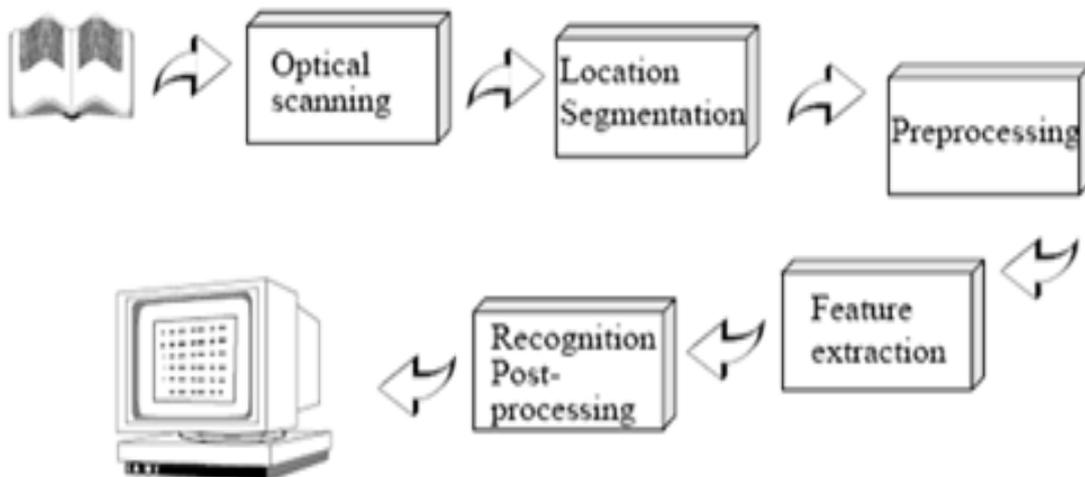
Figure3 Components of OCR

B. WCF WEBSERVICE

The WCF [4] is Windows Communication Foundation web service which acts like an interface between android application and server. With the help of WCF the map [3] can be load into android app and extracted text in android app can be send to the server. It is designed using service-oriented architecture principles to support distributed computing where services have remote consumers.

C. ASP.NET

ASP.NET is more than the next version of Active Server Pages (ASP). It is a unified Web development platform that provides the services necessary for developers to build enterprise-class Web applications. ASP.NET is largely syntax-compatible with ASP; it also provides a new programming model and infrastructure that enables a powerful new class of applications.

D. ANDROID

Android [5] is an operating system based on the Linux kernel and designed primarily for touch screen mobile devices such as smart phones and tablet computers. The user interface of Android is based on direct manipulation, using touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching and reverse pinching to manipulate on-screen objects. , Android is designed to manage memory to keep power consumption at a minimum, in contrast to desktop operating systems which generally assume they are connected to unlimited mains electricity. When an Android app is no longer in use, the system will automatically suspend it in memory while the app is still technically "open", suspended apps consume no resource and sit idly in the background until needed again.

V.   CONCLUSION

Android based Meter Reading using OCR technology suggests the solutions to address the problems related to manual electricity, gas and water billing process. The current technology of billing process uses manual process of meter reading, entering reading into the server and billing customer. The customers also 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. 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.

For future research, it is suggested that to design embedded device including meter. Which can automatically send the meter reading to the server using GPRS modem? This will eliminate the meter reader and reduces the huge amount of cost for companies that are paid to employees.

REFERENCES

[1] A Comprehensive Survey on Historical review of OCR research and development. Shunji mori, Ching y. Suen, Kazuhiko yamamoto.
[2] https://paarl.wikispaces.com/file/view/Standards+and+Procedure+in+Digitization+and+Digital+Preservation.pdf.
[3] GPS,https://developers.google.com/maps/documentation/android/, [online].
[4] http://www.wcftutorial.net/.
[5] http://developer.android.com/index.html.