MJRET
Open Access
Multidisciplinary Journal of Research in Engineering and Technology
Journal homepage: www.mjret.in
ISSN:2348 - 6953

CONSUMER APP WITH AUTOMATIC IMAGE CAPTURING AND PROCESSING FOR METER READING AND BILLING

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Abstract : *This project introduces a system based on image processing efficiently and accurately reading of the electricity digital meter, electricity plays a major role in our lives, the use of electricity is increasing day by day, We introduce a methodology based on image processing to obtain efficient and accurate reading of digital electricity meter, The existing system contains capture image of customer electricity manually and the manually copy the reading to the system and all the billing process in manual and done by human work.*

The proposed system will work on the web and application platform he web platform will contain various views for customer and service provider, service provider will contains various for various authorities application view will have a single view, The user will capture the image of OCR (Optical Character Recognition)mobile phones camera, Permissions for cropping or re sizing are available, user will click the image and send to the server. Then the server side will generate the amount of bill accurately user will get the exact amount of the bill to his email.

Keywords*: Image processing, centralized database.*

1. INTRODUCTION

Electricity plays a major role in our life. The use of electricity is increasing every day. We use it everywhere and for different purposes that we cannot imagine our lives without it. The tool used to measure the electricity consumption is Electric Meters. This work aims to facilitate the electricity meter reading mechanism for electricity companies. It has a lot of disadvantages: It is very tedious, time consuming, man power consuming and is prone to

lot of errors. We introduce a methodology based on image processing to obtain efficient and accurate reading of the digital electricity meters

The contribution of this work is extracting and recognizing the meter reading digits from electric meters . Based on the collected meter images, there are many versions of digital electric meter . In these versions the location of the reading area is on the top of the meter, with Arabic (Hindi) numbers in some types and with English numbers in other types. In addition, they contain six digits of numbers in reading area.

2. LITERATURE SURVEY

The existing system contains the option for view and pay bill, in view bill the user can view its bill it also means that the user can see the bill in print preview format, If user have any complaints regarding the bill system or the meter reading or any technical or any queries related to the system the user can easily register the complaint about it.

If user has changed his contact then the user also can update his/her contact in the database, for any technical or non technical queries the user can contact the customer care, In existing system the user can also check for the bill payments.

3. RELATED WORKS

3.1 Existing System

The proposed system consists of three main stages of image processing . The system is implemented using Android Studio software with open CV library. The meter image is captured by mobile phone back camera with some constraints: the camera has to be parallel to the meter, the meter reading area has to appear in the image without shadows, part of the meter black box must appear from left and right, and the right most digit must be entirely shown and clear. shows an image of the electric meter that satisfies these constraints.

1. Preprocessing

This involves,

1. Image Binarization: This step involves transferring an image to a black and before reading area detection. In this step a threshold function is used.

2. Noise Reduction: Because of the noise could appear on the image after the binarization, noise reduction algorithm must be applied to reduce the noise. We chose to apply Morphological operations.

3. Crop Reading Area: In this step, the binarized image is processed to crop the part that has the meter reading only. We observed that the meter reading area is placed on the top middle of the meter image and it is inside an outer black borders and an inner white boarders. We proposed to search for the small inner white boarders around the reading area, so we scan the binarized image I, from top side starting from the middle pixel at I (I width/2, 0) to find the first black pixel of the outer boarders, continue scanning to find the first white pixel of the inner boarders, and continue scanning to find a black pixel of the meter reading area say at (x ,y). Then from that pixel at (x,y) we scan to the left side until we find a

white pixel say at (x1,y1) and from that pixel we scan to the bottom side until we find a white pixel say at (x3,y3). After that clipping the image area starting at (x1,y1) with a height of (y3-y2) and a width of (I width –x2) to get a new image contains the meter reading.

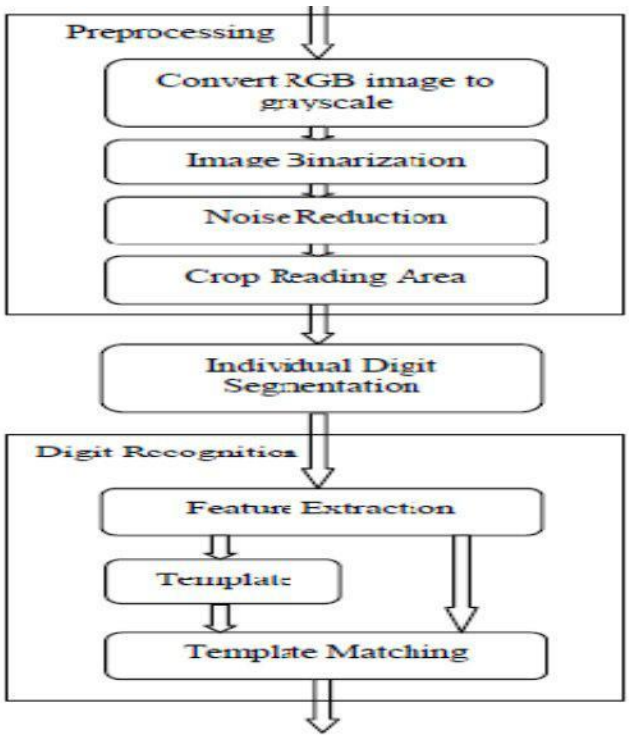

Figure 1. Existing system model

3.2. Taxonomy Chart

Survey paper Features	Author and Publication date	Web based	Android Based	Image processing	Online Notification	Server
Automatic electricity meter reading based on Image processing	Lamiaa A.Elrefaei, Asrar Bajaber 2015	✓	✗	✗	✗	✓
Automatic meter reading and E-bill System	Priyanka R Daware 2013	✓	✗	✗	✓	✓
Automatic meter reading and instant billing	Bhushan D Sawarkar 2015	✓	✗	✓	✓	✓
Automatic Electricity bill generation	P Jaswanth 2014	✓	✓	✓	✓	✓

Table 1. Taxonomy Chart

4. PROPOSED SYSTEM

1. Web and Mobile application interface to the billing agency.
2. Direct image capturing meter reading followed by image processing and automatic number feeding to the billing agency.
3. Final bill and notification to consumer.

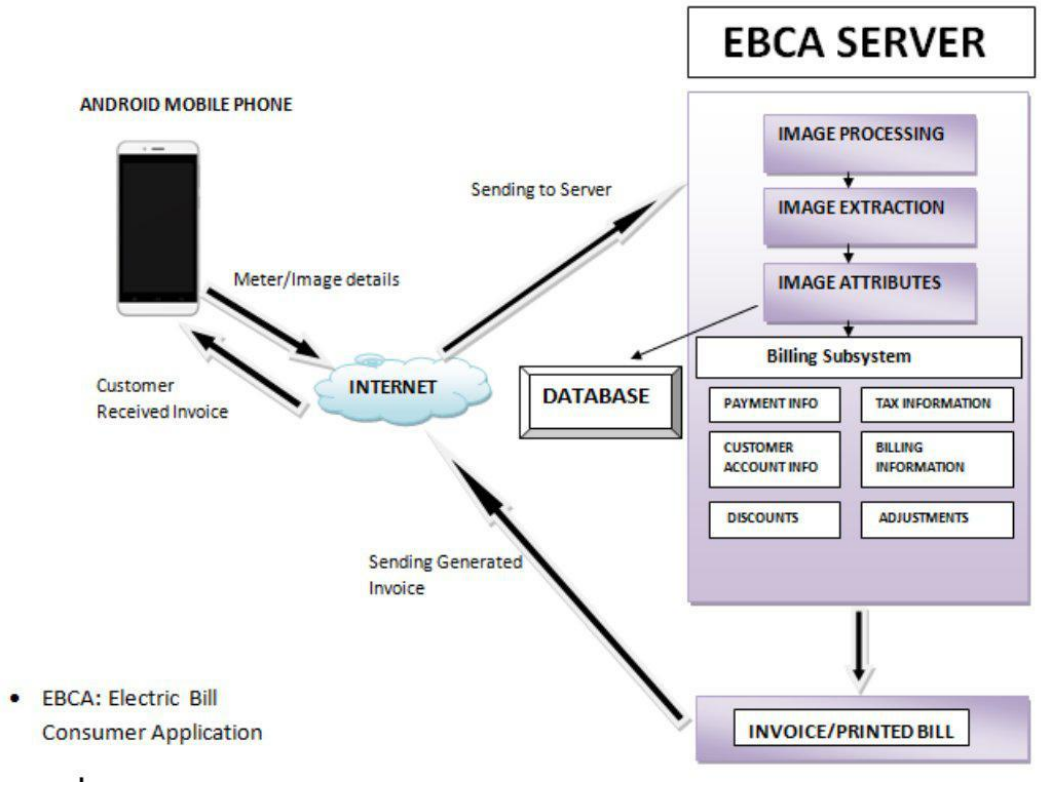

Figure 2. Architecture of Proposed system

4.1 Working of purpose system

In this Project, The system is capturing the image automatically by user (i.e consumer) .In this Image is captured by back Camera of Mobile devices. The system having mobile application to process the data. Then that data is sending to EBCA server. In this we used the TCP/IP protocol to transfer the data.

Then server will process on that data like as Image Processing, Image Extraction, Image Attributes etc. Then server will analyze the data by using image processing technique. Then system will stored the generated data into database.

Then server will generate the bill as per image captured by consumer. Server will generate payment details like as, payment info, Tax information, customer account info, billing information, discounts, adjustments etc. Then system will giving electricity bill to customer by invoice or as per printed bill to consumer by Internet.

5. ADVANTAGES AND LIMITATION

5.1 Advantages

1. Reducing Time
2. Less Man Power
3. More Secure
4. Easy to Use

5.2. Limitation

1. Internet Connection
2. Require Camera Efficiency 3.2MP To HD Camera stability
3. Same android phone should be registered which is using the app for billing

6. CONCLUSION

This project presented an automatic electricity meter reading system based on image processing. Results showed that the system can recognize the electric meter reading digits in three main phases of image processing with sufficient accuracy of 96,49% for each digit and the percentage accuracy of entire reading of 85.71%.The future plan is to improve the system.

So that it can recognize the reading of different types of meters in Saudi Arabia, improve the system accuracy, and develop a mobile application for the electricity company employees that use our system to facilitate the reading process. Using this application the employee just capture the electricity meter image, then the application process the image, recognize the meter reading and automatically send the reading to the company server.

ACKNOWLEGEMENT

Authors would like to thank our complete computer Dept. of support and cooperation during the work. We owe sincere thanks, more than what we can express, towards Prof. Sunil Rathod for this guidance, valuable suggestions and constant support throughout this work. We are highly obliged to Dr. S. S. Sonawane, Director, Dr. D. Y. Patil School of Engineering, Lohegaon, and Pune who has been constant source of inspiration.

REFERENCES

[1] M. Shinde And P. Kulkarni, Reading Of Energy Meter Based On Image Processing Technology, Volume Issue July,Technovision-2014, Pp. 1-5.

[2] Jordan Conference On Applied Electrical Engineering And Computing Technologies 2015 Ieee , (Aeect) 978-1-4799-7431-3/15/$31.00 ©2015 IEEE

[3] C. Edward, Support Vector Machine Based Automatic Electric Meter Reading System, IEEE International Conference on computational Intelligance and Computing Research pp. 1-5 2013,.

[4] K. Parthiban and A. M. Palanisamy, Reading Values in Electrical Meter Using Image Processing Techniques IEEE International Conference on Intelligent Interactive Systems and Assistive Technologies,Coimbatore, INDIA, 2013, pp. 1-6.

[5] S. Zhao, B. Li, J. Yuan, G. Cui, Research on Remote Meter Automatic Reading Based on Computer Vision, IEEE/PES Transmission and Distribution Conference, China, pp. 1–4, Dec, 2005