



## Meter Reading Application for Android Based Handheld Device

Ajinkya Muley<sup>1</sup>, Ganesh Masal<sup>2</sup>, Pooja Wagh<sup>3</sup>, Sumeet Gadade<sup>4</sup>, Prof. Anuradha Bobade [Project Guide]<sup>5</sup>

<sup>1,2,3,4,5</sup> D Y Patil College of Engineering, Talegaon-Ambi, Pune, India

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**Abstract:** Automatic meter reading is an Application designed for assembling consumption mechanically, and standing information from utility meters (electricity) and transferring information to a central info for asking. This is often AN application which is able to assist you to observe your consumption of e.g. electricity, you'll have savings in your budget if you track your monthly consumption of energy. The appliance is constructed primarily to trace the energy usage and accessing the electricity information which may end in higher management electricity. Enabling correct information hold on, analysed and provided to a client on demand. This Application is employed in utility meters for assembling the information that is required for asking functions.

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**Keywords:** Android, OCR, Handheld device, Android based meter reader

### I. INTRODUCTION

Nowadays most of utility service supplier corporations use manual method for taking readings. Those readings should be maintained in book. Owing to manual process of knowledge there must be prospects of generating associate incorrect bill. This method cause further work load on one who is capturing meter readings and there's no such means by that client will simply report a criticism or file criticism, if any drawback happens, to resolve this drawback we tend to should be planned associate android application which is able to carry by meter reader to require readings and internet portal for electricity users to move with electricity Distribution Company. Meter reader merely captures image of meter, then application performs OCR operation (extraction of text from image) and send captured readings to server.

The sever can generate bill per customers meter reading, when change information, PDF is send to client via registered email address, therefore this method reduces manual work, therefore wrongness within the bill generation is reduced. Thus, that point intense method is became fully correct machine-controlled method.

### II. EXISTING SYSTEM

The existing system is AN electricity distribution company which supplies contract to gather meter reading of customer's electricity reading. Then the employee of third party Company takes reading and submits it to the administrator workplace. Administrator workplace sends that information to electricity distribution system. Electricity Distribution Company delivers the generated bill to the shoppers per their meter reading, the businesses United Nations agency accustomed perform manual work for this method assumes that the method of bill generation is simple and that they don't need worker in order that they don't would like invest on adapting new technology for charge, just in case of incorrect bill and device failure client needs to face difficulties for lodging complains, there's no communicating provided by company for broadcasting completely different data like equipment failure.

Problems in Existing System: -

- Completely manual process.
- Increase burden on meter reader.
- More possibilities of human errors.
- Time consuming.

### III. PROPOSE SYSTEM

We are developing the answer for meter reader and an online portal for client. By exploitation android application, reader can get the meter reading. Meter reader carries hand-held device with android software package during which our android application is put in.

This method of bill generation is extremely straightforward. Meter reader must capture image of meter, then the applying perform OCR operation on captured image, outcome of OCR operation i.e. reading shall be send to server for bill calculation and bill generation method.

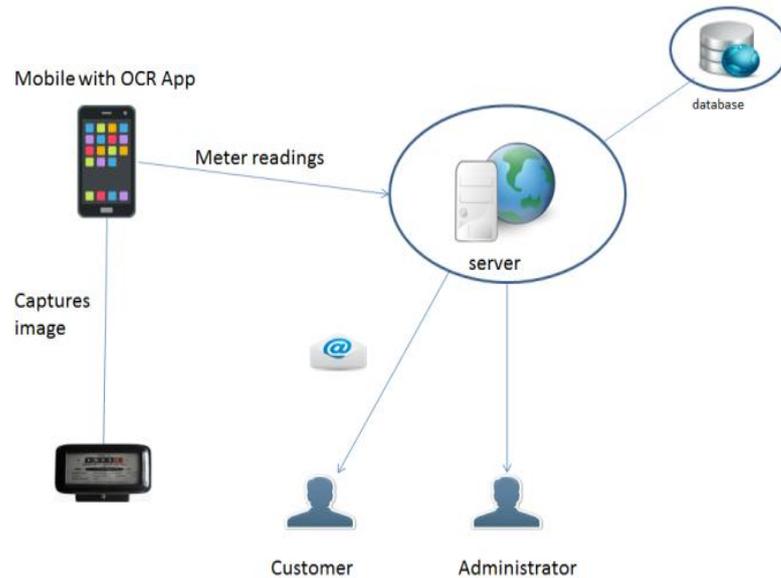


Fig1.System architecture of proposed system

The sever will generate bill according to customers meter reading, after updating database PDF is send to customer via registered email address.

### IV. MATHEMATICAL MODEL

1. LET SYSTEM AS  $S = \{ \dots \}$

2. IDENTIFY INPUT AS INP, THEN  $S = \{ \text{INP} \dots \}$

INP1: METER READER OR USER LOGIN.

INP2: CAPTURED IMAGE OF METER.

3. IDENTIFY OUTPUT OPT

$S = \{ \text{INP}, \text{OPT} \dots \}$

OPT1: GENERATED BILL.

OPT2: SEND PDF TO CUSTOMER.

4. IDENTIFY THE PROCESS AS P

$S = \{INP, OPT, PROC \dots\}$

PROC0: GREY-SCALE CONVERSION.

PROC1: THRESHOLDING.

PROC2: OCR OPERATION.

PROC3: BILL GENERATION.

PROC4: SEND PDF.

5. IDENTIFY SUCCESS AS SUCC.

$S = \{INP, OPT, PROC, SUCC, \dots\}$

SUCC = {SUCCESS OCCURS, IF BILL IS GENERATED ACCURATELY. }

6. IDENTIFY FAILURE AS FAIL.

$S = \{INP, OPT, PROC, SUCC, FAIL \dots\}$

FAIL= {FAILURE OCCURS IF CASE OF INCORRECT BILL GENERATION. }

7. CLASSIFY INITIAL CONDITION AS INICON.

$S = \{INP, OPT, PROC, SUCC, FAIL, INICON\}$

INICON = {METER IMAGE IS COMPULSORY. }

**V. CONCEPT AND TECHNOLOGIES**

*A. OCR (Optical character recognition)*

OCR [2] is a system that provides a full alphanumeric recognition of printed or handwritten characters at electronic speed by simply scanning the document.

There are 3 phases in OCR:

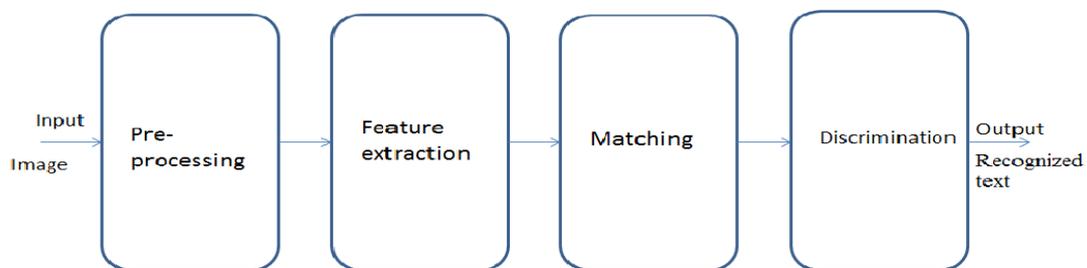


Fig2.System architecture of proposed system

*1. Pre-processing*

Pre-processing produces data for OCR to operate accurately. Pre-processing improves recognition rate. It consists of following techniques:

### 1.1 De-skew

If the document is not aligned perfectly then it may need to tilt in order to make text perfectly horizontal or vertical.

### 1.2 Binarization

It is the process of converting a pixel image into a binary image.

The Otsu [3] Thresholding method is used for binarization process.

b) Compute histogram and probabilities of each intensity level

b) Set up initial  $\omega_i(0)$  and  $\mu(0)$

c) Step through all possible thresholds  $t=1 \dots$  maximum intensity

i) Update  $\omega_i$  and  $\mu_i$

ii) Compute  $\sigma_b^2(t)$

d) Desired threshold corresponds to the maximum  $\sigma_b^2(t)$

### 2. Feature extractions:

It scans and selects the set of features that classifies and analyse the character. This phase will maximize the recognition rate.

### 3. Recognition:

Recognition process divided into two sub processes Matching and Discrimination.

#### 3.1 Matching

In matching phase, features that extracted from image, are matched with Template of character.

#### 3.2 Discrimination

In discrimination feature that are matched, are converted into character

The matched features are converted into character code.

## B. ANDROID

Now days android is preferred OS for all screen devices like smartphones, tablet computers moreover and alternative several devices. Android uses UNIX kernel. Program of android OS is predicated on direct manipulation by mistreatment touch as inputs that are loosely correspond to real word action as sound swiping and pinching to perform varied activities with on screen objects.

Android is essentially designed to stay consumption of low power, for memory management of hand-held device. The memory management is finished by suspending android application that isn't any longer in use. Suspended application continues to be technically open, that consume no resource and idly sit within the background unless and till required once more.

We designated this technology for our project as a result of, currently a day's most of good phones are running on android, and it's easy to user.

## C. PHP

PHP could be a server aspect scripting programing language used for internet development, however it are often used as general purpose programing language. PHP is free software system that is free underneath the PHP license.it are often deploying on each OS platform. PHP code could also be embedding into HTML or it will mix with completely different internet frameworks and internet guide system. PHP code is sometimes handled by a PHP interpreter enforced as a module within the internet server that generates result as webpage. We will execute PHP code by victimization command interface (CLI).In PHP5 provides options like conception of object familiarized programming, and performance enhancements, currently nowadays PHP is put in on over a pair of.1 million internet servers and over 244 million websites.

#### *D. MySQL*

MySQL is most well liked open supply information server. SQL is abbreviate particle of “structured question language”, that is to act with information by accessing data and change data from information. Varied queries are often performed like information choice, insertion, updating, and locating. Essentially information is assortment for well-organized data that yield simple retrieval. MySQL provide 2 editions:

- 1) Community Edition (open source) and
- 2) A Network Edition (licensed).

#### *E. TESSERACT*

Tesseract is associate degree OCR engine for varied operational systems. It's free under Apache license, v2.it is free software package, development of Tesseract has been sponsored by google.it is thought-about to at least one of the foremost correct OCR engine presently out there.

#### *F. DOMPDF*

G. DOMPDF is library that is capable of generating pdf from hypertext mark-up language and CSS vogue. It provides flexibility to determine however our content must look victimization acquainted technology and convert them into pdf. This library offers alternative helpful and fascinating options too.

### **VI. CONCLUSION**

Meter reading application for android based mostly hand-held device suggests the solutions to handle downside associated with numerous utility meters. The present technology uses method that is completely addicted to manual method like meter reading, getting into reading manually to server and generating and distributing bill to customers. Many shoppers complain regarding incorrectness of bill, this can be as a result of improper meter reading and cause major disadvantage of current technology.

Our agenda is enforced on meter reader in order that his work is being reduced. As our answer sends reading to server when capturing image, this may facilitate to cut back human error furthermore on alter and correct method. For future development, we advise to send utility bill by Short electronic messaging service (SMS) to client UN agency doesn't have email address

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### **VIII. REFERENCES**

- [1] Design of an Optical Character Recognition System for Camera based Handheld Devices -IJCSI International Journal of Computer Science Issues, Vol. 8, Issue 4, No 1, July 2011
- [2] “A Review on the Various Techniques used for Optical Character Recognition”, Pranob K Charles, V.Harish, M.Swathi, CH. Deepthi/ International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622, Vol. 2, Issue 1,Jan-Feb 2012.
- [3] [www.wseas.us/e-library/conferences/2013/Antalya/ITCN/ITCN-11.pdf](http://www.wseas.us/e-library/conferences/2013/Antalya/ITCN/ITCN-11.pdf)
- [4] [https://en.wikipedia.org/wiki/PHP\\_interpreter](https://en.wikipedia.org/wiki/PHP_interpreter)
- [5] The Tesseract open source OCR engine,<http://code.google.com/p/tesseract-ocr>.
- [6] [https://en.wikipedia.org/wiki/Android\\_\(operating\\_system\)](https://en.wikipedia.org/wiki/Android_(operating_system))
- [7] <http://github.com/dompdf>

### **BIOGRAPHY**

Prof. Anuradha Bobade [Project Guide] is currently working as an Assistant Professor in Information technology in D Y Patil College of Engineering, Pune, affiliated to Savitribai Phule Pune University.

Sumeet Milind Gadade is currently pursuing Bachelor of Engineering in Information technology in D Y Patil College of Engineering, Pune, affiliated to Savitribai Phule Pune University.

Ajinkya Vilas Muley is currently pursuing Bachelor of Engineering in Information technology in D Y Patil College of Engineering, Pune, affiliated to Savitribai Phule Pune University.

Ganesh Vitthal Masal is currently pursuing Bachelor of Engineering in Information technology in D Y Patil College of Engineering, Pune, affiliated to Savitribai Phule Pune University.

Pooja Ganesh Wagh is currently pursuing Bachelor of Engineering in Information technology in D Y Patil College of Engineering, Pune, affiliated to Savitribai Phule Pune University.