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Smart Metering

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ABSTRACT
Smart Metering is an Automatic Meter Reading, Application designed to automatically collecting consumption, diagnostic, and status data from utility meters (electric, water and gas) and transferring the retrieved data to a central database for billing, troubleshooting, and analyzing etc. Meter Reading is an application that will help you monitor your consumption of e.g. electricity, gas or water. But in fact anything that has a meter can be monitored with Meter Reading. You may have potential savings in your budget if you monitor your consumption and change the way you consume energy. The Application is built essentially to monitor the energy usage and accessing the daily energy data which can result in better energy management. Enabling accurate data stored, analyzed and presented to a customer on demand. Tracking the real-time consumption on a day to day basis in the most cost effective way to identify energy wastage coupled with analysis, can help both utility providers and customer's control the use and production of electric energy, gas usage, or water consumption. The Application used in utility meters for collecting the data that's needed for billing purposes.

Keywords- OCR, Zig Bee protocol, AMR

I. INTRODUCTION

Automatic Meter Reading (AMR) was first tested 35 years ago when trials were conducted by AT&T in co-operation with a group of utilities and Westinghouse. After those successful experiments, AT&T offered to provide phone system based AMR services at $2 per meter. The price was four times more than the monthly cost of a person to read the meter 50-cents. Thus the plan was considered economically unfeasible. The modern era of AMR began in 1985, when several major full scale projects were implemented. Hackensack Water Co. and Equitable Gas Co. were the first to commit to full scale implementation
Of AMR on water and gas meters respectively. In 1986 Minnegasco initiated a 450,000 radio based AMR system. In 1987 Philadelphia Electric Co. faced with a large number of inaccessible meters, installed thousands of distribution line carrier AMR units to solve this problem. Thus, AMR is becoming more viable each day. Advances in solid state electronics, microprocessor components and low cost surface mount technology assembly techniques have been the catalyst to produce reliable cost-effective products capable of providing the economic and human benefits that justify the use of AMR systems on a large, if not full-scale basis. Android based meter reading 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 which is nothing but "optical character recognition". The OCR technique is used to identify the character from an image and used this character to get the meter readings. In Android based meter reading Application the Android based device will be hand over to the employee of the respective department and the admin will be having control over it. The application is used to get the meter reading online without any manual efforts; The Application is built essentially to monitor the energy usage and accessing the daily energy data which can result in better energy management.

II. EXISTING SYSTEM

There are many existing system in today's market such as Stand-alone meter readingSystembut the issues were:

- Highly Person dependant.
- Human errors cannot be avoided.
- Accessibility of meters in rural/ Agricultural zones.
- Energy Audits performed based on bill collection which is highly inaccurate.
- Billing done mainly on estimated/ monthly average basis
- Inability to monitor and control discrete loads
- Billing cycle requires excessive time.

Meter data used only for billing, cannot help in analysis like demand analysis, energy audit, pinpointing losses, etc.

III. PROPOSED SYSTEM

Android based meter reading application is an application that will help you monitor your consumption of e.g. electricity, gas or water. But in fact anything that has a meter can be monitored with Meter Reading. You may have potential savings in your budget if you monitor your consumption and change the way you consume energy.

Android based meter reading 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 which is nothing but "optical character recognition". The OCR technique is used to identify the character from an image and used this character to get the meter readings.

Following Fig1 shows working details of proposed system.

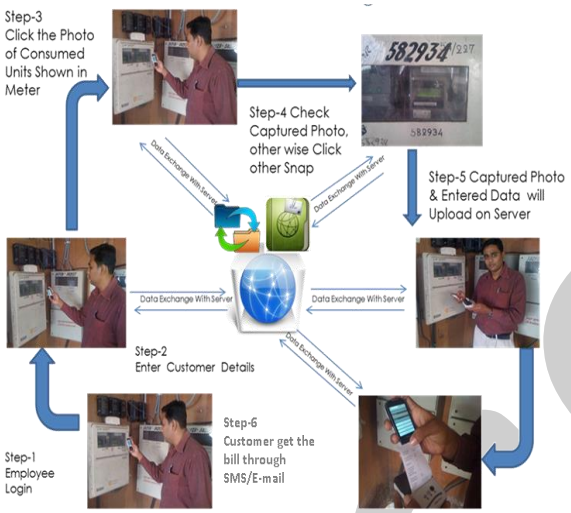


Fig.1 Working Details of Smart Metering

A. *What is OCR?*

Machine replication of human functions, like reading, is an ancient dream. However, over the last five decades, machine reading has grown from a dream to reality. Optical character recognition has become one of the most successful applications of technology in the field of pattern recognition and artificial intelligence. Many commercial systems for performing OCR exist for a variety of applications, although the machines are still not able to compete with human reading capabilities.

Optical character recognition is needed when the information should be readable both to humans and to a machine and alternative inputs cannot be predefined. In comparison with the other techniques for automatic identification, optical character recognition is unique in that it does not require control of the process that produces the information. [2]

(OCR) is a powerful tool for bringing information from our analog lives into the increasingly digital world. This technology has long seen use in building digital libraries, recognizing text from natural scenes, understanding hand-written office forms, and etc. By applying OCR technologies, scanned or camera-captured documents are converted into machine editable soft copies that can be edited, searched, reproduced and transported with ease [1].

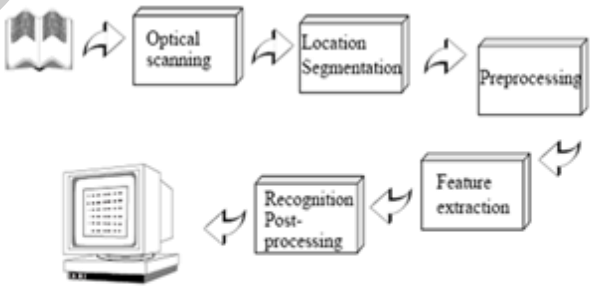
Our interest is in enabling OCR on mobile phones. Mobile phones are one of the most commonly used electronic devices today. Commodity mobile phones with powerful microprocessors (above 500MHz), high-resolution cameras (above 2megapixels), and a variety of embedded sensors (accelerometers, compass, GPS) are widely deployed and becoming ubiquitous today.[8] By fully exploiting these advantages, mobile phones are becoming powerful portable computing platforms, and therefore can process computing intensive programs in real time.[3]

In particular, some modern mobile devices can use pictures of barcodes to look up detailed information about a product's ratings, price, and reviews. Some mobile phones with business card reader application installed facilitate users to transfer contact information directly from business cards. This allows business people to carry only one personalized card with no physical copies to share. [5]

The real time system consists of automating the process of capturing an image and transmitting it to a remote handheld device located out of line of sight of the reader. To design a working solution for the given system problem, several different tasks had to be performed. [4]

Research had to be conducted on key topics, including the Zig Bee protocol and how to interface external devices with different operating systems. As well, implementation of transmission over Zig Bee and communication through external devices. [6]

Fig.2 Component of OCR

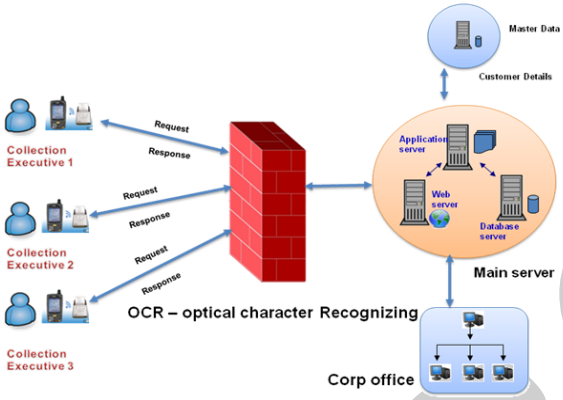


The research that we did, finally conclude that the system can be build based on android operating system which can be used to get the Bill to the customer efficiently without any extra efforts.[7]

B. Components of an OCR system

A typical OCR system consists of several components. In FIG2 a common setup is illustrated.[8]
The first step in the process is to digitize 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

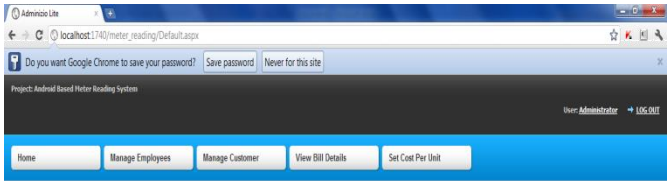


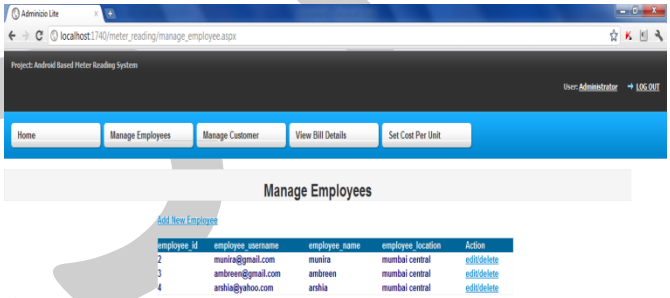
extracted features with descriptions of the symbol classes obtained through a previous learning phase. Finally contextual information is used to reconstruct the words and numbers of the original text. In the next sections these steps and some of the methods involved are described in more detail.

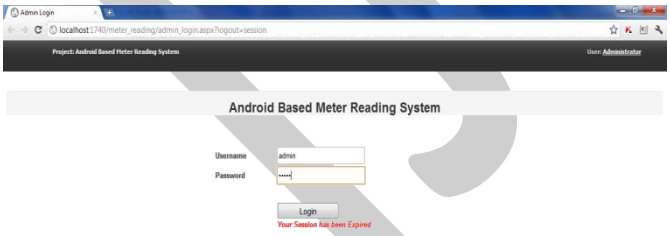
Following Fig3 shows application architecture diagram,

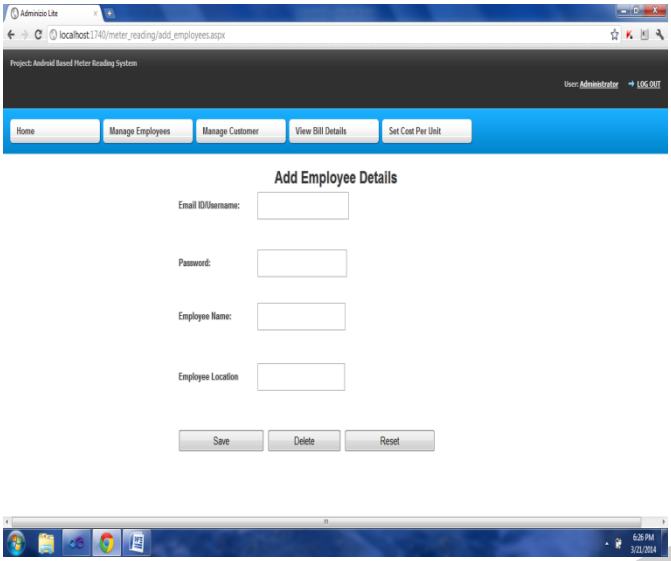
Fig.3 Application Architecture Diagram

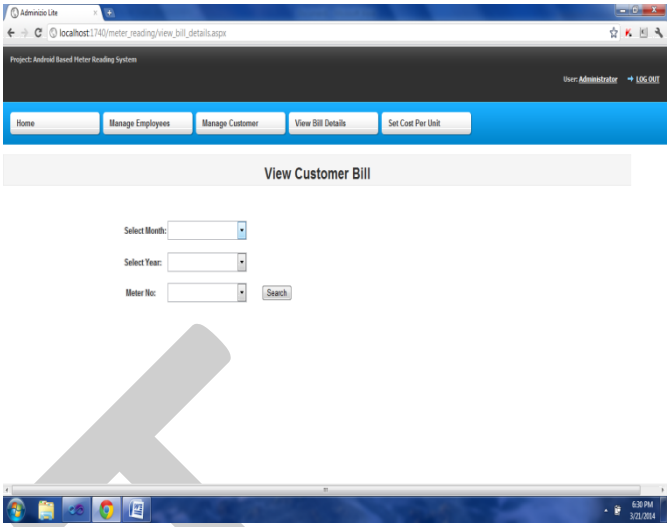
IV. RESULTS

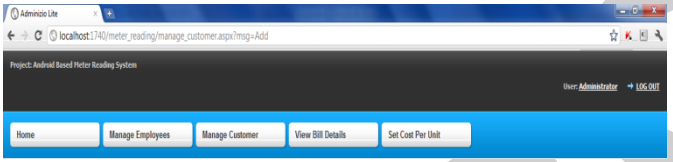












V. CONCLUSION

The development of Smart Metering demonstrates the concept and implementation of new power metering system. Smart Metering have low infrastructure cost, low operating costs, more data security and less man power required. Therefore it not only solves the problem of conventional meter reading but also provides additional feature bill generation on mobile.

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[7] *OCRdroid*
[8]*OCRopus - Open Source Document Analysis andOCRSystem.*