Smart Electricity Board Android Application

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Abstract: *Smart Electricity Board Android Application suggests a mobile based system to collect, process and notify consumers about consumption. This system will be reliable, efficient and accurate to suit the requirements of the providers. Meter reading, even though looks simple, is far from simple and involves processes which are not expedient. Calculation errors and delays in system updating are the major problems involved. Here we aim to eliminate the manual processes involved in the electricity meter reading system and eliminates the need of a user. It measures and monitors the electricity consumed by consumers in a locality and forwards the consumed power to the board which in turn notifies the power consumption with the help of GSM, GPS and Android. Our system reduces the cost of labor involved, increases the accuracy of meter reading and saves a large amount of time.*

I.   Introduction

Smart Electricity Board Android Application is basically a software for the electricity board which suggests a mobile based system to collect, process and notify consumers about their consumption. Electricity is one of the vital requirements for the sustainment of comforts of daily life. In our country, there are localities where we have surplus supply of electricity while many areas do not even have access to it. The current techniques for meter reading in India are not fully automated. The meter readings obtained from the energy meter are used to calculate electricity bill. The energy providers hire people who visit each house and record the meter readings manually. These meter readings are input to the system at the office by the back entry officer. The consumers are not pleased with the services of their providers. They have complaints regarding the statistical errors in their monthly readings.

Smart Electricity Board Android Application aims to receive monthly energy consumptions from remote locations to the board. It aims to minimize the technical errors and reduce human dependency at the same time. Our system helps to reduce the workload of the meter readers. Our project involves the use of a GPS which continuously monitors and records the energy meter readings. The system also makes use of a GSM modem for remote monitoring and control of energy meter. Short Messaging System (SMS) cell broadcasting feature to send the meter readings to the server.

Android is used as a means to notify the consumers about their monthly consumptions and perform monthly calculations at the electricity board. Thus the system is an effective way for collection of data. This reduces the need for a meter reader .It also provides consumer greater accuracy, improved billing, reduces cost etc. It offers better customer services, by sending alert of power cuts and consumption updates. It is very useful for remote areas or small villages which are not connected by any means of transport.

Further reading includes various sections describing the project work in detail. Section two gives an idea about the related work done and researches done in the area of automated meter reading. Section three gives an overview of the system which includes the study of the existing system and detailed discussion and design of the proposed system. Section four discusses about the implementation and the results obtained. It also deals with the various approaches taken to make the architecture 'something better'. The last section finally concludes the research work and discusses the future scope of the research in relevance to the further study.

Related Work

Traditional metering methods for retrieving the energy data is not convenient and the cost of the data logging systems are high. There are many projects that works with the aim of eliminating the manual processes involved, from the time the meter reader starts reading the meter until the system isupdated with the current reading. Automatic Meter Reading system (AMR) is a boom for remote monitoring and controlling domestic energy meter. AMR system gives the information of meter reading, power cut, total load used, power disconnect and tempering on request or regularly in particular interval through SMS. The providers could get any information about the meter once a request is issued from their consumer GPS location.

Projects like, Smart Energy Meter Using Android Application and GSM Network has been

implemented for the purpose of getting a fully automated electricity billing system. Its aim is to measure and monitor the electricity consumed by the consumers in a locality and transmitting the consumed power to the station as well as issuing the bill of consumed power automatically.

A Web site is maintained basically for administrative purposes. Consumer will get the best benefits from this particular system. From the beginning of the day, a mobile phone with a route map called Walk Order Map which has the route of houses that he has to cover within a day will be in use. This leaves no room for missed readings especially for novice meter readers. Then the system does the calculations and the bills are sent to the respective consumers via Notification. Importantly, the meter reader can make complaints then and there whenever a fault is seen or an illegal power usage is spotted. In such a case, an image of that particular meter can be sent. This option is also provided through the system.

As from the above surveys we can conclude that Smart Electricity Board Android Application shares many features of the discussed projects but the shining jewels of our proposed model is that we have an android application which updates the database automatically, as the reading reaches the admin application from the hardware GPS. Any further updates that the admin wishes to make can be simply done in the database which will be reflected in the user application.

System Model

The hardware circuit produces an automated meter reading system. According to the load connected, the meter reading is send to the authorized user as SMS at specified time intervals and to the admin application. An android application is created each for the admin and the user. The android application for the electricity board personnel, is created with the facility to receive user readings which in turn directs the server for further processing, is created with the facility to receive user readings which in turn directs the server for further processing. The user application, with a friendly user interface provide a means for the consumers to retrieve their bill details and sending meter reading details, pay their bill, check their expected bill, provide feedback to the electricity board. Consumers also have the option to pay and to keep a copy of the bills for future reference. Fig. 1 shows the system architecture of (a) Admin (b) User modules.

Fig. 2 shows the message format obtained by (a) User and
(b) Admin. At a time lapse of half the period of bill payment, a message is send to the user specifying his current status of his energy consumption and at the time of bill payment, a message is send to the device of the admin which provides information about the power consumption of the authorized consumer.

The User module is used to send the meter readings to the utility provider. (a) Login page (b) Home page (c) Notification page (d) Message page (e) Bill Notification page (f) Generate bill and payment page (g) Printable format for user application. The user application provides a friendly means for the consumers to retrieve their bill details, pay their bill, check their expected bill, and provide feedback to the electricity board.
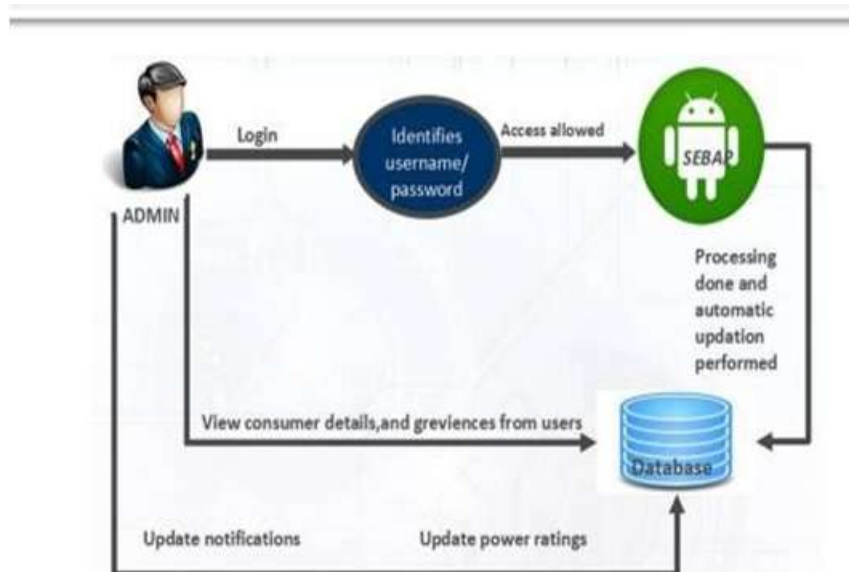
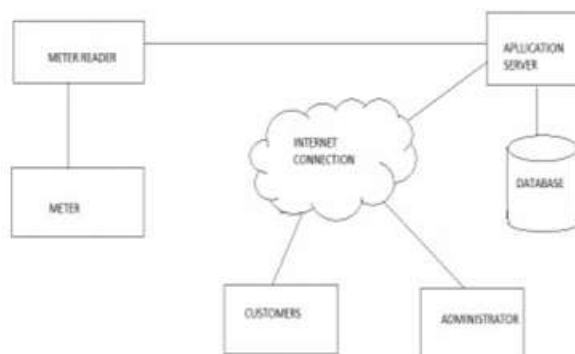

Fig. 1 Admin Module.

Fig. 2 User Module

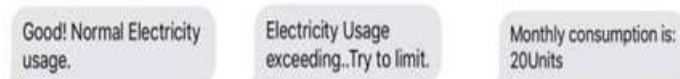**Fig. 3** System Architechture

IV. Result And Observation

Fig. 3 Message Format

Fig. 4 Meter Photo

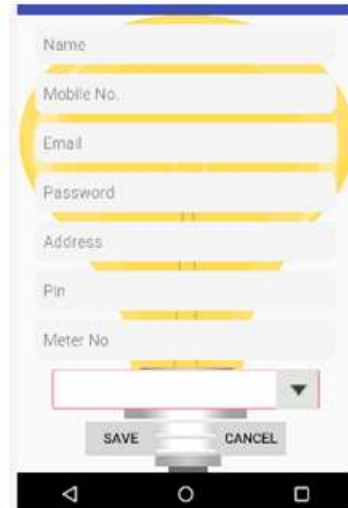**Fig. 5** User Login

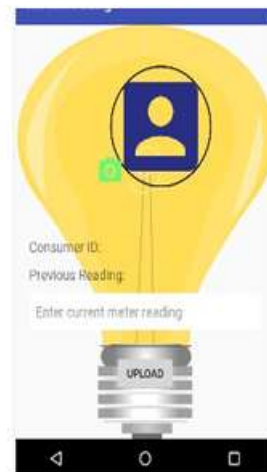**Fig. 6** User Registration

Fig. 7 Dashboard

Fig. 8 Meter Reading

Mathematical Model

1. Let S be the system for meter reading $S = \{...\}$
2. Identify input as $I\ S = \{I,\quad\}$
I1: User or Meter reader Login. I2: Captured image.
3. Identify output $O\ S = \{I, O,\qquad\}$
O1: Generated Bill. O2: PDF to customer.
4. Identify the processes as $P\ S = \{I, O, P,\qquad\}$
P0: Gray scale conversion. P1: Binarization.
P2: Bill Generation. P3: Send PDF.
5. Identify failure cases as F. $S = \{I, O, P, F\quad\}$
F = {Failure occurs if incorrect bill generation.}
6. Identify Success cases as s. $S = \{I, O, P, F, s\}$
s = {Success occurs when bill is generated accurately.}
7. Identify Initial condition as Ic. $S = \{I, O, P, F, s, Ic\}$
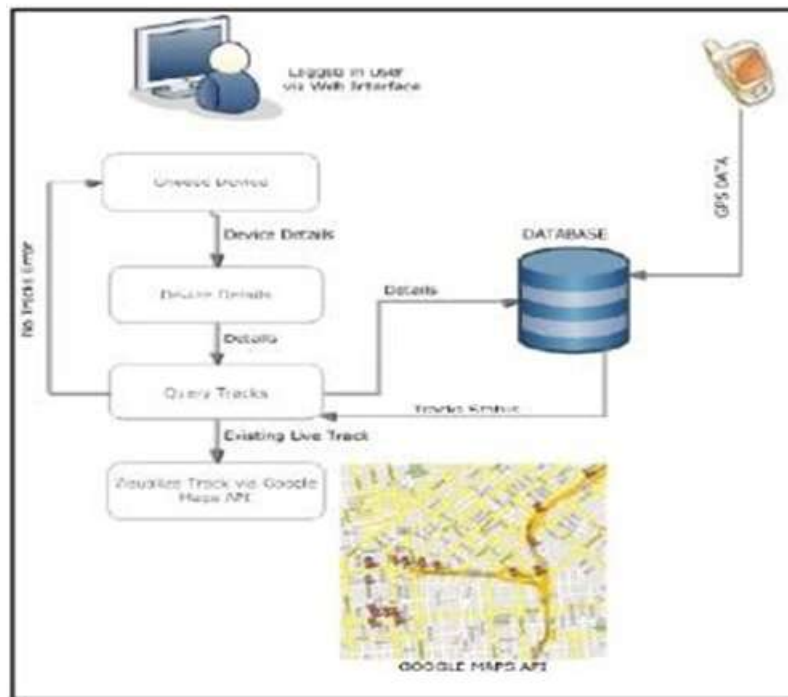Ic = {Meter image is compulsory.}

GPS TRACKING.

Fig. 9 GPS Tracking System

GPS Workflow

Fig.9 shows the workflow of the GPS module. When the GPS module is switched on, it will continuously check for the available GPS strings provided by the satellite. Once the string is available, the GPS module will receive it and sends it to the Arduino. For that purpose, software serial library is used that provides a platform to use a baud rate other than 9600 which is fix for pin 0 and 1 of the Arduino. In order to get the GPS coordinates from the satellite.

TECHNOLOGY
Android :-

Android is an mobile operating system based on the Linux kernel .It is designed primarily for touch screen mobile devices such as tablet computers and smart phones with specialized user interfaces. Android is popular OS with technology companies which requires prepared in advance as per need, min- cost and customizable operating system for hi-tech devices. Android's open source has motivated a large community of developers and enthusiasts to use the open-source code as a foundation for community driven projects. It also adds new features for advanced users. Android is helpful to manage memory to keep power consumption at a minimum compare to desktop operating systems.

Java:

It is general purpose, object -oriented programming language developed by sun micro system of USA in 1991 which was originally called as 'Oka' by James Gosling. The important feature of language is that it is a platform neutral language. Java is the first programming language which is not tied to any particular hardware or any OS. Programs developed in java can be executed anywhere on any system.

II. Conclusion

Android application for meter reading using GPS suggests an easy solution that addresses the problems related to manual electricity billing process. The current method of billing process includes the manual process of meter reading, entering meter details at the server and billing to the customers. Our application is only for meter reader that reduces the workload on employees and to make the process of getting the meter reading, updating server and billing to customer via mail is made easy and accurate and also we have provided the facility for the customers that they can complaint about the incorrect bill to our web blog. Electricity and telecommunication devices are unavoidable agents for a convenient living. An effective method of metering, An effective method of metering, billing and payment system stimulates prudent electricity or mobile phone usage

and compels consumers to pay their bills on time. Smart Electricity Board Android Application is expected to aid electricity companies in their policies, and also triggers future studies. The system eliminates most of the error prone manual calculations and manual data entering for electricity board. They can easily use the system for a faster, easy and error free environment to suit the comfort of customers. As part of future work, the system model can be implemented in other operating systems especially IOS and to integrate the admin application and the server side into a single system.

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