Project Proposal

CEB SELFCARE APP

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INDEX NO   :18/ENG/112
COURSE CODE   :CO3302

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Executive Summary

With the development of the technology, many fields of the world have been changed and upgraded. When comparing with Sri Lanka, though Sri Lanka have developed with some fields, the bill reading system of electricity still have not changed. The system follows the manual system yet. So, I decided to change the bill reading system from manual to automatically. So, the main purpose of this system is to read the current bill by the user himself without any complex calculations. From this system the usage of current can be reduced. As well as, from this self-care app both user and the system provider are updated with the current usage and the overall usage. From this system, it is decided to perform both bill reading and bill paying system from through one system. So, this software can be known as two in one mobile app. The system consists with both hardware part and a software part. The software part consists with Android application only. For the Service provider there is a desktop application. But in this project, I am only developing android application and its services. From the hardware part, the used electricity units of the device are calculated and all data are stored in a cloud server. The result which is given from the hardware part is taken from database and the software part (mobile app) generate pie charts, bar charts, tables to output the usage of electricity and the total bill that is to pay for a specific month can be view using the mobile app. And also, the mobile app can show the past electricity usage of the customer. So, both hardware part and the software part are interacted with each other well.

Background

With the development of the world people always find easy ways to do their day to-day work. Though in the bill paying and bill reading system have not been updated yet, people have to face for some problems. The problems are shown in below.

- ✓ With the current system lots of man power is wasted for manual meter reading.
- ✓ Customers are not able to view their current usage easily.
- ✓ If the usage passes a certain limit additional charges are applied on the bill.
- ✓ People are not aware of peak and off-peak times of electricity usage.
- ✓ There's no single platform for customers to manage and pay their electricity bill using mobile application.

Since these are very common issues among all the customers in Sri Lanka as well as all around the world this project can have an impact on all the people who own a smartphone and a payment card, which is quite a larger percentage. The smart meter system has three main sub systems. They are,

- ✓ Registering, login and authentication system
- ✓ The card payment verification system
- ✓ Security system Above three subsystems are interconnected together to create our full system.

In the registering, the account numbers regarding to the CEB of the customer is taken first. After verifying the account, the details of the customer are taken. After the verification succeed the account is created successfully. After creating the account unique user name and a password is provided to the

customer. In the future login, customer can log with the account with entering user name and the password. In the account, the account details of electricity bill are shown separately. They are electricity side, the current usage, overall usage and the calculated bill is shown in the account properly.

Objectives

- ✓ Build a smart device which can measure electricity usage
- ✓ Develop Android applications for customer to view all usage info and bill info.
- ✓ Make a secure and easy way of reading /paying the bill.
- ✓ Build up a trusted connection with the service provider and the user without less breakdowns

Methodology

The CEB SELFCARE App is for Customers who willing to getting update about their Real-time electricity usage. The customers can create their own account and utilize the service. So, through the Android application we analyst the peek time of electricity usage of a day. Users can manage their electricity usage within necessary limits and pay bills themselves. All the information of customer, such as Realtime electricity usage, customer details are stored in sperate tables in database and create bills according to them. Users Realtime usage is measures and recorded by hardware component that easily plug to switches and wirelessly connect with Active router. The methodology of this project can be categorized into mainly 5 phases. They are analysis, design, implementation, testing and deployment.

🔸 Analysis

A requirements analysis will be conducted to be sure that the needs of the solution for the background problems and above mention objectives are addressed and also to identify deficiencies and address tools and features the user can benefit from.

🔸 Design

In the design phase of the development process, an abstract representation of how the application works will be studied. The database is designed in this phase. Every requirement is taking into the consideration here. Then the problems such as, what are the views of the application and how the views are interacting with each other will be studied. Then prototypes of user interfaces are designed. Tools such as MySQL Workbench (For creating ER diagrams) and Adobe XD (For creating prototypes of user interfaces) are proposed to be used here.

🔸 Implementation

In this phase our designed project will code and develop. The project is mainly a mobile application and therefore, this phase consisted of two main tasks.

1. Front end development

2. Back-end development

The above mention two tasks will be executed in parallel. Front end development will be doing using java and flutter. And back end will be developed using MySQL language and php APIs. Such as dream viewer and an Android studio is going to use as text editors. Here in the server the bill calculations and all process going to be done.
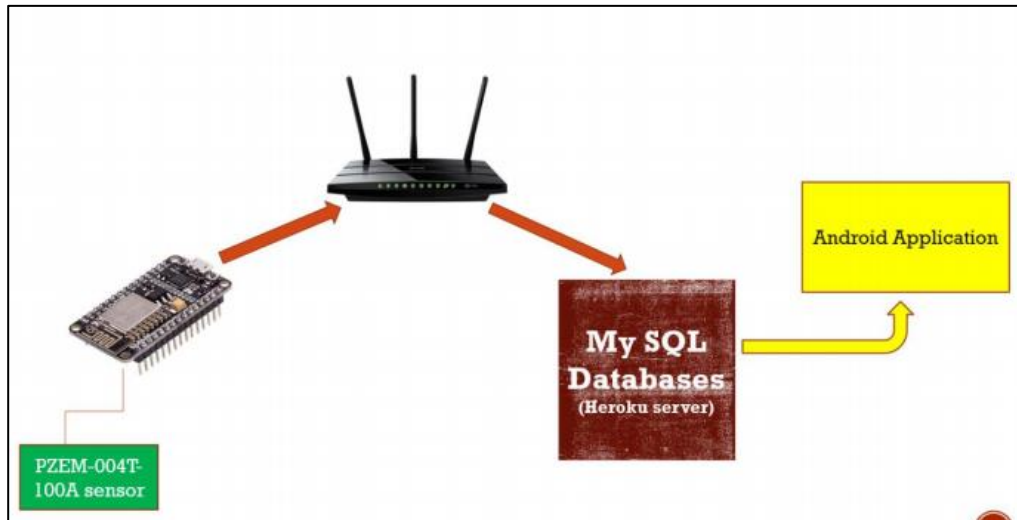

Figure 1-DEVICE WORKFLOW DIAGRAM

There are several tables in one database. The tables names are-

1. Customer info table
2. Device raw data info table (voltage, current, power, power factor)
3. Elec usage history table
4. Payment details table
5. Bill history table

Testing

After the development process is completed, the application will be tested and debugged. After establishing all the device component of the system correctly, Alpha testing is done by using some dummy data and dummy users. For the beta testing few selected real users will be used. At the moment only one device is connected to the system. After that test it will provide a good understanding of the service and beta round will be conducted for full system.

Deployment

After completely finalizing the initial release of the application, this application will be published and available on a google play store that anyone can access. The device part can also be selling trough online website.

Timeline

		Stage									
		1	2	3	4	5	6	7	8	9	10
Planning	Requirement Identification	▓									
	Analyzing the requirements		▓	▓							
Analysis	Scope Analysis			▓	▓						
	Feasibility and performance evaluation				▓	▓					
Design	Designing the views					▓					
	prototyping					▓	▓				
Implementation	Programming each view						▓	▓	▓		
	Device implementation						▓	▓	▓		
Testing	Testing and debugging							▓	▓	▓	
Maintenance	Finalizing and Enhance the performance									▓	▓

Cost Analysist/Budget

Item	Price
Node MCU ESP8266 WIFI ESP-12E CP2101 IoT Dev Board Module	Rs 685.00
Peace fair PZEM-004T sensor module	Rs 2014.00 +Tax
LCD Full Graphics Type 128*64	Rs 985.00
Project Box (263*185*95)	Rs 2000.00+Tax

Jumper wires (Male/Female)	Rs 300.00
Total	Rs 5984.00+Tax

The above mention all parts are previously purchased for another projects.so no need for purchase those things again.

Risk

➕ Risk that can affect during the project development

Risk	Possible Solution
Incapable of finding monetary resources for establishing cloud databases with special services.	✓ Use free or partial free services like Heroku, firebase which provides free and limited web-based storage and services. ✓ Purchase web service for a monthly basis and disable extra service charges payment option deducting option within the server.
Incapable of delivering the project on right time.	✓ Increase the number of parallel tasks ✓ Use tools for speeding up the tasks. (As example drag and drop GUI tools can be used in programming. Some software's like proteus, Atmel studio help to code Arduino programming using virtual equipment's.)
The budget of full system is higher	✓ Sensors that we using is little bit cost. For a home we 10-15 sensors for measure the usage of all devices in each part of the home. Therefore, as a demo we are only using a one sensor for only one equipment.

➕ Risk that can affect After the project development

Risk	Possible solutions
Failures of web hosting services	✓ Frequently gets local backups. ✓ We can purchase secondary service that gives by cloud services
It may become harder to market	✓ Contact and explain the user to benefits of such a new system

There might be security issues and legal issues still after the deployment.	✓ Devices should be sealed and firmware's updates or any modification that customer can do should be blocked.
	✓ We should get a permission from Ceylon Electricity Board to test this system and compare with manual system. If manual system and our system is same, we can test this device for a cluster of houses.

Appendix

References

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