

Prepaid Energy Meter Recharge And Monitoring Using App

Kaliappan.S¹, Jenisha.E², Elankavi.E³, Naveen Thilak.R.K⁴

¹Associate Professor, Department of Electrical and Electronics Engineering, Kumaraguru College of Technology [autonomous], Coimbatore, India

^{2,3,4}Department of Electrical and Electronics Engineering, Kumaraguru College of Technology [autonomous], Coimbatore, India

Abstract - Energy - a word which rules the entire universe. As we all know that in our daily life we are using different forms of energy. One such important and foremost form of energy is ELECTRICITY. Electricity can be produced from different forms like solar, wind, thermal etc.. The production of electricity is increasing day by day. But the usage of electricity is not reduced and also causes the shortage of electricity. The Tamil Nadu election board has taken many steps to overcome this issue. Still there is no solution for this. We underwent research and found that if we reduce the excess usage of electricity and wastage of electricity, we can save nearly 20 percent of electricity. So that only Tamil Nadu electrical board provides 100 watts free supply to each and every home. Growth and development of any country depends on effective monitoring, measurement, billing and access control is imperative management of energy. For most of the homes that amount of electricity is enough. The energy measurement and billing system is automated. This application will allow the consumers to monitor and visualize their consumption pattern and billing system. This application includes prepaid and postpaid systems to the consumers depending upon their need they can choose.

fledged online billing to make it a lot easier. Since we couldn't monitor the usage, many didn't know the importance of saving energy. The new system of monitoring of usage may help to reduce the usage. As compared to the old scheme, this also provides break free electricity to users after the limit of their plan is finished.

2.1 Methodology

Smart meters data are collected, stored and analyzed for energy usage and billing purposes. Omijeh and Ighalo introduced prepaid energy meters but it doesn't not provide real monitoring and access control. Later, an energy meter reading is compared with the revolving credit information by the microcontrollers for effective monitoring and to manage switching the device. Bluetooth is employed which is restricted to within the 100 meter range. Then introduced a replacement concept which incorporates a postpaid scheme when prepaid balance is drawn in order to produce uninterrupted power supply. The diagram of this project is shown below.

Key Words: Prepaid energy meter, Blynk app, IOT, monitor, postpaid system.

1. INTRODUCTION

In the current day, the electricity bills are paid postpaid through applications or reaching the billing office in person. We also know that we won't know the exact amount of energy we are using and the bill we will be paying at the end of the month. So we came up with an idea of a prepaid energy system, which allows us to recharge the required amount of energy when required and will also extend itself to postpaid if we exceed the recharge plan. This helps us to see the usage, pay easier and also creates awareness to the users.

The postpaid method doesn't have transparency between the user and the electricity billing department. So we weren't able to monitor the usage of the data. The postpaid method was a bit old as we all know that technology has grown a lot these days. So we brought full-

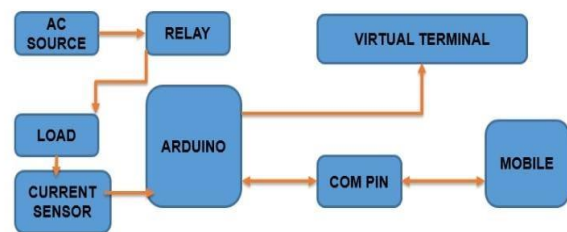


Fig- 2.1.1 Block diagram

To overcome the present prepaid/postpaid system and monitor using apps is developed and is tested and observed and it is working successfully and consistently. This system not only reduces the labor cost but also increases the accuracy of meter reading and saves a huge amount of time. Since this system is a digitally controlled system, the speed of the operative services is drastically enhanced and the manual transaction is maximum avoided.

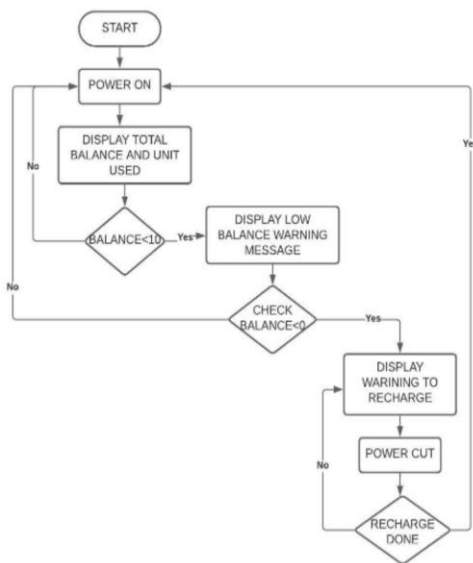


Fig- 2.1.2 Methodology

2.2 Overall Block diagram

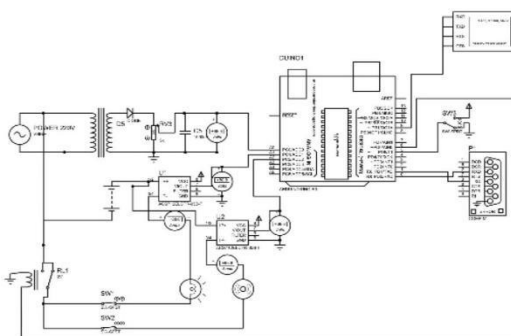


Fig- 2.2.1 overall block diagram

The Complete Schematic of the project is given above. Initially we did the simulation of our project in the Proteus software tool. Then this design includes an energy meter interfaced to the microcontroller through the current transformer. The energy meter will measure the energy consumed and send it to the microcontroller ADC (analog to digital conversion) port. Here this microcontroller converts the analog value from the energy meter into digital value. Comport and virtual terminals are also used for simulation purposes. And the data will be monitored by using the app.

3. Process and Design

STEP:1

Before executing the simulation we have to run the Blynk batch file and VSPE emulator.

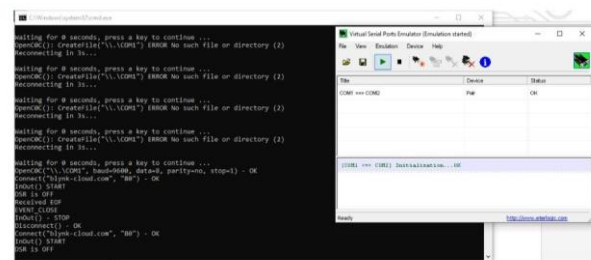


Fig- 3.1 VSPE emulator

STEP:2

Open the Proteus file and start the simulation and also simultaneously run in the Blynk android app. "Balance is low" will be shown as a notification in the app.

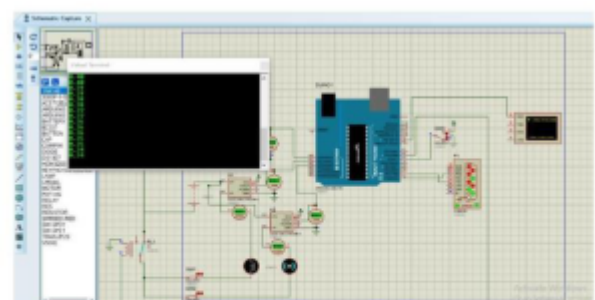


Fig- 3.2 Process flow

STEP: 3

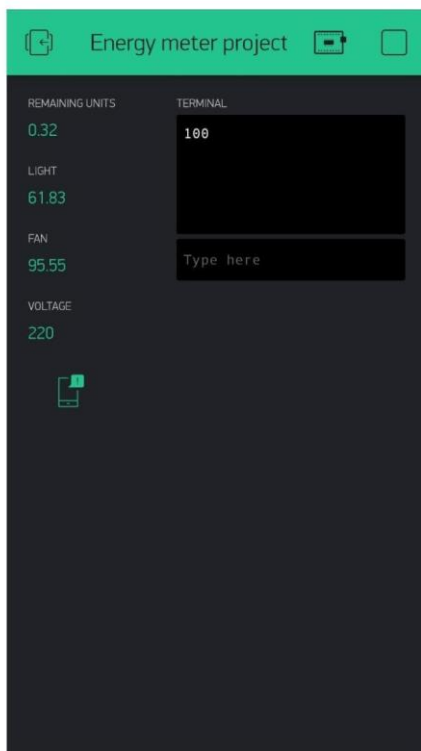
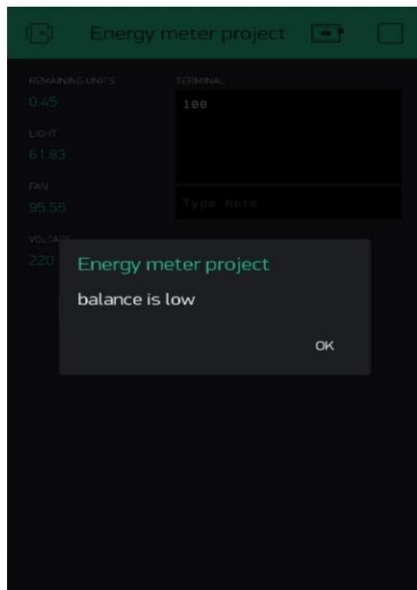


Fig- 3.3 Blynk app

We can decide Prepaid or Postpaid by switching the sw3 switch. Output 1 is prepaid and output 2 is postpaid.

STEP: 4

When the supply of the fan and light is on it will start to consume power. Remaining units and watts used by fan and light will be displayed in the blynk app .

STEP: 5

As Balance is low we have to Recharge. We can recharge by typing the amount in the blynk app.

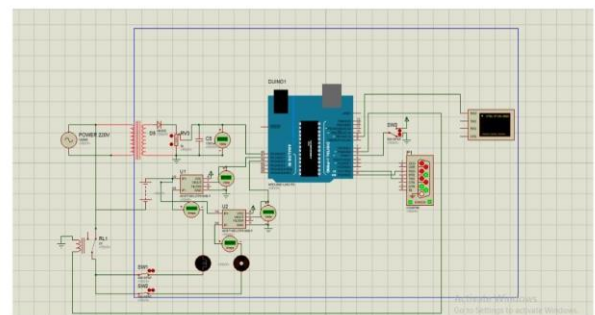


Fig- 3.4 Process flow

Overall simulation of the project is given below.

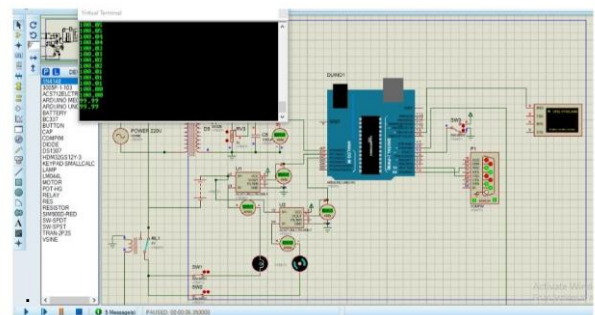


Fig- 3.5 overall simulation

3. CONCLUSIONS

This project work exposes the aim of energy monitoring and controlling by implementing a prepaid system. Smart energy meters will bring an answer of making awareness of unnecessary wastage of power and can tend to scale back wastage of power. it's hoped that this work helps the consumers for better energy management and its utility within the distribution system for economic liability of the Electrical Boards.

Thus the planning and simulation of a part of our project is completed. And also implemented the hardware part also. Actually the expected output came. Next we aim to implement it in a real time application.

4. FUTURE SCOPE

PREPAID ENERGY METER can facilitate improved income management in energy utilities and may reduce problems related to billing consumers living in isolated areas and reduce deployment of manpower for taking meter readings. Every consumer can recharge by their ID assigned and recharge its meter at various ranges(i.e. Rs 50, Rs 100, Rs 200 etc.).Consumer can check its balance within the LCD attached with the module and be prepared for the following recharge before. Radio-frequency identification (RFID) is an automatic identification method, looking forward to storing and remotely retrieving data using devices called RFID tags or transponders. An RFID tag is an object which will be applied to or incorporated into a product, animal, or person for the aim of identification and tracking using radio waves. Some tags will be read from several meters away and beyond the road of sight of the reader.

REFERENCES

- [1] Lešek Franek & Petr Fiedler “Prepaid energy meter in smart metering “ The International of Automatic control September 25-27 , 2013.
- [2] W.D.A.S. Rodrigo, H.K.I.S. Lakmal, N.S. Roshani, S.W.M.G.S. Samarakoon, and S.S. Samararatne “A Prepaid Energy Meter Using GPRS/GSM Technology For Improved Metering And Billing” International Journal of Computer Science and Electronics Engineering
- [3] Kumarsagar M.Dange, Sachin S. Patil, Sanjay P. Patil “Prepaid Energy Meter using GSM Module” International Journal of Engineering Science Invention ISSN (Online): 2319 – 6734.
- [4] K. Sheelasobanarani, S. Raja, K. Raja “A Prepaid Energy Meter for Efficient Power Management “ Published 2014
- [5] Suresh Sankaranarayanan “Application of Intelligent Agents in Wireless Prepaid Energy Meter” I.J. Intelligent Systems and Applications, 2016, Published Online March 2016