ISSN: 2278 – 7798
International Journal of Science, Engineering and Technology Research (IJSETR)
Volume 5, Issue 10, October 2016

ENERGY EXCHANGE BETWEEN E-V LOAD AND RENEWABLE ENERGY SOURCES

Ghousia Fatima[1] and Zeenath[2]

[1]*Graduate Student, Nawab Shah Alam Khan College of Engg and Tech, Hyderabad, INDIA.*

[2]*Associate Professor, Nawab Shah Alam Khan College of Engg and Tech, Hyderabad, INDIA.*

Abstract: **In the proposed paper, a novel approach to energy exchange between Electric Vehicle (EV) load and wind generation utilities participating in the day-ahead energy, balancing, and regulation markets has been implemented. Here, we are using ARM micro controller which is interfaced with DC motor and LCD. Vehicle gets supply from battery which is charged from renewable source (wind). Vehicle is controlled through switches. Controller needs 5V DC supply. GSM is used to emergency intimation with GPS location for control section such as battery drain status. Control section will again reply to vehicle section for wind mill areas which is supplied from power supply module. The output status is monitored on LCD.**

Keywords: ARM microcontrollers, GSM, GPS, Electric vehicle.

I. INTRODUCTION

In the proposed paper, a novel approach to energy exchange between Electric Vehicle (EV) load and wind generation utilities participating in the day-ahead energy, balancing, and regulation markets has been implemented. An optimal bidding/offering strategy model is developed to mitigate wind energy and EV imbalance threats, and optimize EV charging profiles. A new strategy model is based on optimizing decision making of a Wind Generating Company in selecting the best option among the use of the balancing or regulation services, the use of the Energy Storage System (ESS) and the use of all of them to compensate wind power deviation. Energy imbalance is discussed using conventional systems, ESS, and EV-Wind coordination; results are compared and analyzed. Stochastic intra-hour optimization is solved by Mixed-Integer Linear Programming (MILP). Uncertainties associated with wind forecasting, energy price and behavior of EV owners based on their driving patterns are considered in the proposed stochastic method and validated through several case studies.

II. EXISTING SYSTEM

Here, electric vehicle is charged from grid supply. The system gets supply from non-renewable energy sources.

Disadvantages of Existing system:

- High cost
- Using non-renewable energy.

III. IMPLEMENTED SYSTEM

In Implemented system, we can design a new system to exchange the supply from renewable source to vehicles. In the implemented system, we are using ARM micro controller which is

interfaced with DC motor and LCD. Vehicle gets supply from battery which is charged from renewable source (wind). Vehicle is controlled through switches. Controller needs 5V DC supply. GSM is used for emergency intimation with GPS location for control section such as battery drain status. Control section will again reply to vehicle section for wind mill areas which are also supplied from power supply module. Output Status is monitored on LCD.

IV. PROJECT DESCRIPTION

Control Section:

Figure1: Control Section

V. HARDWARE REQUIREMENTS

Power Supply
Transformer
Rectifier
Bridge Rectifier
Voltage Regulators
Advanced RISC Machine (ARM7)
On-Chip Flash Program Memory
On-Chip Static RAM
Memory Map
Interrupt Controller
Crystal Oscillator
Reset and Wake-Up Timer
External Interrupt Inputs
Memory Mapping Control
Power Control
Battery
Liquid Crystal Display (LCD)
Relay
Rectifier
SPDT (Single Pole Double Through)
Load
Grid Supply
Wind Power Generator
GSM (Global System for Mobile Communications)
GPS (Global Positioning System):
DC Motor
Buzzer.

VI. SOFTWARE REQUITEMENTS

Keil Software
µvision3.

VII. IMPLEMENTATION

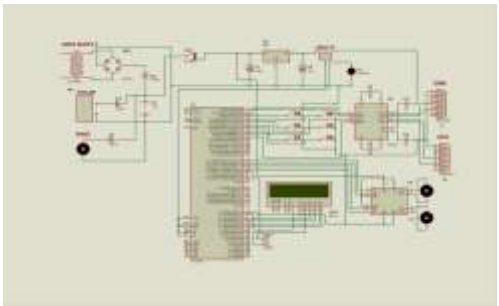

Figure2: Schematic Diagram of Energy Exchange
Working principle of energy exchange between electric vehicle load and wind generating utilities:

In the implemented system, a new system to exchange the supply from renewable source to vehicles has been designed. Here, a system having three sources of power supply mainly solar, wind power generator and grid power supply has been developed. The implemented system greatly helps us to save our money.

All the mentioned power supply sources are connected with the battery which centrally stores the electric charge gain from the various sources of power supply. With the resultant output voltage of the battery, load can be operated continuously using ARM Microcontroller which is interfaced with DC motor and LCD. So DC motor is operated through Microcontroller by using Driver circuit L293D which will supply the enough voltage required to run the DC motor which is 12V and as robot mechanism required two motors, these two are connected to L293D IC of output pin OUT1 OUT2 OUT3 OUT4 and Inputs are connected to microcontroller IN1 IN2 IN3 IN4 to ARM7 pin for operating the motor in clockwise and anti clockwise direction i.e. Forward and Reverse direction of vehicle. Vehicle gets power supply through battery which is charged from renewable source (wind and solar here). Wind turbine mechanism has a motor from which EMF will be collected and generated voltage will be stored in battery. Solar energy is collected by using solar panel based on the sun radiation collected by the Photo Voltaic cells and Electrical Energy is generated. Similarly, in the day time, the solar power will be collected and stored in the battery. Vehicle is controlled through four switches. Voltage sensing unit is used to monitor the battery status, Continues monitoring of battery will be shown on LCD and if battery low condition occurs, message will be sent to backup team for assistance for location tracking. GPS is used for tracking and for sending message GSM Modem is used. So as ARM7 consists of two serial communications, UART0 and UART1, GPS and GSM are connected through UART0 and UART1 respectively.

Electric vehicle without renewable sources:

Figure3: Complete Model of electric vehicle without Renewable Energy

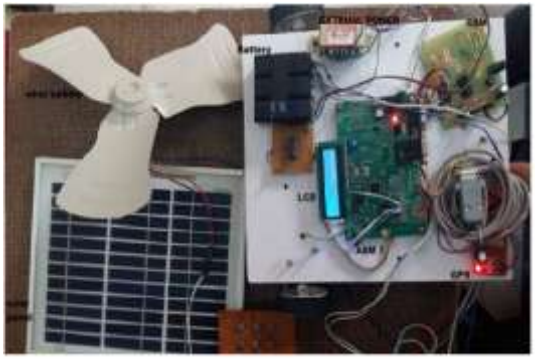

Figure4: Complete Model of Electric Vehicle with Renewable Sources with Labeling

Figure5: Battery Alert Status

Figure6: Vehicle Tracking System Using GPS Coordinates

Advantages:

1) Multi –sources of battery charge

2) It is inexhaustible i.e., it never runs out

3) It requires less maintenance

4) Human intervention is less

5) Easy to implement and low cost technique

6) Fast response

7) Eco-friendly.

Applications:

1) It is used in on road ways

2) Continuously operates load without break

3) Operates the load with battery storage

4) Less impact on the natural environment

5) Healthy environment and improved productivity

6) Reduced risks and reliability.

Future scope:

In Future, civilization will be forced to conduct research and develop alternative energy sources. Our current rate at fossil fuel usage will lead to energy crisis this century. In order to avoid the energy crisis, many companies in the energy industry are inventing new ways to extract energy from renewable sources. While the rate of development is slow, mainstream awareness and government pressures are growing. Further, taking care of environment in future this technique can be applied in automobile with the help of which air pollution can be reduced.

VIII. CONCLUSION

In this paper we have shown that PEVs can substantially improve power grid transient stability by designing a control strategy that regulates the power output of a fleet of PEVs based on the speed of generator turbines. The control strategy has been successfully tested. By regulating the power output of the PEVs, we have shown that speed and voltage fluctuations following a large disturbance can be significantly reduced up to 80% and the critical clearing time can be extended by 20–40%. Future work will focussed on a more general control strategy that can cope with different PEV penetration scenarios.

Although there are many benefits of V2G systems, including the improved transient stability suggested in this paper, the V2G concept faces several challenges that should be addressed before the V2G technology becomes widely accepted. The increased number of PEVs may impact power distribution system dynamics and performance through overloading of transformers, cables, and feeders. Other barriers to the V2G transition include investment cost, resistance of automotive and oil sectors and customer acceptance. Two biggest challenges are battery technology (PEV batteries should have an extended cycle life, use lower cost and lightweight materials, and be more efficient) and fast and reliable two-way secure communication infrastructure network, which is needed to enable V2G technology. Nevertheless, we believe that the V2G concept has bright future as two large energy conversion systems, namely the electric

utility system and the light vehicle fleet, which initially were developed separately will merge at some level in this century.

ACKNOWLEDGMENTS

Ghousia Fatima is thankful to Zeenath and others for their support in publishing this paper.

Zeenath is thankful to Ghousia Fatima for preparing this paper.

REFERENCES

[1] Uwe Albrecht: Hydrogen as storage option in the energy system of the future, Presentation, Ludwig-Bölkow-Systemtechnik GmbH, 10th annual meeting of the network for fuel cells andhydrogen (NRW), 9 Dec 2010.

[2] T. B. Atwater and Arthur Dobley, Metal/Air batteries, Lindens Handbook of Batteries, 2011, ISBN 978-0-07-162421-X.

[3] N.N.: Bath County Pumped Storage. Civil Engineering, ASCE, 55 (7), pp. 55, 1985.

[4] The Boston Consulting Group: Revisiting Energy Storage, Report, Feb 2011.

[5] Electric Power Research Institute: Electric Energy Storage Technology Options White Paper, 2010.

[6] International Energy Agency: Prospects for Large Scale Energy Storage in Decarbonised Grids, Report, 2009.

[7] Simon Schwunk: Battery systems for storing renewable energy, Report, Fraunhofer-Institut fürSolare Energie, April 2011.

[8] P. Schossig: Thermal Energy Storage, 3rd International Renewable Energy StorageConference, Berlin/Germany, 24-25 November 2008.

[9] Webpage CSP Today: http://social.csptoday.com/industry-insight/direct-steam-generationparabolic-troughs-what-does-endesa-dlr-have-store,Accessed 4 Aug 2011.

[10] Webpage Enertrag: https://www.enertrag.com/en/project-development/hybrid-power-plant. html, Accessed: 8 Aug 2011.

[11] P. Fairley: http://spectrum.ieee.org/energy/environment/largest-solar-thermal-storage-plant-tostart-up, Article 2008, Accessed 27 July 2011.

[12] Webpage Active Power, Inc.: http://www.activepower.com, Accessed: 8 Aug 2011.

[13] U.S Department of energy .Building Energy Data Book.