Dynamic Power Generation and Control from Hybrid Wind-Solar and Foot Step Stand Alone System.

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Abstract— The renewable energy source such as wind is available in remote areas. However, power from the wind is fluctuating and weather dependent. Therefore, they can be used as a standalone power supply source for an isolated community. This paper aims to implement hybrid power generation in which each power generating system will be standalone. In this paper, a complete analytical methodology has been presented for three power source. Technical optimization is enhanced by adding the Battery back up for the storage of photovoltaic power where the electrical energy gained is stored in the battery and when the light intensity is low, energy is consumed from the battery. Next Pitch angle is added to provide 360 degree movement for the PV system. So the PV system can sense the light intensity using LDR (Light Depending Resistor) sensor and based on the intensity level the stepper motor moves the system to the direction. For Economic optimality voltage monitoring circuit is used to monitor the voltage gained by the PV system in each direction. Next the Foot step is designed mechanically i.e., suspension system will be placed in each steps or plain surface and when the footwear is pressed the system will move ups and down to create the mechanical energy. Chain track will be connected between the gearing system and DC motor. When it is pressed the DC motor will start rotating and produce the electric power which is stored in the battery for particular load to be operated. The Voltage monitoring circuit is placed to monitor the voltage level of the battery and transmit the signal to the controller part that would indicate the level of battery. The last phase will wind power Generation generated by wind alternator. Power generated by each source is stored in the battery and power is analyzed. When the voltage generated by any of the source is not up to the set point other source energy must be compensated.

Index Terms— Microcontroller, Relay, Stepper Motor, Solar Panel, Wind-Setup.

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1 INTRODUCTION

In the Last few years, there has been an increasing demand for low power energy sources due to the development and mass consumption of electronic devices. Furthermore, the energy sources must be associated with environmental issues and imposed regulations. Electricity produced from the wind produces no CO2 emissions and therefore does not contribute to the greenhouse effect. Wind energy is relatively labor intensive and thus creates many jobs. Solar energy in turn is available in surplus; especially in India we have solar power for 3/4th in a year. We take the responsibility of utilizing the renewable resources in our day to day life routine by this footpath power generation.

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2. EXISTING SYSTEM

The use of piezoelectric polymers in order to harvest energy from people walking and the fabrication of a shoe capable of generating and accumulating the energy. An electrostatic generator was also included in order to increase energy harvesting. A thin-film rechargeable lithium battery can be used to store the energy generated. In particular, electro active polymers are particularly interesting due to their low cost, flexibility, and easy integration into elements such as clothes and shoes. In this paper, electro active polymers based on β-PVDF have been used in order to fabricate an energy-harvesting system fully integrated into the sole of a shoe. The static electricity charged when walking is synchronized with the walking steps. As a basic study, they investigate the relationship between the feet and the floor. The walking motion led to electrical charging and discharging due to triboelectricity by friction between the feet and ground upon contact and when a foot was raised off the ground.

3. PROPOSED SYSTEM

As days moves on the technological growth of the nation is getting increases which in turn provides new application for people. Increase in such application increases the power needs. Considering nations that are thickly populated like our country, the power consumption will be higher in

quantity. Power generation for such nation is quite complex. To match these requirements, when these nations use the renewable sources which are available in plenty will reduce the production cost and eco friendly. Solar and wind power generation are common and environment dependant sources. In case of foot path power generation, the power can be easily generated in case of people crowding areas such as shopping malls and railway stations. Foot path power generation may power even the entire building at which it is implemented. It is highly efficient at thick populated areas. In future commercial complexes will be powered by this method as it is cost efficient.

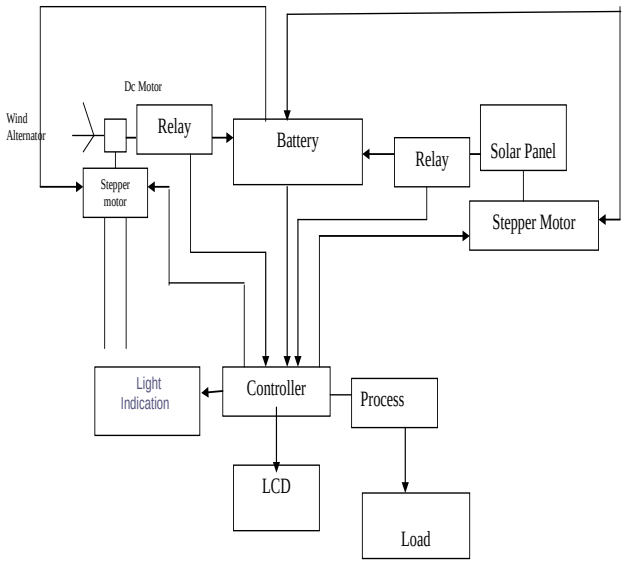
3.1 HARDWARE REQUIREMENTS

PIC Microcontroller
LCD
DC Motor
Solar Panel
Wind Turbine
Battery
Voltage Monitoring Circuit
Foot Step design

3.2 SOFTWARE REQUIREMENTS

Microsoft Xp
MPLAB
XCTU

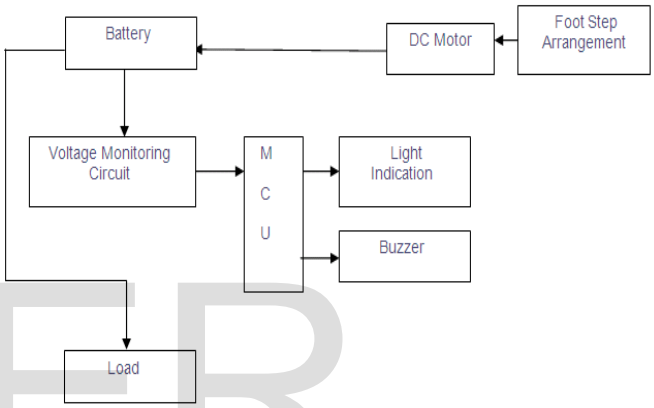
4. SOLAR AND WIND POWER GENERATION



4.1 DESCRIPTION

The Block comprise of two power sources like solar and wind power. Wind Alternator will absorb the wind power as it rotates with help of stepper motor with the pitch angle position. When Wind blade rotates the Dc motor will convert to electrical energy and transmit to the controller and battery source. The controller will monitor the position where more energy is received and rotate the wind blade to that direction using Stepper motor. The Stepper motor operations are controlled in the Controller section. The same process is repeated for the solar power which is operated with pitch angle and power transmitted to both controller and battery. The energy consumed in the battery is processed for the load. The Feedback from the load is sent to the controller to reduce the error rate.

5. FOOT STEP POWER GENERATION



6. BLOCK EXPLANATION

6.1 PIC MICROCONTROLLER

Only 35 single-word instructions to learn. All single-cycle instructions except for program branches, which are two-cycle. Operating speed: DC – 20 MHz clock input DC – 200 ns instruction cycle. Up to 8K x 14 words of Flash Program Memory, Up to 368 x 8 bytes of Data Memory (RAM), Up to 256 x 8 bytes of EEPROM Data Memory. Pin out compatible to other 28-pin or 40/44-pin PIC16CXXX and PIC16FXXX microcontrollers. Timer0: 8-bit timer/counter with 8-bit prescaler. Timer1: 16-bit timer/counter with prescaler, can be incremented during Sleep via external crystal/clock.Timer2: 8-bit timer/counter with 8-bit period register, prescaler and postscaler. Synchronous Serial Port (SSP) with SPI™ (Master mode) and I2C™ (Master/Slave) Universal Synchronous Asynchronous Receiver Transmitter (USART/SCI) with 9-bit address detection Parallel Slave Port (PSP) – 8 bits wide with external RD, WR and CS controls Brown-out detection circuitry for Brown-out Reset (BOR) Low-power, high-speed Flash/EEPROM technology 10-bit, up to 8-channel Analog-to-Digital converter (A/D)Analog Comparator module with: Two analog comparators Programmable on-chip voltage reference (VREF) module Programmable input multiplexing from device inputs & internal voltage reference

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6.1.1 FEATURES

- 100,000 erase/write cycle Enhanced Flash program memory typical
- 1,000,000 erase/write cycle Data EEPROM memory typical
- Data EEPROM Retention > 40 years
- Self-reprogrammable under software control
- In-Circuit Serial Programming™ (ICSP™) via two pins
- Single-supply 5V In-Circuit Serial Programming
- Watchdog Timer with its own on-chip RC oscillator for reliable operation
- Programmable code protection
- Power saving Sleep mode
- Selectable oscillator options
- In-Circuit Debug (ICD) via two pins

6.1.2 APPLICATIONS

- Industries
- Big malls
- Crowded place

6.2 STEPPER MOTOR

A stepper motor is a brushless, synchronous electric motor that can divide a full rotation into a large number of steps. The motor's position can be controlled precisely without any feedback mechanism, as long as the motor is carefully sized to the application. Stepper motors are similar to switched reluctance motors. For each half cycle alternate electromagnets are energized which in turn will generate power.

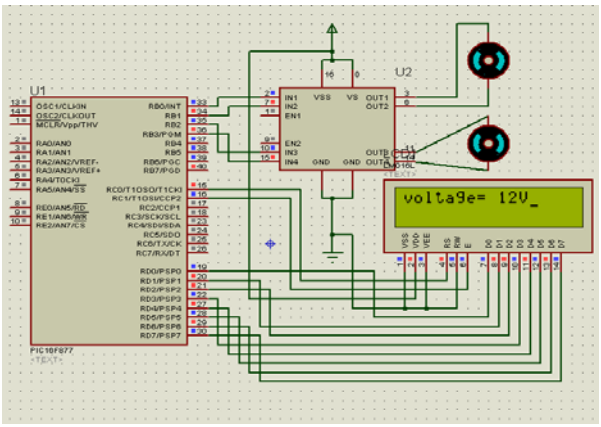
6.3 LDR SENSOR

LDRs are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms, but when they are illuminated with light resistance drops dramatically

7. PROS & CONS

- The battery is always fully charged because this system is a closed loop system.
- In this project we have to use all physical powers which are abundantly available.
- One of the disadvantages of our project is the price of wind turbine and it creates some noise when they produce electricity.

8. STIMULATED RESULT



8.1 INFERENCE FROM SIMULATION RESULTS

- Battery is charged continuously from renewable sources
- Input voltage from the source is displayed on LCD Screen
- When the input voltage is less than the threshold of the battery from one source, then an addition of voltage from the next source is done for a better output integrity
- When the input voltage is much higher than the upper threshold of the battery then any of the source is disconnected in-order to maintain a constant current flow.

CONCLUSION

This paper is studied and analyzed with all possibilities of wind, solar and Foot step generation. Mechanical design will be done for Foot step power Generation and wind turbine for wind power generation.

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