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Controlling and Monitoring of Hybrid Power Station using LabVIEW

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Abstract: Sustainable power source advancements range from the entrenched, for example, hydropower, to the developing a breeze sun oriented mixture framework. Every innovation has its own individual instrumentation necessities to quantify and control framework factors. The expansion of the new LabView module to the framework gives the truly necessary ongoing data on the framework factors, for example, wind speed, wind bearing, dc power, air conditioning power, air conditioning/dc voltages, and flows. This continuous information procurement framework is being utilized broadly to furnish the understudies with an active research center experience identified with electrical, gadgets, and instrumentation. In this paper, conversations on numerous parts of information securing, instrumentation, interfacing, and writing computer programs depend on a current 1.5 kW wind-sun based half breed power station.

Keywords: Hybrid power, LabView, Power station.

I. Introduction

Sustainable power source innovations range from the settled, for example, hydropower, to the developing, for example, a breeze sun oriented half and half framework. Every innovation has its own individual instrumentation prerequisites to gauge and control framework factors. Public Instrument's LabView information procurement equipment and programming model has gotten one of the most generally utilized devices to catch, view, and cycle controls, instrumentation, and force framework information both in the scholarly community and the business. Especially a few parts in the sustainable power source plants, for example, batteries and dc-to-air conditioning power inverters can prompt force quality and network strength issues when wind-sun based force frameworks are attached to petroleum product based turbine and generators. An existing 1.5 kW rated wind-solar hybrid power station is shown in Fig. 1 [1-3].

Fig. 1: Existing 1.5 kW Wind Solar Hybrid Power Unit Interface of the Wind Solar Power System

The goal is to change the six exploratory factors: DC voltage, DC current, AC voltage, AC current, wind speed, and wind course into a structure intelligible by the PC, show and store the outcomes continuously. The DC force and AC power should be determined and checked through the other foreordained factors utilizing LabView programming capacities. The sign molding equipment to condition and disconnect the voltage and wind data flags before being associated with the DAQ board will assume a huge part in the virtual instrumentation of the general framework. The instrumentation period of the breeze sun oriented force station incorporates the accompanying equipment: One CR4110-10 True RMS AC Current Transducer and one CR5210-50 DC Hall-Effect Current Transducer from CR Magnetics, voltage and momentum divider and scaling circuits, one breeze checking gadget called an anemometer, a LabView 6i Professional Development System for Windows NT/98, one PCI-6071E I/O Board, one NI-DAQ Driver Software, one SH 100100Protected Cable, SCSI-II Connectors,

one SCB-100 Shielded Connector Block, one disengagement enhancer circuit, and a PC A DMM and an oscilloscope to check the simple signs would likewise be helpful. Fig. 2 delineates a square chart of the general instrumentation framework [4-5].

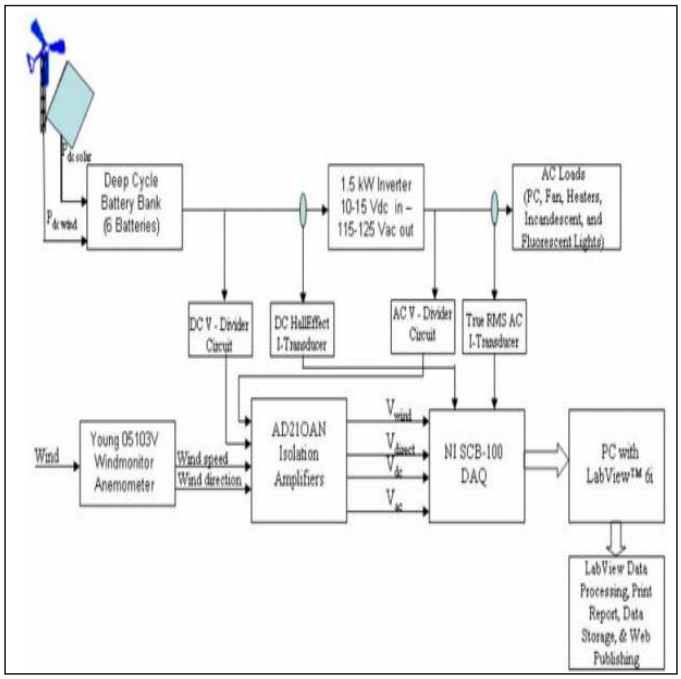

Fig. 2: Functional Block Diagram Overall Instrumentation System

DC voltage produced by four sun oriented boards and one breeze generator is applied to the battery bank. A Young 05103V Anemometer gives two voltage signals relating to wind speed and wind heading esteems. These breeze signals are taken care of to AD21OAN Isolation Amplifiers and the yield is applied to National Instrument's SCB-100 Data Acquisition Board (DAQ). Two voltage signals, one from battery yield and one from inverter yield are additionally applied to segregation intensifiers through their relating voltage divider-scaling circuits. Two current signs, one from battery yield through a DC Hall-Effect current transducer, and the other from inverter yield through one genuine RMS AC current transducer are taken care of legitimately to the DAQ board. The CR 5210-50 DC Hall impact current transducer may give 0-5.0 V DC to enter current of 0-50 A DC. Likewise, the CR 4110-10 AC current transducer may give a sign of 0-5 V DC for input current of 0-10 An AC. Fig. 3 portrays the inverter and AC load bank which incorporates a Pentium III PC, an assortment of energy-effective bright lights, a few brilliant lights, one electrical warmer, and a fan. The all out force rating of the AC loads is around 1400 W. The instrumentation framework essentially utilizes a PC whose force is provided by wind and sun oriented half and half framework. Fig. 4 portrays a CR4110-10 genuine RMS AC current transducer associated with inverter yield not long before the AC load bank. A circuit for a voltage divider and scaling reasons for existing is additionally appeared in Fig. 4. Additionally, a CR5210-50 DC Hall-Effect current transducer is appeared in Fig. 2 between the battery bank yield and the inverter input [6-9].

Fig. 3: AC/DC Loads in the Wind Solar Power Station and Data Acquisition to the Computer

Fig. 4: AC Voltage Divider and True RMS Current Transducer

II. Results and Discussion

Fig. 5 portrays the Virtual Instrument (VI) block chart where the source code for the particular VI for this work is created. The VI block charts incorporate information handling modules, and predefined numerical models, for example, adders, foundations, integrators, and so forth utilized in a blended methodology stage. In the square chart, there is a terminal for each item made in the front board. The DC/AC voltage and current, wind speed, and wind bearing should be perused continuously. A channel number is determined for every factor as appeared in Fig. 5. Since the perusing levels are restricted to 0-5 V, a scaling must be done to show the signs on their unique qualities in the LabView™ programming.

To see the showed waveforms in genuine reaches, the preconditioned signs require suitable alignment utilizing the math or potentially rationale work prospects accessible in LabView™ Fig. 6 portrays the front board of the information procurement VI for the time span of 5:15 pm to 5:32 pm.

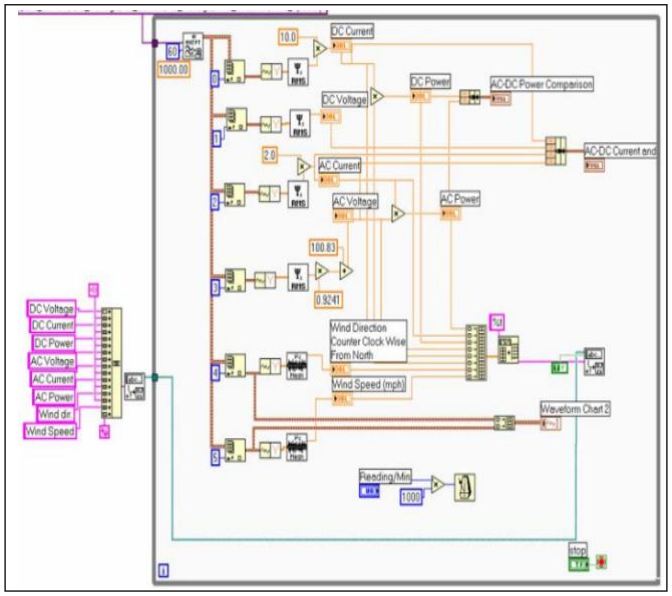

Fig. 5: Virtual Instrument (VI) Block Diagram

To view the displayed waveforms in actual ranges, the preconditioned signals require appropriate calibration using the arithmetic and/or logic function futures available in LabView™ Fig. 5 depicts the front panel of the data acquisition VI for the time period of 5:15 pm to 5:32 pm.

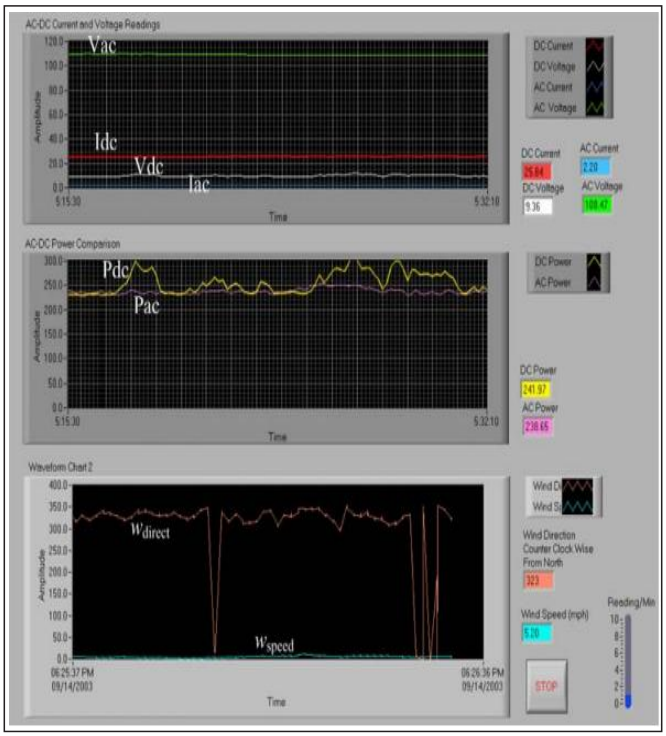

Fig. 6: Front Panel of the Data Acquisition Virtual Instrument

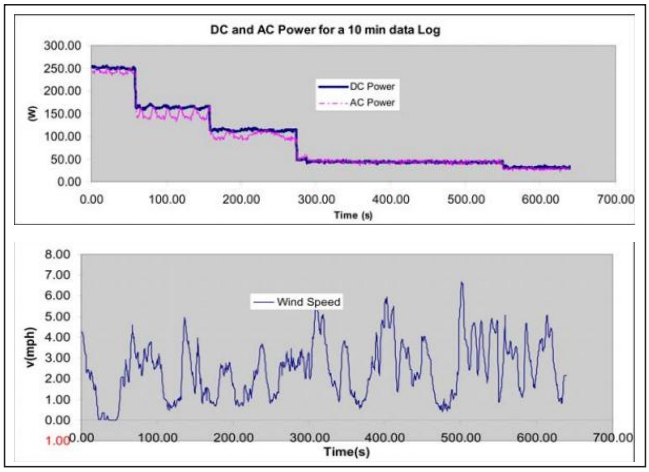

Fig. 7: PDC and PAC Waveforms for a 10 Min Time Period

As found in Fig. 7, the DC power has an estimation of 241.97 W while the AC power has an estimation of 238.65 W.

III. Conclusion

The advancement of an instrumentation and information securing of a breeze sunlight based half and half force station is introduced. LabView™ based instrumentation has created understudy intrigues both in customary and sustainable power source as seen in the classes and research centers. Any involvement with LabView additionally gets ready innovation for professions in the assembling business where various comparative graphical instrumentation apparatuses have assumed a noteworthy function in the information procurement zone. Likewise, it gives an extraordinary chance to the specialists to embrace practice-situated true lab ventures. Future work of this instrumentation task will include, checking sun powered cluster position, recording outside temperature, and imagining windmill speed versus dc power yield. This will empower us to watch numerical connections among sunlight based following, wind speed, and the dc power yield factors. Additionally, a few LabView-based information obtaining stations in the electrical force and hardware research centers will be created.

References

[1] J. H. Arthur, and M. R. Sexton, "LabView application: Energy laboratory upgrade," *Proceedings of the 2002 American Society for Engineering Education (ASEE) Annual Conference & Exposition*, Session 3233, 2002.

[2] R. H. Bishop, *Learning with LabView 6i*. Prentice Hall, Upper Saddle River, NJ, 2001.

[3] N. Ertugrul, *LabView for Electric Circuits, Machines, Drives, and Laboratories*. Prentice Hall PTR, Upper Saddle River, NJ, 2002.

[4] H. Franz, "Use of LabView™ software for virtual instrumentation technology," *Proceedings of the 2003 American Society for Engineering Education (ASEE) Annual Conference & Exposition*, 2003.

[5] R. Hennessey, H. Loya, B. Diong, and R. Wicker, "Using LabView to develop an automated control system," *NI Instrumentation Newsletter*, Special Academic Edition, 2001. [Online]. Available: http://www.nemesis-online.it/newsletters/Academic%20Newsletter%201%202001.pdf

[6] M. L. Higa, D. M. Tawy, and S. M. Lord, "An introduction to LabView exercise for an electronics class," *Proceedings of 32nd ASEE/IEEE Frontiers in Education Conference*, Session T1D-13, 2002.

[7] C. D. Johnson, *Process Control Instrumentation Technology*, 7th ed. Prentice Hall, Upper Saddle River, NJ, 2003.

[8] N. Kiritsis, Y. W. Huang, and D. Ayrapetyan, "A multipurpose vibration experiment using LabView," *Proceedings of the 2003 ASEE Annual Conference & Exposition*, Session 1426, 2003.

[9] M. Kostic, "Data acquisition and control using LabView™ virtual instrument for an innovative thermal conductivity apparatus," *Proceedings of Virtual Instrumentation in Education 1997 Conference*, MIT, Jun. 12, 1997, pp. 131-136.