WSN BASED WIND POWER BOOSTING SYSTEM USING LABVIEW

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Abstract: The objective of the system is to reduce or get rid of the dependence on grid electricity or to reduce their carbon footprint. Wind generators have been used for house hold electricity generation in conjunction with battery storage space over many decades in remote areas. In general wind energy is not a regular source of energy. It varies continually and gives energy in abrupt bursts. In the existing system entire energy has out in just of the operating time since wind strengths varies and so cannot guarantee for continuous electric power. To overcome these difficulties Wireless Sensor Network (WSN) based system is proposed with KALMAN selection algorithm. In this system a wind mill continually monitored through LabVIEW software which is connected with Voltage and Current sensors rating also the running velocity in the wind motor is computed by employing ultrasonic Speed sensor in wind Motor. In the proposed system wind motor will continuously run without holding off power even in low air flow strength and it hook up with wind mill by displaying the computed values to the CU for controlling operation. As a result more power consumption can be minimized.

IndexTerms - Wireless Sensor Network (WSN), Laboratory Virtual Instrumentation Engineering Workbench (LABVIEW), Control Unit (CU).

I. INTRODUCTION

Besides the power system operation constraints induced by the renewable power sources availability, there is an additional issue that should be taken into account. This issue is the power unbalance between power generation and demand, resulting from the coincidence of the higher availability of renewable sources(wind power, for instance) with the periods of lower demands. Positive power unbalances correspond to an excess of generation, while negative power unbalances corresponds to a generation shortage. Positive power unbalances can occur in power systems with high penetration of non-dispatch-able renewable power sources, like wind power.

High hydro power availability and the minimal spinning reserve of the thermal power units also contribute to the occurrence of positive power unbalances. Negative power unbalances only occur in moments when the available power capacity is not enough to cover all the power demands needs. The main goal is to achieve maximum stored energy usage while protecting from dangerous conditions like overcharge and high discharge. This is performed while accounting for ambient conditions and high currents. At the border between the simulated and real domains lay predefined interfaces which merge information coming from both sides which result in action upon the device under test. In our particular case, we achieve realistic charging and discharging conditions for renewable energy storage. As both methods are usually imprecise to a certain degree, more advanced methods like the applications of Kalman filtering to predict the SOC based on noisy measurements and uncertainties have been developed.

2. EXISTING TECHNOLOGIES

The wind mill energy will be abundant in certain days and remain low for long period. In the existing system the wind mill generator is turned in the direction of strong wind force for continuous energy harvesting it involves a complexity in design and control. In our system wind motor is coupled with a generator for continuous generation. KALMON filter algorithm is implemented in LabVIEW. In this approach, tracking becomes much faster than using the generic & observe algorithm in case of sudden weather changes.

3. PROPOSED SYSTEM

The proposed system of our project is to continuously generate energy from the wind mill. The current sensor is used to acquire the amount of current provided to the motor. The voltage sensor is used to acquire the amount of voltage generated in the generator. The ultrasonic sensor is used to calculate the speed of the rotating wings. The information will be transmitted through the WSN transmitter.

4. HARDWARE AND SOFTWARE

This data is transmitted efficiently and smoothly to receiver end through wireless Sensor Network. The AT89S32 Microcontroller at the transmitter end is so programmed that if the monitoring parameters of industrial machine come out of the desired or safety limit, a signal will be generated by the Microcontroller which will energize the relay circuit to trip the supply into standby machine. If Standby machine starts run, automatically the parameter of standby machine also monitored. If fault occurs in both machines the contractor cuts the mains supply to the industrial machine.

The data received at the receiver end is transferred to computer system through LabVIEW Software. Thus a continuous monitoring of the parameters of industrial machine can be done from a remote location far away from the actual working location. If the user anytime wants to Start or stop the industrial machine, a signal will be given by the computer system present at the receiver end, which is communicated at the transmitter end.

In turn the Microcontroller unit present at plant location generates a signal which energizes and de-energizes the relay circuitry to stop and start the industrial machine respectively.

5. BLOCK DIAGRAM:

The Serial Interface Node for WSN features one RS232 port to interface with serial sensors, instruments, and control boards. Using the LabVIEW WSN Node and the LabVIEW Serial Compatibility API, can deploy graphical code to embed command, query, and parse algorithms to the node, which creates a local, autonomous communication loop between the node and the serial device. With deployed LabVIEW WSN code, can analyze local data, respond to digital value or network status changes, and perform local control of the digital I/O lines. The digital I/O lines feature industrial ranges and support input, sinking output, and sourcing output. The Serial Interface Node for WSN also features a sensor power output channel and can be used to deliver power to external devices or sensors.

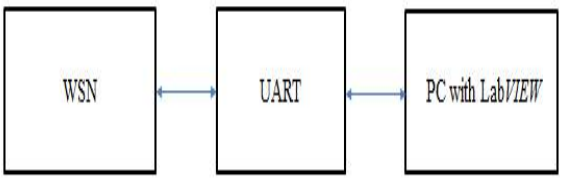

Fig.1.Monitoring unit

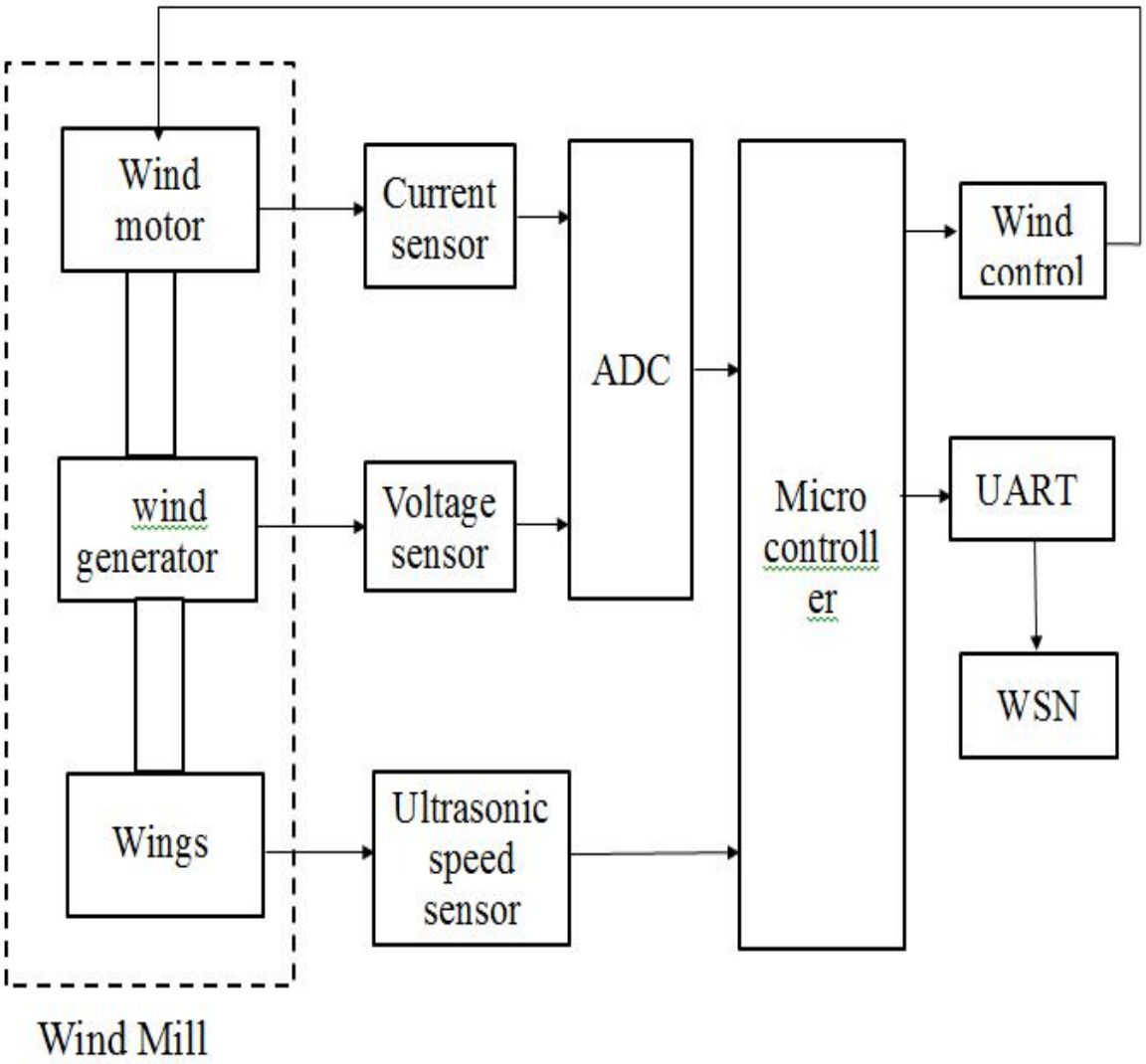

Fig.1.Controlling unit

The power supply is provided to the wind motor so that the current is measured using current sensor. The voltage is generated in the generator is measured using voltage sensor. The speed of the wings is measured using ultrasonic sensor. The output from the current and voltage sensor is provided to the analog to digital converter because the microcontroller accepts only the digital values.

The output of the ultrasonic speed sensor is provided to the microcontroller .those values are processed and the output values are given to the UART. The UART coverts parallel into serial bits. The bits are transmitted to the space through WSN .on the other side the WSN is used to receive the transmitted signal and the UART covert serial to parallel bits. Finally, the values are monitored by the LabVIEW software in the pc. The control operation is done in the microcontroller and the control unit controls the operation.

MICRO CONTROLLER:

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the Indus-try-standard 80C51 instruction set and pin out.

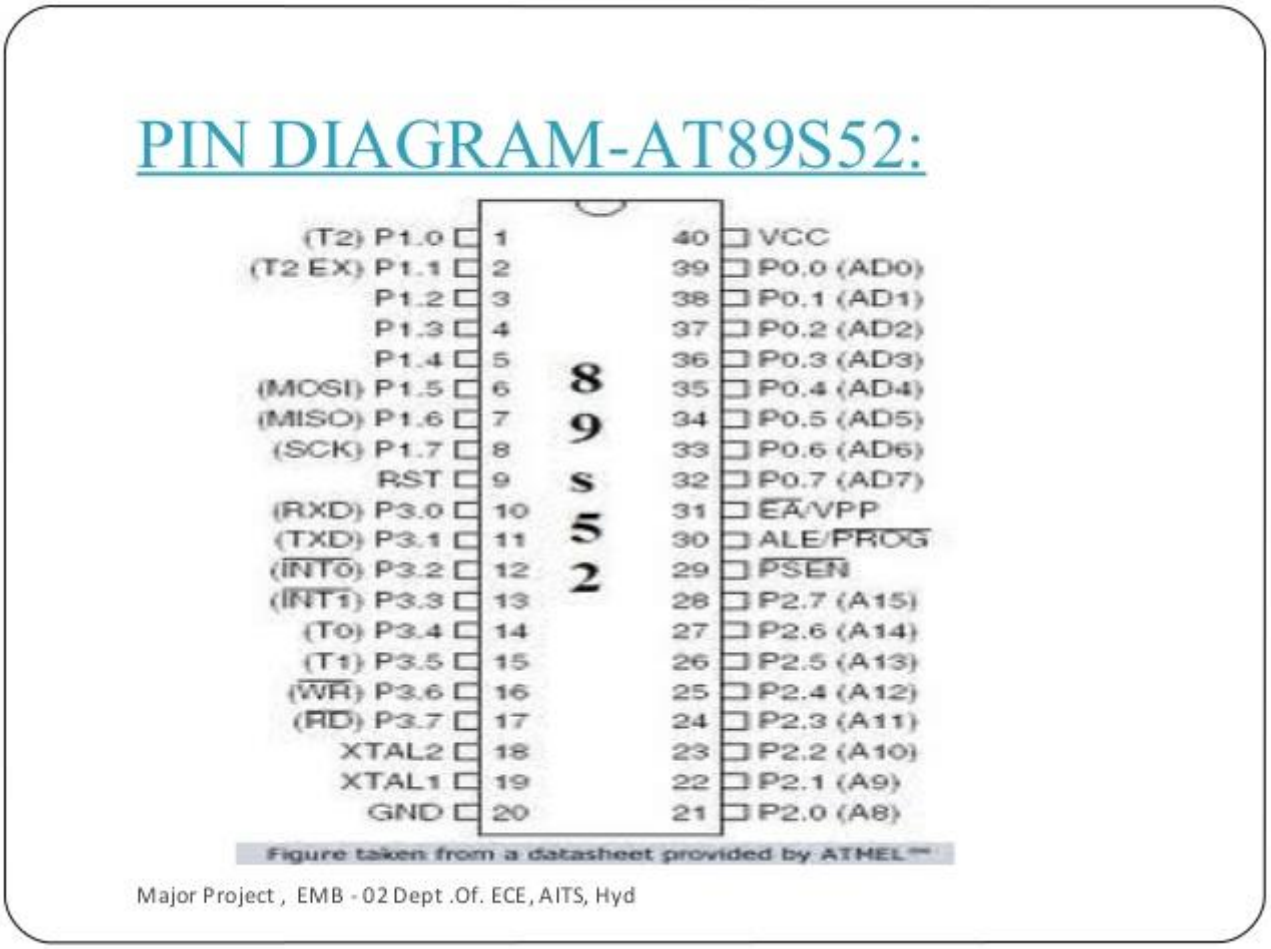

Fig.1.Pin Diagram of AT89S32 Microcontroller

ADC:

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the Indus-try-standard 80C51 instruction set and pin out.

VOLTAGE SENSOR:

Sensors often create voltages in different ranges than those required by the controllers they are being interfaced to which requires the conversion of one voltage to another. This conversion often breaks down into a combination one or more of three types, amplification, dividing, and shifting. Voltage dividing is probably the easiest transformation you can perform on sensor outputs to alter the value being connected to a microcontroller or other circuit.

RELAY:

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal.

POWER SUPPLY:

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

WINDMILL:

A wind turbine is a device that converts kinetic energy from the wind, also called wind energy, into mechanical energy; a process known as wind power. If the mechanical energy is used to produce electricity, the device may be called a wind turbine or wind power plant. If the mechanical energy is used to drive machinery, such as for grinding grain or pumping water, the device is called a windmill or wind pump

CONCLUSION

The research paper "WSN based wind power boosting system using LabVIEW" makes the electric power available throughout the year without congestion. In the existing paper, the wind mill is turned according to the direction of air force. But if there is no air force the wind mill cannot able to perform the operation. In this paper, the wind motor is simulated by the power supply which is attached externally. So that the electric power obtained throughout the year is partially constant. This is done with the help of the LabVIEW software with the KALMAN filtering coding.

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