



# WSN BASED WIND ENERGY HARVESTING USING LAB VIEW

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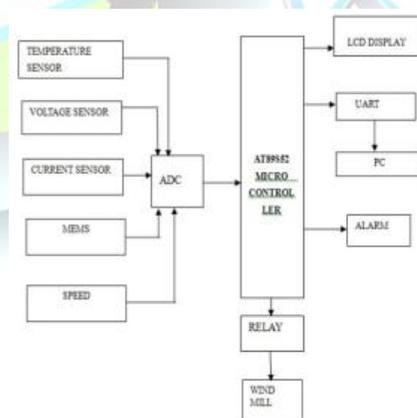
## ABSTRACT

This system is used to reduce or get rid of the dependence on grid electricity for economical reasons. Wind generators have been used for house hold electricity generation in conjunction with battery storage space over many decades in remote areas. In mainly wind energy is not a regular source of energy. It varies continually and gives energy in abrupt bursts. Wind strengths vary and so cannot guarantee continuous electric power and cannot predict damage in wind mill. In this system a wind mill continually monitors. The voltage sensor and current sensor are used to monitor the voltage that currently reaches the wind mill also to compute the velocity running in the Wind Motor. An ultrasonic speed sensor is employed in wind motor. When air flow is low at that time wind motor will automatically run without any delay, power will continuously run towards wind mill. Using MEMS sensor we can find the direction of blade so that it is used to detect the wind mill rotation.

## 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-dispatchable 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.

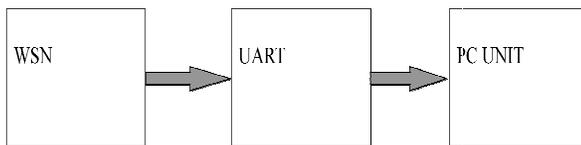




WIND ENERGY MONITORING

Pin configuration:

WIND CONTROL UNIT:



40-lead PDIP

(T2) P1.0	1	40	VCC
(T2 EX) P1.1	2	39	P0.0 (AD0)
P1.2	3	38	P0.1 (AD1)
P1.3	4	37	P0.2 (AD2)
P1.4	5	36	P0.3 (AD3)
(MOSI) P1.5	6	35	P0.4 (AD4)
(MISO) P1.6	7	34	P0.5 (AD5)
(SCK) P1.7	8	33	P0.6 (AD6)
RST	9	32	P0.7 (AD7)
(RXD) P3.0	10	31	EA/VPP
(TXD) P3.1	11	30	ALE/PROG
(INT0) P3.2	12	29	PSEN
(INT1) P3.3	13	28	P2.7 (A15)
(T0) P3.4	14	27	P2.6 (A14)
(T1) P3.5	15	26	P2.5 (A13)
(WR) P3.6	16	25	P2.4 (A12)
(RD) P3.7	17	24	P2.3 (A11)
XTAL2	18	23	P2.2 (A10)
XTAL1	19	22	P2.1 (A9)
GND	20	21	P2.0 (A8)

HARDWARE DESCRIPTION

Microcontroller(AT89S52) :



AT89s52 MICROCONTROLLER

Atmel's has high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out.

Features:

- Compatible with MCS®-51 Products.
- Fully Static Operation: 0 Hz to 33 MHz.
- Three-level Program Memory Language.8
- 256 x 8-bit Internal RAM.
- 32 Programmable I/O Lines.
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ADC 0808/0809:

The ADC0808, ADC0809 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and microprocessor compatible control logic



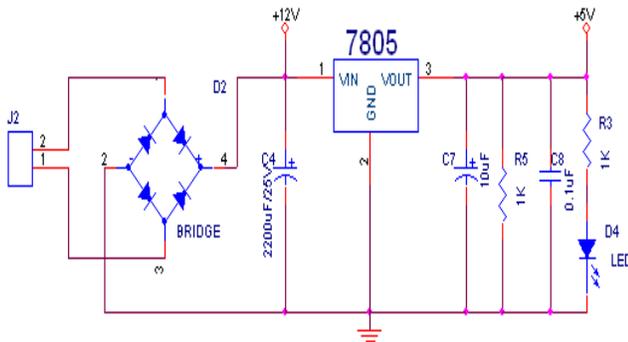
FIG 3.7 PIN DIAGRAM OF ADC

Features:

- Easy interface to all microprocessors.
- Operates ratio metrically or with 5 VDC or analog span.
- Adjusted voltage reference.
- No zero or full-scale adjust required.
- 8-channel multiplexer with address logic.
- 0V to 5V input range with single 5V power supply.
- Outputs meet TTL voltage level specifications.



### VOLTAGE SENSOR :



The interface of various sensors to a controller like the brain stem GP 1.0 module typically involves either conditioning or converting voltage levels into the range the controller requires. Many systems use A/D converters to make the sensor value relevant in a program or data logging configuration. These converters have a fixed range of voltages they can convert from with 0-5V being by far the most common. 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, division, shifting.

### 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.

### DC motor principles.

DC motors consist of rotor-mounted windings (armature) and stationary windings (field poles). In all DC motors, except permanent magnet motors, current must be conducted to the armature windings by passing current through carbon brushes that slide over a set of copper surfaces called a commutator, which is mounted on the rotor. The commutator bars are soldered to armature coils. The brush/commutator combination makes a sliding switch that energizes particular portions of the armature, based on the

position of the rotor. This process creates north and south magnetic poles on the rotor that are attracted to or repelled by north and south poles on the stator, which are formed by passing direct current through the field windings. It's this magnetic attraction and repulsion that causes the rotor to rotate.

### WIND MILL

It 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. Similarly, it may be referred to as a wind charger when used for charging batteries.

The result of over a millennium of windmill development and modern engineering, today's wind turbines are manufactured in a wide range of vertical and horizontal axis types. The smallest turbines are used for applications such as battery charging or auxiliary power on boats; while large grid-connected arrays of turbines are becoming an increasingly important source of wind power-produced commercial electricity.

### APPLICATION:

Windmills are generally used to harness power of wind to perform mechanical work as well as generation of electricity. Applications of windmills are as follows –

- Large Scale Electric Power Generation- Huge numbers of windmills are installed on a single site called as wind farms to produce large scale electric power from wind. Small Scale Electric Power Generation- Single windmill can be installed in remote locations to produce electricity, where connection to the general electric network is not available
- Pumping Water for Irrigation- Windmill is used for pumping of water from the well for agricultural purposes.

### WSN :ZIGBEE

Zig bee is a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4-2003



standard for wireless personal area networks (WPANs), such as wireless headphones connecting with cell phones via short-range radio. The technology defined by the Zigbee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth. Zigbee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking.

#### **4.8.1 Features of Zigbee MRF24J40MA:**

- ✓ Supports Zigbee®, MiWi™, MiWi™ P2P and
- ✓ Proprietary Wireless Networking Protocols
- ✓ Small Size: 0.7" x 1.1" (17.8 mm x 27.9 mm),
- ✓ Surface Mountable
- ✓ Integrated Crystal, Internal Voltage Regulator.

#### **CURRENT SENSOR**

A current sensor is a device that detects electrical current (AC or DC) in a wire, and generates a signal proportional to it. The sensed current and the output signal.

#### **SPECIFICATIONS:**

Ambient temperature: -40°C to +85°C  
Storage temperature component: -40°C to +85°C  
Packaging trays: -40°C to +80°C  
V out tolerance ±10%

#### **ULTRASONIC SENSOR:**

Ultrasonic sensors (also known as transceivers when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. This technology can be used for measuring: wind speed and direction (anemometer), fullness of a tank and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure the amount of liquid in a tank, the sensor measures the distance to the surface of the fluid.

#### **UART**

A universal asynchronous receiver/transmitter is a type of "asynchronous receiver/transmitter", a piece of computer hardware that translates data between parallel and serial forms. UARTs are commonly used in conjunction with other communication standards such as EIA RS-232. UART controller is the key component of the serial communications subsystem of a computer. The UART takes bytes of data and

transmits the individual bits in a sequential fashion. At the destination, a second UART re-assembles the bits into complete bytes. Serial transmission of digital information (bits) through a single wire or other medium is much more cost effective than parallel transmission through multiple wires. A UART is used to convert the transmitted information between its sequential and parallel form at each end of the link. Each UART contains a shift register which is the fundamental method of conversion between serial and parallel forms.

#### **SOFTWARE ANALYSIS**

##### **Introduction**

The main purpose of using the microcontroller in our project is because high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The programs of the microcontroller have been written in Embedded C language and were compiled using KEIL, a compiler used for microcontroller programming. The communication between PC and the microcontroller was established MAX 232 standard and those programs were also done in C language. The following programs are used at various stages for the mentioned function. Serial communication In this program, the various special function registers of the microcontroller are set such that they can send and receive data from the PC. This program uses the serial library to communicate with the ports.

##### **KEIL compiler**

The C programming language is a general-purpose, programming language that provides code efficiency, elements of structured programming, and a rich set of operators. C is not a *bit* language and is not designed for any one particular area of application. Its generality combined with its absence of restrictions, makes C a convenient and effective programming solution for a wide variety of software tasks. Many applications can be solved more easily and efficiently with C than with other more specialized languages. The Cx51 Optimizing C Compiler is a complete implementation of the American National Standards Institute (ANSI) standard for the C language. Cx51 is not a universal C compiler adapted for the 8051 target. It is a ground-up implementation dedicated to generating extremely fast and compact code for the 8051 microprocessor. Cx51 provides you the flexibility of



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programming in C and the code efficiency and speed of assembly language. Since Cx51 is a cross compiler, some aspects of the C programming language and standard libraries are altered or enhanced to address the peculiarities of an embedded target processor.

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