

# Low Power Wireless Sensor for Online Ambient Monitoring

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**Abstract**-INDOOR air quality (IAQ) represents an important factor affecting the comfort, the health and also the safety of building occupants. IAQ problems lead to a set of symptoms, including headaches, dizziness, difficulties in concentration and others, referred to as “sick building syndrome” (SBS). Basic measurements, such as temperature, relative humidity and CO<sub>2</sub>, can provide information useful in solving such problems . Measuring these required parametrs these can be remotely send to the desired location using the ZigBee module. The sent values can be displayed on the PC/ Laptop or they can as well be displayed on the LCD screen on the remote location.

**Index Terms**- ambient parameters, temperature sensor , humidity sensor, gas sensor, light sensor, low energy consumption.

## I. INTRODUCTION

Today, The project presents the development of a compact battery-powered system, that monitors the temperature, relative humidity, the humidity and the intensity of light in indoor spaces, and that sends the measurement data using the existent wireless infrastructure based on the IEEE 802.11 b/g standards. This provides the possibility of the remote gathering and further processing of data from a large number of such wireless sensing systems. The characteristics of the developed device, namely reduced dimensions, low power consumption, high flexibility and robustness, make it suitable for its use as a node in a wireless sensor network (WSN). With this system used consumption is low as single chip is used to mount all the components with single power supply to the chip .

The temperature and relative humidity sensor has a power consumption that is comparable to the one of the gas sensor (1 mA), while the other attached sensors, measuring pressure and light intensity, are less power hungry than these, consuming 5 µA and 0.24 mA respectively. A wireless sensor network (WSN) is a network made of numerous small

independent sensor nodes, which consist of a battery, radio sensors, and a minimal amount of onboard computing power. These nodes do not have a pre-programmed network topology that gives them the flexibility of self-organizing into a network but are low on resources. These nodes are built with power conservation in mind because of lack of resources such as electrical energy etc.

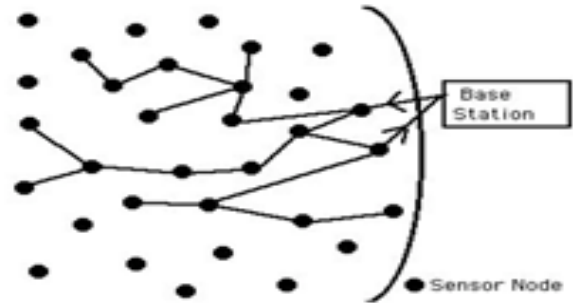


Figure 1- Wireless Sensor Network

## II. DESCRIPTON

Shown below is the proposed block diagram of the system.

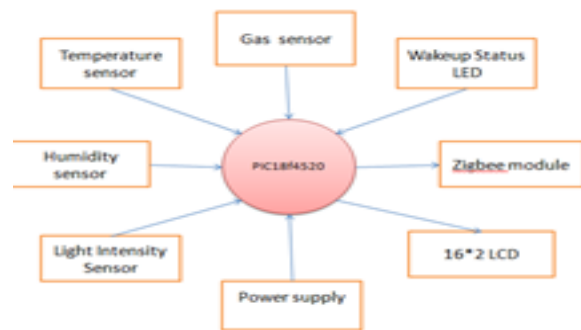


Figure 2. Proposed Block Diagram

The device’s core is represented by a PIC , a programmable system on chip microcontroller. This is the central part of the ambient sensor, initiating all the main actions that have to be performed for its proper operation. The components that make up the system can be divided into four main groups: the sensing unit, the processing and storage unit, the

transceiver and the power supply. The sensing unit consists of digital temperature sensor, humidity sensor, a gas sensor and a light sensor. The processing and storage unit is represented by the core microcontroller, while data transmission is implemented by the Zigbee module. A 12V battery form the power supply unit.

i) PIC18F4520 MICROCONTROLLER

This PIC family offers the advantages of all PIC18 microcontrollers- namely high computational performance at an economical price-with the addition of high-endurance, Enhanced Flash program memory. It introduces design enhancement that makes these microcontrollers a logical choice for many high-performance, power sensitive applications.

The core features are :

- Alternate run modes
- Multiple idle modes
- Low consumption in key module
- Self programmability

ii) GAS SENSOR

The gas sensor is used to detect the leakage gases that are present in the environment .It is highly sensitive to carbon containing residues. Gas sensor is a subclass of chemical sensors. It measures concentration of gas in its vicinity. Gas sensors interacts with the gas to measure its concentration. Each gas has a unique breakdown voltage. Sensors identify these gases by measuring these voltages. Gas sensors are available in wide specifications depending on the sensitivity levels, type of gas to be sensed, physical dimensions and numerous other factors. Gas sensors have high sensitivity to LPG, iso-butane, propane and less sensitivity to alcohol and smoke and provides faster response.

iii) TEMPERATURE SENSOR

Temperature is the most-measured process variable in industrial automation. Most commonly, a temperature sensor is used to convert temperature value to an electrical value. Temperature Sensors are the key to read temperatures correctly and to control temperature in industrials applications. Sensors differ a lot in properties such as contact-way, temperature range, calibrating method and sensing element. The temperature sensors contain a sensing element enclosed in housings of plastic or metal. With the help of conditioning circuits, the sensor will reflect the change of environmental temperature.

iv) HUMIDITY SENSOR

Humidity is the presence of water in air. The amount of water vapour in air can affect human comfort as well as many manufacturing processes in industries.The presence of water vapour also influences various physical, chemical and biological processes. Humidity sensing is very important, especially in the control systems for industrial processes and human comfort. Humidity sensors are employed to provide an indication of the moisture levels in the environment.

Humidity measurement determines the amount of water vapour present in a gas that can be a mixture, such as air or a pure gas, such as nitrogen or argon. Humidity measurement can be done using dry and wet bulb hydrometers.

v) LIGHT INTENSITY SENSOR

Light sensors creates an output signal indication the intensity of light by measuring the radiant energy that exists in a very narrow range of frequencies called light. It converts the light energy into an electrical signal output. They are also known as photoelectric devices or photo sensors as photons are converted to electrons. Light sensors can be divided into two categories based on output. One sensor which converts light energy to electrical energy and those which change their electrical properties in some way such as photo-resistors or conductors.

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance.

III. RESULT AND CONCLUSION

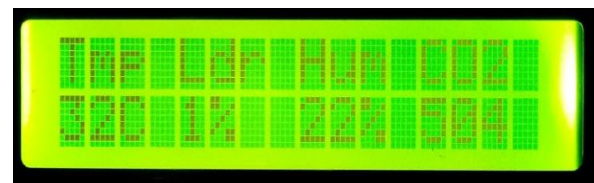


Figure 3. LCD display showing the sensed values

The values shown onscreen that sh the lcd are the values sensed by the respective sensors and are displayed on the lcd screen.

The values as seen are Temperature 32 deg, Light intensity 1 %, Humidity 22%, CO2 gas in the air 504.

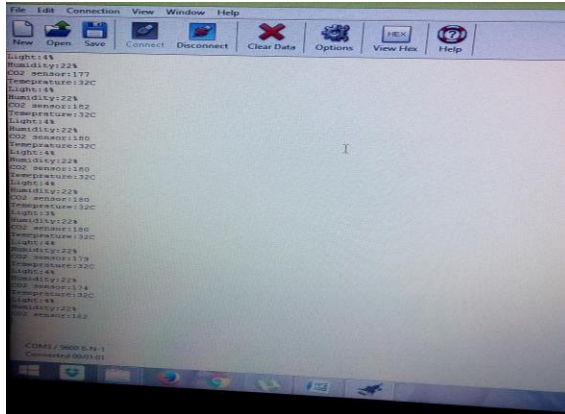


Figure 4. Computer screen showing the sensed values transmitted online to the remote location

The figure 4 is the image of the screen that shows the ambient parameters sensed and transmitted online to the remote location using the Zigbee module.

#### REFERENCE

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