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Research Paper

Development of real time environment monitoring system using with MSP430

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Abstract

This paper specifies about the monitoring environmental parameters regularly to forecast the weather prediction. Nowadays, Weather prediction plays a vital role for citizens living in the coastal areas. Mostly the parameters of the weather prediction vary to different fields and areas which hep the agricultures and travelers. This application makes the system more reliable, accurate, and flexible and dynamically varies the parameters of environment. We mainly consider the two factors; one is to acquire the parameter value accurately and second is to monitor continuously acting with reliability. The Environmental parameters considered in this paper are temperature and humidity, atmospheric pressure and light intensity. The MSP430 Micro controller observes the parameters by which the threats can be easily identified by the users and get alerted from the situations.

Keywords: *Use about five key words or phrases in alphabetical order, Separated by Semicolon.*

1. Introduction

Fascinating about the weather – experimenting signs of substitutes and variations on predictions of forecasting weather is mostly required to some occupations. Human interaction gets reduced and role of computer and modern embedded systems comes into picture.

Objective of the project is casting the weather conditions with several parameters like humidity, light intensity, temperature and atmospheric pressure etc where those are most important in number of professions. By providing eagle eye on around-the-clock monitoring of various types of parameters.. This development is interfaced both in Digital and Analog systems. The paper consists of parameters monitoring, using Gateway parameter validations are done in between Client vs Server.

Gateway interface with the Micro controller is one of the main features of the project, it itself provides the platform for IOT for both monitoring at the server and provides the access for client too. We have used Microcontroller MSP430 using UBISENSES sensor provided an algorithm to track the results. Section 2 describes about proposed deign and advancements in the architecture. Section 3 gives the methodology continuation to proposed design. Section 4 defines the procedure for developing the system concepts to realize towards the output application. Section 5 interacts with the results that were obtained.

2. Proposed design

The proposed design of this model provides the atmospheric parameters which plays a vital role in prediction of the environments.thi paper considered with different parameter sensors collects the data and send to the MSP430 Micro controller. The MSP430 mainly concentrate to grab the parameters values which are temperature and humidity, atmospheric pressure, and light intensity. By grabbing these values by the MSP430 Micro controller from sensors, MSP430 Micro controller is an output that shares the values to the required gateway by which the server is connected. The Wi-Fi is connected to the server systems to get the accurate value of the environment.

3. Methodology

To design the design methodology We opted specific ways to mind about the Microcontroller, sensors, Wi-Fi network, monitor, Power supply need etc. Microcontroller selected is with specific reason and cost is comfortable for new users to invest.

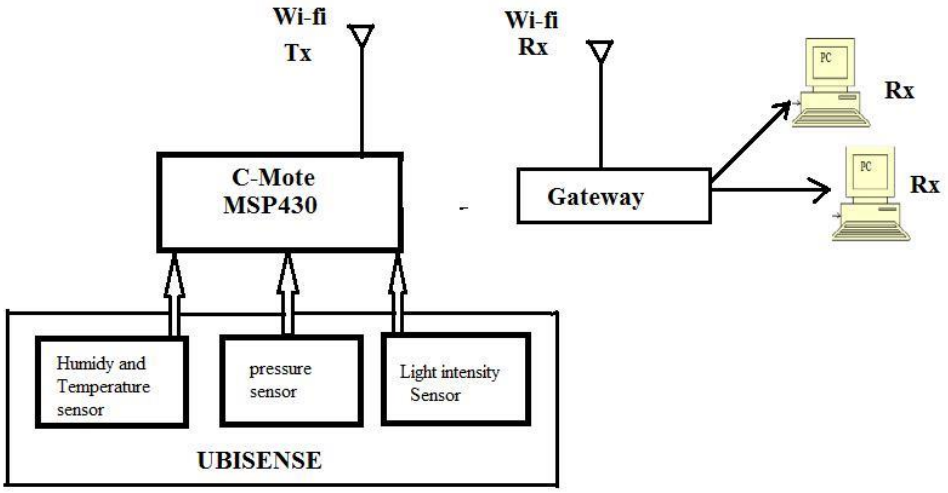

Fig. 1: Design Methodology of Real Time Environment Monitoring System.

4. System concepts

4.1. C-mote MSP430

The C-Mote is a Wireless communication module designed with a robust RF front end and highly flexible power management system. It has IEEE 802.15.4 compliant WSN platform. Two-chip solution based on the popular CC2520 transceiver along with ultra-low power MSP430 MCU. High range with

+5dBm, output and Frequency	power and Compliant Scaling for effective	to IEEE 802.15.4.The following Features are Dynamic Voltage Power management. It Can be used as coordinator/ router or end

Device. Mostly can by designed for Indoor/outdoor deployment [9] as sensor node.

Risc MSP-430 can also named as mixed-signal microcontroller family .MSP 430 low power and low current of the order of 1µA. The highest CPU speed is 25 MHz. The MSP430 also uses six different low-power modes. In addition, MSP 430 allows wake-up times of less than 1 µs , the MSP430 microcontroller remains long in sleep mode, minimizes the power consumption. The device supports various configurations with various peripheral functions such as PWM, watchdog, internal oscillator, I²C, USART, SPI, 10/12/14/16/24-bit ADC, and timer including brown- It is becoming. For less popular peripherals, there are a comparator (a simple ADC can be executed using a timer), an on-chip operational amplifier for signal adjustment, an LCD driver, 12-bit DAC, a hardware multiplier, a USB, an ADC result DMA etc. Except for some older EPROM and High Capacity Mask ROM, all devices support UARTs such as JTAG (full 4 wire or Spy - Bi - Wire) or built - in bootstrap loader (BSL) RS 232, Or USB on a device that supports USB.MSP430 is limited to on-chip memory up to 512 KB of flash memory and 66 KB of RAM. It also has a DMA controller but it is very difficult to use to move data from the chip because there is no DMA output strobe.

Fig. 2: MSP430 C-Mote Embedded Boards with Sensor Node Arrangement.

4.2. Sensor concepts

Sensors and sensor systems plays important role for our environment and enable monitoring in the environment system. By using smart sensor systems, the technology have been transformed for the development. One system to another system [8] the definition of smart sensor differs and microprocessor provides the combination of a intelligence sensing elements and will be processed and provides output to external devices. Interpretive power and resultant outputs significantly gives sensor capabilities as features the fundamental idea.

Here Ubisense is interfaced with MSP430 and processor the data through wifi to the display for monitoring the environment.

4.2.1 Ubisense

Ubi-Sense is a generic sensor board having the following listed sensors.

a) Temperature
b) Light Intensity
c) Barometric Pressure
d) Humidity

All the sensors can be interfaced with microcontroller via I2C bus. It contains additional I2C connector for connecting external I2C compliant sensors to the communications modules. Ubi-Sense connects with Wi-Fi through their expansion connector and [5] sensor interface libraries are available for all the communication modules.

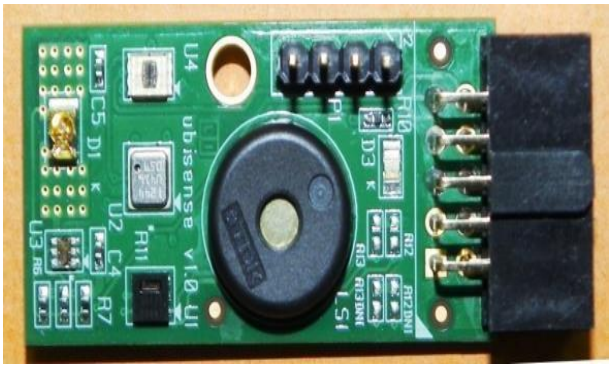

Fig. 3: Ubisense Onboard Sensor Components.

a) Humidity and Temperature Sensor

Humidity and Temperature Sensor is interfaced with MSP430 board for humidity and temperature measurement using single wire serial peripheral interface (SPI). It has resistive type humidity measurement component and negative temperature coefficient (NTC) temperature measurement component. It gives calibrated digital output which MSP430 can directly understand so no need to have analog to digital converter. This sensor needs 3-5.5V voltage supply and 0.5-2.5mA current supply, which can be given from MSP430 board [2].

b) Pressure Sensor

Pressure sensor is interfaced with MSP430 board at SDA and SCL pin for atmospheric pressure (in Pa) using I2C interface. It can also measure temperature. Pressure sensor works on the principle of piezo-resistive technology. It gives fully calibrated digital output so no need to have ADC. This sensor needs 1.8-3.6V supply voltage and 5µA supply current in standard mode, which can be given from MSP430 Board[3].

c) Light Intensity Sensor

Light Dependent Resistor (LDR) is interfaced with MSP430 for light intensity measurement. LDR gives analog output which MSP430 does not understand and to avoid the use of ADC, circuit is developed using capacitor. Here we measure capacitor charging time [4] depending on resistance of LDR. Resistance of LDR changes with intensity of light, if more light intensity resistance will be less and if low light intensity resistance will be high. So at high light intensity capacitor charging time will be less and at low light intensity capacitor charging time will be more. By taking some readings of capacitor charging time light intensity is decided to measure in three values that are High, Medium and Low. In graphical representation that is shown in terms of percentage.

4.3. Wireless sensor nodes

The Sensor nodes design is responsible for the collecting the parameters data and collected data is sent to the input .these parameter values are tested with the sensors provided .[10] The general design of the wireless sensor network node is as shown in fig.1.MSP430 microcontroller makes the functionality of the system in between Sensors and Wi-Fi module. The MSP430 is used for and collect the information from the sensors and the analog input signals attrived from the sensors are converting to digital signals. The Wi-Fi device plays a major role for communicating with other nodes and data transmissions.

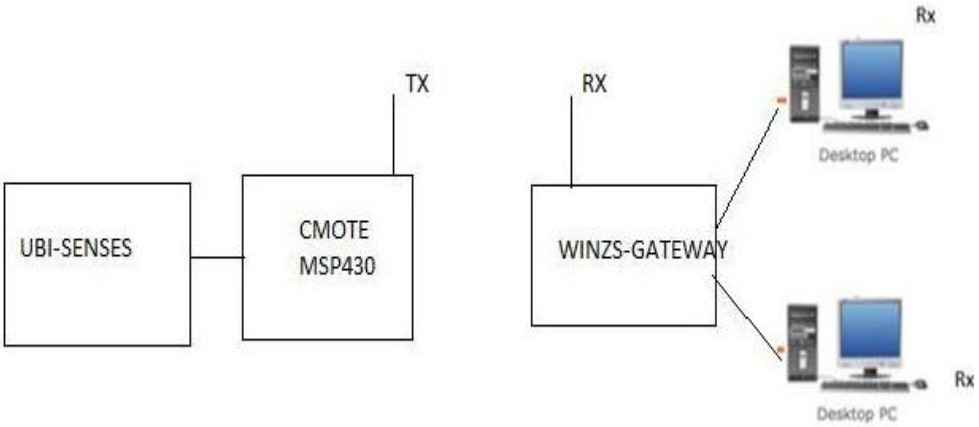

Fig. 4: Wireless Sensor Node Assembling for Environmental Measures.

4.3.1. Design of wireless sensor networks

The design narrates the specifications of devices connected and how data exchange between the Transmitter and receiver and process continues for future predictions. Collection of environmental parameters by using different sensors to track the record of the same. [6] Node will receive and send data as per the configuration designed and will be used. Data transmission among the shortest distance is sent via gateway node. Generally these applications are widely used [10] in wide applications in Embedded systems & IOT platforms.

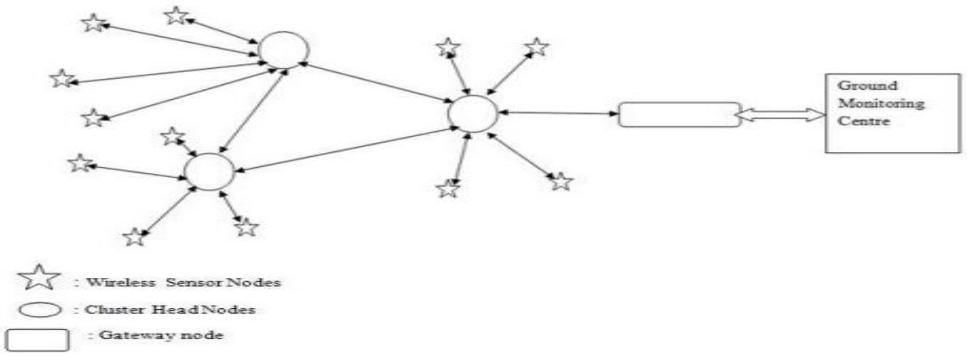

Fig. 5: Wireless Sensor Network.

4.3.2. Monitoring and controlling environmental parameters

From Ubisenses Temperature, Pressure, humidity and Light Intensity values were sensed and tracked and processed from MSP-430 board and via Wi-Fi node sends the data to Gateway. Through wireless communication measured the environmental parameters and used in various applications.

Fig. 6: Winzs Gateway to Establish Communication.

5. Results & discussions

The environmental parameters are processed using MSP430 microcontroller and the results are displayed in the serial monitor shown in Figure 7.This parameters continuously performes with the real time based concept.

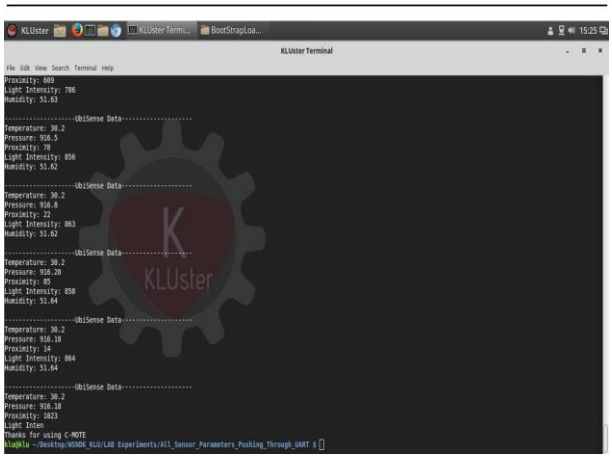

Fig. 7: Displaying the Environmental Parameters.

Many Cloud platforms [10] are available to make a record of the parameters and monitor the for future reasons and application predictions. MIP app inventor and cloud platforms are used widely.

6. Conclusions and future scope

The science and technology development is rapidly increasing day by day. At present the technology improves to run with the intelligence performing with ultra low power..With the proposed system, we can regularly keep on monitoring the environmental parameters which mainly point the results with its accuracy and efficiency. As considering the major benefits of wireless sensor networks, we can make environmental data store in the public cloud platform which will provide useful information to the citizens. The citizens can refer the environmental changes happened at earlier or present via internet. Thus an IoT system can be improvised with this paper have an application oriented IP protocols.

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