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GSM Based Greenhouse Environment Monitoring System

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ABSTRACT: Greenhouse monitoring is a needed one for variable climate changes. GSM technologies have been rapidly improving wireless technology during few years. Initiating from industrial controls and telecommunication, it is now being applied in environmental monitoring and agriculture. The existing system has the ability to yet lack the ability to control indoor humidity and other parameter. This paper propose modern greenhouse measurement system, the GSM-SMS and sensors are used to sense necessary green house parameters and transmit data using wireless communication. This project is used to measure the various parameters like Temperature, Gas and light. Values of these sensors are displayed on a LCD. These parameters are sensed by sensors and sensor output is amplified and given to ADC. ARM processor controls these parameters and keeps them at some predefined values using relay interface. At the same time these current values of all parameters are sent through SMS using a GSM modem.

Keywords: **Green House, ARM processor, Keil Software, GSM, Wireless Sensor Network.**

I. INTRODUCTION

We live in a world where everything can be controlled and monitored automatically. But there are still few important fields where automation is needed like agriculture. Since farming is the primary occupation in our country. Green house forms an important part of agriculture which is use to control environmental condition for optimum production. Automation is the process for Green house controlled parameters automatically by replacing the human efforts. In this system user communicates with the centralized unit using SMS. This unit communicates with the system through SMS which will received by the GSM with the help of SIM card. The GSM send its data to ARM which is also continuously receives the data from sensors. This data is displayed on the LCD. After receiving the activation command from the subscriber first it checks all the conditioned gives detailed feedback to the user.

In this system we are controlling the four main parameters of green house like Gas, temperature and light intensity. And we have used different sensors for sensing these different parameters. Also some predetermined threshold values are set for all these parameters by the user according to the need of climatic conditions required in greenhouse.

The paper purposes GSM/Bluetooth based remote controlled embedded system for green house. System gives the information about the conditions of parameter like changes in the temperature, light intensity and humidity in the atmosphere and set the greenhouse time depending on the temperature, light intensity and Gas reading from sensors and type of crop. To control these parameters of green house different relays are used. Current status of system is provided to the user through the GSM. If the user is nearer to the field then the information is

provided to the user through the Bluetooth and if the user is far away from the field then the information is provided to the user through the GSM modem. Also these current values are displayed on the LCD. The global system for mobile communication is a standard to describe communication technologies developed by the European Telecommunication standards institute.

II.EXISTED SYSTEM

This existed architecture is based on a programmable system on-chip microcontroller produced by Cypress Semiconductor, the part that initiates all the actions performed by the wireless node. The block diagram of existed system is shown in below fig 1.

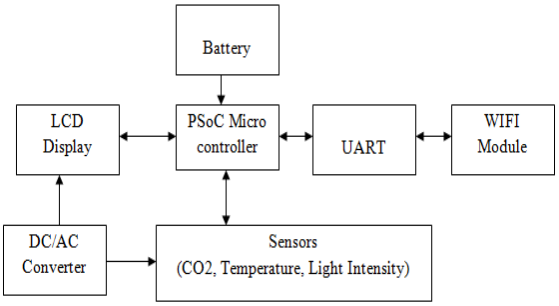

FIG 1. BLOCK DIAGRAM OF EXISTED SYSTEM

The devices in this category can measure CO2 (carbon dioxide) levels, temperatures, and the relative humidity in the air, and the light intensity. These sensors can appear in any combination attached to a Wi-Fi device, with or without an LCD for the local visualization of the measured values. The communication with each one of the components is performed through using different protocols: serial data transmission for the carbon dioxide sensor and for the Wi-Fi module, a proprietary protocol for the DHT22 sensor, and I2C with the barometric pressure and light sensors. Being a wireless sensing node, with constraints regarding its power supply, the device stays most of the time in sleep mode and wakes up only when measurements and result transmissions have to be performed.

This is one of the most efficient strategies for minimizing energy consumption in these kinds of systems. Furthermore, because the power consumption of all the attached transducers in sleep mode does not allow long battery lifetimes, a separate power supply was developed and included in this design.

The menus allow the specification and the display of the parameters required for the proper operation of the wireless sensors, namely, the period between measurements, which can be set to have a value between several seconds and 60 min; the information for connecting to WLANs, namely, the channel used, the Service Set Identifier, and passwords; the data server information, which includes the server port and the IP; the node IP; the gateway and the subnet mask, which are important in the case in which data is sent outside the local area network (LAN) to which the sensor is connected; and the CO2 sensor's configuration, if this is present in the design.

The presence of the carbon dioxide sensor significantly affects the design of the device's hardware and software components, requiring the use of a separate power supply, a dc/dc converter, in the case of the model based on the PSoC micro controller device. The carbon dioxide non-dispersive infrared sensor requires special routines for calibration also and additional recordings in the menu are added for setting the parameters of different types of supported calibration routines: auto calibration, calibration using a gas containing no CO2, calibration using a known gas concentration, and calibration using fresh air.

The calibration routine for non-dispersive infrared carbon dioxide sensors has to compensate for the sensor drift that appears after long operation times. It implies the addition of an offset value to all readings. This is computed as the difference between the readings when a sensor is exposed to a known gas concentration and the original calibration value and is performed through sensor specific commands issued by the core microcontroller. These types of sensors also require a warm-up period, which significantly affects the power consumption of the device.

III. PROPOSED SYSTEM

The hardware unit of the prototype of the system is represented by the block diagram below. It contains a ARM processor as the main processing unit and it gets inputs from the temperature sensor (LM35), Light sensor (LDR), and Gas sensor. From the data obtained from the sensors the program controls the actuator components to achieve the system requirements. It also uses a GSM module which sends information from of SMS to the user from which the data obtained from the sensors and the data obtained from the user.

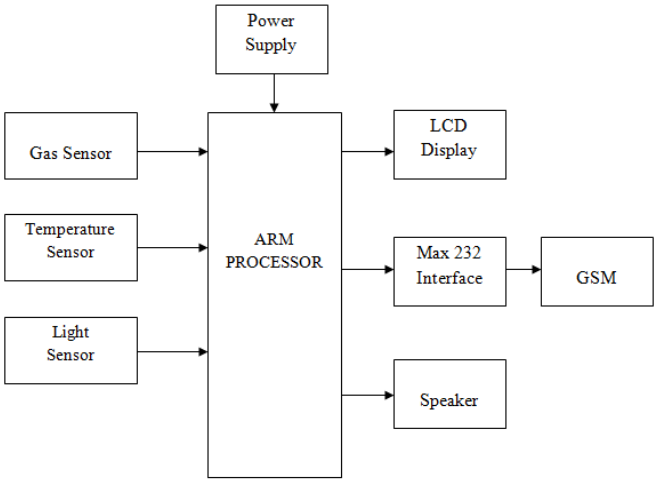

FIG 2. PROPOSED SYSTEM

Initially a temperature point is set. The temperature sensor senses the change in input temperature. After signal conditioning this analog signal is given to the ARM processor. If the temperature sensed is below the low threshold value, the controller unit will start the heater. Once it reaches the set limit it will switch off the heater. If the temperature sensed is above the set limit, it will start the blower to bring the temperature down. Once it reaches below a set point, it will switch off the blower.

In this way, temperature is controlled. Similarly, an intensity of light can be controlled. Initially intensity point is set. Light dependent resistor senses the change in input intensity of light. If the intensity of light sensed is below the low limit set, the controller unit will switch on bulb. Once it reaches the set limit it will switch off the bulb. In this way, intensity of light is controlled. Co2 can be control by using a gas sensor. Initially gas is set. Gas Sensor senses the change in gas. After it senses intensity of temperature, light and gas it gives digital display at the output on LCD.

IV.HARDWARE REQUIREMENTS

A. Power supply: We utilize 7805 is a voltage regulator integrated circuit in power supply. Generally, it is a 7805 series of fixed linear voltage regulator ICs. The voltage source in a circuit contains fluctuations and

produces the continuous change in voltage output. The constant output voltage is provided by the voltage regulator IC. It provides 5v supply voltage.

B. LCD interfacing: It is the display unit in a system which displays appropriate messages depend up on the scenario. LCD consists of LCD driver/controller that is used to interface LCD and microcontroller.

C. GSM modem: The GSM modem is used to send and receive messages to and from the owner. GSM is a specific type of modem and it acquires a SIM card which operated over a subscription to a mobile operator like as a mobile phone.

D. MAX 232: It is an integrated circuit. Max232 is a voltage converter which converts from RS232 voltage levels to TTL voltage levels and vice-versa. MAX232 utilizes +5v power source which is same as that of source voltage. Single +5v power supply is utilized to power both microcontroller and MAX232. It contains two sets of line drivers for transferring and receiving data.

E. Gas Sensor: Gas sensor is used to detect the gas leakage. If there is leakage then buzzer is turned on. Specially in the cooking gas industry they have to be very careful with whatever their are working or designing. Because there are thousands of pipes that bypass the LPG gases from inlet of pipe to another outlet of pipe. If there is leakage in the pipe due to any reasons in the night time or any time there might be chances of getting major incidents of end of workers. This system can protect the workers all damages. Sending of data will be there if the gas is leakage on the registered mobile number.

F. Light Dependent Sensor: Light dependant resistor is also known as a LDR, photo-resistor, photoconductor or photocell, is a resistor whose resistance increases or decreases based on the amount of light intensity. LDRs (Light Dependant Resistors) are a very useful tool in a light/dark circuits. LDRs can have a variety of resistance and functions. For example it can be utilized to turn on a light when the LDR is in Darkness or to turn off a light when the LDR is in light. It can also work the other way around so when the LDR is in light it turns on the circuit and when it's in darkness the resistance increase and disrupts the circuit.

G. Temperature Sensor: Temperature is one of the most commonly measured environmental quantity for different reasons. There are different types of temperature sensors that can measure temperature, such as thermocouple, thermistors, semiconductor temperature sensors, resistance temperature detectors (RTDs), and so on. Based on the requirement, various types of sensors are used for measuring temperature in different applications.

V. RESULTS

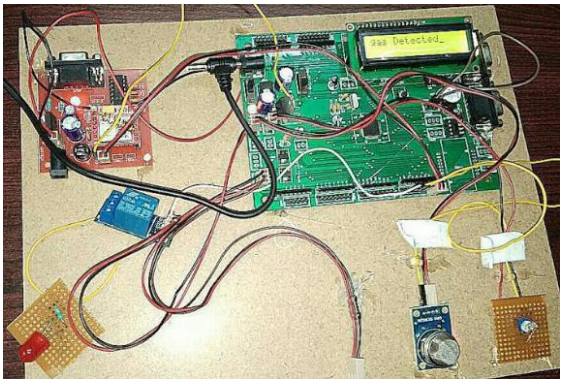

FIG 3. GAS DETECTED

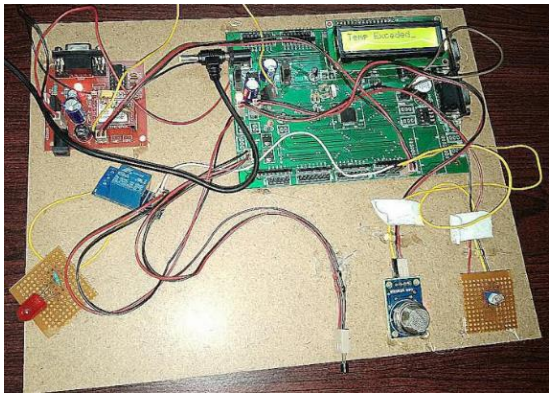

FIG 4. TEMPERATURE EXCEEDED

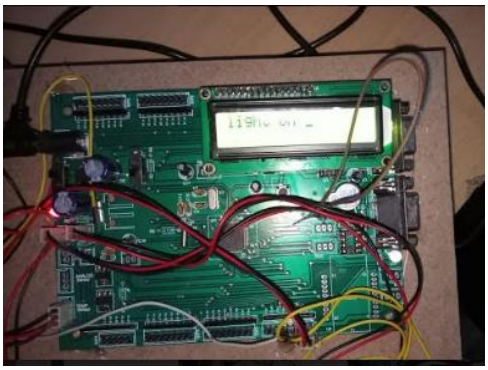

FIG 5. LIGHT ON

VI. CONCLUSION

This paper presents an embedded system design of wireless sensor monitoring system for sensing and computation of environmental parameters. A Co2 commercial sensor had been integrated with ARM processor for monitoring and computes the level of existence of GHG parameters such as CO2, temperature and light in atmosphere utilizing information and communication technologies. Prototype operates for data gathering and data transmission utilizing GSM-SMS and preliminary test prove that the developed prototype is capable to monitoring and compute CO2, temperature and light parameters in the deployed environment and has several advantages in term of fast delivery, zero data lose, low cost, flexibility, user friendliness and energy efficiency. This greenhouse monitoring system will create awareness, performing scientific studies and to forecast re mediation policies by the authorities to individuals and organization in controlling global warming.

VII.REFERENCES

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