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Green House Monitoring and Automation Using GSM Module

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ABSTRACT: Wireless Sensor Networks (WSNs) have played major role and attention in recent years. The ambiguous application of WSNs is immense. These networks used for collecting, storing and sharing sensed data among them self's and to external node. WSNs have been used for various applications such as habitat monitoring agriculture, nuclear reactor control, security, tactical surveillances and many more applications where human cannot monitor.

The monitoring and GSM systems and developed in this project is for use in green house applications, where real time data of climate conditions and other environmental properties are sensed and control decisions are taken by monitoring systems they are modified by the automation system and sends SMS that what operation is performed by them to user.

The architecture of a Green House monitoring system comprises of a set of sensor nodes and a control unit that communicate with each sensor and collects local information to make necessary decisions about the physical environment. The Temperature sensors LM 45 senses the temperature and sends to SCU, it will amplify and send to control Unit. The Humidity sensor is used to find the humidity of the greenhouse. The control units have the MCU to check the reading and make the fan ON or OFF. Then status of the greenhouse will send to the user Mobile through GSM Module.

KEYWORDS: Index Terms-Sensor Automation; SMS; GSM; monitoring system

I. INTRODUCTION

The concern with a lot of consumer needs and demand for the agriculture products has stimulated awareness among the farmer that increases their products in the market by implementing advance technologies in this industry. The products that are important that may come to the farmers' interest that controls the use of natural sources and natural environment which controls agriculture with various aspects. Therefore, this problem makes farmers interest to implement agro-conditions sending alert notification messages to farmers using GSM and SMS technology. The proposed system is aimed to be a reliable and cost [1] environment with remote monitoring method in their agriculture field. For some crucial plants such as vegetarian and flowers plants, which need 24 hours attention from human so that the plant quantities and qualities are controlled with proper management by the collected data and information from the fields. This will provide enormous foundation for future growth and future development of their plants in the green house. However, with the increasing size in farming areas, this type of manual practice is increases time consuming and cost of the labour.

However, with the growth of management in agriculture techniques and with modern telecommunication technologies which provides great assistance with the implementation in the agriculture industry.

With the rapid development in telecommunication and wireless technologies, it is proved that wireless communication has good practice for remote sensing in the agriculture industries. In this paper uses wireless sensor network, Global System for Mobile Communication (GSM) and short message service (SMS) to carry out data from

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the green house with sensors directly alert the farmers to their mobile phone. This type of practice can eliminate the use in the farming areas. This technology has seen to be suitable for these modern days.Moreover, this paper focuses on the monitoring and automation system in greenhouse which has capability of controlling.

II. BLOCK DIAGRAM OF THE SYSTEM

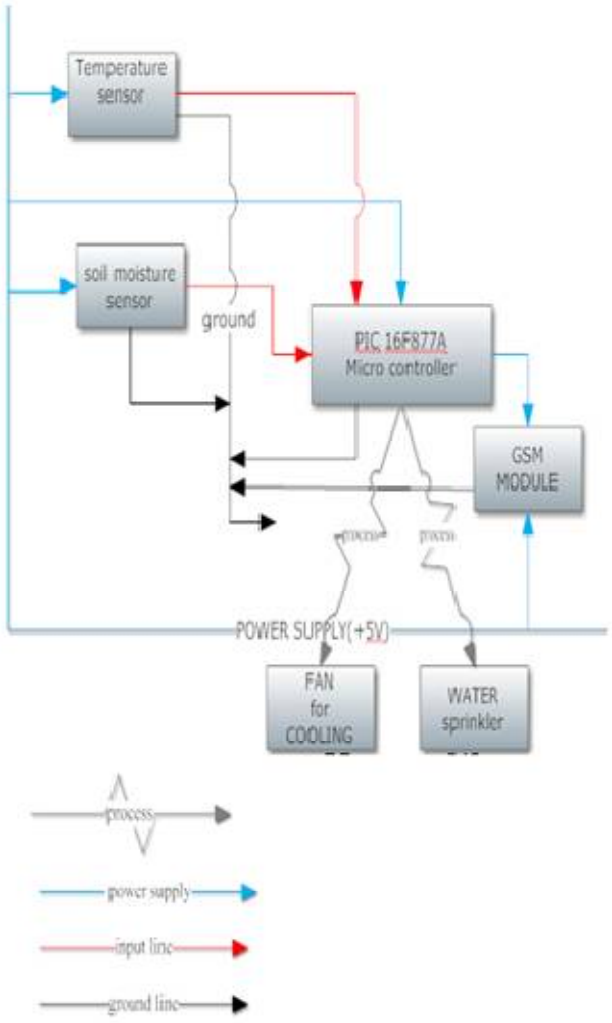

Fig. Block Diagram of system

III. SYSTEM DESIGN

The hardware unit of the prototype of the system is represented by the block diagram bellow. It contains a PIC16F877A microcontroller as the main processing unit and it moisture sensor (simulated using a variable resistor). From the data obtained from the sensors the program controls the actuator components such as fans and sprinkler 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 [2].

The system consist of two subsystems temperature monitor and soil moisture and control system. The system operates according to the flow chart show. The temperature monitor and control system consist of a LM35 temperature

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sensor a user mode switch the fan for cooling. The user mode switch is connected to RB7 pin in the microcontroller and tested whether the switch is ON, if it is ON (RB7read as high) the microcontroller saves the value to the EEPROM set by the user by means of the potentiometer connected to the RA1 pin. The analogue input value is converted to a digital value inside the microcontroller and the value is saved in the variable. Then it will be written to an address location of the EEPROM which in this case is 0x10. The program then checks again whether the user mode switch is pressed and if it is ON once again the program convert the analogue input value to digital and saves it in the value set by the user. In this mode the temperature sensor detects the current temperature value and inputs it to RA0 pin of the microcontroller. The input is an analogue input and it is converted to a digital input and calibrated as follows. The resulting value after A/D conversion is reduced by a constant 1 and divided by 2. Then it is displayed and checked with the user defined temperature value saved in the EEPROM. If the result is negative it means that the current temperature value is greater than the user defined temperature value so the microcontroller makes the RB7 pin high to ON the cooler fan to bring down the temperature to the user defined value and sends SMS alerts to the user. If both the values are equal the result is zero then both RB7 pin is set to low hence fan is switched off and sends SMS alert to user mobile.[2]

The soil moisture level is also controlled to a predefined ideal level like temperature monitor and control system. The sensor was simulated using a non-linear potentiometer and it is an input to the microcontroller at RA1 pin. The analogue value is converted to a digital value and saved in EEPROM. Then this value is subtracted from ideal value which is assumed to be '70' and if the result is zero then RB6 pin made high and sends SMS alert to user mobile. When the result is negative again the value is RB6 pin is low and sends SMS to user mobile. [2]

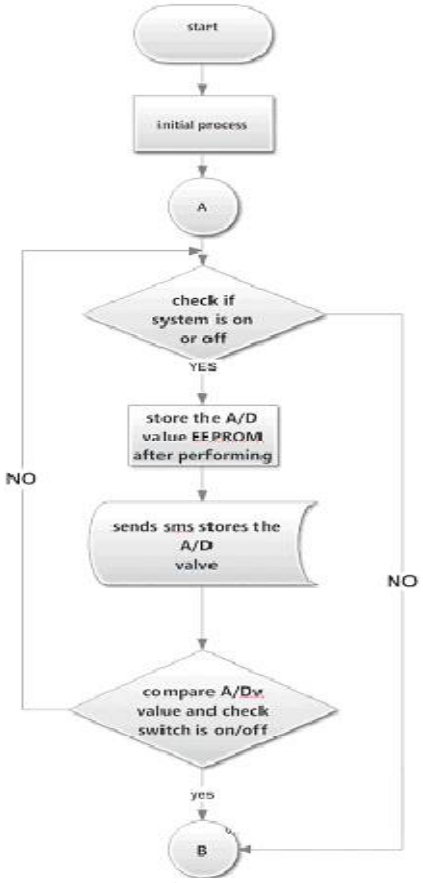

Figure 2: System process

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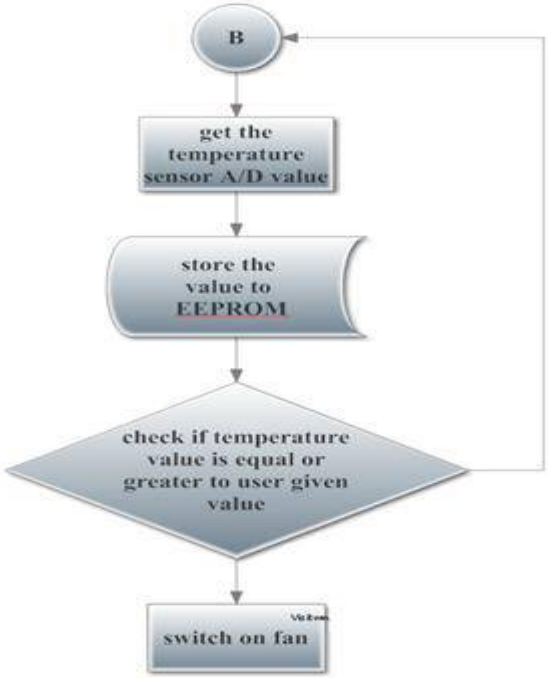

Figure 3: Temperature process

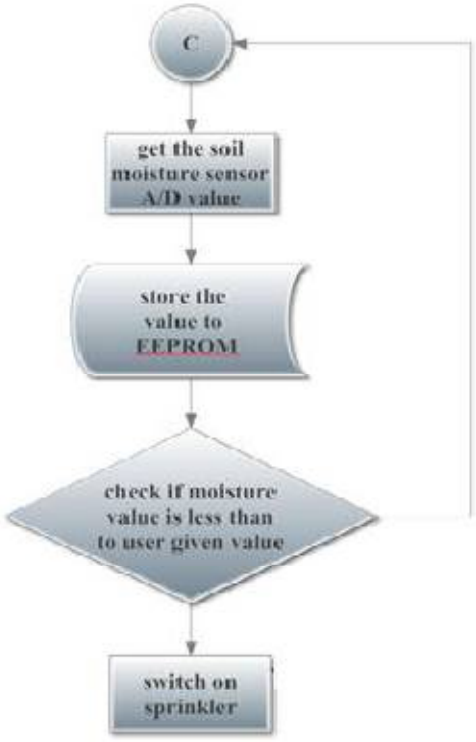

Figure 4: Soil moisture process

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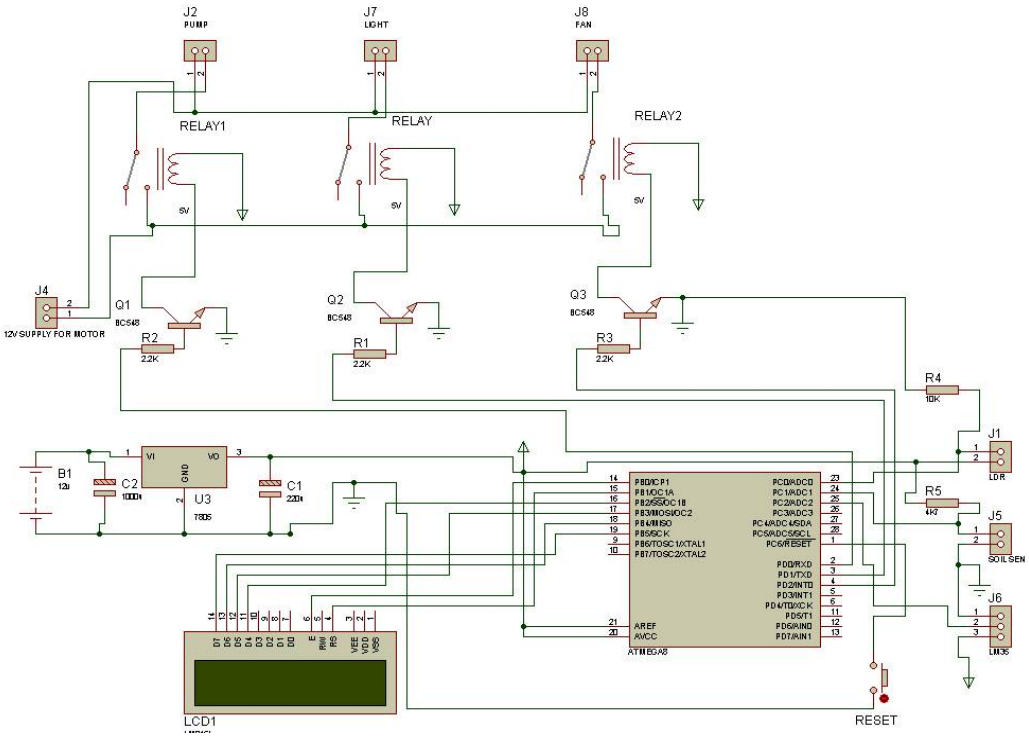
IV. CIRCUIT DIAGRAM



V. CONTROL UNIT

A. PIC Microcontroller: PIC is a family of modified Harvard architecture microcontroller made by Microchip Technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "Peripheral Interface Controller" [3].

A. Peripheral Features:

- 8-bit RISC based CPU architecture having 14.3K program memory, 368 SRAM, 256 EEPROM and 33 I/O lines.
- Timer0: 8-bit timer/counter with 8-bit prescalar.
- Timer1: 16-bit time/counter with prescalar, can be incremented during Sleep via external crystal/clock.
- Time2: 8-bit time/counter with 8-bit period register, prescalar and postscalar.
- Two Capture, Compare, PWM modules.
- Synchronous Serial Port (SSP) with SPI^{TM}(Master Mode) and I2C^{Tm}(Master/Slave)
- Universal Synchronous Asynchronous Receiver Transmitter(USART/SCI) with 9-bit address detection.
- Parallel Slave Port (PSP) – 8 bits wide with external RD, WR and CS controls (40/44 pin only)
- Brown-out detection circuitry for Brown-out Reset (BOR)

Control Unit consists of PIC Microcontroller. Temperature sensor senses the temperature and gives the reading in variation with voltage. So using the analog signal we cant directly send to the GSM modem. But, the PIC Microcontroller have the in-built 10/8-bit ADC with 10-channel. We are using the ADC in 8-bit, ADC will convert the two channel into equivalent reading[3].

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VI. GSM MODULE

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate [6].

VII. FUTURE SCOPE

The system which we are discussed above is implemented on the board and results are shown. But the system can work more efficiently with present technology and may improve the existing technology in the field of wireless communication and with the wide improvement of GSM technology which can improve Short Message Service with the help of embedded technology anything may become possible and easy.

VIII. CONCLUSION

With the wide improvement of wireless and GSM technology. The system may be cost with wireless sensors may little cost but it works with more effectively. The system may be implemented with the help of many technologies but these technologies more reliable, easy to implement, works effectively and easy to operate.

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BIOGRAPHY

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