Real Time Auto Irrigation System Using WSN and GSM Module

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Abstract-An automated irrigation system mainly designed to optimize the utilization of dihydrogen monoxide on agriculture because of climatic conditions which leads to lack of rains. The farmers working on the agriculture fields are dependent of rain, bore wells and rivers. Suppose if the farm land has pumps for irrigation it withal needed someone to on/off the pumps. Traditional dihydrogen monoxide quality quantification is done by taking samples that does not distribute the authentic time data. The system has soil moisture wireless network and a wireless sensor to maintain the quality of water in three parameters- pH, conductivity, and temperature. In this gateway sensor is utilized to handle sensor information and avails to transmit data to web application. Wireless and soil moisture sensor is programmed with microcontroller predicated gateway which is utilized to control and maintain the flow and quality of dihydrogen monoxide. The system had a duplex communication link predicated on a cellular- Internet interface that sanctions for inspection of data and irrigation scheduling which is programmed through webpage. This system is composed of potent photovoltaic cells. By utilizing this automated system dihydrogen monoxide is preserved of up to 92% and engender a good yield compared with old irrigation systems. This system can be utilized in geographically dihydrogen monoxide isolated areas because it is low cost and engender good energy[1].

Keywords-Automation, temperature sensor, moisture sensor, GSM, cellular networks, irrigation, measurement, water resources, wireless sensor networks (WSNs)

I. INTRODUCTION

India is the agriculture predicated country. Our antediluvian people plenarily depended on the agricultural harvesting. Agriculture is a source of livelihood of majority Indians and has great impact on the economy of the country. In dry areas or in case of inadequate rainfall, irrigation becomes arduous. So, it requires to be automated for felicitous yield. In present scenario, irrigation techniques in India are through the manual control in which the farmers irrigate the land at conventional intervals. Manual operation of the routine practices in agriculture requires lot of attention and care. Withal it is arduous to perform desired jobs efficiently and

precisely. Ultimately this may result in lower crop engenderment, non-uniform magnification and poor quality. The prelude of automation in irrigation system will result in incremented application efficiency and drastically reduce labour requisite. The proposed system avails to monitor and control the irrigation system utilizing a simple mobile phone [2].

II. PROPOSED SYSTEM WORK

Here in this project an experimental scale within rural areas where there is an astronomically immense deployment of irrigation system which is implemented utilizing pic controller and wireless communication. The main of this implementation was to demonstrate that the automatic irrigation system can be habituated to optimize /reduce dihydrogen monoxide utilization. It can withal be a photovoltaic irrigation system which consists of a wireless network that is the soil moisture sensor and temperature sensor placed under the soil where plants roots are reached which is a distributed network. The system has a dihydrogen monoxide level sensor which will betoken the presence of dihydrogen monoxide level in tank. A gateway unit manages the information cognate to sensors which triggers the actuators, and data is transmitted utilizing GSM module. A software application was developed by predetermining the threshold values of soil moisture, temperature and dihydrogen monoxide level that was programmed into an pic controller. The data from GSM is transmitted /received from/to mobile or normal texting mode which optimizes the utilization of dihydrogen monoxide quantity. The communication between sensors and data is through the ZigBee protocol. The receiver unit in this system has a duplex communication which is predicated on cellular internet interface which is done utilizing GSM/GPRS protocol. This is a packet oriented mobile data accommodation which is utilizing 2G and 3G cellular ecumenical system for mobile communication [3]

Fig.1 Block diagram of Auto Irrigation system using WSN & GSM

III. COMPONENTS OF AUTOMATED IRRIGATION SYSTEM

A.   PIC 16F877a:

The PIC microcontroller PIC16f877a is one of the most renowned microcontrollers in the industry. This controller is very convenient to utilize, the coding or programming of this controller is additionally more facile. One of the main advantages is that it can be indite-expunge as many times as possible because it use FLASH recollection technology. PIC16f877a finds its applications in an immensely colossal number of contrivances. An EEPROM is additionally featured in it which makes it possible to store some of the information aeonianly like transmitter codes and receiver frequencies and some other cognate data. The cost of this controller is low and its handling is withal facile. Its flexible and can be utilized in areas where microcontrollers have never been used afore as in coprocessor applications and timer functions etc. CMOS FLASH-predicated 8-bit microcontroller packs Microchip's puissant PIC® architecture into an 40- or 44-pin package and is upwards compatible with the PIC16C5X, PIC12CXXX and PIC16C7X contrivances. The PIC16F877A features 256 bytes of EEPROM data recollection, self-programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I²C™) bus and (USART). All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications.

Fig.2 Pin diagram Pic microcontroller PIC16F877a

B.   Temperature Sensor:

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in oC). The sensor circuitry is sealed and consequently it is not subjected to oxidation and other processes. With LM35, temperature can be quantified more accurately than with a thermistor. It withal possess low self-heating and does not cause more than 0.1 oC temperature elevate in still air. The operating temperature range is from -55°C to 150°C. The output voltage varies by 10mV in replication to every oC elevate/fall in ambient temperature, i.e., its scale factor is 0.01V/ oC.

Fig.3 Temperature Sensor

C.   Soil Moisture Sensor:

Soil moisture sensors measure the volumetric dihydrogen monoxide content in soil. Since the direct gravimetric quantification of free soil moisture requires abstracting, drying, and weighting of a sample, soil moisture sensors measure the volumetric dihydrogen monoxide content indirectly by utilizing some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. The cognation between the quantified property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity. Kenning the exact soil moisture conditions on their fields, not

only are farmers able to generally use less dihydrogen monoxide to grow a crop, they are withal able to increment yields and the quality of the crop by ameliorated management of soil moisture during critical plant magnification stages
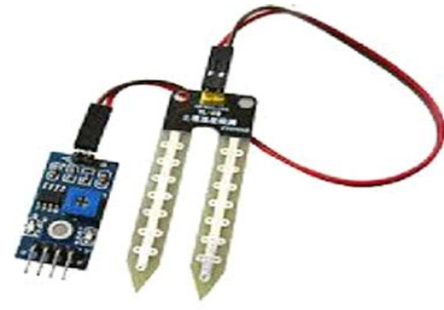

Fig. 4 Soil Moisture Sensor

D. LDR Sensor:

Light Dependent Resistor (LDR) or a photo resistor is a contrivance whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive contrivances. A light dependent resistor works on the principle of photo conductivity. Photo conductivity is an optical phenomenon in which the materials conductivity is incremented when light is absorbed by the material. When light falls i.e. when the photons fall on the contrivance, the electrons in the valence band of the semiconductor material are exhilarated to the conduction band. These photons in the incident light should have energy more preponderant than the band gap of the semiconductor material to make the electrons jump from the valence band to the conduction band. Hence when light having enough energy strikes on the contrivance, more and more electrons are exhilarated to the conduction band which results in sizably voluminous number of charge carriers. The result of this process is more and more current commences flowing through the contrivance when the circuit is closed and hence it is verbally expressed that the resistance of the contrivance has been decremented. This is the most prevalent working principle of LDR.

Fig.5 LDR sensor

E. MAX232:

The MAX232 IC is utilized to convert the TTL/CMOS logic levels to RS232 logic levels during serial communication of microcontrollers with PC. The controller operates at TTL logic level (0-5V) whereas the serial communication in PC works on RS232 standards (-25 V to + 25V). This makes it arduous to establish a direct link between them to communicate with each other .The intermediate link is provided through MAX232. It is a dual driver/receiver that includes a capacitive voltage generator to supply RS232 voltage levels from a single 5V supply.

F. GSM Modem:

The SIM900 is a consummate Quad-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuring an industry-standard interface, the SIM900 distributes GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a diminutive form factor and with low power consumption. It has Built-in TCP/IP Protocol Built-in RTC in the module. AT Command predicated system it has the signalling speed of 85.6 kbps

Fig.7 GSM Modem

G. 16x2 LCD Display:

LCD (Liquid Crystal Exhibit) screen is an electronic exhibit module and find a wide range of applications. A 16x2 LCD exhibit is very fundamental module and is very commonly utilized in sundry contrivances and circuits. These modules are preferred over seven segments and other multi segment LEDs This LCD has two registers, namely, Command and Data. The command register stores the command ordinate dictations given to the LCD. A command is an injuctive authorization given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling exhibit etc. The data register stores the data to be exhibited on the LCD. A 16x2 LCD betokens it can

exhibit 16 characters per line and there are 2 such lines. In this LCD each character is exhibited in 5x7 pixel matrix.

IV. ADVANTAGES

- User friendly and cost effective.
- Highly sensitive
- Easy to maintain.
- Saves labor works.
- No soil erosion, which saves land.
- Enhances plant growth and yield and better Quality of produce.
- Water is only delivered, when its needed.

V. FUTURE SCOPE

- This system can rapidly realize the automatic networking irrigation system, transmission and exhibit.
- Through the Web technology, we can realize the function of remote monitoring of the agricultural field.
- It shows that the system can meet the requisites of the moisture level of the soil, according to that motor can be controlled.
- Thus, the utilizer can anytime view their sensor data details and the motor functionality status. The utilizer can access the sensor details and motor functionality status from the PC via LAN connection.

VI. CONCLUSION

This application of sensor-based irrigation has Some advantages such as preventing moisture Stress of trees, diminishing of excessive water Usage, ensuring of rapid growing weeds, Measuring fertility of soil. Thus the proposed methodology has Implemented a wireless sensor network based on The soil moisture level, temperature and light Intensity monitoring system to control the water Pump.

ACKNOWLEDGMENT

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