Advanced Automated Irrigation System

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Abstract-**This paper is about Advanced Automated Irrigation System which makes use of new technologies for wireless automatic system. Agriculture is the broadest economic sector and plays an important role in the overall economic development of a nation. Farming can be done using various new technologies to yield higher growth of the crops and their more production. The main objective of this project is to work for the same mentioned above. In this project we are going to check temperature, light, humidity, and soil moisture. The project here is all about automated control features with latest electronic technology using microcontroller and GSM phone line. The project works automatically and hence reduces the man power.**

Keywords: Soil moisture sensor, Temperature sensor, Humidity sensor, automated irrigation, GSM Module, Microcontroller.

I.   INTRODUCTION

We live in a world where everything can be controlled and operated automatically, but there are still a few important sectors in our country where automation has not been adopted or not been put to a full-fledged use, perhaps because of one such reason is cost. One such field is agriculture. Ever since civilization has come into picture, agriculture has been one of the most important occupations of mankind. FARMS form an important part of the agriculture and horticulture sectors in our country as they can be used to grow crops under controlled climatic conditions for optimum production [1]. Automating a farm envisages monitoring and controlling of the climatic parameters which directly or indirectly govern the crop growth and hence their produce. India has various greenhouses where the sub-zero temperature up to -40° C, in the proximity of high altitudes, which makes any kind of plantation almost impossible. The GSM based irrigation system may offer users the flexibility to regulate and control the operations of their irrigation systems with little intervention to reduce runoff from over watering for improvement in crop yield. This enables users to take advantage of the globally deployed GSM networks with its low SMS service cost to use mobile phones and simple SMS commands to manage their irrigation system. It will be possible for users to use SMS to monitor directly the conditions of their farmland, schedule the water needs of crops, automatically control watering, and set control operational conditions in accordance with the water needs of crops. This will help minimize water logging and reduce the cost of crop production.

OBJECTIVE:
    • Save water, energy and boost automation in the agriculture sector [1]
    • Make handling of the system, a 2 way process – manual and automatic
    • To design, build and test the system which will be economical, efficient and effortless

II. TECHNOLOGIES REQUIRED

A. GSM Module

.   At present the GSM module is used for various Remote Control activities such as Gate Control, Temperature Control etc. GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and

communication interfaces (like RS-232, USB) for computer. The MODEM plays an important role in the functioning of such modules. [2] It generates, transmits data from a cellular network, and decodes it in a form required by the system for establishing communication between the cellular network and the computer. [6] These are manufactured for specific cellular network (GSM/UMTS/CDMA) or specific cellular data standard (GSM /UMTS /GPRS /EDGE / HSDPA) or technology (GPS/SIM). They use serial communication to interface with the user and need various commands and functions such as Hayes compatible AT (Attention) commands for communication with the computer device (any microprocessor or microcontroller system).[6] An RS-232 port was once a standard feature of a personal computer for connections to modems, printers, mouse, data storage, un-interruptible power supplies, and other peripheral devices. However, the limited transmission speed, relatively large voltage swing, and large standard connectors motivated development of the universal serial bus which has displaced RS-232 from most of its peripheral interface roles. [2] Many modern personal computers have no RS-232 ports and must use an external converter to connect to older peripherals. Some RS-232 devices are still found especially in industrial machines or scientific instruments.

B. moisture sensor and precision centigrade temperature sensors

Such sensors detect presence of any kind of liquid or moisture content between two wire-leads and turns on the active High output to denote its presence. [1] This is because the exposed wire is porous; that is it allows transmission of water vapors or any liquid content into the sensor. These exposed areas are minutely engineered.[5] Thus the sensor has a very rapid response to changes in applied moisture, both when being dried (on process start-up) and when called into action if there is moisture ingress into a process. These are the types of sensors mainly used for

- Interfacing with Microcontroller to detect liquid levels.
- Moisture detection for automatic watering of plants.
- Liquid level detection by putting multiple probes at each liquid level.

Another important feature of this circuit is induction of Precision Centigrade Temperature Sensors. The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C). With LM35, the measurement of temperature is supposed to be more accurate than a thermostat. The sensor circuitry cannot get oxidized as it well tightly sealed. The LM35 provides a higher output voltage than thermocouples and may not require the output voltage be amplified.

III. METHODOLOGY

A. Previous scenario of Indian agriculture

The traditional methods of agriculture reveal the previous scenario of Indian agro system. The overall agricultural processes were dependent on human efforts. No signs of automation were visible in irrigation and crop production harvesting techniques. Hence, due to the human errors and other default problems, the production was quite slow and affected to a large extent [1]. After the 13th century, agricultural automation concept came into existence, and thereafter began the journey of progress in the field of agriculture.

B. Current scenario with market expectations

Further, after the introduction of farm monitoring, the production of crops increased to some extent. Also, some new innovative techniques had been implemented to grow up the environment and production of crops. Gradually with the increase in global population, the expectations and requirements of the market have increased to greater level. So, in order to overcome this problem, different machineries have arrived in the industry with various advanced techniques. Even though, the sector was not totally automated that time and now also it is not automated totally. So, this project trying to introduce automation in the agricultural sector, specially focusing towards automation in farm irrigation.

C. Architecture

This proposed system is an embedded system which will monitor and control the microclimatic parameters closely of a greenhouse on a regular basis round the clock for cultivation of crops or specific plant species which could maximize their production over the whole crop growth season. This system is designed to eliminate the difficulties involved in the system by reducing human effort to the best possible extent. The system consists of sensors, Analog to Digital Converter, microcontroller and actuators [5][4][3]. When any of the above mentioned climatic parameters cross a safety threshold which has to be maintained to protect the crops, the sensors sense the change and the microcontroller reads this from the data at its input ports after being converted to a digital form by the ADC. The microcontroller performs the needed actions with the help of relays until the strayed-out parameter has been brought back to its optimum level. As a microcontroller is the heart of the system, it makes the entire set-up cost efficient and effective [3]. The system also uses an LCD display to continuously alert the user of the greenhouse conditions so that the entire set-up becomes user friendly. Thus, this system eliminates the drawbacks of the existing set-up and is considered as an easy to maintain, flexible and a cost efficient solution.
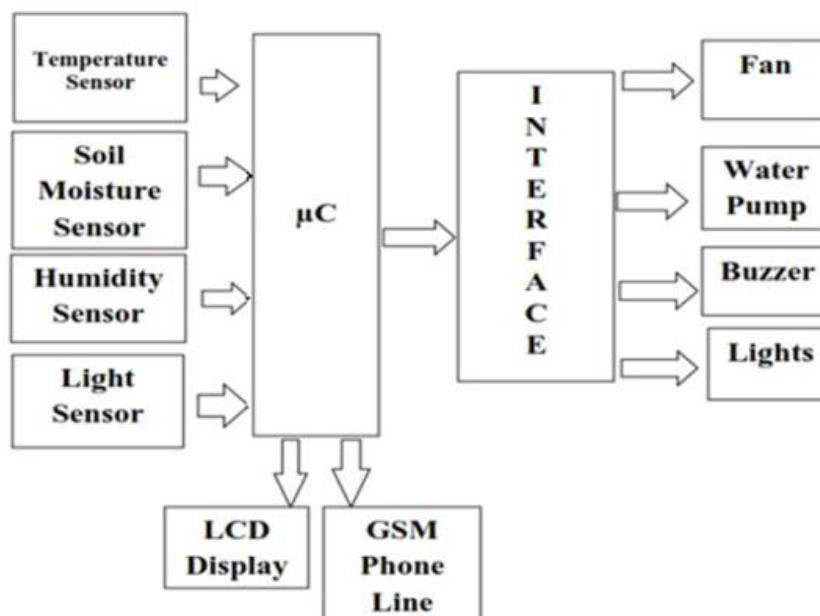
Fig. 3. Block Diagram

D. Sensors

- Temperature Sensor (LM35)
- Humidity Sensor (HIH4000)
- Light Sensor (LDR)
- Moisture Sensor [5]

IV. CONCLUSION

In this paper we are presented a different approach of various different types of irrigation systems based on GSM. These systems were all remotely controlled systems which proposed a low cost information exchange via SMS and GSM. The result of the survey conducted has lead to a very positive approach on the impact of GSM technology in farm irrigation methods & techniques. Everyday new techniques have been implemented for minimizing the irrigation process like mobile phone and other software application for conduction of irrigation process. This leads to a better and more efficient agricultural development for the future generations to come.

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