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INTERNET OF HYDROPONIC FARMING

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ABSTRACT - High yielding and high grade of crops are essential in modern day agriculture, this can only be achieved by smart farming technology which is used by making farms more intelligent in sensing its controlling parameters. Manual monitoring is in practice which is a very important task because if there is no proper care is taken then the plants may die out. The architecture of this hydroponic system which is fully automatic that can be integrated into the agricultural curriculum while introducing business skills. The automatic monitoring and control of the environmental events such as light intensity, PH, electrical conductivity, water temperature, and relative humidity is carried out by lodging sensors and actuators onto the system. The maintenance and automated monitoring are done by the intervention of the IOT(Internet of Things) that are used to transfer and A mobile app is used to communicate the current state of the hydroponic system to the user by retrieving data fr om the internet (mass storage) and sending it to their mobile phones.This cuttingedge system can use sophisticat ed data analytics and extensive data collection to increase the precision of reckoning.

I. INTRODUCTION

Hydroponic is a method where the crops are grown in the absence (minimum) of soil the nutrients that are acquired from the soil are given to them artificially. The term Hydroponics was acquired from the Greek words ‘hydro’ means water and ‘ponos’ means labour. This soil less culture of originating crops often involves their roots to be immersed in the nutrient solution along with some gravels or perlite medium. The maximum yield is achieved by the supply of sufficient quantity of nutrients and optimum microclimatic conditions are the main goal of hydroponics. Since soil is excluded from production process there will not be any problem related to soil borne diseases, pests and weeds. By the exclusion of these problems, there will not be any usage of harmful plant protection chemicals, so that there is a fresh and healthy yield of crops by the hydroponic method. The set-up of hydroponic only Demands limited space and limited quantity of water as they recirculate and reuse the water.

This resolves issues brought on the dirt.Hydroponic gardening benefits from the constrained space requirement because it may be done on terraces, balconies, and courtyards.So there is a high likelihood of growing crops in urban areas when there is a shortage of arable land.

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I. BLOCK DIAGRAM

A. The Block Diagram

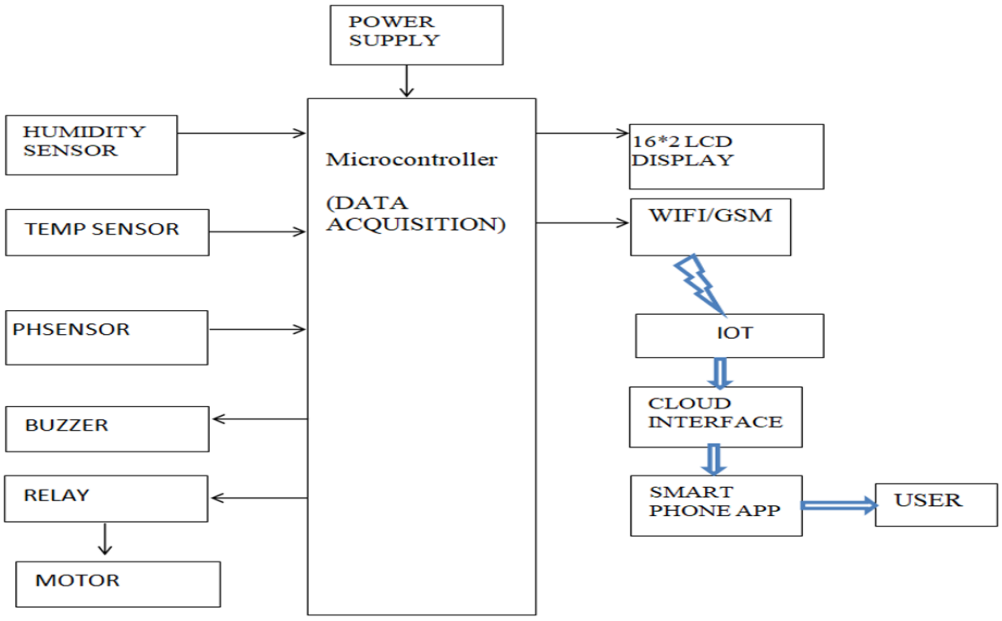

Fig. 1. Block Diagram of Internet of Hydroponic Farming

In the Figure[1] block diagram of Hydroponics system , we can see that sensors such as a pH sensor are used to measure the pH level of water, a DHT11 is used to measure temperature and humidity, and a circuit is used to measure the conductivity of water level. One communication process takes 4 milliseconds. The sensors are connected to the Pic18f4520 , which serves as a microcontroller. The controller obtains the values of each parameter using the WIFI module. The data is sent to a mobile app, which allows users to view the parameters of each sensor. After submitting the data to Blynk, the user will be alerted via text message or email, and he will be able to take further action.

B. Hardware Implementation

1) PIC18F4520:

PIC18F4520 is a microcontroller from the PIC18 family of microcontrollers manufactured by Microchip Technology. It is an 8-bit microcontroller that uses the Harvard architecture and operates at a maximum frequency of 40 MHz. The PIC18F4520 has a wide range of features, including 32 KB of flash memory, 1536 bytes of RAM, and 256 bytes of EEPROM. It also has an integrated analog-to-digital converter (ADC), multiple timers and PWM modules, and communication interfaces such as UART, SPI, and I2C. The PIC18F4520 is widely used in a variety of applications, including industrial automation, consumer electronics, and automotive applications, due to its versatility and low cost. It can be programmed using various programming languages such as C and assembly language.

Features:

- Operating Voltage is 2 to 5.5V
- Input Voltage is 0V to Vdd
- Digital I/O Pins are 36
- Analog Input Pins are 13
- DC Current per I/O Pin are 25 mA

2) Piezoelectric Buzzer:

The PS series are high-performance buzzers that employ unimorph piezoelectric elements and are designed for easy incorporation into various circuits. They feature extremely low power consumption in comparison to electromagnetic units. Because these buzzers are designed for external excitation, the same part can serve as both a musical tone oscillator and a buzzer. They can be used with automated inserters. Moisture-resistant models are also available. The lead wire type (PS1550L40N) with both-sided adhesive tape installed easily is prepared.

Features:

- tone type: single
- operating voltage: 3-6V DC
- rated voltage: 5V DC
- current consumption: 25mA
- OSC sc. frequency: 3.2kHz

3) 16*2LCD Display:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Clickto learn more about internal structure of a LCD.

Features:

- Operating Voltage is 4.7V to5.3V
- Current consumption is 1mAwithout Backlight
- Alphanumeric LCD display module meaning can display alphabets and number.

4) DC Motor:

Geared DC motors can be defined as an extension of DC motors that already had their Insight details demystified. A geared DC Motor has a gear assembly attached to the motor. The speed of the motor is counted in terms of rotations of the shaft per minute and is terms RPM. The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure.

Features:

- Runs on DC power or AC line voltage with a rectifier.
- Operating speeds of 1,000 to 5,000 rpm.
- 60-75% efficiency rate.
- High starting torque.
- Low no-load speeds.

5) Regulated IC LM 7805:

The MC78XX/LM78XX/MC78XXA series of three-terminal positive regulators are available in the-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down, and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current.

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Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

Features:

- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V
- Thermal Overload Protection
- Short Circuit Protection
- Output Transistor Safe Operating Area Protection

6) GSM Module:

This GSM modem has a SIM800A chip and RS232 interface while enables easy connection with the computer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once you connect the SIM800 modem using the USB to RS232 connector, you need to find the correct COM port from the Device Manger of the USB to Serial Adapter. Then you can open Putty or any other terminal software and open an connection to that COM port at 9600 baud rate, which is the default baud rate of this modem. Once a serial connection is open through the computer or your microcontroller you can start sending the AT commands. When you send AT commands you should receive back a reply from the SIM800 modem saying "OK" or other response depending on the command send.

Features:

- Bands: GSM 850MHz, EGSM 900MHz, DCS 1800MHz, PCS 1900MHz
- GPRS class 2/10
- Control via AT commands (3GPP TS 27.007, 27.005 and SIMCOM enhanced AT commandset)
- Supply voltage 3.4-4.4V
- Coding schemes: CS-1, CS-2, CS-3, CS-4 Tx power: Class 4 (2W), Class 1 (1W)

II. CONCLUSIONS

Production of terrestrial crops using a hydroponic system is advantageous in the suggested system's proper resource management and can produce significantly more nutritious crops than conventional farming. The combination of this sort of farming with the internet and IOT creates several options for research into the advantages of this system in numerous locations throughout the world, which further aids streamlining system's operations.The user can add another factor for complete, IOTbacked system with the help of the features of news feed links to buy hydroponic systems and their components.Building a community with the aid of an IOT web server can aid in raising awareness of hydroponics and provide platform for people to connect and exchange ideas.

III. REFERENCES

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