IoT based Automatic Watering System for Indoor Plants

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Abstract: Here we introduce automatic plant watering system, which is considered as one of the most commonly used and the most beneficial automated systems nowadays, which help people in their daily activities by reducing or completely replacing their effort.

This system uses sensor technology along with microcontroller and other electronics in order to behave like smart switching system which senses soil moisture level and irrigates the plant if necessary. Purpose of this work is to show how someone can easily make own and cheap automatic plant watering system in just few hours by connecting certain electronic components and other materials required. In our experiment, we connected all required materials exactly as shown in this paper, in order to test whether our system will work properly or not. Although the system made in that way would be the most appropriate for home usage as solution for some daily and usual issues, there is a wide spectrum of possibilities of implementing these systems as a long-term solution for many agricultural and medical problems.

As one possible agricultural solution, this system can be very helpful in keeping vegetables and other useful and specific plants watered for bigger harvest, which enables farmers from all around world to breed crops of these plants which are the most wanted and the most commonly used in diet. As medical solution, these systems can be used for purpose of cultivating certain plants that are famous and well known by their ability to remove air pollutants and therefore reduce the concentration of toxic pollutants in the air as well the occurrence of respiratory diseases. (Abstract)

Keywords—component, formatting, style, styling, insert

I. INTRODUCTION

In daily operation related to watering the plants are the most important cultural practice and the most labour-intensive task. No matter whichever weather it is, either too hot and cold or too dry and wet it is very crucial to control the amount of water reaches to the plants.

So, It will be effective to use an idea of automatic plant watering system which waters plants when they need it. An important aspect of this project is that: "when and how much to water". To reduce manual activities for the human to watering plant, an idea of plant watering system is adopted. The method employed to monitor the soil moisture level continuously and to decide whether watering is needed or not, and how much water is needed in plant's soil. This project can be grouped into subsystems such as; power supply, relays, Arduino GSM shield, Soil moisture sensor and LCD.

2. AIM OF THE WORK

Since nowadays, in the age of advanced technology and electronics, the life style of the human should be smart, simpler, easier and much more convenient. So, therefore; there is a need for many automated systems in human's daily life routine to reduce their daily activities and jobs. Here an idea of one such system named as automatic plant watering system is very useful. As many people are facing a lot of problem watering the plants in the garden, especially when they away from the home. This model uses sensor technologies with microcontroller in order to make a smart switching device to help millions of people

Automatic Watering System

- Some plants as thorny plants don't need a lot of water means high humidity ratio so the farmer can benfit from the sensors reading the determination if the plants need the water now or not.
- It can be also used for irrigation purpose ,as farmer's agricultural lands are very far from the farmer's house, so farmer's can use this system from their house itself

Problem Statement

During day to day activities many people often forget to water their plants and thus it becomes challenging for them to keep their plants healthy and alive. Also it is a challenge for farmers to maintain their fields and manage watering of plants during shortage of water. Based on the above background, we thought that it is necessary to implement the automated system which will take care of plants considering all the different aspects of home gardening system (for system based on household purpose) as well as larger landscape (for the system based on agricultural farms) and helps them to grow healthy. We also believe that technology can help people in cultivating plants, not just by automation but also through digital communications (such as to notify the user with the current status of the plant is

important to note). Therefore, our project aims to implement a simple system, using automatic irrigation, watering a small potted plant or crop with minimal human intervention

3. HARDWARE REQUIREMENT

3.1 ARDUINO

Arduino Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

3.2 SOIL MOISTURE SENSOR

This is a simple water sensor can be used to detect soil moisture when the soil moisture deflect module output a high level and vice versa output low. Using this sensor we produced an automatic plant watering device so that the plants in your garden without people to manage.Today's project is reading a soil hygrometer in a plant to determine the moisture level soil moisture module is most sensitive to the ambient humidity is generally used to detect the moisture content of the soil.

3.3 POWER SUPPLY

The power supply section is the section which provide +5V for the components to work. IC LM7805 is used for providing a constant power of +5V. The ac voltage, typically 220V, is connected to a transformer, which steps down that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation.

A regulator circuit removes the ripples and also retains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.

3.4 LIQUID CRYSTAL 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 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

3.5 WATER PUMP

The water pump can be defined as a pump which uses the principles like mechanical as well as hydraulic throughout a piping system and to make sufficient force for its future use. They have been approximately in one structure otherwise another because of early civilization. At present these pumps are utilized within a wide range of housing, farming, municipal, and manufacturing applications.

3.6 TEMPERATURE SENSOR

The temperature sensor used to measure the temperature at the field is LM35. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade).The LM35 does not require any external calibration or trimming to provide typical accuracies of degree C at room temperature and degree C over a full -55 to +150C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35‟s low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. The device is used with single power supplies, or with plus and minus supplies. As the LM35 device draws only 60 μA from the supply, it has very low self-heating of less than 0.1°C in still air.

4 SOFTWARE REQUIREMENT

4.1 ARDUINO IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

Programs written using Arduino Software (IDE) are called **sketches**. These sketches are written in the text editor and are saved with the file extension. in. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays

text output by the Arduino Software (IDE), including complete error messages and other information. The bottom righthand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

5 PROJECT DESCRIPTION

5.1 BLOCK DIAGRAM

The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value. When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level will be higher. Dry soil conducts electricity poorly, so when there will be less water, then the soil will conduct less electricity which means that there will be more resistance. Therefore, the moisture level will be lower.

This sensor can be connected in two modes; Analog mode and digital mode. First, we will connect it in Analog mode and then we will use it in Digital mode.

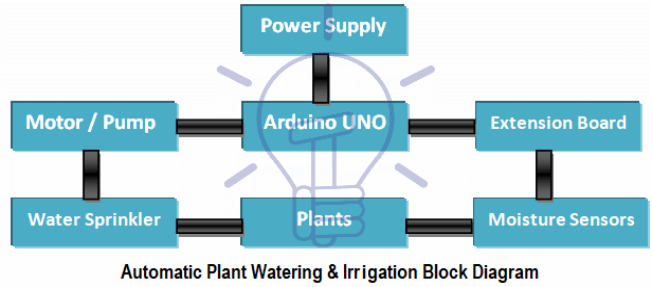

Fig 1 Block Diagram of Automatic Plant Watering

5.3 ADVANTAGES

- SAVE TIME: Your system will do all the watering for you.
- SAVE WATER: An automatic system uses less water than watering by hand.
- SAVE MONEY: Your water bills will be lower and your plants will live longer.
- Weather efficiency.
- Less stress.
- Works according to the soil condition.
- No nutrition pollution is released into the environment because of this controlled system.
- Complete elimination of man power.

5.2 Flowchart of the Project

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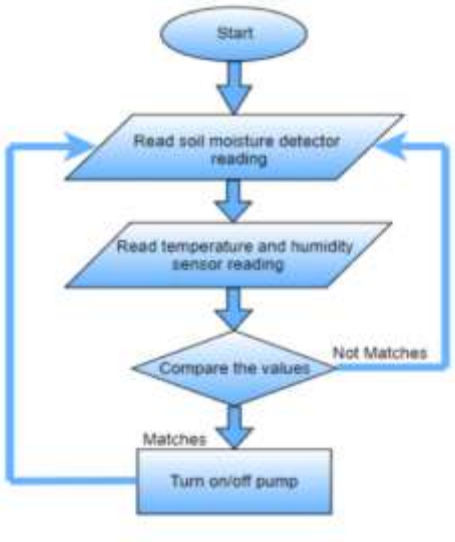

Fig 2 Flow Chart

6 RESULTS AND DISCUSSIONS

6.1 Result of the project

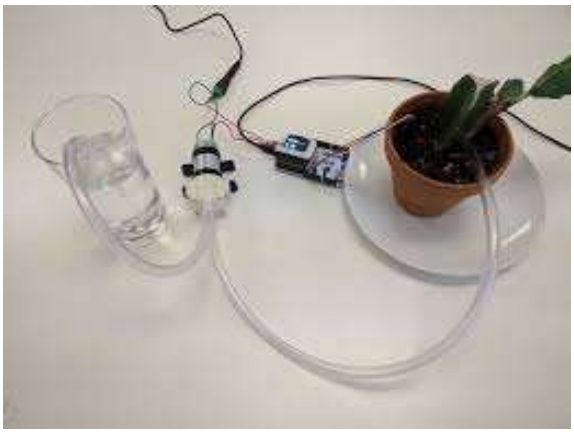

Fig 3 Snap Shot of Device Connections

Fig 4 Upload Plant Data to Cloud

6.2 Future Scope

The working of project is basically dependent on the output of the humidity sensors. Whenever there is need of excess water in the desired field then it will not be possible by using sensor technology. So we have to adopt some other technology like Bluetooth . By using this we will be able to irrigate the desired field and in desired amount more efficiently.

7 .CONCLUSION

The work is designed and implemented in such a way ,that it is much easy and cost effective .Such system will be able to contribute to the socio-economic development of the nation ,with fast response and user friendly.

As water supplies become scarce and polluted, there is a need to irrigate more efficiently in order to minimize water use and chemical leaching. Recent advances in soil water sensing make the commercial use of this technology possible to automate irrigation management for vegetable production. However, research indicates that different sensors types perform under all conditions with no negative impact on crop yields with reductions in water use range as high as 70% compared to traditional practices.

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