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MICROCONTROLLER BASED E-GARDENING

[1]S.T.Vasan, Chetana [2]Hooli, [2]Abida Kanavi
[1]Professor, [2]Assistant Professor
Department Of Engineering Science, RTE Society's Rural Engineering College Hulkoti (VTU), GADAG India. vasan_rec@rediffmail.com

ABSTRACT

The most important problems faced in garden maintenance are misusage of electricity and its wastage. Sometimes due to carelessness of the authorities and the workers lamps are left ON, which results in wastage of electricity. Water wastage is another problem which needs to be dealt with. Our project helps to overcome all these problems. Public garden automation system uses LDR sensor to sense intensity of light. By setting a threshold value for intensity of light, if it goes above the threshold value then lamps will be automatically turned ON.

1. INTRODUCTION

In today's world, automating the data acquisition process of the soil conditions and various climatic parameters that govern plant growth allows information to be collected at high frequency with less labor requirements. Garden automation is one of the primary concerns in this area. The objective of garden automation is to develop and implement automated garden monitoring system that can scale down to improve the conditions of indoor gardens as small as household garden boxes for garden enthusiasts or as big as green houses for the agriculture industry. It is simple to design and easy to install, microcontroller-based circuit to monitor and record the values of soil moisture and sunlight of the natural environment that are continuously modified and controlled in order optimize them to achieve maximum plant growth and yield. The controller used is a low power, cost efficient chip manufactured by ATMEL having 8K bytes of on-chip flash memory. An integrated Liquid crystal display (LCD) is also used for real time display of data acquired from the various sensors and the status of the various devices. Also, the use of easily available components reduces the manufacturing and maintenance costs.The existing systems employ PC or SMS-based systems for keeping the user continuously informed of the conditions inside the greenhouse; but are unaffordable, bulky, difficult to maintain and less accepted by the technologically unskilled workers.

The design is quite flexible as the software can be changed any time. It can thus be tailor-made to the specific requirements of the user. This makes the proposed system to be an economical, portable and a low maintenance solution for public garden

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utomation applications. Real time data will be collected by employing several analog and digital sensors, such as LDR(light dependent Resistor)sensors. These sensors will then be integrated with a comparator. The comparator will then insert the data into a microcontroller at every second .The application will also display data by using LCD(liquid crystal display).

2. LITERATURE SURVEY

As of the time of this proposal, Cellular Machines and Monnit Corporation provide similar functionality in the form of professional greenhouse monitoring software integrated with various circuits. In addition to these two providers, various gardeners, farmers, and hobbyists have attempted similar products mostly making use of the Arduino system, many of which are currently in the ―functional prototype‖ state of development.

Currently, there are a few solutions to the autonomous greenhouse problem which are primarily divided into two camps: the professional product and the open source project. The professional products make use of proprietary integrated circuits connected to various wireless sensors that monitor a greenhouse and report abnormalities via a web application or SMS alerts. Also, the professional products currently on the market require both an upfront purchase of the monitor system as well as a monthly subscription fee. The open source world, on the other hand, consists of several unrelated projects, many at the ―functional prototype‖ stage of development. Arduino is the preferred platform, and wireless sensors are used to communicate. Metrics and alerts are available via a web application. Several limitations exist in the current market, the most glaring of which is the lack of remote control capability. While both the professional and open source products provide monitoring and alert capabilities via SMS message and web applications, none of the available products appear to offer any support for scheduled and manual control of the sprinkler and lighting system. In addition, current products seemed to be limited to web applications for viewing collected.

Manual watering

This method is time consuming, but it is accessible and economical. It also enables targeted watering where needed. It is important to water the soil — and not the plants — directly. Avoid the formation of puddles and runoffs .To reduce the workload, spread out watering over several days, watering one section of the garden at a time.

Figure 2.1: Manual watering system

Sprinkler system

Sprinkler system irrigates the field and thus it is widely used in sandy areas as it checks the wastage of water through seepage and evaporation. Sprinkler irrigation is a method of applying irrigation water which is similar to natural rainfall. Water is distributed through a system of pipes usually by pumping. It is then sprayed into the air through sprinklers so that it breaks up into small water drops which fall to the ground. The pump supply system, sprinklers and operating conditions must be designed to enable a uniform application of water.

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Figure 2.2: Sprinkler system

Automatic Irrigation

An automatic irrigation system does the work quite efficiently and with a positive impact on the place where it is installed. Once it is installed in the agricultural field, the water distribution to crops and nurseries becomes easy and doesn‘t require any human support to perform the operations permanently.

Figure 2.3 : Automatic irrigation

Wastage of Electricity in existing garden system

The cost effectiveness of when to turn off lights depends on the type of bulb and the cost of electricity. The type of light bulb to use is important for several reasons. All light bulbs have a nominal or rated operating life, which is affected by how many times they are turned on and off. The more often they are switched on and off, the lower their operating life. So as all lights are left ON they consumes more electricity.

Figure 2.4: Wastage of Electricity in existing garden system

Street lights are controlled manually in olden days. These days automation of lights has emerged. But one can observe that there is no need of high intensity in peak hours. when there full light intensity in early mornings. By reducing the intensity in these times, energy can be saved to some extent.

3. BLOCK DIAGRAM

Microcontroller based garden automation consists of monitoring and control of various parameters such as water and electricity, includes various elements such as LDR,LCD display, Relay etc.

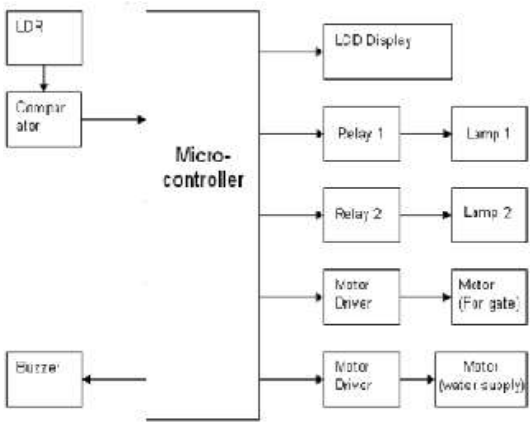

Figure 3.1: Overview of microcontroller based E-Gardening system

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Internal Block Dig of Microcontroller Based E-Gardening

Internal block diagram of E-Gardening consists of various circuits such as day/night sensing circuit, power supply circuit, motor driver circuit , relay circuit etc…

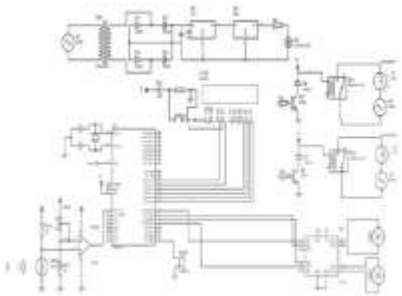

Figure 3.2: Internal Block Diagram Of Microcontroller Based E-Gardening

Working of L293D

There are 4 input pins for l293d, pin 2,7 on the left and pin 15 ,10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1.

In simple you need to provide Logic 0 or 1 across the input pins for rotating the motor.

Submersible Motor

Figure 3.3: Submersible motor

A submersible pump (or sub pump, electric submersible pump (ESP)) is a device which has a hermetically sealed motor close-coupled to the pump body. The whole assembly is submerged in the fluid to be pumped. The main advantage of this type of pump is that it prevents pump cavitation, a problem associated with a high elevation difference between pump and the fluid surface. Submersible pumps push fluid to the surface as opposed to jet pumps having to pull fluids. Submersibles are more efficient than jet pumps.

The submersible pumps used in ESP installations are multistage centrifugal pumps operating in a vertical position. Although their constructional and operational features underwent a continuous evolution over the years, their basic operational principle remained the same. Produced liquids, after being subjected to great centrifugal forces caused by the high rotational speed of the impeller, lose their kinetic energy in the diffuser where a conversion of kinetic to pressure energy takes place. This is the main operational mechanism of radial and mixed flow pumps.

Working

This is used to detect the night or day. When the light falls on LDR , the 555 IC to triggers .This circuit is constructed with the help of 555 timer IC working in Monostable mode. When the LDR resistance decreases it supplies the triggering pulse to the pin no.2 and the multi vibrator triggers and produces the high voltage at pin no.3 and makes the relay to conduct. The o/p is taken at collector with respect to VCC is fed to lights. With the help of contacts the lights are made ON during night time. The time delay of the On/OFF can be changed by changing the values R1 and C1.

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4. ADVANTAGES AND DISADVANTAGES

Advantages

1) Saves electricity because lights are turned on only when there is insufficient light in the environment. Thus it avoids wastage of electricity and water.

2) All process in Garden like Gate opening, water supply, light controlling are fully automated.

3) This small scale project can be implemented in any garden with minimum cost and resources .

4) Relatively simple to design and installed.

5) Reduces soil erosion and nutrient leaching.

Disadvantage

1) The change in automation has caused a shift into replacing humans with machines, leading to unemployment.

5. APPLICATIONS

SCHOOL GARDEN

A school garden is an innovative teaching tool and strategy that lets educators incorporate hands-on activities in a diversity of interdisciplinary, standards-based lessons. The garden engages students by providing a dynamic environment in which to observe, discover, experiment, nurture, and learn. This project can be implemented as collage Garden maintenance system with minimum cost and resources.

Figure 5.1 School Garden

GARDEN IN HEALTHCARE FECILITIES

These gardens are designed for a specific population, often with an specific purpose (e.g., encouraging seniors to get outside for exercise, sunlight and fresh air; enabling children to "blow off steam" during a hospital visit; helping patients learn to use a wheelchair on outdoor surfaces). They are (or should be) designed using evidence-based design (EBD), design based on the most current research available.

Figure 5.2: Garden In Healthcare Facilities

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6. FUTURE SCOPE OF STUDY

The future scope of this project mainly focuses on following issues

1. In public places it can monitor various hazardous parameters like fire, bomb detection using fire sensor and metal detector respectively.

2. This can be expanded in the sense of security by using metal detectors and CCTV cameras.

3. Voice playback device can be added to inform user about the status of various devices. Also by using GSM technology further control of water supply and lights can be achieved.

4. The system can also be connected with the android or windows mobile app to make its use more user friendly.

7. RESULTS AND ANALYSIS

Hardware Results

This section describes the required hardware results obtained through device. Initially the device is configured and verified for the expected result. figure 8.1,8.2 and 8.3 shows the expected hardware results for garden maintenance system.

Figure 7.1 show before opening of garden system the Microcontroller around 4.00pm switches on the water supply once to water the entire garden few hours before opening of the garden for public.

Figure 7.1: Before opening of the garden

The gate is opened by running the motor which is driven by a motor driver operated by the Microcontroller. At around 6.00pm the lights are switched ON depending upon the output of the LDR and the lights remain functional till the garden remains open for visitors.

Figure 7.2: After opening of the garden

The gate is then closed at 9.00pm and one of the two lamps is switched off. One lamp is kept on throughout the night.

Figure 7.3: closer of garden

8. CONCLUSION

E-gardening is simple and easy. E-gardening will reduce the human efforts in gardening and also make the gardening automated and tech friendly. It also makes the appropriate use of water resource which will help us to fight with the water scarcity problem and it also improves the health and life of plants. In this system various applications like gate, water

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pump, light etc are turned ON and OFF for the predefined time. Using this system one can save manpower & water to improve production and ultimately reduces more electricity consumption.

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