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Automated Irrigation System

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Abstract: A satisfactory water supply is important for plant growth. Our project purposes is to automate this procedure by analyzing the moisture content of the soil. The input from the moisture sensors is analyzed by the Arduino and the plants are watered using the pump and sprinkle. The water is obtained from a connection pipe of the building. The pump are activated only when the soil is dry. The dryness will sense the moisture sensor and send the signal to the Arduino and the Arduino will activate the pump and hence supply of water will continue until the desire moisture is reached in the soil. Therefore, this automated irrigation system will decrease human labor and water consumption thereby increasing productivity. This type if automated irrigation system is ideal for gardening. It could also be used for home gardening requirements or could be used in multiple potted plants. So it is appropriate for both commercial as well as growing plants at home.

Keywords - Arduino, moisture sensor, microcontroller, pump, moisture, irrigation, gardening.

I. INTRODUCTION

By using the concept of modern irrigation system can save time to do the watering. Nowadays, it is a challenge to improve the irrigation system of garden to enhance the plant growth. The plants are irrigated and monitored manually by the people and this monitoring may cause wastage of water, if the gardener is unavailable. Most of the people are not able to maintain their gardens due to their workload. The plant soil moisture stress is prevented by providing essential amount of water resources frequently or frequently daily by which the moisture condition of the soil will retain well. In the later part of the project we showed the 3d model of the project. The traditional techniques like sprinkler or surface irrigation requires uses closely half of water sources. Even more exact amounts of water can be supplied for plants. In current scenario, the Arduino microcontroller is used to monitor and irrigate the plant automatically. The moisture sensors measure the amount moisture level of the different plants. If the soil moisture level is below the threshold level, the moisture sensor sends the signal to the Arduino board which enables the water pump to turn ON and supply the water to the plant Sprinkler. When the desired moisture level is reached, the water pump is turned OFF.

1.1 project background:

In late decades, the people use to gardening the plant by manual and this will increase the labor cost as well as there might be a chance of over load of water to the plant and this will increase the moisture in the soil and roots of the plant will not able hold the soil and the plant will fall eventually. We all know that plants are very beneficial to all human beings in many aspects. Plants benefits is keeping the environment healthy by cleaning air naturally and producing oxygen. Many people like to have plants in their yard. But due to development and insufficiency of place many people used to grow plants in a mold or dirt, pot, and placed on the windowsill. This plant are rely on conventional breeding - watering, and provide the right amount of sun to sustain life and growth. In busy schedule of day to day life, many time people forget to water their plants and due to this plants suffers many illnesses and ultimately died. It is very vital to utilize the water resources in proper way.

II. LITERATURE REVIEW

T. Prabhu , B. Ragnath² ,P.Rubika , S.Varun kumar ,K.Vasanthi, 2019 [1] Garden automation is an automatic system used to irrigate the plants, whenever needs and reduces the workload of people. An idea of automatic irrigation is done by analyzing both the temperature and moisture of the soil and detects the human presence in the garden. These parameters are sensed and monitored using sensors and processed by arduino to store the data in the IoT server.

Drashti Divani, Pallavi Patil, Sunil K. Punjabi,2016 [2] Modern watering systems could be effectively used to water plants when they need it. But this manual process of watering requires two important aspects to be considered: when and how much to water. In order to replace manual activities and making gardener's work easier, we have create automatic plant watering system. By adding automated plant watering system to your garden or agricultural field, you will help all of your plants reach their fullest potential as well as conserving water. For implementation of automatic plant watering system, we have used combination of sprinkler systems, pipes, and nozzles. This project uses the Arduino.

Vijay S. Deshpande , Amit S. Vibhute , Amol K. Choure , Prof Smitha P, 2019[3] Home automation is an integral part of modern lives that help to monitor and control the home electrical devices as well as other aspects of the digital home that is expected to be the standard for the future home. Home appliance control system enables house owner to control devices Lighting, Heating and ventilation, water pumping, gardening system remotely or from any centralized location. Automatic systems are being preferred over manual system.

Dr.P.Sengottuvel1, Dr.J.Hameed Hussain, 2018 [4] an adequate water supply is important for plant growth. When there is insufficient rainfall it is necessary to provide additional irrigation to the plant. Our project aims to automate this procedure by analyzing the moisture content of the soil and atmospheric temperature. The input from the moisture sensors and the temperature sensor is analyzed by the microprocessor (arduino) and the plants are watered using a specifically designed matrix system.

AMC Priyashantha, EMNDM Ekanayaka, TBSV Bandara, MWPN Mettananda and AKG Weerasekara, 2018 [5] Automated systems are increasingly present in modern industry and everyday life. Their applications range from health-related situations, assistance to elderly people or surgical operations, to automated industrial applications. Recently, an interest towards the application of robotics in agriculture and gardening has arisen, with applications to automatic seeding and cropping or to plant disease control etc.

Uroromu Ighrakpata , Mohamed Chouikha , O'tega A. Ejofodomi and Godswill Ofualagba,2019 [6] The automated irrigation system works by continuously monitoring the soil moisture content and wirelessly activating the pipeline valves to open when the moisture level drops below the minimum threshold for the cultivated crop, causing the land to be irrigated. When the moisture level rises above the maximum threshold, the system deactivates the irrigation pipeline valves, causing them to close and ceasing land irrigation. This automated irrigation system is customizable and can also be used to upgrade existing drip irrigation systems, surface irrigation systems, and sprinkler irrigation systems to overcome their existing limitations.

Prof. Rashmi Jain, Shaunak Kulkarni, Ahtesham Shaikh, Akash Sood, 2016 [7] In India, agriculture plays an important role for development in food production. In our country, agriculture are depends on the monsoons which is not sufficient source of water. So the irrigation is used in agriculture field. In Irrigation system, depending upon the soil type, water is provided to plant. The greenhouse based modern agriculture industries are the recent requirement in every part of agriculture in India.

III. PROBLEM DEFINITION AND OBJECTIVE

3.1 Problem Statement:

If a person do gardening then the watering to plant is very important on daily basis but in a busy life, most of the people don't get the time for watering plant and if a person goes to vacation then the watering to plant is not possible. This may lead damage or dryness to plant. We will make a system which measure the moisture in soil and if the moisture content is low then the system will sprinkle water to the plant. The system is very useful for people who do not have time to water their plants because of busy life schedule and they can do their works or go to vacation without any tension. Irrigation of plants is usually a very time-consuming activity, to be done in a reasonable amount of time, it requires human resources. Traditionally all the steps were performed by humans. Nowadays some systems use technology to decrease the number or workers or the time required to water the plants. With such systems, the control is very limited, and many resources are still unused. Water is one of these resources that are used extremely.

3.2 Objective:

- We are using Arduino Nano microcontroller for our project.
- Arduino IDE software will use for programming the Arduino by using c/c++ programming language.
- Also moisture sensor will use for the sensing the moisture in the soil.
- A pump for the supply of water.
- We will require a battery to store the current in case of power cutoff.

IV. METHODOLOGY

4.1 flow chart of the process:

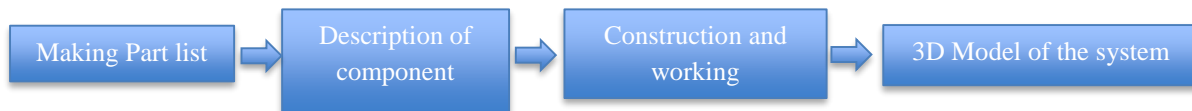


Fig 4.1 Flow Chart of the process.

4.2 Part list:

- 4.2.1 Microcontroller.
- 4.2.2 Battery.
- 4.2.3 AC to DC converter.
- 4.2.4 Pump.
- 4.2.5 Moisture sensor.

4.3 Description of component:

- 4.3.1. Microcontroller:
 1. 14 digital pins, 8 analog Pins, 2 Reset Pins & 6 Power Pins.
 2. Operating voltage of 5V but the input voltage can vary from 7 to 12V.
 3. Maximum current rating is 40mA.
- 4.3.2. Battery:
 1. Voltage: 12v
 2. Battery Capacity: 1.3 Ah
 3. Weight: 0.450kg
 4. Size: 98mm x 43mm x 52 mm
- 4.3.3. Ac to Dc convertor:
 1. 12V DC output power supplies.
 2. 120 – 240 AC input voltage.
- 4.3.4. Pump:
 1. Dc pump with 9-12 volts.
 2. Operating current: 120-230mA.
 3. Flow rate: 80-120 L/h.
- 4.3.5. Moisture Sensor:
 1. Operating Voltage(VDC) : 3.3 to 5 V
 2. PCB Dimension : Approx. 3 cm x 1.5 cm
 3. Soil Probe Dimension : Approx. 6 cm x 3 cm
 4. Cable length: 20 cm

4.4 Construction and Working:

- 4.4.1. Construction:
 - Battery will store current in case of power cut off.
 - Moisture sensor to measure moisture in soil.
 - AC to DC convertor to store current in battery.
 - Microcontroller to sense the signal from moisture sensor.
 - A small pump to force the water to sprinkle the plant.
- 4.4.2. Working:
 - The electric current is stored in battery for working of controller, sensor and pump.

- The AC to DC convertor is used to convert the AC current to DC and the DC current will stored in battery.
- The moisture sensors measures level of moisture in the soil and sends the signal to the controller if watering is required.
- The controller will operate the pump for supply of water.
- This project uses controller to control the motor pump. The controller board is programmed using the Arduino IDE software and by using c/c++ programming language.
- The water pump supplies water to the plants until the desired amount of moisture is reached.

4.5 CAD model of project:

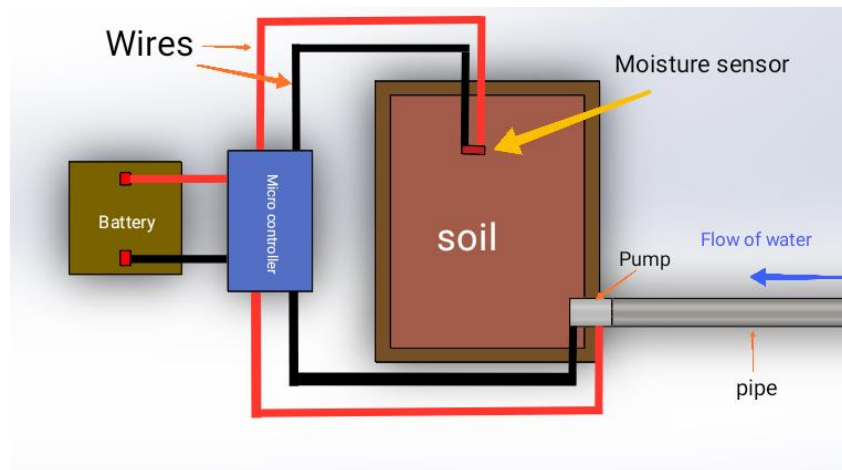


Fig 4.2 3d model using solidworks.

V. FIGURES AND TABLES

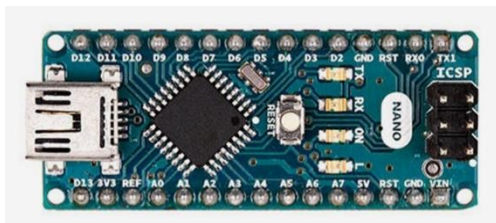


Fig 5.1 Arduino Nano



Fig 5.2 Battery



Fig 5.3 Pump



Fig 5.4 Moisture Sensor

Table 5.1 Cost Analysis

Parts	Quantity	Cost
1.Moisture sensor	1	320
2.Pump	1	300
3.Battery	1	700
4.Microcontroller	1	425
5.Ac to Dc convertor	1	150
Total		1895

VI. CONCLUSION

Automatic system using a microcontroller, moisture sensor and other electronic tools were been developed. It was detected that the proposed methodology controls the moisture content of the soil of cultivated land. The motor automatically start pumping water if the soil is dry and need water and stops when the moisture content of the soil is preserved as required. The challenging part of our project is the code for the Arduino which we have to learn from the internet to make the code and we have test and run the code until we get desired output. There are many clone electronic components available in the markets but we need to research the specification and the proper brand model so we get the good electronic components for our projects.

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