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Automatic Plant Watering System

Snehal Rathod*, Anushka Daware*, Manasi Shende*, Tanvi Iche*, Ayush Dhale*, Aun Sheikh*, Swaraj Tawlare*, Saurabh Ingole*, Kaiwalya Rathod*, Prof. A. N. Shire**

*(Electronics And Telecommunication Engineering Department, Jawaharlal Darda Institute of Engineering & Technology Yavatmal
Email: snehalrathod468@gmail.com)
** (Electronics And Telecommunication Engineering Department, Jawaharlal Darda Institute of Engineering & Technology Yavatmal
Email: atul_shire@jdiet.ac.in)

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Abstract:

The project Automated plant watering system [APWs] is designed to make irrigation easier and smarter by automatically watering plants whenever the soil become dry the system works with the help of soil moisture sensor, which constantly check the water level in the soil. when the soil become too dry the sensor sends a signal to Arduino uno, which then turn on a motor pump to water the plant once the soil has enough moisture the motor automatically stop, preventing over watering and saving water. This project is very useful for farmer as it reduces manpower, avoid human error and ensures that crops always get the right amount of water the system is built using simple electronic component like Arduino uno, relay modules, sensor and a motor pump which makes it cost- effective and easy to understand the technique can be applied to small farm gardens or even large agricultural land by expanding the number of sensors and pumps. The project aims to support busy individuals, urban households, and agricultural application by offering a smart, reliable and user-friendly watering system that enhances plant growth while conserving resources.

Keywords —Arduino UNO, Soil moisture sensor, relay module, water pump, lcd display.

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INTRODUCTION

The automatic plant watering system is a device design to water plant automatically without requiring manual effort it help to maintain the right moisture level in soil the preventing both over watering and under watering in this project soil moisture sensor is used to detacte the soil moisture level when the soil become dry the system automatically supply water to the plant once the soil has enough moisture this is steam stop watering its own this process save time water and effort while ensuring that plant receive the right amount of water necessary for their healthy growth many people having plant around their home but due to their busy schedule they often find it difficult to take proper care of them with this system plant can be water automatically even when we are away on vacation eliminating the need of relay on neighors such system are highly beneficial inform and garden and green houses specially in areas when regular watering is difficult The automatic plant for drink system The automatic plant for drink system provide and efficient and sustainable solution for modern irrigation with the growing need for automation and environmental conservation represent and important smart and sustainable agriculture practices.

LITERATURE SURVEY

[1][5][11][14] development an automatic plant watering system using Arduino board, soil moisture sensor, water pump, relay module provides a right amount of water to plant, saving amount of reduce human efforts. After providing right amount of water

to plant Motor automatically off with the help of relay module and maintain soil health by using soil moisture sensor.

[2][4] system is need to perform automatic art and of by relay module to maintain soil health as for 15 or 20 days how much water need for crop according to that they can set the moisture level for growth crops.[13][3] automatic plant watering system ek soil washer level for as well as for growth of plants need to check concentration of water this system observe soil moisture level as well as water concentration whenever there is change in water conservation Sensor will since the change it give the signal to microcontroller why is the resource whose soil pH property used to describe the degree of acidity and basicity which affects the nutrient availability and ultimately plant growth. Thus whenever there is fluctuation in water concentration sensor will since it and microcontroller.

[6][7] plant need to right amount of water but also environment is the factor which can affect plant growth it may be good or bad affect. According to environment temperature or rain we need to observe it also. That's because whenever there is a fluctuation in environment sensor will sense and work according. If temperature is very high then microcontroller will on relay and whenever where is the temperature low or rain sensor will be sense and give signal to the microcontroller and it will turn off automatically [a] some plants need is watering them twice in a day. If the requirement of plant is watering twice in a day we can set the timing according that motor will turn on an off with the help of relay some plants need are different according to that we can set the timing and according that system will work. [12] in this paper development of Smart home using Google assistant is proposed control home device with voice according to command it will work it require command voice in this project single board computer that is raspberry Pi will be used it link to j JFTIT website and voice command added for Google assistant in this home appliances like bulb cooling fan and motor are used which can be control easily using Google assistant from the voice control.

METHODOLOGY

The automatic plant watering system is used for watering the plant as required. Based on the soil moisture and temperature providing right amount of water to the plant. Using Arduino Uno, soil moisture sensor, relay module, battery, water pump, and pipe.

1) Component

a) Arduino uno

An Arduino board is an open source platform used for building electronics projects. Arduino is a programmable circuit's board which we can write a program based on your projects. Arduino program will be uploading with IDE (Integrated Development Environment) software that runs on your computer, it is used to write and upload computer code to the Arduino physical board. Arduino language is merely a set of C/C++ functions that can be called from your code.

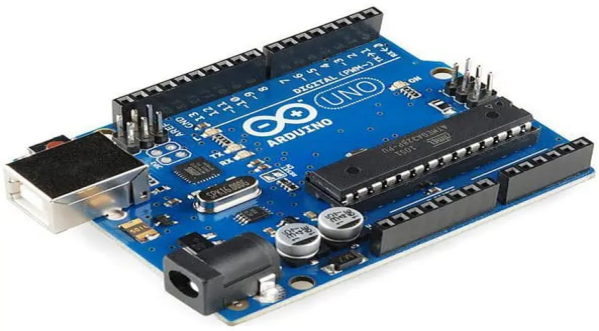

Fig.1 Arduino uno

b) Soil moisture sensor

Soil moisture sensors measure the humidity of water content in soil. Since the direct hydrometric measuring of free soil wetness needs removing, during, and coefficient of a sample, soil wetness sensors live the meter water content indirectly by victimization another property of the soil, like electrical phenomenon, one conductor constant, or interaction with neutrons, as a proxy for the wetness content.

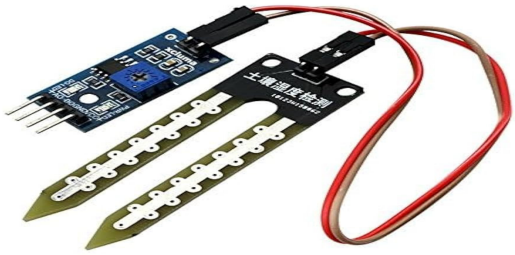

Fig 2. soil moisture sensor

c) Relay module

a relay is an electrically operated switch. Several relays use a magnet to automatically operate a switch, however alternative in operation principles are used, like solid state relays. Relays are used wherever it's necessary to regulate a circuit by a separate low-power signal, or wherever many circuits should be controlled by one signal.

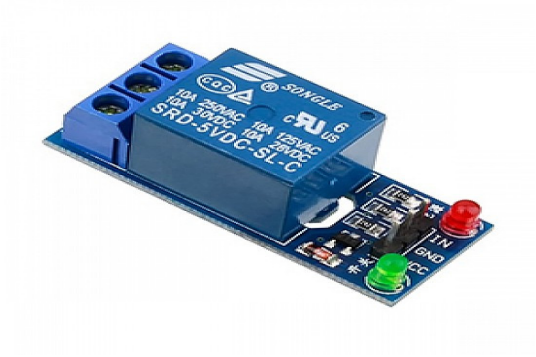

Fig.3 Relay module

d) water pump

An AC motor is an electrical motor driven by Associate in alternating current (AC). In figure: 5, The AC motor normally consists of two basic components, an outdoor stationary stator coil having coils furnished with AC to supply a rotating flux, and an indoor rotor connected to the output shaft manufacturing a second rotating flux. The rotor flux could also be made by permanent magnets, reluctance striking, or DC or AC electrical winding.

Fig.4 water pump

e) Lcd display

In automatic plant watering system lcd use for displaying result motor ON or OFF. The lcd is 16*2 character display means lcd display maximum 16 characters in each of its row. Lcd it a liquid crystal display commonly use with Arduino and other microcontroller. Lcd display soil moisture level like display message pump is ON or OFF and status like soil dry or wet.

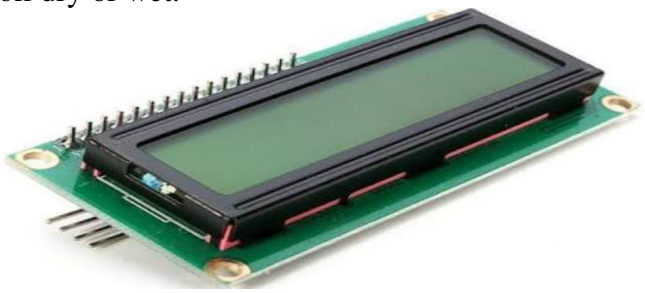

Fig.5 LCD display

CIRCUIT DIAGRAM

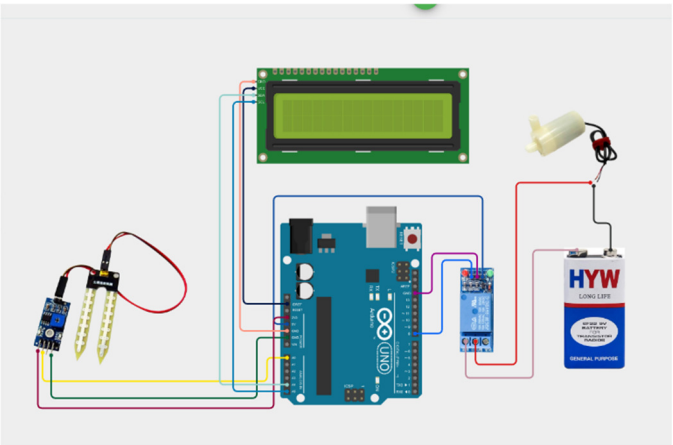

Fig .6 Circuit diagram

FLOWCHART

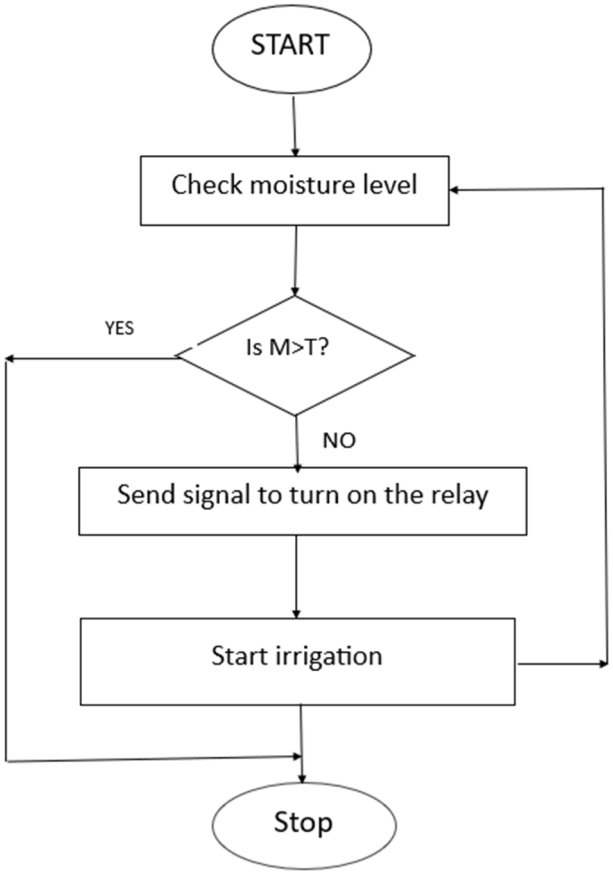

Fig.7 Flowchart

WORKING

In automatic plant watering system we used Arduino, soil moisture sensor, water pump, relay, power supply, etc. We used soil moisture to analyse soil moisture level, microcontroller operate all components and relay used for automatically on and off the pump after starting the working of system. Here M is soil moisture level and T is threshold value which is 500 .soil moisture sensor check the moisture level of soil if moisture level is smaller than threshold value which is 500 then soil moisture sensor give signal to microcontroller and microcontroller send signal to relay then relay will turn on and if the moisture level is greater than threshold value 500 then a sensor give signal to microcontroller send signal to relay then relay will turn off automatically the system continuously analyse the moisture level and accordingly it will work.

RESULT

The project "automatic plant watering system" was successfully monitored soil moisture level and activate whenever plant need water and automatically will off when right amount of water provide to plants.

System work without manual work it reduce human effort and save time.

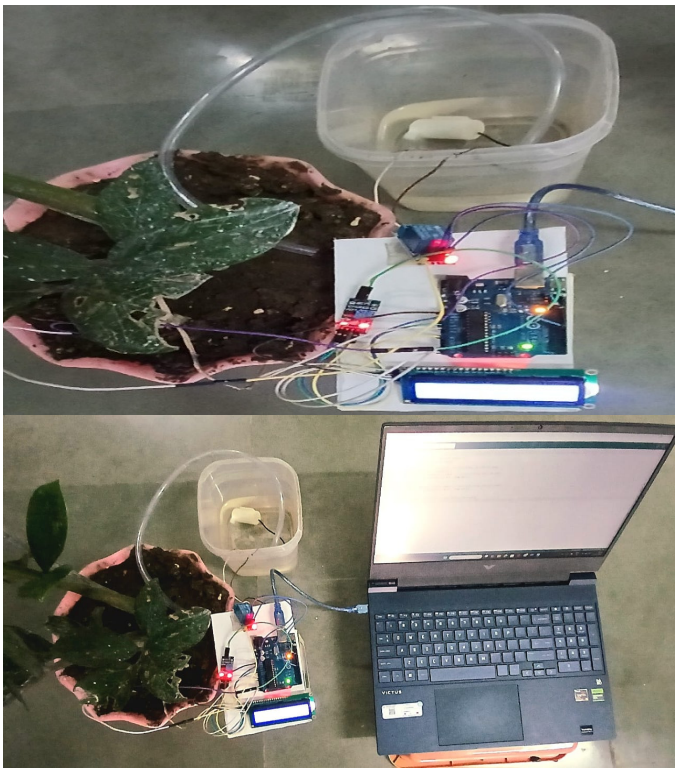

Fig.8 Working Model

CONCLUSIONS

The reviewed studies consistently demonstrate that automatic and arduino-based plant watering systems effectively maintain optimal soil moisture, reduce human effort, and conserve water. Most designs utilized Arduino microcontrollers or integrated with soil moisture sensors, water pumps, and relays to automate irrigation.

Experimental results across our project showed that when soil moisture dropped below a set threshold, the system automatically activated the pump, ensuring plants received adequate water and preventing both under- and over-watering.

The findings also revealed improvements in plant growth, water-use efficiency, and labor reduction compared to manual irrigation. Some prototypes incorporated temperature and humidity sensors for more precise control. Despite these advantages, limitations such as calibration issues, sensor sensitivity to soil type, and setup cost were noted.

Overall, the results confirm that automated irrigation systems using Arduino or IoT platforms are reliable, efficient, and sustainable solutions for modern agriculture and home gardening. Future work may focus on scalability, weather-based automation, and integration with renewable energy sources to enhance system performance and sustainability.

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