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Smart Irrigation System

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Abstract: *The Key Objective of the paper is to monitor the soils moisture contain during its dry and wet condition with the aid of a moisture sensor circuit, calculate the corresponding relative humidity and irrigate its based on its nature using a PC based lab view system, NI MY RIO, IOT ,GSN, and an Automatic water inlet setup which can also monitor and record temperature, humidity and sunlight, which is constantly modified and cab be controlled in future to optimize these resource so that the plant growth and yield is maximized.*

A Record of soil moisture, temperature, rainfall is maintained in a database for backup. This backup is used for weather forecasting and directs the farmers regarding the type of crop to the cultivated in future. IOT gives the whole information to the operator about the irrigation. In this paper, we experiment for different soils suitable for different crops in various climatic parameters that governs plant growth and allow information to be collected at high frequency and with less labor requirement.

Key Word: *Soil moisture, Irrigation, Lab View System, NI MY RIO, IOT, GSM*

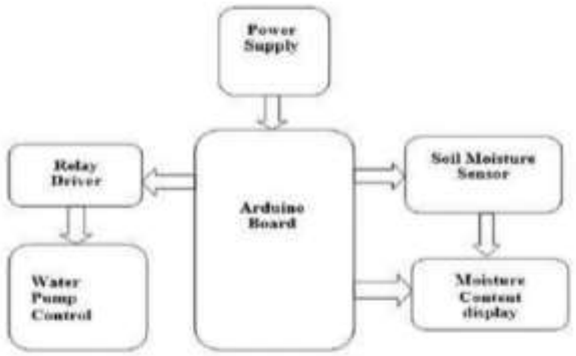
I. INTRODUCTION

Aim is to develop a wireless three level controlled smart irrigation system to provide irrigation system which is automatic for the plants which helps in saving water and money the main objective is to apply the system for improvement of health of the soil and hence the plant via multiple sensors. Appropriate soil water level is a necessary prerequisite for optimum plant growth. Also, water being an essential element for life sustenance, there is the necessity to avoid its undue usage. Irrigation is a dominant consumer of the water. This calls for the need to regulate water supply for irrigation purposes. Fields should neither be over irrigated nor under irrigated. In order to replace expensive controllers in current available system, the Arduino uno will be used in this project as it is an affordable microcontroller. The Arduino can be programmed to analyze sum signal from sensor such as a moisture, temperature, and rain. A pump is used to pump the fertilizer and water into the irrigation system the use of easily available components reduced the manufacturing and maintenance costs. This makes the proposed system to be an economical, appropriate and low maintenance solution for applications, especially in rural areas and for small scale agriculturists. This research work is enhanced to help the small-scale cultivators and will be increased the yield of the crops then will increase government economy.

II. OBJECTIVE

To improve and stabilize the crop yields of small holder olive farmers through the implementation of sustainable irrigation systems. To promote water management practices that consequences for farmer and their families. Minimize year to year fluctuations, leading to higher and more stable farm income.

III. BLOCK DIAGRAM OF SMART IRRIGATION SYSTEM



Block diagram of automatic irrigation using Arduino uno the required connection of the automatic irrigation system is in (1) indicates the power supply, (2) indicates the relay module, (3) indicates microcontroller, (4) indicates the soil moisture sensor, (5) indicates the humidity probes of the soil, (6) indicates the plant in the pot, (7) indicates s the water pump and (8) indicates the water container or the water source. In the first cable of three bridges connected to the soil moisture sensor, three jumper cables, one connected to GND, one connected to VCC and last one connected to the A0 port. Therefore, another part of the jumper cables connected to the Arduino board, i.e., the VCC of the bridge cable is connected to the Arduino 5v, the GND connected to the GND and the ground moisture sensor port is A0 is connected to the analog port 0 of the Arduino board. These connections are shared between the soil moisture sensor and the Arduino board therefore, the connection between the relay module and the Arduino board has been establish the GND port of the relay goes to ground. The first IN port is connected to an audio digital pin and this connection control the first relay channel. When we connect the battery to the relay, a supply is supplied to a load.

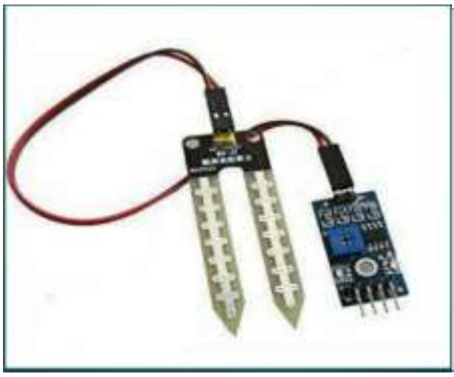
Resources:

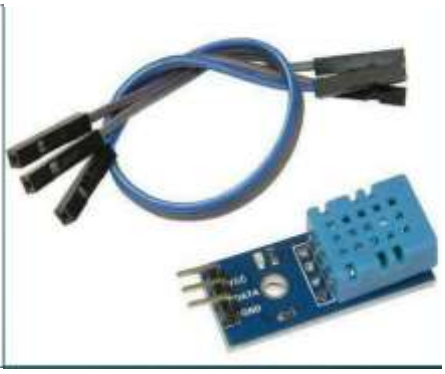
Sensor: Three sensors used in this system are as follows:

1. Soil Moisture Sensor

2. PIR sensor (Passive infrared sensor)

3. Humidity and temperature sensor DHT11

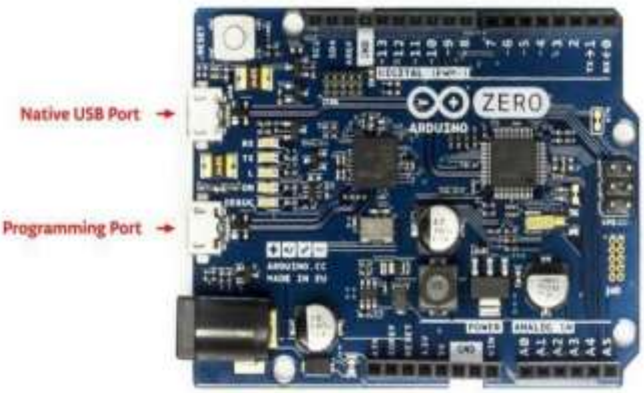


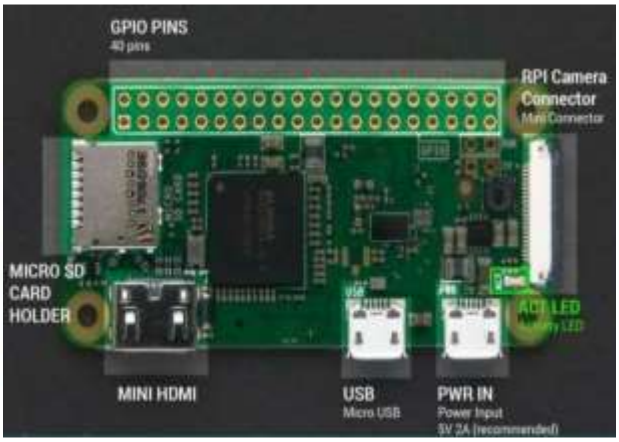


2] Microcontroller: There are two types of microcontrollers:

1.ARDUINO mega 2560

2.Raspberry pi





3] GSM Module:

1. The SIM900 can be used embedded in many of the applications.

2. The SIM900 has the capability delivering GSM/GPRS 800/900/1800/1900MHz performance for voice, data, SMS and requires slow power consumption.

Sensors and devices	working	Advantages and disadvantages
RASPBERRY PI	Type of controller	It is small in size and control web traffic. It is the type of normal computer but cannot replaceable.
ARDUINO MEGA 2560	As a microcontroller in irrigation system	It is better than raspberry pi because raspberry pi usually a Linux operating system and it have ability to run many programs so it is complicated to use than arduino
SOIL MOISTURE SENSOR	This sensor used to sense the moisture level of the soil.	Their results immediate but sensor provides less accuracy in sandy soils because of large particles
DHT11 (TEMPERATURE AND HUMIDITY SENSOR)	Both measure moisture and air temperature	It is excellent quality, fastest response and high cost performance.
TEMPERATURE SENSOR (LM35)	For measure temperature	It is the most popular sensor. This is sufficient for Smart configuration for heating and air conditioning system
PIR SENSOR	It is the detector of any movement.	It use for security but it is passive sensor insensitive to very slow motion of the object.
SIM900 GSM MODULE	It is connector network with the irrigation system using at command	Is provides cost effective products and solution. It provides limited data rate.

4]Power supply: All Arduino boards need electric power to function. A power supply is what is used to provide electric power to the boards and typically can be a battery, USB cable, AC adaptor or a regulated power source device.

IV. ADVANTAGES

1] Increase in productivity
2] Reduced water consumption
3] Safe
4] No man power required
5] Reduce soil erosion and nutrient leaching
6] Require smaller water sources

V. RESULT

The uniformity tests resulted in a wide range of DU_{tq} values across the plots (15% to 78%), with ana average of 52% that, according to the irrigation association (2003) overall system quality ratings, is considered "fair". Oblivious problems such as leaks and broken heads were repaired prior to testing but in some cases, problems are produced as a result of testing and according to the correct the problem. Baum et al (2003) performed uniformly tests on irrigation systems of homes in central Florida having spray heads. That research found an average DU_{tq} of 41%, with a range of 12%to 67%.the average CU for all the plots was 71%, with a range of 50% and 72%. Therefore, these experimental plots had a better distribution application of water depth, expressed as DU_{tq} and CU, than actual spray irrigation zones on homes sampled in central Florida.it is interesting to mention that, considering all the catch-cans of the experiment responsible for the lowest readings,99%of them were placed on the edges of the plots, indicating that substantial edge effects occurred in the testing. This is common for sprinkler irrigation system and did not negatively impact the results, because soil moisture and turf quality ratings of each plot were always taken inside this perimeter. In addition, this situation tended to minimize the effect of irrigation overlapping between plots.

VI. CONCLUSION AND FUTURE WORK

The goals of this research were to find out if different SMS-system could reduce irrigation water application-while maintaining acceptable turf quality-compared to current practices and, on the other hand, to collect evidence related to RS performance and reliability. The main objective of this experiment was to quantify differences in irrigation water use and turf

quality between:
1] A soil moisture sensor -based irrigation system compared to a time-based scheduling 2] Different commercial irrigation soil moisture sensor (SMSs), and 3] A time-based scheduling system with or without a rain sensor (RS). The secondary objective was to; a) evaluate the reliability of two commercially available expanding disk RS-types, b) quantify the amount of water that RSs could save compared to time-based irrigation scheduled without RS, and c) estimate the payback of RSs at different set points.

Results showed that no significant differences in turf grass quality among treatments were detected, which was evidenced by good quality in non-irrigated plots. This was a consequence of the high frequency rainfall events and large amount of cumulative precipitation that prevailed during the time frame of thus research and, on the other hand, because of the documented characteristics of Bermuda grass as a drought tolerant plant.

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