ARDUINO BASED SMART AUTOMATED PlANT WATERING SYSTEM

Dr.K.SUDHAKAR[1], YAMINI RAMINDLA[2]

[1] Professor, ECE Department, Malla Reddy Engineering College for Womens, Maisammaguda,Telangana, India.

[2]M.Tech Student, ECE Department, Malla Reddy Engineering College for Womens, Maisammaguda, Telangana, India.

Abstract: Watering is the maximum crucial cultural exercise and maximum hard work intensive venture in daily greenhouse operation. Watering systems ease the burden of having water to flowers once they want it. Knowing while and how much to water is two vital factors of watering method. To make the gardener works without difficulty, the automated plant watering machine is created. There have a diverse kind the use of automatic watering device which are by the usage of sprinkler machine, tube, nozzles and other. This venture makes use of watering sprinkler system because it could water the plants positioned in the pots. This assignment makes use of Arduino board, which includes ATmega328 Microcontroller. It is programmed in the sort of way that it will sense the moisture stage of the flowers and deliver the water if required. This form of machine is often used for preferred plant care, as part of being concerned for small and large gardens. Normally, the flora need to be watered twice every day, morning and night. So, the microcontroller needs to be coded to water the flora within the greenhouse about times in line with day. People revel in plants, their blessings and the sensation associated with nurturing them. However for most humans it will become hard to preserve them healthy and alive. To accommodate this undertaking we've got evolved a prototype, which makes a plant extra self-sufficient, watering itself from a massive water tank and imparting itself with synthetic sunlight. The seasoned-To kind reviews status of its contemporary conditions and additionally reminds the user to refill the water tank. The system automation is designed to be assistive to the consumer. We wish that via this prototype people will revel in having vegetation without the challenges related to absent or forgetfulness.

Keywords: ARDUINO UNO, Soil moisture sensor.

I. INTRODUCTION

The process of producing ingredients with the aid of vegetation or timber is called Photosynthesis. During photosynthesis, plants and their organisms use Carbon Dioxide from Air and Water from soil or other supply in the

presence of mild and convey Sugar and Oxygen. The chemical response occurs in photosynthesis is:

$$6CO2 + 6H2O \rightarrow C6H12O6 + 6O2$$

Carbon dioxide Water sugar oxygen The center elements of photosynthesis are light, water and carbon dioxide, which they need collectively during photosynthesis. Plants can get the carbon dioxide every time as it could be observed from the air and sunlight hours can be furnished if it's miles saved inside the right place. Most of the time for lack of water, the vegetation can't boost nicely and turn out to be morbid. On the alternative hand, deliver of excessive water at a time can result a venturesome impact on the flowers in particular the sensitive trees like bonsai. Such timber additionally need timely water supply for the ideal growth. That method, for the right growth, water is needed in proper time together with proper quantity. Currently there are some microcontroller-based plant watering projects available, however the trouble with the initiatives is, they don't have a particular time for watering. But there are a few sensitive and luxurious flora which want water on the time and uncommon watering ought to reason them to demise. Moreover, the best time for watering is early morning, at the same time as the environment is cool. This allows water to enter deep and attain the roots of the plants with out too much excess water misplaced to vaporization. Watering at night time ought to motive damage inside the base of the plant and can also be accountable for fungal troubles together with, powdery mold or sooty mildew, which is very harmful for plant life. Besides, the existing works do now not have the characteristic to tune any leakage in water supply or discover the lack inside the water source. As a end result, any implausible state of affairs can be created in absence of person at domestic Hence, an automated watering plant that works each in the wet season and the dry season is important to design. The tool used a microcontroller chip programmed primarily based at the detection of agricultural soil moisture sensors. When the soil turned into dry, the tool robotically watered the plants. Conversely, if the soil was moist, the device would no longer water them. It led to wholesome plant life due to the fact the need for water have been fulfilled all the time

II LITERATURE SURVEY

Irrigation is the synthetic application of water to the land or soil. It is used to assist within the growing of agricultural vegetation, upkeep of landscapes, and re plant life of disturbed soils in dry regions and all through periods of insufficient rainfall. When a area comes on, the water flows via the lateral lines and ultimately finally ends up on the irrigation emitter (drip) or sprinkler heads. Many sprinklers have pipe thread inlets on the lowest of them which lets in a fitting and the

pipe to be attached to them. The sprinklers are commonly hooked up with the top of the pinnacle flush with the ground surface. When the water is pressurized, the head will pop up out of the ground and water the desired vicinity until the valve closes and shuts off that sector. Once there's no extra water pressure inside the lateral line, the sprinkler head will retract returned into the ground. Emitters are generally laid on the soil surface or buried a few inches to lessen evaporation losses. Healthy vegetation can transpire a variety of water, resulting in an boom within the humidity of the greenhouse air. A excessive relative humidity (above eighty-eighty five%) need to be prevented due to the fact it is able to growth the occurrence of ailment and decrease plant transpiration. Sufficient venting or successive heating and venting can save you condensation on vegetation surfaces and the greenhouse structure. The use of cooling systems in the course of the hotter summer time months will increase the greenhouse air humidity. During durations with warm and humid outdoor conditions, humidity manage inside the greenhouse may be a undertaking. Greenhouses placed in dry, dessert environments gain substantially from evaporative cooling systems because big quantities of water may be evaporated into the incoming air, resulting in massive temperature drops. Since the relative humidity by myself does no longer inform us anything approximately the absolute water holding capability of air, a exceptional measurement is someday used to describe absolutely the moisture repute of the soil. The vapor pressure deficit is a measure of the difference among the amount of moisture the air incorporates at a given moment and the quantity of moisture it could keep at that temperature while the air would be saturated. Pressure deficit size can tell us how easy it is for flowers to transpire: higher values stimulate transpiration (but too high can reason wilting), and lower values inhibit transpiration and may lead to condensation on leaf and greenhouse surfaces. In the mid 20th century, the appearance of diesel and electric vehicles caused systems that might pump groundwater out of major aquifers faster than drainage basins ought to fill up them. This can cause everlasting lack of aquifer potential, decreased water excellent, ground subsidence, and different troubles. Apart from most of these troubles and disasters, there has been a significant evolution in the strategies to perform irrigation with the help of era. The application of era inside the regions of irrigation has validated to be of extremely good assist as they supply efficiency and accuracy. Sudarshan Gowda, Devarajnayaka R, Jagadeesh Kumar H. B. “Automated Plant Watering System” in INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) ,24-04-2018. Indonesia is a maritime and

agricultural usa with rainy and dry seasons. In the wet season, food plants normally do now not need to be watered, whilst in the dry season, the flora ought to be watered often in step with the soil moisture conditions. Farmers generally do not grow meals vegetation within the dry season for fear that it'll not grow well. The farmer's dependence at the season causes the manufacturing to decline and turns into an obstacle within the fulfillment of the food selfsufficiency software. An facts and communique era-primarily based agricultural device is needed to conquer the trouble. There seek aimed to layout a programmed microcontroller chip to manipulate watering robotically based totally on soil moisture detected using a domestic soil moisture sensor. This device detected whether the soil turned into dry or no longer. The farmers did now not want to do watering manually. In addition to helping farmers, the device may also be mounted on plantations, seedbed nurseries, city parks, lodges, places of work, and home The designed automated plant watering tool makes use of a copper plate sensor working as an electrode to measure soil resistance that is transformed into analog voltage and then into virtual statistics in order that it is able to be processed through the Arduino Uno processor. The determination of the upper restriction for the watering manner is done by using trials on special soil situations.] Ipin Prasojo1, Andino Maseleno2, Omar tanane3, Nishith Shah "Design of Automatic Watering System Based on Arduino" Journal of Robotics and Control (JRC)Vol. 1, No. 2, 2020, March 2020, pp. Fifty five-fifty eight. In this paper, automated plant watering device by using using Arduino became effectively established and tested. As the automated plant watering system has a consumer-friendly layout so it's miles utilized by the family customers in addition to the industrial consumer. The great benefit is that it reduces the wastage of water for the duration of irrigation and helps in saving the precious water resource. Another is saving time, ultimate water Deliver to plant or crop, automatic operation, and safety against destructive climate situations. The advantages of this paper are numerous. If this technology is applied inside the real world, a variety of water is saved. The international makes use of about 70% of clean water for irrigation and alternatively irrigation multiplies yield of maximum vegetation via almost 2 to five times. So, irrigation is a essential evil. The satisfactory solution out of this paper is controlled usage of water for irrigation purpose. Khin Thandar Tun , Hay Man Oo , Cho Thet New, "AUTOMATIC PLANT WATERING SYSTEM USING ARDUINO" © IJCIRAS three.

III METHODOLOGY

To put into effect the technique there are numerous unique varieties of technology and ways.But we've got opted for the motive of the Air great management gadget using

Arduino as it is very efficient and easy method to get the concentration of the particulate count number (PM) inside the form of PPM (components consistent with million). This approach we've considered could be very much less pricey and in addition to this it's far an easy pass approach wherein we will get our favored programs to happen. The statistics of air is recognized by way of the MQ135 fuel sensor. The MQ135 sensor can feel NH3, NOx, alcohol, Benzene, smoke, CO2. So, it's miles a dynamic gas sensor for our Air pollution Monitoring device. When it's miles related to Arduino then it'll sense all gases, and it will provide the Pollution level in terms of PPM (components according to million). The MQ135 fuel sensor will give the output inside the form of voltage levels and we have to convert it into PPM. So, for converting the output in PPM, we've got used a library for the MQ135 gasoline sensor. The MQ135 gas sensor and POT-HG are related to the enter of the Arduino Uno.

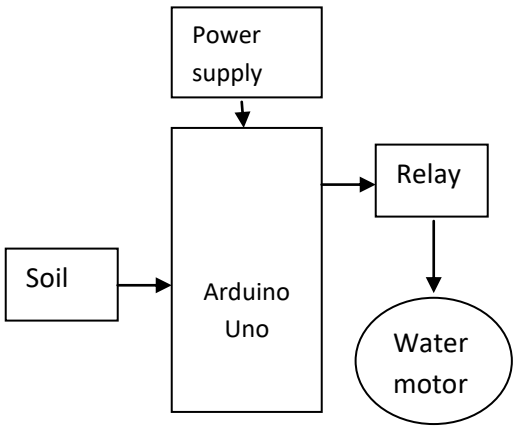

Fig1: Block diagram of plant system

The output of Arduino Uno is connected to the buzzer, LCD, virtual terminal and led. After executing the code, if the ppm is much less than the edge, then the air best might be Good and it displays on the LCD screen that "AQ Level Good". The buzzer might be grew to become off.

If the ppm is extra than the threshold, the air quality can be excessive and it shows at the LCD screen that "AQ Level High". The buzzer could be turned on. The digital terminal will display the output. Led will glow while threshold degree is going high and led will start to glow when threshold degree goes high.

IV. SOFTWARE AND HARDWARE

Arduino Uno:

The Arduino Uno is an open-supply microcontroller board primarily based mostly on the Microchip ATmega328P microcontroller and advanced via manner of Arduino.Cc.[2][3] The board is equipped with gadgets of digital and analog enter/output (I/O) pins that can also be interfaced to a number growth forums (shields) and distinctive circuits.[1] The board has 14 virtual I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), through a kind B USB cable.[4] It can be powered through the USB cable or with the useful resource of an exterior 9-volt battery, although it accepts voltages

among 7 and 20 volts. It is akin to the Arduino Nano and Leonardo.[5][6] The hardware reference cartoon is dispensed below a Creative Commons Attribution Share-Alike 2.5 license and is obtainable at the Arduino website. Layout and manufacturing files for a few variations of the hardware are moreover to be had.The phrase "uno" capacity "one" in Italian and became once chosen to mark the preliminary launch of Arduino Software.[1] The Uno board is the first in a set of USB-based Arduino forums;[3] it and model 1.Zero of the Arduino IDE were the reference versions of Arduino, which have now advanced to more moderen releases.[4] The ATmega328 on the board comes preprogrammed with a bootloader that approves uploading new code to it barring the use of an exterior hardware programmer.

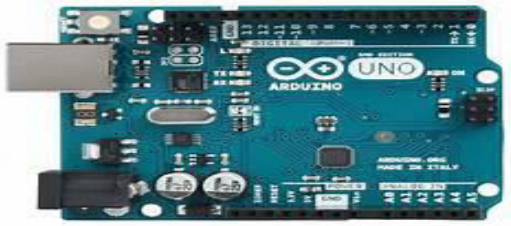

Fig2: Arduino Uno

Soil sensor:

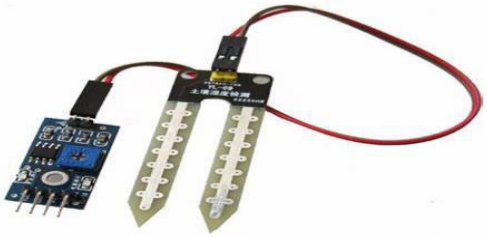

Fig3: Lcd

The water content in surrounding air and materials such as soil is a key factor for the well-being of humans, animals, plants, and other living things. The term moisture refers to the water content of any material. It is applied to liquids and solids, whereas humidity refers to the water vapor content in gases. This soil moisture sensor consists of two probes to pass current through the soil figure 3.2. It measures the resistance and represents the change in resistance as moisture level. More water makes the soil conduct electricity more easily (less resistance), while dry soil conducts electricity poorly (more resistance). This sensor will be helpful as a reminder to water your indoor plants or to monitor the soil moisture in your garden. A closer look at the pins: There are two pins on the soil moisture sensor, these connect to the two other pins on the top of the module.

Water Motor:

Fig4: water motor

We need a small pump to irrigate the plant, but in the case of a garden, we need to drive a larger pump that can provide a higher volume of water depending on the size of your garden which cannot be directly powered by an

Arduino. So, in case you need to operate a larger pump Figure 3.4 , a driver is necessary to provide enough current for the pump, to show that we are using a 5v relay. You can also use an AC-powered pump and use a suitable relay. The working will remain the same as shown in this project, you just have to replace the DC power input connected to the relay with an AC power input and have to power your Arduino with a separate DC power source.

Relay:

Fig5: Relay

5V relay module is the most key component in this project. Instead of using a relay and wiring it up with transistors, diodes and resistors or any other additional components, a relay module board like this already includes everything you need. 5V Relay module is shown in above Figure 3.1. A relay is an electrically actuated switch. Many sensors are incredibly sensitive, and which may produce only small electric currents. When we need to use them in circuits involving larger currents, that's when relays bridge the gap; A relay makes it possible for small currents to activate larger ones, and to safely do so. The relay is used to turn the submersible water pump on and off.

Arduino IDE:

Arduino is an open-source PC tools and programming association. The Arduino Community is recommended to the activity and patron mastermind that constructions and occupations microcontroller-based motion sheets. These alternate sheets are recognized as Arduino Modules, which are open furnish prototyping stages. The smoothed out microcontroller board suggests up in an assortment of increase board packs. The transcendent drastically perceived programming method is to use the Arduino IDE, which organizations the C programming vernacular. This offers you get to an Arduino Library that is industriously making draw close to open furnish network.

V. EXPERIMENTAL RESULTS

From this work, we can control the moisture content of the soil of cultivated land. According to soil moisture, water pumping motor turned on or off via the relay automatically. This saves water, while the water level can be obtained in a preferred aspect of the plant, thereby increasing productivity of crops. Servo motor from vegetation water uniformly dispersed in water, in order to ensure the maximum utilization of absorption through. Thus, there is minimal

waste of water. The system also allows the delivery to the plant when needed based on the type of plant, soil moisture, and observed temperature. The proposed work minimizes the efforts of major agricultural regions. Many aspects of the system can be customized and used software to fine-tune the requirements of the plant. The result is a scalable, supporting technology. Using this sensor, we can see that the soil is wet or dry. If it is dry, the motor will automatically start pumping water.

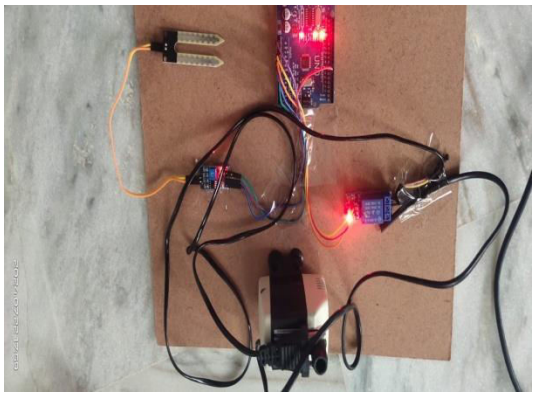

Fig -6. Plant system

VI CONCLUSION

Although it seems to be more demanding and challenging, there are many other possibilities like creating complex connections of plants of similar variety or so-called "Internet of Plants". Also, using more than one sensor is another idea for an experimental venture, but there are also many other experimental and challenge-like ideas such as using solar power supply, timer for setting irrigation system etc. However, independently of the way used to construct it, there is no doubt that this system can be very helpful in solving many problems, from those that seem harmless to those that are on the scale of the most important and most dangerous ones for human population. By means of this system, it is possible to control the amount of water released from the process of watering the plant. This system automation is designed to be assistive for the University Park. Although it can be very helpful for humanity in general, agriculturists, craftsmen, and botanists could have the biggest benefit of using this system.

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