



e-ISSN: 2278-8875
p-ISSN: 2320-3765

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

Volume 10, Issue 7, July 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.282

☎ 9940 572 462

☑ 6381 907 438

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Automatic Irrigation by Smart Machine with Arduino Uno

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BSTRACT: Trees are life of human. The trees are one of the important things of human life. Trees are contribute to their environment over long period of time by providing oxygen, improving air quality, climate amelioration, preserving soil, conserving water, and supporting wildlife. As the biggest plants on the planet, they give us oxygen, store carbon, stabilise the soil and give life to the world's wildlife. They also provide us with materials for tools and shelter. Sometimes plant get dry because shortage of water. Some government scheme plant trees on road side but after that they get dried because reduction of water. We always forget to supply water to plant. This project is based on this problem. The robot gives water to the plant. Whole system is controlled by ARDUINO Uno. It has four wheels to get move anywhere and has colour Sensor to senses tag located at the trunk. It also have tank on the robot which fulfil from water. It is useful in urban area. It is automatically controlled by mobile software which name is Bluetooth RC controller. Without the help of ARDUINO software we control it by moving any direction. It has also Bluetooth technology to control the robot without any wiring device we control the robot by Bluetooth module. Colour sensor is located at one side of robot. Whenever the colour sensor senses the colour of tag it sends a command to Arduino to the pump for irrigation. Then water pump get start. Moving robot in any direction is done by Bluetooth RC controller through mobile. Tree plantation is important to our future and we have to save our world. From this small technique we can definitely save our nature of the earth.

KEYWORDS: Bluetooth Module, Arduino uno, Irrigation, Bluetooth RC Controller.

I. INTRODUCTION

India has the vast area to plantation trees. We have 99,278sq km area of very dense forest. Trees affect our climate, and therefore our weather, in three primary ways: they lower temperature, Reduce lower temperatures, reduce energy usage and reduce or remove air pollutants. Each part of the tree contributes to climate control, from leaves to roots. We should increase this area by planting more trees. But somewhere trees are not properly grown and some getting dry because shortage of water. With the help of new technology the automation work was done by robots. And now we need to grow largest plant in our earth. We should save our beauty of nature by creating some ideas, project for future. life. And this is time to create beautiful nature in our country and all over the world. This is also helpful for farmer for farming. Drought is a measure problem of any farmer.

To avoid this problem the use of automation will help us to growing plants. In this paper the irrigation is done by a robot which has many component of automation. The Arduino uno controls the whole system. Colour sensor is a main component of paper. We have green coloured tag at the trunk of tree. Bluetooth model helps to control the robot without any wiring. Bluetooth RC controller is software which helps to move robot anywhere by sending signal to Bluetooth module. When colour sensor senses the colour of tag the submersible water pump start pumping water from reservoir. If we were moving robot forward, then robot comes under contact of tag and supplied water to plant. This will help full for urban. If there is shortage of water plant won't grow properly. So, we have to plant tree everywhere. If forest area hasn't maximum trees at this place we can to grow the trees with the help of this project. The farmer also farms the fruit trees in there farm. This will be helpful for the farming. In this paper the renewable energy is supplied to the battery to work continuously without any shortage of energy. It is done by using solar plate to charge battery. By using renewable energy source, it helps to save in operating cost.



II. LITERATURE REVIEW

SMART IRRIGATION SYSTEM FOR WHEAT IN SAUDI ARABIA USING WIRELESS SENSORS NETWORK TECHNOLOGY By Ragheid Atta, Tahar Boutraa and Abdellah Akhkha.

In this paper a more advanced technology has been used to prove the possibility of using wireless automated system and that is a better water management system that leads to water saving when irrigating plant.

AN AUTOMATED IRRIGATION SYSTEM USING ARDUINO MICROCONTROLLER by Aslinda Hassan, Nazrulazhar Bahaman, Siah Bing Sheng, Wahidah Md Shah.

In this paper an automated irrigation using Arduino microcontroller system which is cost effective and can be used farm field or average home garden. The proposed system is developed to automatically water the plants when the soil moisture sensor has detected the soil is insufficient of water by using the Arduino as the center core

A REAL - TIME IRRIGATION CONTROL SYSTEM FOR PRECISION AGRICULTURE USING WSN IN INDIAN AGRICULTURAL SECTORS by Prathyusha Kuncha, Sowmya Bala G, Sreenivasa Ravi K

In this paper the aim is to find the exact field condition and to control the wastage of water in the field and to provide exact controlling of field by using the drip irrigation, atomizing the agricultural environment by using the components and building the necessary hardware. For the precisely monitoring and controlling of the agriculture field, different types of sensors were used. To implement the proposed system ARM LPC2148 Microcontroller is used. The irrigation mechanism is monitored and controlled more efficiently by the proposed system, which is a real time feedback control system. GSM technology is used to inform the end user about the exact field condition. Actually this method of irrigation system has been proposed primarily to save resources, yield of crops and farm profitability.

COST EFFECTIVE AUTONOMOUS PLANT WATERING ROBOT by Mahendra Vucha, K Jyothi, Kiran Kumari, R Karthik

In this paper autonomous system consists of a mobile robot with RFID detector and a temperature-humidity sensor and uses wireless communication between the mobile robot and sensing module. This autonomous system is adaptive to any kind of weather condition and addresses the watering the help of temperature-humidity sensor. The gardening robot used is portable and contains an RFID module, Controller, a water reservoir and a water pump. Without human intervention this autonomous robot can sense the watering need of a plant locates the plant following a predefined path and then waters the plant.

IOT AND MACHINE LEARNING APPROACHES FOR AUTOMATION OF FARM IRRIGATION SYSTEM by Anneketh Vij, Singh Vijendra, Abhishek Jain, Shivam Bajaj, Aashima Bassi, Aarushi Sharma

In this paper rising water issues and need for proper methodologies for farm maintenance is a hot issue that needs to be tackled at utmost propriety. An automation of irrigation systems in farms is proposed in this research. The proposed solution is based on the Internet of Things (IoT), which would be a cheaper and more precise solution to the farm needs. A Monitoring system whose main purpose is to solve the over irrigation, soil erosion and crop-specific irrigation problem will be developed to ease and efficiently manage Irrigation problems.

APPLICATION OF AN AUTOMATIC PLANT IRRIGATION SYSTEM BASED ARDUINO MICROCONTROLLER USING SOLAR ENERGY by Cagatay Ersin, Risa Gurbuz, Kemal Yakut.

In this paper, plants optimum water need level is controlled by Arduino Uno Microcontroller. With the help of the buttons on the Lcd Shields, the plant species are chosen and after the humidity level is entered, it is controlled by Arduino Uno Microcontroller. When the humidity level of the earth decreases, Arduino Uno Microcontroller sends data for irrigation the plant and takes photo of it with Raspberry Pi before irrigation.

AN AUTOMATED IRRIGATION SYSTEM FOR SMART AGRICULTURE USING INTERNET OF THINGS (2018) By V. Ramachandran, R. Ramalakshmi and Seshadhri Srinivasan. In this paper an automated irrigation system to reduce water utilization in agriculture by combining the Internet of Things (IoT), cloud computing and optimization tools. The automated irrigation system deploys low cost sensors to sense variables of interest such as soil moisture, pH, soil type, and weather conditions. The data is stored in Thingspeak cloud service for monitoring and data-storage.



IMPLEMENTATION OF AN AUTOMATED IRRIGATION SYSTEM (2015) By 1U N V P Rajendranath and Dr. V. Berlin Hency

In this paper is to develop an automated irrigation system based on sensor, which are infrared to the microcontroller unit. The sensor used in this paper is temperature and humidity sensor DHT 11 sensor and soil moisture VH400. This sensor is interfaced to the microcontroller unit and whole unit was placed under the root zone of the plant. The irrigation system is tested under different temperatures and humidity levels of different plant under normal and wet condition. The use of soil moisture sensor is to limit the water content to the particular areas. Throughout all the values obtained in wet and normal condition are proved to be intuitive.

III. METHODOLOGY

ARDUINO UNO Board:

The Arduino UNO based upon AT mega 328P microcontroller and developed by ARDUINO.cc. The board is equipped with sets of digital and analog input and output pins that may be interfaced to various expansion boards and other circuit .the Arduino is a controller of whole system. With help of programming we set the action of robot. Arduino is very important part of the project. Arduino uno is open source microcontroller board based on the microchip AT mega 328P microcontroller. It is type of single board microcontroller.

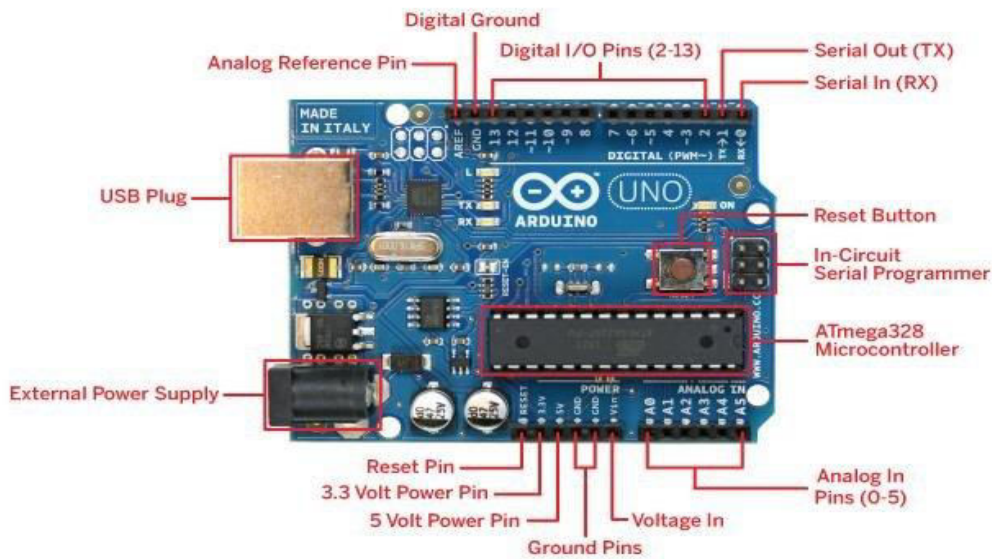


Fig. Arduino Uno

COLOUR SENSOR:

Colour sensor is an important device of our machine. When the plant is nearer to the colour sensor it detect colour of tag which placed near the plant. We placed a blue coloured tag at the trunk of the tree. A colour sensor is type of “photoelectric sensor” which emits lights from transmitter, and then detects the light reflected back from the detection object with receiver. The colour sensor can detect received light intensity for red, green and blue.

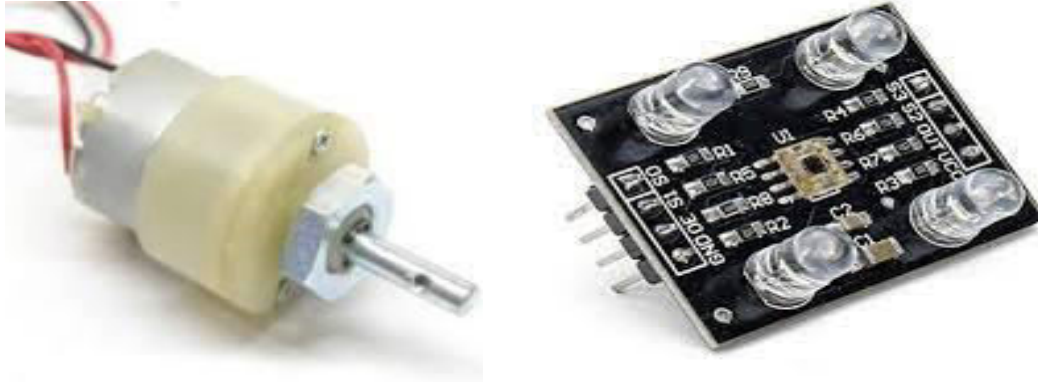


Fig. DC Geared Motor Fig. Colour Sensor

DC GEAR MOTOR:

DC geared motor is used to move robot with wheels. There are four wheels used in this project. It has gear assembly attached to the motor. The gear assembly help in increasing the torque and reducing the speed. The geared DC motor is very useful in project work it gives high torque. The weight of the project body is slightly heavy because of water reservoir, that's why we choose geared DC motor. If torque is large the robot easily runs at particular speed. In this machine we used two DC geared motor. It is controlled by a motor driver L293D.

JUMPER WIRE:

Jumper wires are used to connect the device that is non-joined to the circuit.

MOTOR DRIVER:

Motor driver controls the motors which joined to the machine. It is used to control the speed and direction of motors. That can motor run easily at any direction and any speed. It help to reverse and forwarding the direction of motor. The motor driver can run two motor.



Fig. Motor Driver



Fig. Bluetooth Module

BLUETOOTH MODULE:

The Bluetooth technology manages the communication channel of the wireless part. The Bluetooth modules can transmit and receives the data wirelessly by using two devices. The Bluetooth module can receive and transmits the data from a host system with the help of the host controller interface (HCI).



WATER PUMP:

To pump water from water tank,with the help of water pump it supplies water by pumping from the reservoir. The pumping of water is a basic and practical technique, far more practical than scooping it up with one's hands or lifting it in a hand-held bucket.



Fig. Water Pump



Fig. Relay

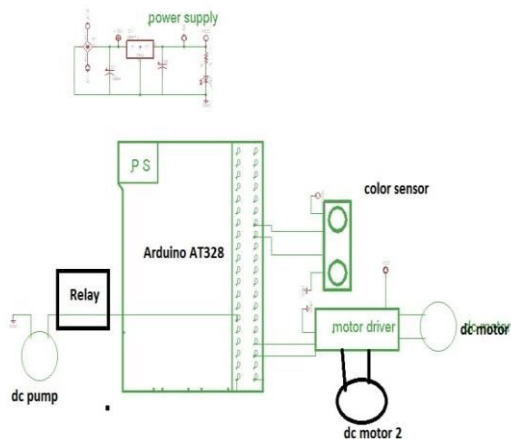
RELAY:

Relay works on the principle of electromagnetic induction. It is electrically operated switch. When the electromagnet is applied with some current it induces a magnetic field around it. A switch is used to apply dc current to the load. In the relay copper coil and the iron core acts as electromagnet. Relays are used to protect the electrical system and to minimize the damage to the equipment connected in the system due to over currents/voltages. The relay is used for the purpose of protection of the equipment connected with it.

BATTERY:

Lead acid battery comes under the classification of rechargeable and secondary batteries. In spite of the battery's minimal proportions in energy to volume and energy to weight, it holds the capability to deliver increased surge currents. This corresponds that lead acid cells possess a high amount of power to weight proportions. These are employed in emergency lightening to provide power for sump pumps. it is used in electric motors, submarine. Sealed acid battery is used to energize the dc geared motor and other component. To energize battery the solar panel used to recharge the battery. The 12 v rated battery is used. Renewable energy has large scope to save energy. For recharging battery 12 v solar panel is used.

CIRCUIT DIAGRAM



Circuit diagram: Automatic irrigation by smart machine with arduino Uno



In above circuit diagram the components mounted are motor drivers, two dc gear motor connected to the motor driver. DC water pump is connected to relay and relay connected to the Arduino AT328. 12 v power supplies are given to the battery. Colour sensor is connected to arduino Uno. This paper is on automatic Irrigation by smart machine. This is automatically controlled by ARDUINO UNO with colour Sensor. As the above circuit diagram Colour Sensor is a main part of this project which senses the colour of tag at the trunk of the tree. A colour sensor is a type of “photoelectric sensor” which emits from a transmitter, and then detects the light reflected back from the detection object with a receiver. A colour sensor can detect the received light intensity for red, blue and green respectively, making it possible to determine the colour of the target object. If light containing the red, blue, and green wavelengths is shown on a red object, only red light will be reflected.

It is capable to Sensing colour. At the trunk of the tree, we add the tags which are blue coloured. Colour Sensor is located outside the robot. If colour of tag has sensed by colour Sensor it sends the signal to the ARDUINO and next procedure will be start. After sending command to ARDUINO.A ARDUINO sends the signal to pump to pump the water.

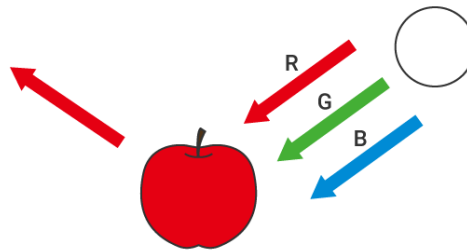


Fig . When red object is sensed by colour sensor

With the help of new technology the automatic work was done by robots. And now we need to grow largest plant in our earth. Farmers are one of the largest developing economies of the world. The agricultural sector has its largest contribution in the Indian economy. Also, we should develop some new methods that use the renewable sources of energy. The development of these new techniques is going to reach our goal of country development. This technique will be a very good option for the incoming generation, who suffer every year just because of failure of plants that took place every year. The implementation of this technology has a wide scope in the future.

IV. RESULT

Hence the robot is successfully supplies the water to plant from this new idea. This technology is automated and gives us large benefit. It supplies water properly to plant and able to sense every coloured tag located at the plant. This technology has done by some sensing components are present in this project. As in the below diagram the picture shows the machine work can be done step by step. It is very helpful to supplying water to the plant. With the help of Bluetooth module it is to control robot without any wiring device.



Fig.1. water pump start supplying water after sensing tag



Fig.3. when robot moves towards next plant after supplied water to first.



Fig.3. when robot moves towards next plant after supplying water to first.

V. CONCLUSIONS AND FUTURE WORK

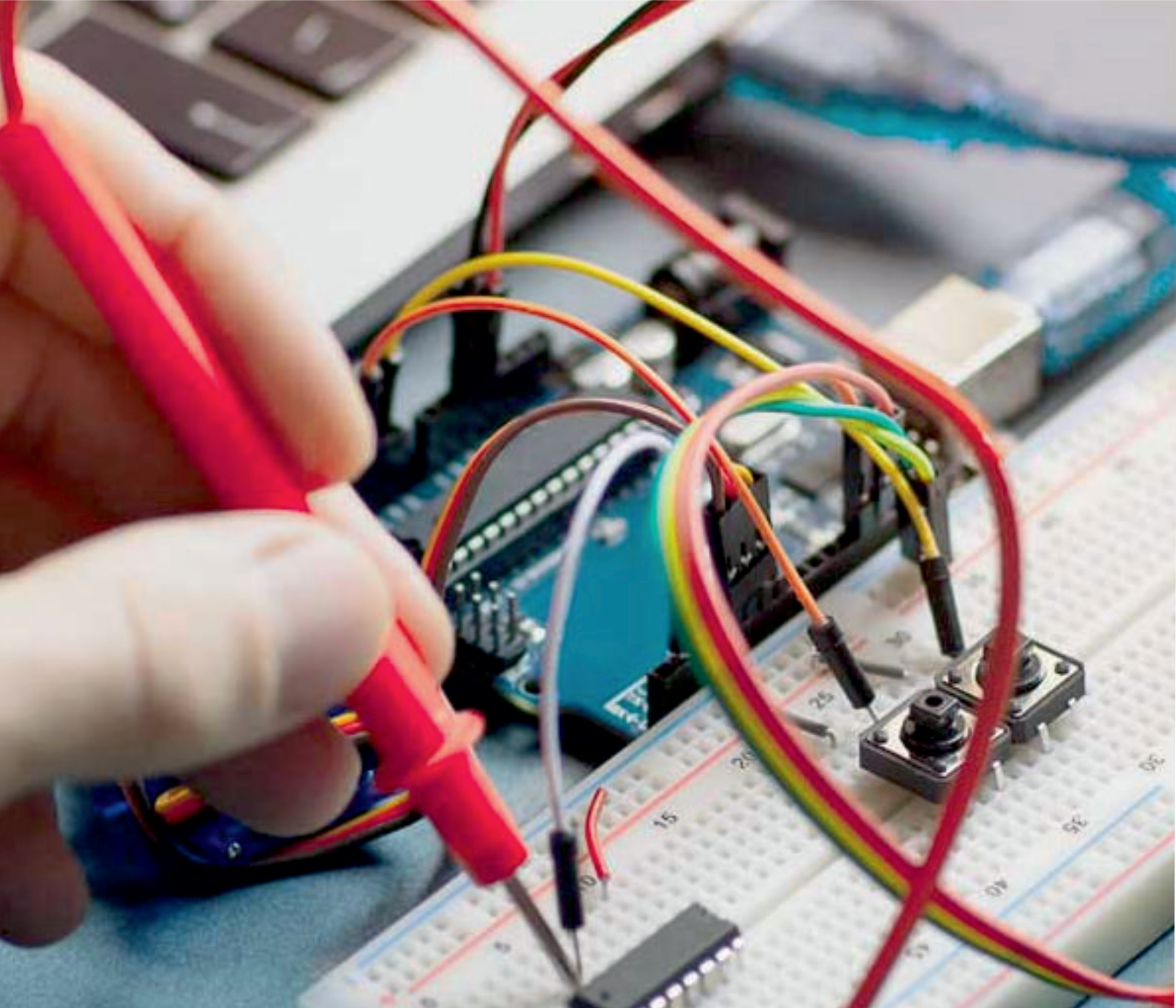
This project is capable to supplying water to plant with the help of sensing component and some new technologies. Renewable energy source will helps to save energy. It works accurate when it moving toward the plant and it sense the color of tag at the trunk of tree. Supplying water to plant will be very easy in future with this machine. With help of Bluetooth model it controls robot to move any direction. We can control robot manually trough Bluetooth RC controller. This automatic work of machine is done by arduinouno, which helps to control whole system. It has coding to run device properly without any mess. By using dc geared motor it helps to give a maximum torque.

For future work we will update it by using some other new technologies, like high rated motors, some system that communicate easily over long range. As we know the dairy farm automation has been increased in India. Automation at every place will be need of every human. This automation will helpful for our nature also.



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