IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 5, May 2022

DOI: 10.17148/IJIREEICE.2022.10514

DESIGN AND FABRICATIONOF AGRICULTURAL ROBOT

Wayal Onkar Rajendra[1], Pund Suraj Sudhakar[2], Temgire Sanil Rohidas[3], Patil Sourabh Rajendra[4]

Student, Dept. of Mechanical Engineering, JSPM's Imperial College Of Engineering & Research, Pune, Maharashtra, India

Assistant Professor, Dept. of Mechanical Engineering, JSPM's Imperial College Of Engineering & Research, Pune, Maharashtra, India.

Abstract: Sowing machine should be suitable to all farms, all types of corps, robust construction, also is should be reliable, this is basic requirement of sowing machine. Thus we are designing sowing machine which is operated manually but reduces the efforts of farmers thus increasing the efficiency of planting also reduces the problem encountered in manual planting. For this machine we can plant different types of seeds also . This also increases the planting efficiency and accuracy. We are designing it with easily available materials thus it will be cheap and very usable for small scale farmers. For effective handlingof the machine by any farmer or by any untrained worker we simplified its design. Also its adjusting andmaintenance method also simplified . It also enables grass cutting in a uniform ratio and ,it can also tillage the land for sowing seeds. Now a day's water is becoming very precious due to scarcity in obtaining clean water for domestic purpose including irrigation. In order to optimize the use of water, mechanism to develop water conversation is the need of the hour. Also, automation in agricultural systems is a necessity to optimize water usage, reduce water wastage, and to implement modern technology in agriculture systems. Soil moisture sensor is a novel device which senses the moisture content in the soil, and with suitable mechanism allows water to be irrigated depending on the moisture content of the soil. This allows flow of water or stoppage of water to the plants by using an automated irrigation system. The device consists of an Arduino board, which is the micro controller which activates the water pump and supplies water to plants through Rotating Platform Sprinkler. A submersible motor pump is used for this purpose of pumping water. Necessary tunings for pumping and supplying water is arranged dependingon the consumption of water. This involves a power supply of 2.5 V to 6V. Soil moisture sensor is inserted in the soil which contains a probe to measure the moisture content of the soil.

I. INTRODUCTION

Agriculture has been backbone of the Indian economy and it will continue to remain so for a long time. A man without food for three days will quarrel, for a week will fight and for a month orso will die. India record of progress in agriculture over the past four decades has been quite impressive. The agriculture sector has been successful in keeping pace with rising demand for food. The contribution of increased land area under agricultural production has declined over time and increases in production in the past two decades have been almost entirely due to increased productivity. More than 42% of the total population in the world has chosen agriculture as their primary occupation. In recent years, the development of autonomous vehicles in agriculture has experienced increased interest. This development has led many researchers to start developing more rational and adaptable vehicles.

In the field of agricultural autonomous vehicles, a concept is being developed to investigateif multiple small autonomous machines would be more efficient than traditional large tractors and human force. These vehicles should be capable of working 24 hours a day all year round, in most weather conditions and have the intelligence embedded within them to behave sensibly in a semi- natural environment over long periods of time, unattended, while carrying out a useful task. There are a number of field operations that can be executed by autonomous vehicles, giving more benefits than conventional machines.

The idea of applying robotics technology in agriculture is very new. In agriculture, theopportunities for robot-enhanced productivity are immense and the robots are appearing on farmsin various types and in increasing numbers. We can expect the robots performing agricultural operations autonomously such as seed sowing, Grass cutting and water spraying or pesticides. The robot is controlled by Node MCU and Wi-Fi model. The language input allows a user to interact with the robot which is familiar to most of the people. The advantages of these robots are hands- free and fast data input operations. In the field of agricultural autonomous robot, a concept is been developed to investigate if multiple small autonomous machine could be more efficient thantraditional large tractors and human forces.

IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 5, May 2022

DOI: 10.17148/IJIREEICE.2022.10514

II. LITERATURE SERVEY

Nitin P V1 et al. [1] Discussed on the design, development and the fabrication of the robot which can dig the soil, put the seeds, leveler to close the mud and sprayer to spray water, these whole systems of the robot works with the battery and the solar power. More than 40% of the populationin the world chooses agriculture as the primary occupation, in recent years the development of the autonomous vehicles the agriculture has experienced increased interest. The vehicle is controlled byRelay switch through IR sensor input. The language input allows a user to interact with the robot which is familiar to most of the people. The advantages of these robots are hands-free and fast data input operations. In the field of agricultural autonomous vehicle, a concept is been developed to investigate if multiple small autonomous machine could be more efficient than traditional large tractors and human force.

T.Balaji1 et al. [2] Proposed "Mechanical Design and Development of Agricultural Robot". It all Started to "Green Revolution" by means of which farmers came to know about the various techniques involved in farming and the advantages in it. As centuries passed, certain modern techniques were invented in agriculture due to the progress in science. These modern techniques included the use of tractors for ploughing the field, production of pesticides, invention of tube-wells etc.

K.Prabhakara Rao et al. [3] Suggested that Soil moisture content is being detected by using acoustic based technique. The main purpose of this technique is to develop a tool to help measure soil moisture in real time. This method is dependent on two main factors i.e. speed of sound and degree of saturation with respect to water in soil. With this it was concluded that the speed of sounddecreases with the soil moisture content and it depends on the kind of soil. While this method canbe used to pinpoint the moisture level of a soil sample in real time, it is much too complicated and not feasible for use by farmers.

Mr. Ahmad Hussain, et. al. [4] Suggested that the usage of WSN in irrigation management by a sensible watering system during which the irrigation method is controlled by valves. It helps to utilize water resources very efficiently.

Prasanna Raut, et. al., [5] Studied to meet the food requirements of the growing population and rapid industrialization, modernization of agriculture is inescapable. Mechanization enables the conservation of inputs through precision in metering ensuring better distribution, reducing quantity needed for better response and prevention of losses or wastage of inputs applied. Mechanization reduces the unit cost of production through higher productivity and input conservation.

R. Suresh, et al. [6] Proposed GSM based Automatic Irrigation Control System for Efficient Use of Resources and Crop Planning by Using an Android Mobile in which the low moisture content of the soil will be deducted. The moisture data will be sent to the microcontroller. The microcontrollercalls the mobile to press the button after hearing the buzzer indication. After that the valve isopened for the supply of water, and then it will attain the certain level of moisture content the sensor updates the moisture level and the valve will be closed by the signal of the microcontroller.

S. P. Maniraj et al. [7] Proposed the design of irrigation system based on the soil moisture sensor and microcontroller to help the farmers to irrigate the lands with right amount of water. keil vision3 software is employed with 8051 microcontroller and sensor. When the land reaches the 70% of moisture the pump will turn off and for below 70% the pump will turn on till it reaches particular level of moisture. The regulating of water pump is done with solenoid valve.

III. PROPOSED SYSTEM

Block Diagram:

The Given Block Diagram Shows The basic Structure Of The entire Project and Position of allComponents.
he main aim is to design and develop a system which can remotely control the agriculture functions such as seed sowing, Grass cutting, water spraying and measure the moisture level of soilby using soil moisture sensor. The system consists of Node mcu which will act as the heart of the system.

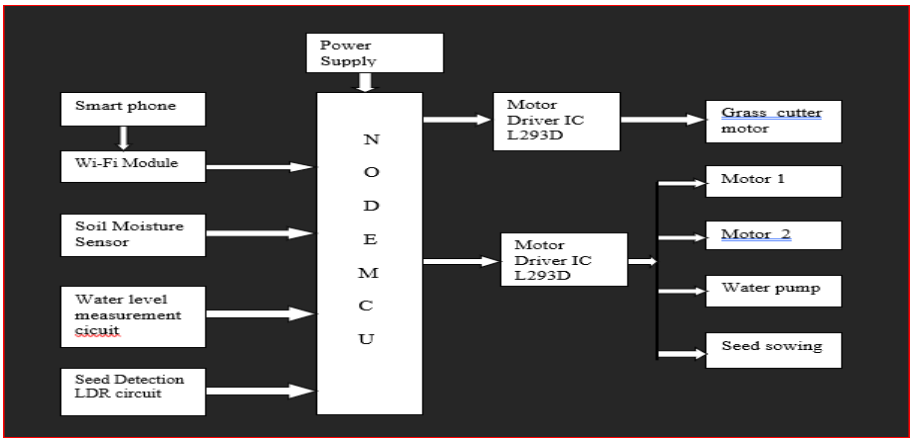
IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 5, May 2022

DOI: 10.17148/IJIREEICE.2022.10514

Fig 1.shows complete block diagram of Agriculture robot developed for farming operations.LDR circuit to check conditions for seed tank and field detection. Output is obtained through mechanicalparts to perform seeding operation and movement of these parts controlled using DC motors.Power supply given to Node mcu board is through 12V Lead-acid rechargeable battery, but node mcu requires 5v so we have used voltage regulator IC7805 to regulate this high voltage. First we have to check moisture level in soil by using soil moisture sensor. Moisture level is then display on blynk app; user can switch on the water motor as per their need.

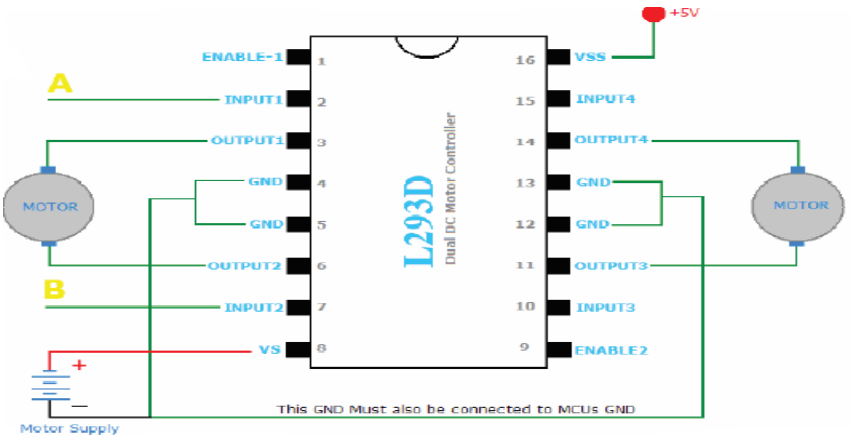


IC L293D-DC MOTOR CONTROLLER:

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H- bridge Motor Driver integrated circuit (IC).
Working of L293D

There are 4 input pins for l293d, pin 2,7 on the left and pin 15 ,10 on the right as shown on the pindiagram. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs providedacross the input pins as LOGIC 0 or LOGIC 1.

In simple you need to provide Logic 0 or 1 across the input pins for rotating the motor.



DESIGN:

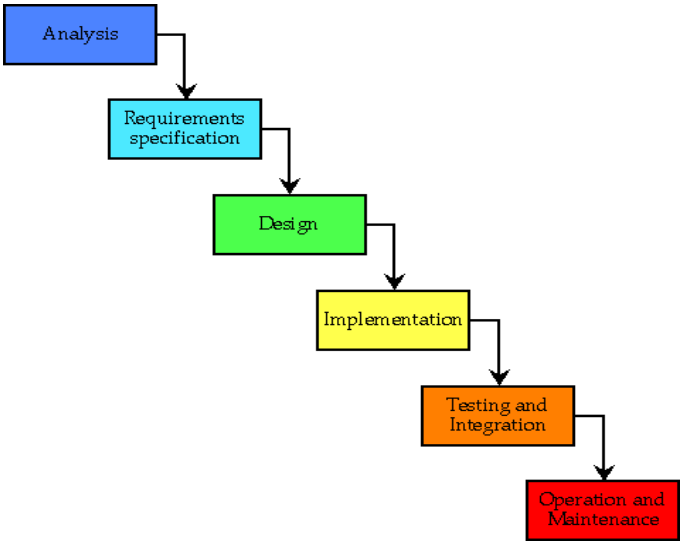
Computer-aided design (CAD) is the use of computer systems to aid in the creation, modification, analysis, or optimization of a design. Computer-aided manufacturing (CAM) is an application technology that uses computer software and machinery to facilitate and automatemanufacturing processes. Many CAD vendors market fully integrated CAM systems, aptly called CAD/CAM systems. These CAD/CAM packages deliver many advantages. For starters, they feature a common user interface that allows CAD operators to quickly learn the software. Moreover, users can easily transfer CAD data to the CAM system without worrying about translation errors or other difficulties. And finally, some integrated systems provide full associatively, which means that any modification to the CAD model will prompt the associated toolpath to be automatically updated. Computer Aided Design (CAD) has completely changed the drafting

IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

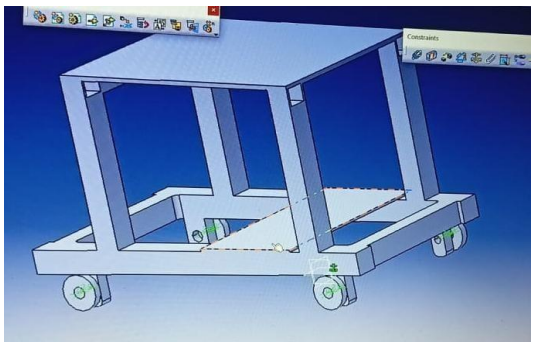
International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 5, May 2022

DOI: 10.17148/IJIREEICE.2022.10514



business and made the storage and retrieval of projects much easier. However, manual drawing is still very important and provides the basics of learning to draw.



MANUFACTURING PROCESSES:

Manufacturing is the process of turning raw materials or parts into finished goods through the use of tools, human labor, machinery, and chemical processing. Manufacturing is integral tothe economy. Most products were handmade using human labor and basic tools before the Industrial Revolution.

Assembling:

An assembly line is a manufacturing process (most of the time called a progressive assembly) in which parts (usually interchangeable parts) are added as the semi-finished assembly moves from work station to work station where the parts are added in sequence until the final assembly is produced.

The assembly operation is the second basic type of manufacturing, where components are joined together using permanent or semipermanent methods.

Permanent methods of joining components together are used in applicaons where the components are required to remain together and not easily disconnected. These permanent methods can be a single or combination of methods such as adhesive bonding, brazing, soldering, and welding.

IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 5, May 2022

DOI: 10.17148/IJIREEICE.2022.10514

Semipermanent methods of joining components together are performed using a combinationof mechanical operations and components such as screws, bolts.

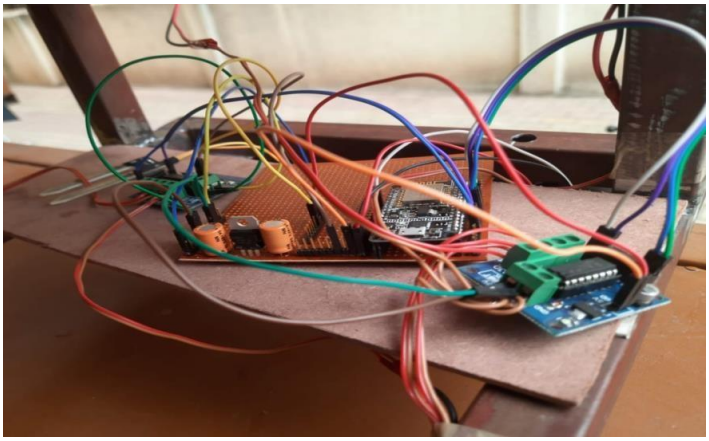


Fig Model Stage .1

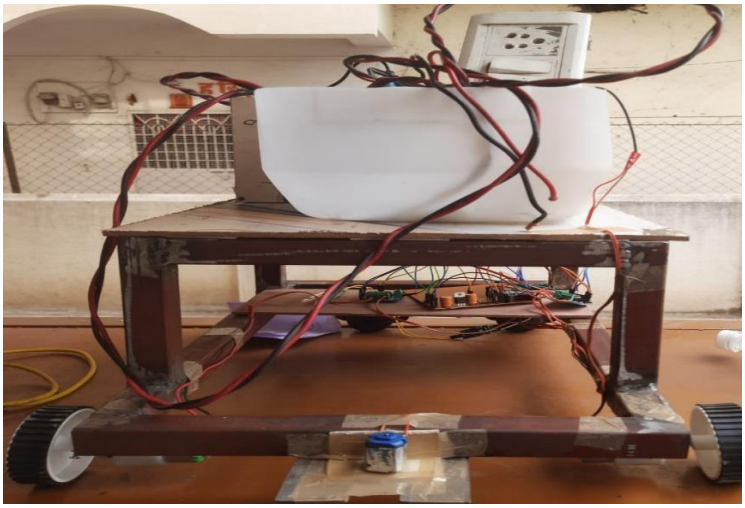


Fig Model Stage 2

IV. CODING FOR BLYNK APP

HOW BLYNK WORKS

Blynk was designed for the Internet of Things. It can control hardware remotely, it can displaysensor data, it can store data, vizualize it and do many other cool things.
There are three major components in the platform:
Blynk App - allows to you create amazing interfaces for your projects using variouswidgets we provide.
Blynk Server - responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It'sopen-source, could easily handle thousands of devices and can even be launched on aRaspberry Pi.

IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 5, May 2022

DOI: 10.17148/IJIREEICE.2022.10514

Blynk Libraries - for all the popular hardware platforms - enable communication withthe server and process all the incoming and outcoming commands.

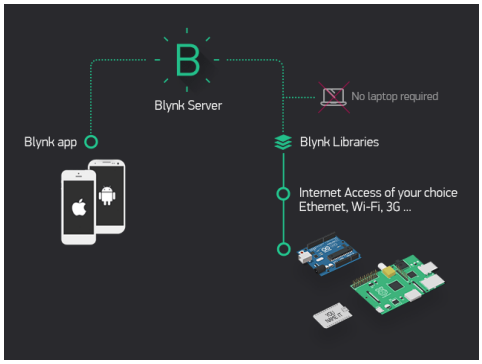
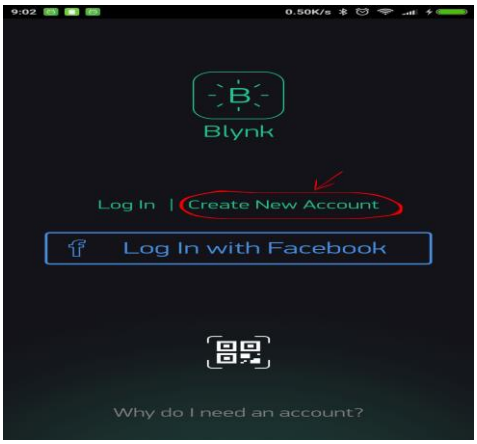


Fig. Working Of Blynk.

GETTING STARTED WITH THE BLYNK APP:

Create a blynk account:

After you download the Blynk App, you'll need to create a New Blynk account. This account isseparate from the accounts used for the Blynk Forums, in case you already have one.We recommend using a **real** email address because it will simplify things later.An account is needed to save your projects and have access to them from multiple devices fromanywhere. It's also a security measure.You can always set up your own Private Blynk Server and have full control.



V. RESULT

Output:

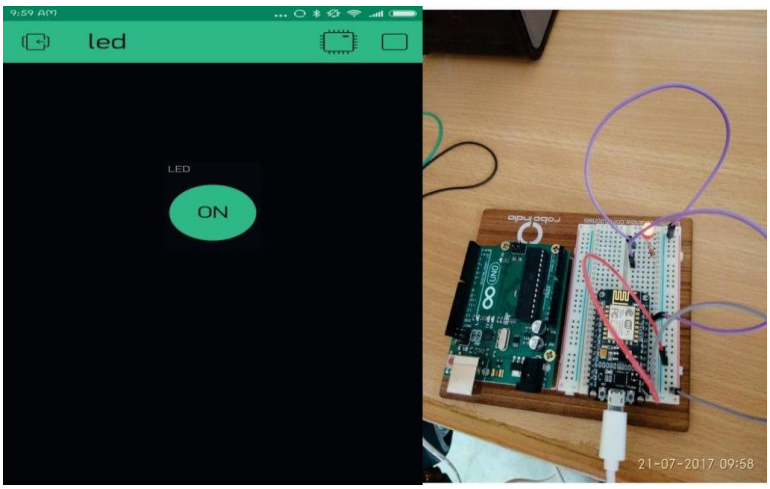


Fig Output signal ON

IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 5, May 2022

DOI: 10.17148/IJIREEICE.2022.10514

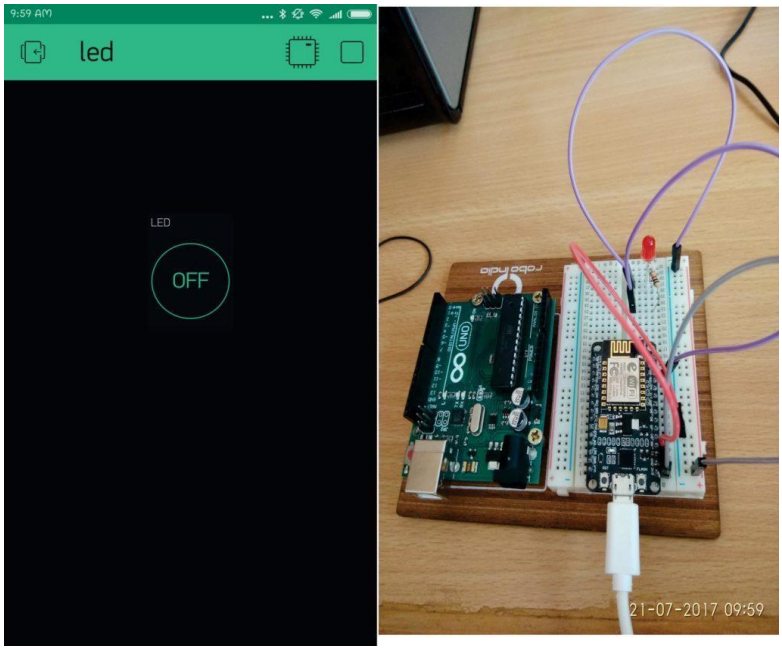


Fig Output signal OFF

VI. CONCLUSION

The smart agri-bot has improved productivity in agriculture functions. Multitasker Agri Bot is successfully developed and all attachments are implemented. It helped to reduce human effort by doing automatic functions like automatic seed sowing, automatic pesticides and fertilizers sprayer, plant disease detection, etc. More innovation can be done on the charging system of battery, such asSolar energy can be used for the charging purpose which would significantly reduce maintenance aswell as the cost of an electric bill. We can also identify how to increase the productivity of certain plants based upon the amount and type of fertilizer to be used. The plant disease detection can be done as per the requirement of the farmer. Precision in seed sowing and spraying can be improved by developing different nozzles as per size and requirements.

VII. REFERENCES

1. Nitin P V1, ShivaprakashS2 , " Multipurpose agricultural robot", 20 May 2016 Abdulrahman MangeshKoli, Umesh Kori, Ahmadakbar Department of Computer Science and Engineering Them College of Engineering, " SeedSowing Robot "March–Apr 2017 .
2. T.Balaji1, R.Rajappan2,b ,S.Senthil3, 1Research Asst, Mailam Engineering College, India. Mechanical Engineering, Head of the department, Mailam Engineering College, India country Principal,Mailam Engineering College, Tamilnadu, India, "Mechanical Design and Development ofAgriculturalRobot".
3. K.Prabhakara Rao et al., S.K.Sahu, Jayendra Kumar, Soil Moisture Sensor using acoustic based techniques, International Journal of Engineering Research &Technology (IJERT),Vol. 1 Issue 3, May– 2012.
4. Mr. Ahmad Hussain, et. al., Mohamed A. Abdellatif, Ahmed A. Ramadan, and Ahmed A. Abo- Ismail, Development of WSN in Irrigation System, World Academy of Science, Engineering and Technology.
5. PrasannaRaut, PradipShirwale, AbhijeetShitole " A Survey On Smart Famer Friendly Robot Using Zigbee", International Journal of Emerging technology and Computer Science , Volume: 01, Issue: 01, February 2016.
6. R.Suresh, S.Gopinath, K.Govindaraju, T.Devika, N.SuthanthiraVanitha, "GSM based Automated Irrigation Controlusing Raingun Irrigation System", International Journal ofAdvancedResearch in Computer and Communication Engineering Vol. 3,Issue 2, February 2014. 7] S.P.Maniraj , Tanya Chaudhary , Akanksha Agarwal ,Nandini Kishore , Vaibhavi Verma "Irrigation Management System Using Soil Moisture Sensor and Arduino" Journal of NetworkCommunications and Emerging Technologies (JNCET) Volume 8, Issue 4, April (2018)
7. Joaquín Gutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Ángel Porta-Gándara "Automated Irrigation System Using a Wireless Sensor Network and GPRS Module " ieee transactions on instrumentation and measurement, vol. 63, no. 1, January 2014.