

## International Journal of Computer Science and Mobile Computing



A Monthly Journal of Computer Science and Information Technology

ISSN 2320-088X

IMPACT FACTOR: 6.017

*IJCSMC, Vol. 6, Issue. 4, April 2017, pg.349 – 352*

# PLANT WATERING ROBOT “PLANT O BOT”

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**Abstract—** Today we all love having a garden in our homes and we pay monthly to the gardener for taking care of it but not every gardener knows everything about each plant's watering requirement because every plant's requirement of water is different from others. Why should all plants get the same amount of water in every season? Water must be provided to plants depending upon environmental conditions. Also every plant needs different amount of water to grow. So we designed a robot called plant watering robot. This robot checks the soil moisture of garden or plant soil. If the amount of water is less than 30% in the soil it means dry soil then automatically water is poured over and the level is risen up to 100% . It will check every plant's moisture level and if there is a plant having moisture up to 50% then the robot will not provide water to the plant. Plant watering robot also checks the moisture of grass in garden and in the soil. It spreads water and maintains moisture for grass and this process is repeated for every radius. The robot has the capability to give water to flower pots in garden too since it has an adjustable nose. Plant watering comes with autonomous and manual operating system. This robot has a fully automatic function of obstacle identification, auto adjustable nozzle, power steering, water tank indicator, soil sensors etc. To operate it in a manual mode, we have designed an android based application for robot. In this application, we drive robot manually like forward, back, right, left, etc. If robot is connected via application and it finds that the soil moisture is less than 30% , then it sends an image and voice message to application via Bluetooth connectivity like water content is low please fill the water and we get to know about the water condition from distance and after knowing we turn ON all pumping components in robot and complete the water need of soil, then robot again checks the soil and sends the image and voice message to application like water content is full, thank you and it then suggests to move forward. If robot is in manual operating system mode and finds any flower pot then its ultrasonic sensors help to find the height of flower pot and the robot adjusts the nozzle and gives 200-400ml of water depending upon the size of pot. Plant watering robot has a 15w Solar panel for charging battery and there's no need to provide external power source because it is an eco friendly robot .This robot has 5L water storing capacity, robot wheels having up to 30 kg Nm torque and with lock power steering for turning the robot and the robot has a 4\*4 wheel drive.

**Keywords—** “microcontroller atmel 2560, solar panel, autonomous, manual, ultra sonic”

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## I. INTRODUCTION

Plant O bot is a care taker of both plants and garden. It will provide care to our garden and the plants in absence of human beings. It also takes care of our garden if we go out for a long time. This robot can be used in large fields or gardens too because robot gets power by solar panel and solar power gets energy directly from the sun. It works continuously up to 4 hrs and it's solar panel always tracks the sun during work. The robot has a low battery indicator,

for seeing battery status. Android based application is used for connecting the robot. Ultrasonic sensors help in obstacle identification and send the signal to controller for turning right or left. It is comparatively easy to turn and move in the shortest path automatically.

## II. MODELING OF A SYSTEM

The usage of electronics engineering in Robotic field is very popular. It makes Robotics more advanced. This robot is designed by hollow aluminium frame for light weight and steering is designed by iron and takes concept from real cars. The back wheels have differential transmission for better road grip and the wheels have patterns for better grip. The wheel diameter is (10cm). The main focus in the robot frame is to maintain the centre of gravity which provides robot balancing in sloping areas. Robot contains 5L capacity of water and for force pumping, there is a 12v dc pump for throwing water with a force on a particular point .We have also designed an automatic water valve system which is used for controlling the flow of water outlet. If robot finds dry soil then it sends a signal to controller for filling the required amount of water. So the controller sends signal to motor drivers. The motors are connected and the pump will force water on the soil or pots and moves forward. If any hurdle is observed, then the robot compares the turns (right or left) and moves on the shortest path and the solar will track the sun automatically in each direction (in solar, light depending resistor sensors define the direction and track the sun). In manual mode robot will connect via an android based application and drives all degree of freedom. The water nozzle has 4 degree of freedom for filling water. Left sided ultrasonic sensor helps to find the pots in left side for filling water. All these small components are made by aluminium and their cutting and trimming is done by lathe machine and milling machine. A soil sensor mechanism which is down and up with the help of 12v dc motor for taking reading is sent to microcontroller. Robot has a good wheel alignment for better traction.

## III. BLOCK DIAGRAM

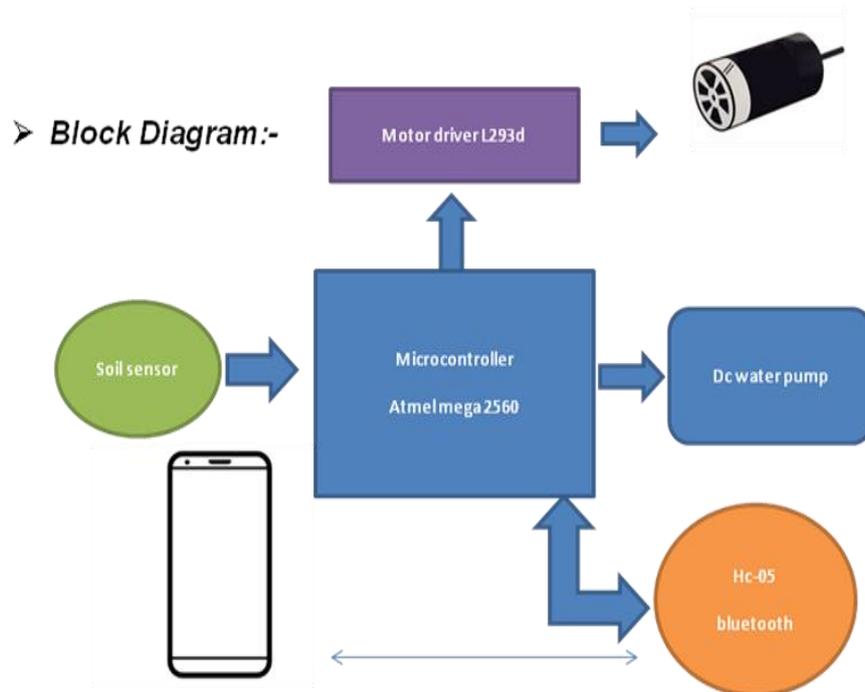


Fig. 1 Block Diagram of Plant Watering Robot

#### IV. CIRCUIT DIAGRAM

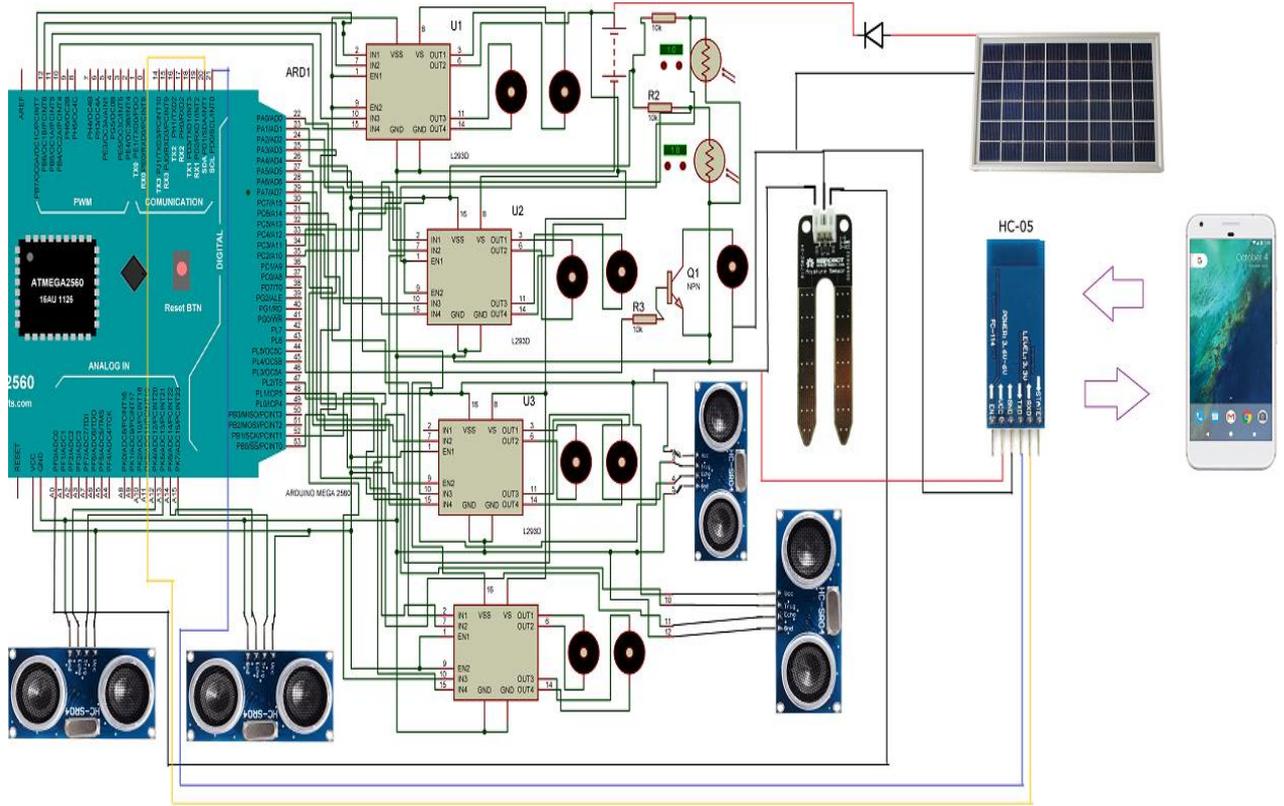


Fig. 2 Circuit Diagram of Plant Watering Robot

#### V. PRACTICAL BOT



Fig. 3 Picture of a Practical Bot

## VI. CONCLUSION

Plant O bot is taking care of our garden better than a human in both automatic mode and manual mode. Their structure is aerodynamically designed for loose air drags and nozzle is designed especially for plants and garden. The wheel diameter is especially for off road driving and its application is easy to use and control, robot is light because of the aluminium metal frame and their differential transmission is provided by low turning radius for robot. If moisture is not found it sends the voice and image message to application. In automatic mode it automatically compares and blows a buzzer.

Plant watering robot is a particular design for gardening purpose and for encouraging the green India and go green campaigns. It is easy to operate and eco friendly for the environment.

## REFERENCES

- [1] B.C. Wolverton, Anne Johnson, and Keith Bounds, "Interior Landscape Plants for Indoor Air Pollution Abatement: Final Report", National Aeronautics and Space Administration ( NASA-TM-101768) Science and Technology Laboratory, Stennis Space Center, 1989.
- [2] E.J. Van Henten, J. Hemming, B.A.J. Van Tuijl, J.G. Kornet, J. Meuleman, J. Bontsema and E.A. Van Os; "An Autonomous Robot for Harvesting Cucumbers in Greenhouses"; Autonomous Robots; Volume 13 Issue 3, November 2002.
- [3] Kevin Sikorski, "Thesis- A Robotic PlantCare System", University of Washington, Intel Research, 2003.
- [4] Ayumi Kawakami, Koji Tsukada, Keisuke Kambara and Itiro Siiro, "PotPet: Pet-like Flowerpot Robot", Tangible and Embedded Interaction 2011, Pages 263-264 ACM New York, NY, USA, 2011.
- [5] Constantinos Marios Angelopoulos, Sotiris Nikolettseas, Georgios Constantinos Theofanopoulos, "A Smart System for Garden Watering using Wireless Sensor Networks", MobiWac '11 Proceedings of the 9th ACM international symposium on Mobility management and wireless access Pages 167-170 ACM New York, NY, USA, 2011.
- [6] T.C.Manjunath, Ph.D. ( IIT Bombay ) & Fellow IETE, Ashok Kusagur , Shruthi Sanjay, Saritha Sindushree, C. Ardil, "Design, Development & Implementation of a Temperature Sensor using Zigbee Concepts", International Journal of Electrical and Computer Engineering 3:12 2008.
- [7] Rafael Muñoz-Carpena and Michael D. Dukes, "Automatic Irrigation Based on Soil Moisture for Vegetable Crops", Applied Engineering in Agriculture (2005).
- [8] Christos Tatsiopoulos and Aphrodite Ktena, "A Smart ZIGBEE Based Wireless Sensor Meter System", IEEE Electrical Engineering (2009), ISBN: 9781424445301,2009
- [9] Ragheid Atta, Tahar Boutraa and Abdellah Akhkha, "Smart Irrigation System for Wheat in Saudi Arabia Using Wireless Sensors Network Technology", International Journal of Water Resources and Arid Environments 1(6): 478-482, 2011, ISSN 2079-7079, © PSIPW, 2011.
- [10] Manual by Martin Hebel and George Bricker , " Getting Started with XBee RF Modules: A Tutorial for BASIC Stamp and Propeller Microcontrollers", Version 1.0, ISBN 9781928982562.
- [11] UC Hobby, "Visualizing sensor data with Arduino processing", <http://www.uchobby.com/index.php/2009/03/08/visualizing-sensor-with-arduino-and-processing/>.