

**Automatic Gardening Robot**LAVANYA V<sup>1</sup>, SUPRAJA B<sup>1</sup>, NIDHI A MEHTA<sup>1</sup>, SUNDAR GANESH C S<sup>2</sup><sup>1</sup>UG student, Department of Robotics and Automation, PSG College of Technology<sup>2</sup> Assistant Professor, Department of Robotics and Automation, PSG College of Technology

**ABSTRACT:** This papers deals with the efficient design of a water spraying robot which is mainly used for gardening. Water gardening is a time consuming process for human ,so that idea is to design a mobile robot which moves all along the garden to spray mater using the Arduino board, relay and pump. It is a simple and cost effective design to spray water for garden .Arduino board controls the timing of spray, timing of robot in standstill position and other controls. L293 driver circuit controls the motor in forward and reverse direction.

**KEYWORDS:** Arduino Controller, Mobile robot, Gardening robot, L293Driver, Automatic spraying

**1. INTRODUCTION**

Gardening is often enjoyable, but always time consuming. Watering garden plants and spraying pesticides periodically without fail is an important issue. In people's day to day life spending time for that is difficult. However, available conventional facilities such as automatic sprinkler systems will be effective only when the garden plants are planted on the surface of the soil. They cannot be used for potted plants. And also the cost of installation increases with the expansion of the garden. Similarly the other watering method used commonly is drip irrigation. The drip irrigation involves watering the plants directly to the roots or to the soil through a network of valves, pipes, tubes, and emitters. In the above mentioned methods, the watering equipment can be used for watering plants on the surface of the soil. They cannot be used for simultaneously spraying pesticides. The objective is to design a bot which can be used to spray pesticides as well as water especially for home gardens. It must also be capable of spraying water or pesticides to plants in the soil surface as well as potted plants. The design was inspired by the lawn movers, which is remote controlled, highly popular and affordable. This design should also be user-friendly, easy to operate, less time consuming and highly useful for elderly and physically challenged people.

A system is proposed for a technological solution to the current human health hazards involved in spraying of potentially toxic chemicals in the confined space of an atmosphere [1]. Sprayers are commonly used on farms to spray pesticides, herbicides, fungicides, and defoliants as a means of crop quality control.[2]. Moreover, while spraying pesticides, it might be hazardous for human beings to be around the vicinity for a very long duration. Therefore, this bot will help to overcome all of the above mentioned issues. Farmbot is a robot designed for agricultural purposes. As one of the trends of development on automation and intelligence of agricultural machinery in the 21st century. This Bot can performs basic elementary functions like ploughing, seed sowing, spraying. We are applying the idea of robotics technology in agriculture. We can expect the robots performing agriculture operations autonomously watching the farms day and night for an effective report. It is designed to minimize the labour of farmers in addition to increasing the speed and accuracy of the work.[3]

**II. IMPLEMENTATION**

The motor used in the wheel are helical gear motors. Four motors are used. Two in the front and two in the back. It carries a torque of 3kg-cm and has a shaft diameter of 6mm. Its No-load current is 70mA (Max). It has an rpm of 60rpm. The width of the tire is 20 mm. The diameter of the tire is 70 mm. The diameter of the Shaft Hole is 6 mm. This wheel is suitable for heavy loads and garden terrains. The L293D is a popular motor driver IC designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Each can control 2 DC Motors, their direction using control lines and their speed using PWM. Thus for four motors, two servo drives are used. RF transmitter and receiver is a 433Mhz wireless transmitter and receiver. It consists of a built-in encoder in the transmitter and decoder in the receiver. The transmitter board consists of HT12E and the receiver board consists of HT12D. The joystick consists of two potentiometers that allows us to measure the movement of the stick in 2-D. Voltage regulator 7805 is used to regulate the supply given to the transmitter and the joystick. A 9V battery is been used. Hence the usage of voltage regulator was necessary.

The pumps used in ESP (Electrical Submersible pumps) installations are multistage centrifugal pumps operating in a vertical position. Produced liquids, after being subjected to great centrifugal forces caused by the high rotational speed of the impeller, lose their kinetic energy in the diffuser where a conversion of kinetic to pressure energy takes place. This is the main operational mechanism of radial and mixed flow pumps. The pump shaft is connected to the gas separator or the protector by a mechanical coupling at the bottom of the pump. Fluids enter the pump through an intake screen and are lifted by the pump stages. Other parts include the radial bearings (bushings) distributed along the length of the shaft providing radial support to the pump shaft turning at high rotational speeds.

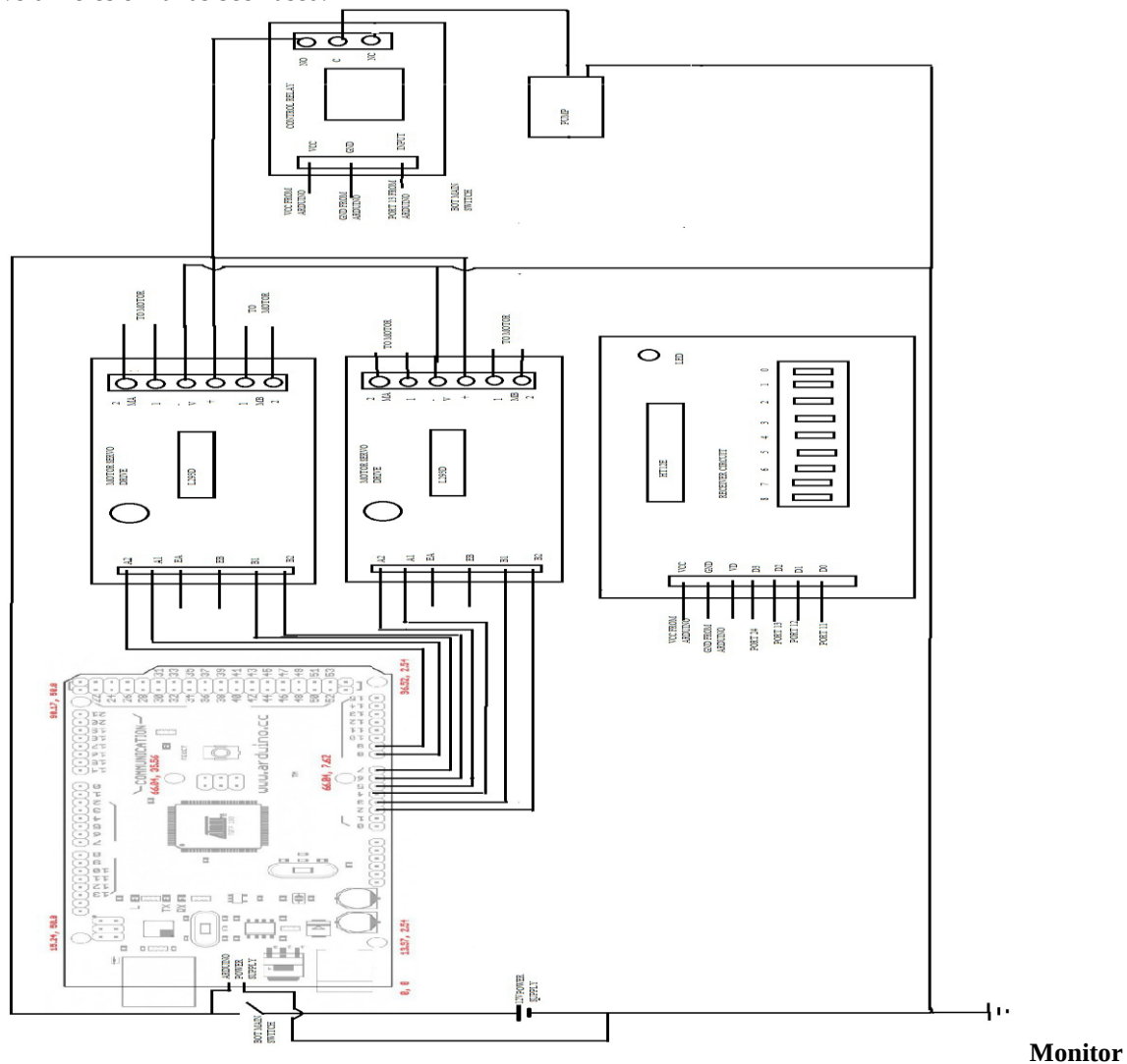
Control relay is used to control the ON/OFF of pump. It consists of pins Vcc, Gnd and input. 5V input is given to Vcc and Gnd. When the motor is supposed to be switch ON, input pin is made high. Similarly there are three pins such as NC,C and NO. the two input from the power terminals are given to C and NC.

The Arduino Mega is a microcontroller board based on the ATmega1280. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Arduino Mega has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega1280 provides four hardware UARTs for TTL (5V) serial communication. An FTDI FT232RL on the board channels one of these over USB and the FTDI drivers (included with the Arduino software) provide a virtual com port to software on the computer. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the FTDI chip and USB connection to the computer (but not for serial communication on pins 0 and 1).

The entire bot is supported on a polycarbonate sheet. There are two sheets. One has wheels and circuits mounted on it. And the other is placed above it. It has a water tank which has provision for direct water supply from hose connected to tank. The sheet is supported by four supports made of mild steel. Fig.1 show the main circuit diagram of the project.

For height adjusting, adjustable holders are used. These holders are capable of being rotated or bent for any required shape or height. They can provide any heights and can withstand the pressure of the pump. For spraying the water, a pipe with several holes on it has been used.



**Fig .1 Main Circuit Diagram**

### III. RESULTS

The final prototype is developed and it is tested in the actual field. The robot has an switch to operate the robot. Fig.1 shows the front view of the robot.



**Fig.2 Front view of robot**

A small water tank is placed on the top of the robot. Fig.3 shows the side view of the robot. A joystick is placed on the top of the robot. It has two buttons for one for start and other for stop. A sliding mode controller is used to move the motor in all directions.



**Fig.3a Side View of robot**



**Fig. 3b Joystick**

Fig.3 b shows the joystick implemented on the robot. The bot has been successfully tested in the gardens. Extra provisions were made to make sure that the liquid from the outlet is not affecting the circuits. The pump is switched on when watering is required.

### IV. CONCLUSION

The Automatic spraying bot is one of its kind. We may have been through several gardening equipments such as normal pesticide sprayers, watering method such as drip irrigation but this automatic spraying bot is something which can be used for watering as well as for pesticide spraying.

This bot can withstand moderate garden terrains. Thus the bot can be used for domestic applications and will be a time-saving equipment. When remote-controlled lawn-movers were introduced, they were quite popular, highly useful and had a huge market because of its simplicity. Similarly, this project can be useful because of its easy-operation.

Moreover, this equipment can be very useful if there is any need for spraying pesticides from a far away distance. This equipment will enable even children to spray pesticides.

Thus the automatic spraying bot can be a useful product for home gardens especially in India.

**REFERENCES**

- [1] MitulRaval, AniketDhandhukia and SupathMohile “Development and Automation of Robot with Spraying Mechanism for Agricultural Applications”, International Journal for Research in Emerging Science And Technology, Volume-2, Issue-8, Aug-2015,pp.60-66.
- [2] Nitish Das,NamitMaske, VinayakKhawas, Dr. S. K. Chaudhary “Agricultural Fertilizers and Pesticides Sprayers -A Review”, IJIRST –International Journal for Innovative Research in Science & Technology| Volume 1 | Issue 11 | April 2015,pp.44-47
- [3] S.Gopinath, Kavinraja G, Bala Ganesh R, Aravindhana S, KrisnaPrashant G, "Automated Farming bot", International Journal of Informative and Futuristic Research, Vol.4,Issue 8,April 2017,pp.6950-6957
- [4] <http://www.engineersgarage.com/electronic-components/7805-voltage-regulator>
- [5]S.S.Katariya, S.S.Gundal, Kanawade M.T and Khan Mazhar, “Automation in Agriculture” , International Journal of Recent Scientific Research Research , Vol. 6, Issue 6, pp.4453-4456, June 2015.
- [6] Simon Blackmore, Bill Stout, Maohua Wang, Boris Runov, ” Robotic Agriculture”, 5th European Conference on Precision Agriculture ,Uppsala, Sweden ,9-12th June 2005.