Design and Operation of Agriculture Based Pesticide Spraying and seeding robot

P. G. Dhawale[1] , K.D. Jagtap[2], R.S. Gavade [3], M.V. Bhopale[4], S.M.Patil[5],A.K. Kamble[6]

[1]Assistant professor, Department of Electrical Engineering, Sanjay Ghodawat Group of Institution, Atigre.

[2,3,4,5,6]BE Student, Electrical Engineering Department , Sanjay Ghodawat Group of Institution, Atigre.

---***---

Abstract - *We know that agriculture is the backbone of India. In our country, near about 70% of people are dependent upon agriculture. So the agricultural system in India should be advanced which reduce human effort. This paper strives to develop a robot which is capable to performing operations like pesticide spraying and seeding which reduce the human effort and protect the farmers from health issues causes because of chemicals. Here main component is at mega 328P that supervises the entire process. The designing of robot which can be controlling through the android app. We are going to developed remote buttons in android app through which we can control the robot motion and in which* we use Bluetooth communication which interface with controller and android. According to command which is received from the android, robot motion can be controlled.

Key Words:
 Android app, Bluetooth module, arduino, robot vehicle

1. INTRODUCTION

Agricultural plays very important role in India's economy. As the population growth increase day by day in our country. Hence requirement of agricultural products is also increasing. Hence now a day's automation in agricultural field is necessary. This paper involves partial automation in agriculture field such as in pesticide spraying and seeding by the use of android app.

SR.NO	PARAMETER	MANUAL	TRACTOR	SEEDING MACHINE
1.	Man power	More	Moderate	No
2.	Time required	More	Moderate	Less
3.	Seeding technique	Manually	Manually	Automatically
4.	Required energy	High	Very high	Less
5.	Labor cost	High	High	Initial cost only

Fig-1: Comparison Between Seeding Sowing Technique

Spraying pesticides is very harmful procedure for farmers for this they have to take too many precautions such as wearing hand glows, masks and suitable outfits etc. The use of tractor is almost common trend in current agriculture field. Before going to seeding process it is necessasary to mixing of soil from top level to fertile bottom level which is done by using tractor or animal driven plough. For this lot of energy and human interaction is required. Due to use of tractors soil will lose its porosity. Because of this germination rate of seed is reduces.

2. PROBLEM STATEMENT

In the existing method of seed sowing and pesticide spraying process is required lot of human efforts. In the traditional method of seed sowing process, it is difficult to achieve uniform soil depth for seed placement and to obtain uniform distance between the seed placement and also in pesticide spraying it is quite difficult to bear the weight of pesticide tank for more time. In sowing also, there is wastage of seed while seed placement. In order to overcome these limitations in the existing method, we design one robot that can perform pesticide spraying and seeding operation automatically.

3. BLOCK DIAGRAM

For designing Agriculturally Based Pesticide Spraying and Seeding Robot we use 12v, 2A battery supply. This 12v supply is converted into 5v. For this conversion we use the 7805-voltage regulator, bridge rectifier and capacitor. On this 5v supply Arduino, motor driver circuit L293D, relay is operating. Then the crystal oscillator is used which generate the pulse and give timing cycle to controller. Then four DC motor are interfaced to motor driver circuit L293D.This circuit is having digital input and analog output.
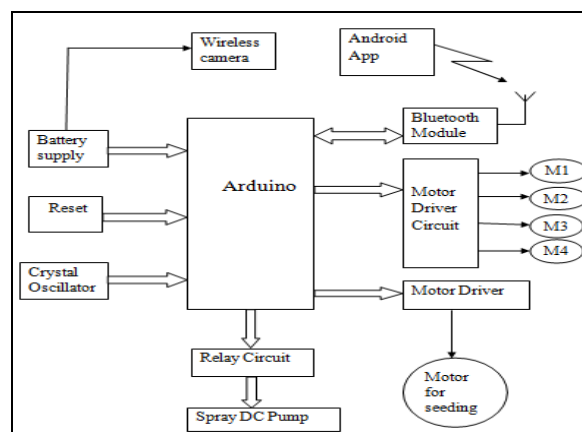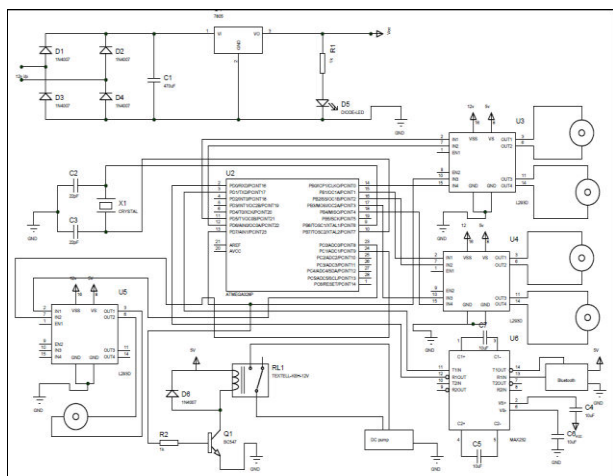

Fig-2: Block Diagram

When we give the high and low input then motor rotate anticlockwise. When we give input low and high then motor rotate clockwise.

Then this total assembly is controlled through Android app. In this app by making programming in embedded C we set the keys. These keys are paired with Bluetooth module. Then these keys are given to the Bluetooth module. Bluetooth module giving command to Arduino. Arduino read the command and operate the robot.

For spraying we use the 12v dc pump and relay is for triggering purpose. Relay is connected to inlet of liquid tank and outlet is at top of the sprayer. When relay is triggered then liquid is pumps up and spread on the crops. When stop button is pressed then sprayer operation is stop. Another function of robot is seeding. For this when robot is moving in forward direction and seeding is done. Seeding is done according to programming and within specified Time.

4. CIRCUIT DIAGRAM USING PROTEUS

The proteus design suite is proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards (PCB**).**
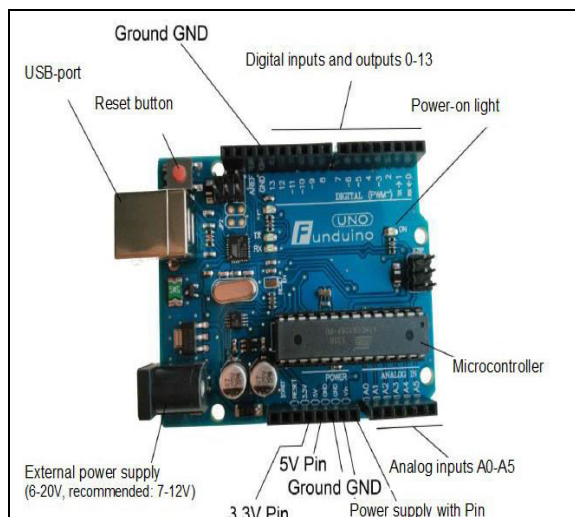
Fig. 3:Circuit diagram

5. MAJOR COMPONENTS OF THE PROJECT

5.1 Arduino:

Arduino is an Open-source-electronic platform which is used in the field of micro controlling. In simple word ,we can use the arduino to read sensors and control the things like motor and lights. It is a open source base, that means the boards and software are easily available also anyone can modify and optimize the board for better functionality. Is used for arduino devices is called as IDE that is integrated development environment. It is free to use and some basic skills are required to learn it. Commonly c and c++ languages are used for programming.
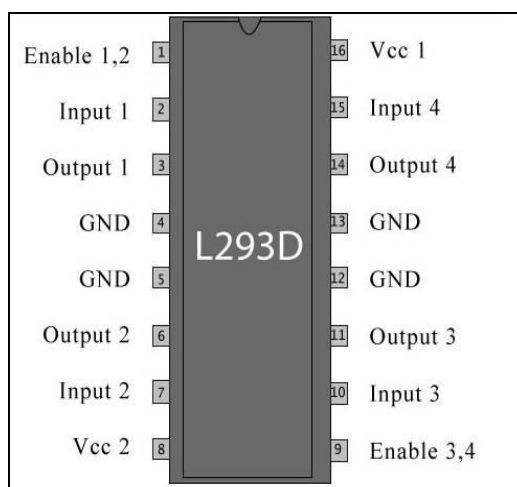
Fig- 4: Arduino

5.2 Motor Driver L293d:

L293D is a motor driver IC. It takes low current control signal and provides higher current control signal. To drive the motors this higher current signal are used.

L293D consist of two inbuilt H-bridge driver circuits .It can drive two DC motors simultaneously, both in reverse and forward direction. Input logic at pins 2 and 7 and 10 and 15 controls the motor operation of two motors to stop the motor input logic 0 0 or 11 is used. Logic 01 will rotate it in clockwise direction and logic 10 will rotate it in anticlockwise direction.

For starting of motors enable pins 1 and 9 must be high when an enable input is high, the corresponding driver gets enabled. Hence, output become active and work in phase with their inputs. Same, when enable input is low, corresponding driver is disabled and hence their outputs are off and are in the high impedance state.

Fig- 5: Pin diagram of L293D Driver IC

5.3. Bluetooth module:

Bluetooth is a wireless technology. It is used for exchanging data over short distance(using short length radio waves) from fixed and mobile devices. Bluetooth is better way for short range wireless communication. Bluetooth is a promising technology for transmission of data over short distance.
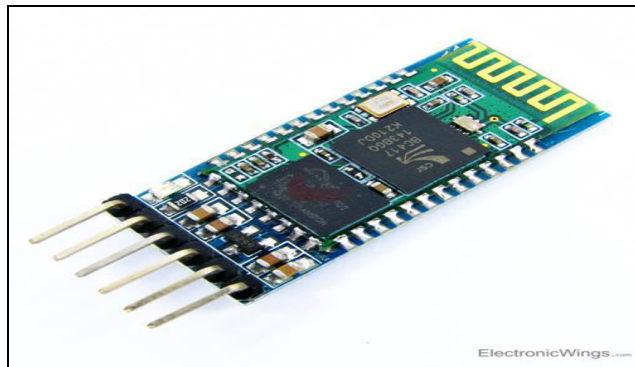

Fig-6: Bluetooth chip

5.4. Relay Driver Circuit:

Here to **show on the Relay with Arduino** we Arduino we tend to simply have to be compelled to create that Arduino Pin High (A0 in our case) wherever Relay module is Connected. Below given is **Relay Driver Circuit** to make your own Relay module:
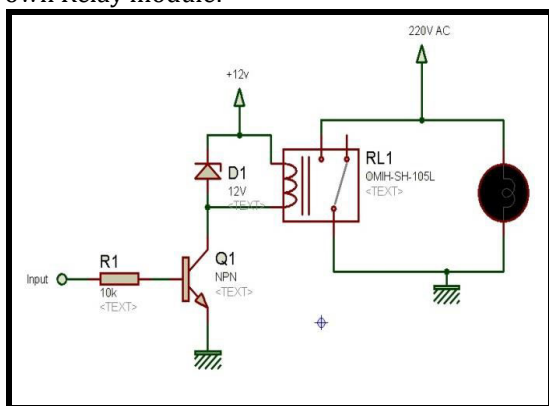

Fig- 7: Relay Driver Circuit

5.5. Wireless Camera:

Wireless camera is basically wireless transmitter which carries camera signal. Camera takes the picture and then provides the data to transmitter. Then the transmitter send the wireless signal to receiver. For this camera and transmitter power is provided by either by battery or transformer.
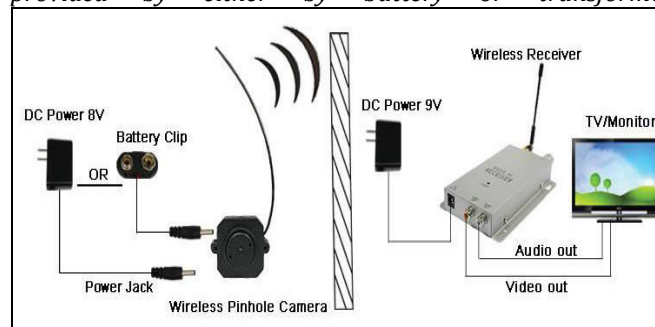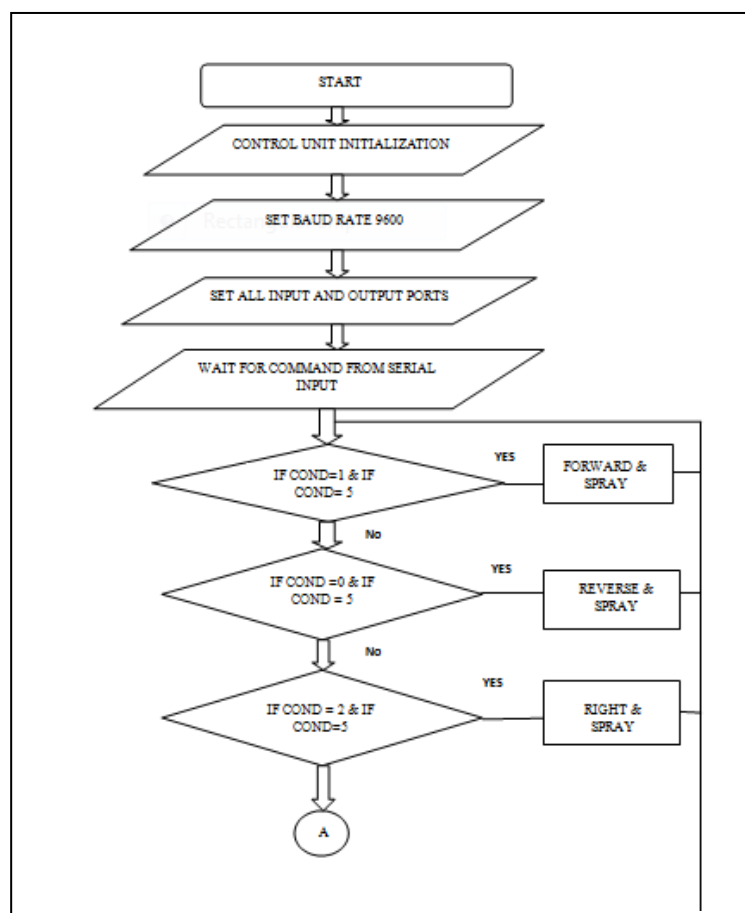

Fig-8: Wireless Camera

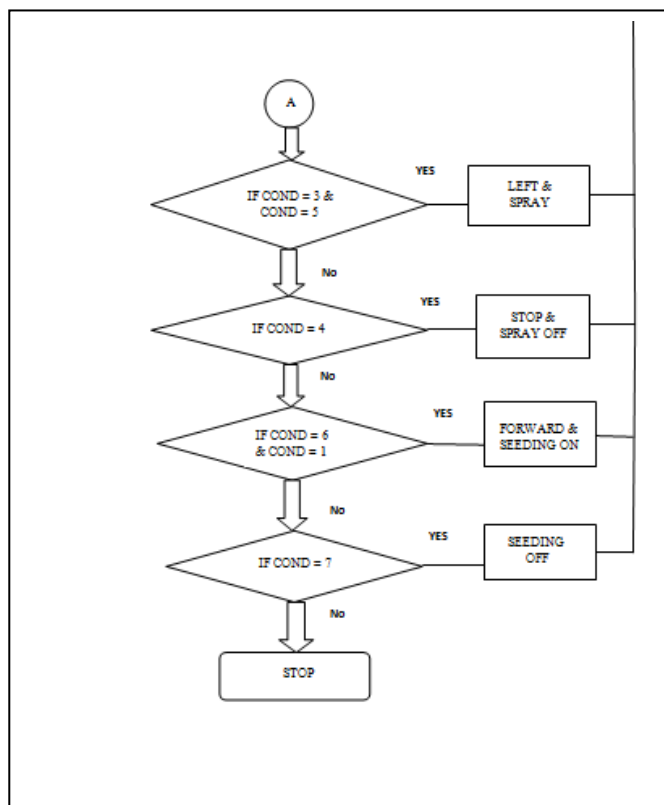## 7. FLOW CHART

Fig-9: Flow chart 1

Fig-10: Flow chart 2

8. RESULT

8.1 MODEL RESULT:

10 Feet = 22 sec = Without Seeding
10 Feet = 25 sec = With Seeding
10 feet= 300 cm
1000cm=1m
1000m=1km
1km=3280.83feet

FOR WITHOUT SEEDING:

10 feet= 22sec
For 1 Feet =2.2 sec
Now
3280.83 feet=2.2*3280.83
=7217.826 sec
=120.2971 min
=2.0049 hr
1km =0.5km/hr

FOR WITH SEEDING:

10 feet= 25sec

For 1 Feet =2.5 sec
Now
3280.83 feet=2.5*3280.83
=8202.075 sec
=136.70 min
1km =2.27 hr

8.2RESULT OBTAINED

Fig-11: Robotic Vehicle

Fig-12: Spraying operation

Fig-13: Seeding Operation

9. CONCLUSION

The experiment showed that the robot can basically complete the work of automatic controlled and meet spraying requirements in the greenhouse. The control system has good stability and reliability.

The wireless camera bases tracking performs well when the robot runs less than 0.5m/s and turning radius more than 0.5 meters. The spraying part can adjust position within a certain range according to the height of target, and reduce leakage spray and heavy spray as much as possible.

There are still some shortcomings in the robot system. For example, there is no location system for nozzle, some manual instructions are also required for remote control when the robot works. The system hasn't automatically adjusting devices of the spray quantity. In the current condition of rapid development of precision farming technology, we should make more efforts to realize variable automatic spray.

10. REFERENCES

[1] Sammons P J, Furukawa T, Bulgin A." Autonomous Pesticide Spraying Robot for Use in A Greenhouse [A]", Australian Conference on Robotics and Australian Conference on Robotics and Automation, Sydney Nan, Zhang Australian 2008.

[2] Zhang Ying, Xueqin." The Development Status and Trends of Facility Agriculture Overseas [J]".

[3]" Bluetooth based android phone/tablet-controlled robot", Available: http://www.robokits.co.inand http://www.robokitsworld.com

[4] R. Eaten, J. Katupitiya, K. W. Siew, B. Howarth, Autonomous farming: Modeling and control of agricultural machinery in a unified framework", In Proc.15th Int. Conf. Mechatronics and Machine Vision Practice, Auckland, New Zealand, Dec.

[5] Amruta Sulakhe,M. N. Karanjkar, "Design and Operation of agriculture based pesticide spraying robot" IJECT Vol. 6, Issue 4, Oct- Dec 2015

[6] Peng Jian-sheng, " An intelligent robot system for spraying pesticides " The open electrical & electronics engineering journal, 2014, 8, 435-444.

[7] A. Keerthana, P. Kirubaharan, S. Krishnamoorthy, K. Rajeswari, Mr. G. Syed Zabiyullah " Agriculture robot for seeding and forming".