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Remotely Operated Pesticide Sprayer Robot

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Abs tract

Abstract : *The use of pesticides in agricultural production is an insecticide, sterilization, pest or weed killing drugs for the prevention, eradication or control hazards in agriculture, forestry, disease, insects, grass and other harmful organisms and purposeful regulation of plant growth of chemicals . Agriculture plays a vital role in the Indian economy. But an attack of pest in crops is one of the major problems to reduce the population growth in agriculture field. This project presents a technological solution to the current human health hazards involved in spraying of potentially toxic chemicals in the confined space of an atmosphere. This is achieved by designing a semiautonomous mobile robot for use in pest control and disease prevention applications in commercial farm. The effectiveness of this platform is shown by the ability to successfully navigate itself down rows of a Farm, spray the pesticides effectively while the farmer controls it from afar distance.*

Keyword: *semiautonomous robot, pesticide spray system, remote, Motor Driver, LCD, Zigbee technology etc.*

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1. INTRODUCTION :

Fertilizers are mainly classified as organic and inorganic fertilizer. But it is very harmful procedure for farmers when they spray pesticide, they have to take too many precautions like wearing suitable outfit, gloves and masks etc. For getting best solutions in such cases use of robots is very imminent technological solution which improves productivity and efficiency. It becomes cost effective technological solution. An automatic pesticide sprayer is involved to spray the pesticide to the localized area of the affected crops. This system is based on the sprayer that is filled with pesticide. This provides a continuous flow of pesticide and an accuracy that is not affected by varying fluid properties and flow

conditions and also sprays pesticide on affected area of plant by adjusting the height of pesticide sprayer. This can be controlled by using Team viewer software through mobile remotely. The design is ideal for pesticide sprayer application.

2. EXISTING SYSTEM :

Bluetooth technology, created by telecom vendor Ericsson in 1994 [1], shows its advantage by integrating with smart phones. It has changed how people use digital device at home or office, and has transferred traditional wired digital devices into wireless devices. A host Bluetooth device is capable of communicating with up to seven Bluetooth mod- ules at same time through one link. Considering its normal working area of within

eight meters, it is especially useful in home environment. Thank for Bluetooth technology and other similar techniques, with dramatic increase in Smartphone users, smart phones have gradually turned into an all-purpose portable device and provided people for their daily use [3-4]. In recent years, an open-source platform Android has been widely used in smart phones [5].

3. PROPOSED SYSTEM

"Automation as a part of solution"

(1) The actual concept is to make an automated robot using Atmega 16 microcontroller will eliminate all the health issues.

(2) This robot is expected to be an all terrain robot.

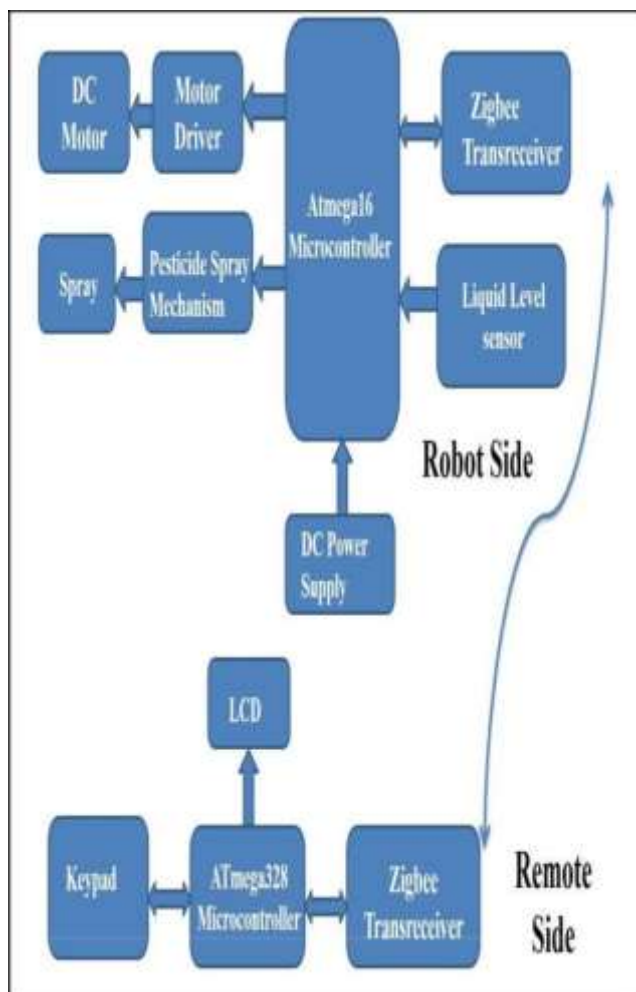(3) Efficient and health conscious operation .

3.1 System Block Diagram :

Fig 3.1: Block diagram of Agro-Robot

4. METHODOLOGY :

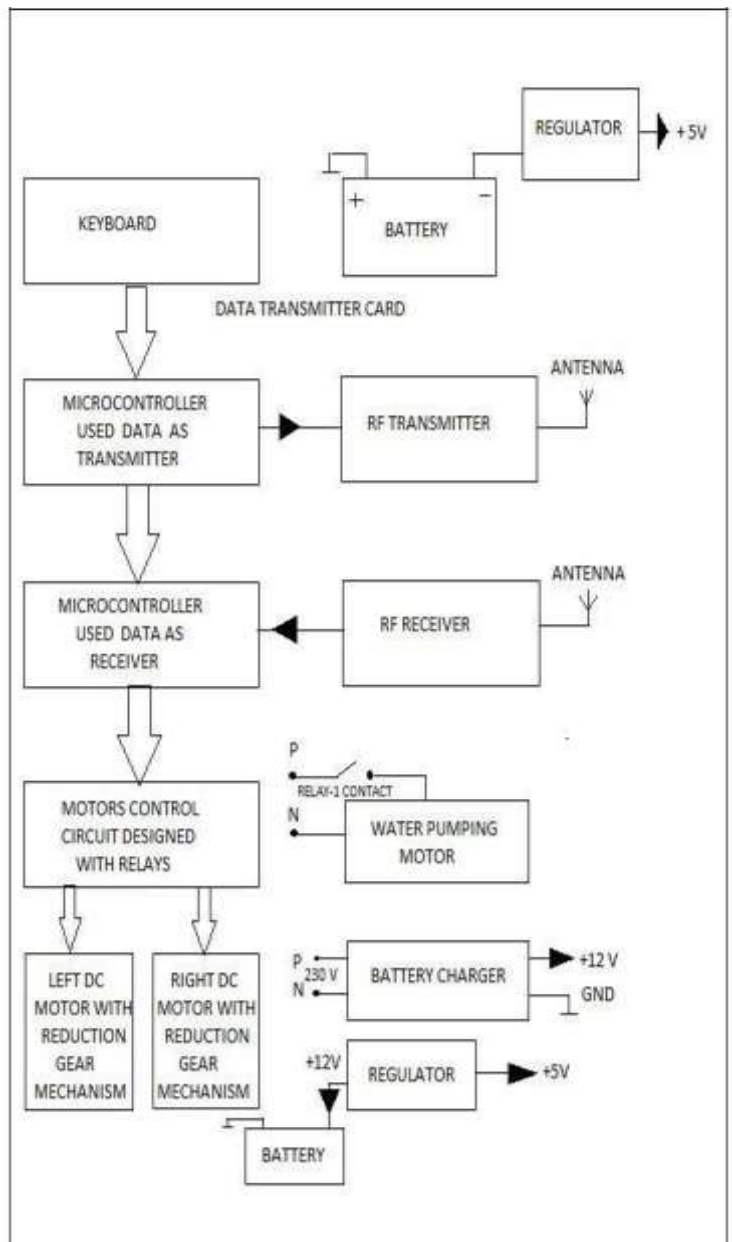## 4.1 Block Diagram of Working of our Project :

Fig 4.1 : Working of Agro-Robot

4.2 Working principle of Agro-Robot:

The Robot contains components Key-board, microcontroller, battery etc. will work as shown in block diagram. Key board of remote which works as transmitter transmits the signal given to it. This signal is captured by robot which works as receiver by microcontroller. As robot senses signal with help of h bridge circuit D.C motor will actuate and motors get revolution. Wheels which are connected through D.C motors also

revolve. Wheels are rotated as given order reverse, forward, left, right. When voltage is given to circuit as right wheel, motor of right side actuates and wheel takes right turn. For left turn, repeat this procedure simultaneously. As the carrier of robot travels in the field, the robot sprays the liquid pesticides on the crops with help of sprayer at particular distance.

5. IMPLEMENTATION:

List of components used

A. Voltage Regulator IC(7805)

B. Atmega 328 microcontroller

C. DC Motor

D. LCD

E. Motor Driver

F. Relays

G. Zigbee

H. Zigbee Technology

A. Voltage Regulator IC(7805) : 7805 is a voltage regulator integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The voltage regulator IC maintains the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. Capacitors of suitable values can be

connected at input and output pins depending upon the respective voltage levels.
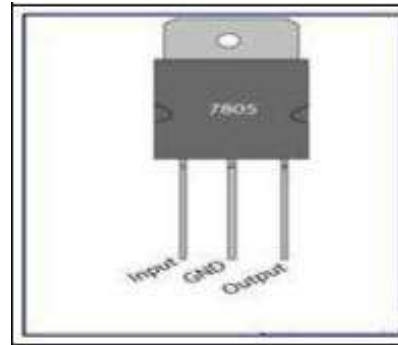

Fig.A. Pin Diagram of voltage regulator (7805)

B. Atmega 328 microcontrolle r :

Features of Atmega328:-

High-performance,

Low-power AVR 8-bit Microcontroller,

Advanced RISC Architecture

130 Powerful Instructions - Most Single Clock Cycle Execution

32 x 8 General Purpose Working Registers

Up to 6 MIPS Throughput at 16MHz

Fully Static Operation

On-chip 2-cycle Multiplier

Non-volatile Program and Data Memories

8k Bytes of In-System Self-Programmable Flash

Optional Boot Code Section with Independent Lock Bits

512K Bytes EEPROM

Programming Lock for Software Security

1K Byte Internal SRAM

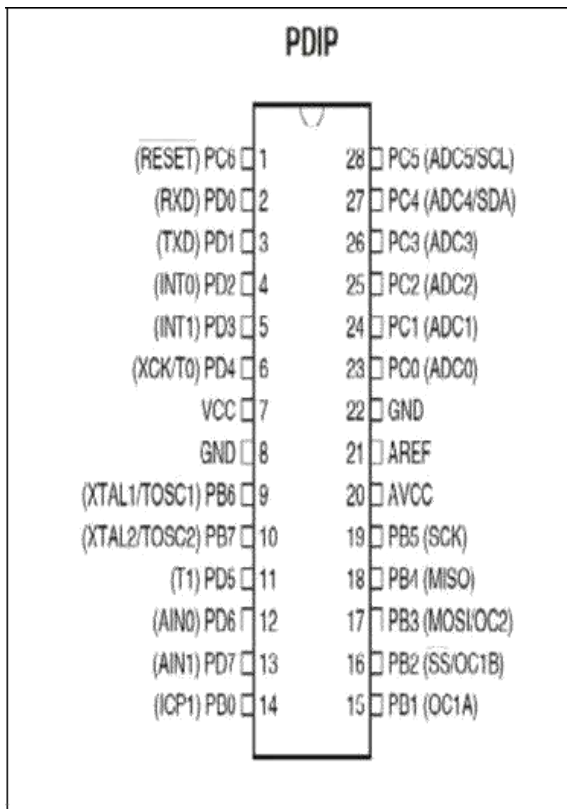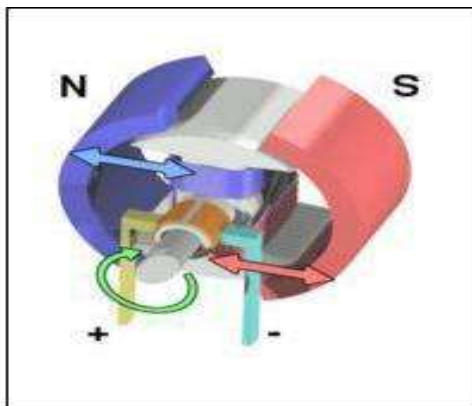*Fig B. Pin Diagram of At mega328*

C. DC Motor :

Fig. C. DC Motor

A DC motor relies on the fact like magnet poles repel and unlike magnetic poles attract each other. A coil of wire with a current running through it generates an electromagnetic field aligned with the center of the coil. By switching the current on or off in a coil its magnet field can be switched on or off or by switching the direction of the current in the coil the direction of the generated magnetic field can be switched

180°. The winding in the armature continues to loop all the way around the armature and uses either single or parallel Conductors (Wires), And Can Circle Several Times Around The Stack Teeth.

D. LCD (Liquid Crystal Display) :

A liquid crystal display (LCD) is a thin, flat display device made up of any number of colour or monochrome pixels arrayed in front of a light source or reflector. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other.

Pin description

Most LCDs with 1 controller has 14 Pins and LCDs with 2 controller has 16 Pins (Two pins are extra in both for back- light LED connections).
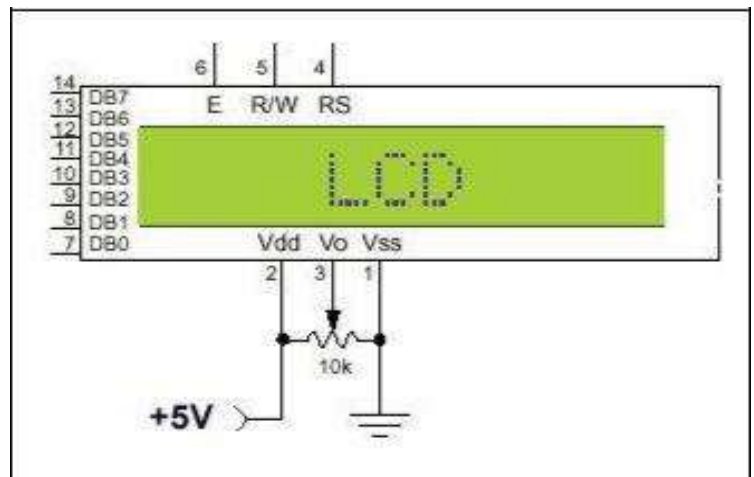

Fig D. Pin diagram of 2x16 line LCD

E. **Motor Driver (L293D) :** L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors. L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse

direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively. Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high- impedance state.
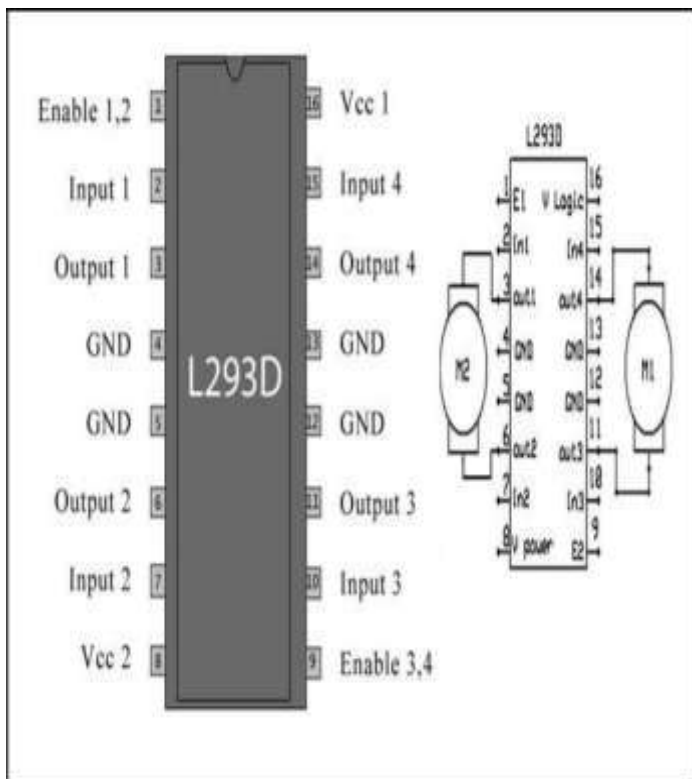

Fig E . Pin Diagram of L293D

F. Relays :

A relay switch can be divided into two parts: input and output. The input section has a coil which generates magnetic field when a small voltage from an electronic circuit is applied to it. The output section consists of contactors which connect or disconnect

mechanically. In a basic relay there are three contactors: normally open (NO), normally closed (NC) and common (COM). By using proper combination of contactors, the electrical circuit can be switched on and off.
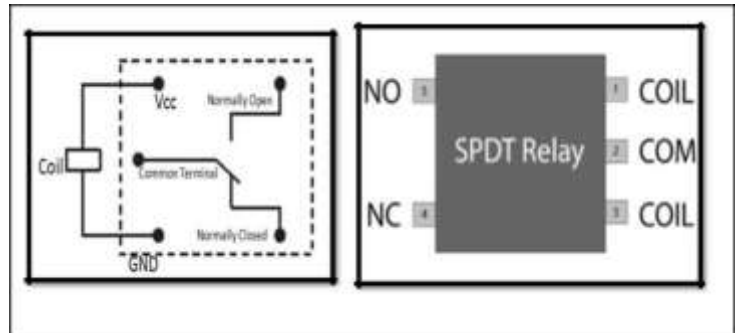

Fig F. Circuit diagram of Relay

G. Zigbee :

The explosion in wireless Technology has seen the emergence of many standards, especially in the industrial, scientific and medical (ISM) radio band. There have been a multitude of proprietary protocols for control applications, which bottlenecked interfacing. Need for a widely accepted standard for communication between sensors in low data rate wireless networks was felt. As an answer to this dilemma, many companies forged an alliance to create a standard which would be accepted worldwide. It was this Zigbee Alliance that created Zigbee. Bluetooth and Wi-Fi should not be confused with Zibgee. Both Bluetooth and Wi-Fi have been developed for communication of large amount of data with complex structure like the media files, software etc. Zigbee on the other hand has been developed looking into the needs of communication of data with simple structure like the data from the sensors.
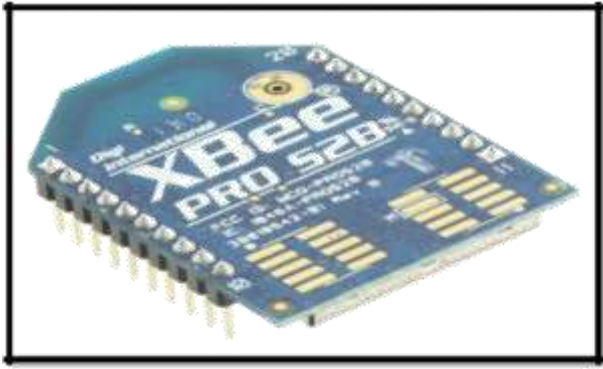
Fig. G. Zigbee

Working of Zigbee :

This RF Module can be used for applications that need two way or multi-way wireless data transmission. It features Multi-Master and Multi-Slave and reliable transmission small size and best range in its class protocol is self-controlled and completely transparent to user interface. The module can be embedded to your current design so that wireless communication can be set up easily for wireless data transmission. It supports adjustable data rate with reliable transmission distance.

Connection Diagram

Fig. G (i) Connection Diagram of zigbee

H. Zigbee Technology

The technology is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZigBee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking.

6. RESULT :

During work farmers have to suffer from many problems, at the time of spraying pesticide liquids they have to face some breathing dieses. Chemicals used in the pesticide liquids are harmful and dangerous for mankind, if they don't pay attention during spraying they have to suffer problems. Robots have to done work also an unequal surface, so it is hard to do work in the fields. Sensing distance, these robots are works in particular distance sets by user. Capital cost of the robot. Workload on farmers can be minimized by using agro-robots, and also reduce the chance of danger of breathing problems. By making track for robot it will be worked properly in slippery and unequal surface. By using High sensitivity sensor we can work far distance on the field in any atmosphere. Time consumed by robots for spraying liquids is less than mankind, and they can improve the working efficiency.

Fig.6. Image displaying agro-robot with remote

7. CONCLUSION :

The paper was aimed at not just to extend the application of advanced technology in the field of agriculture, but also to bring the technology close to the reach of farmers in financial aspect, in a very convenient way. This paper provides an engineering solution to diagnose diseased affected area of plant by automatic sprayer robot remotely. An automatic pesticide spray is involved to spray the pesticide to the localized area of the affected crops. This system is based on sprayer filled with pesticides. The Sprayer movement is controlled by DC motor at low velocity, up & down direction according to plant height. The proposed system can remotely operate through any electronic device like mobile, laptop etc. This is very essential in developing countries, especially India, where agriculture is the backbone of the economy.

8. FUTURE SCOPE:

The spraying mechanism can be closely observed by using a camera which would be mounted near the robotic arm giving the farmer live feedback of the spraying.

(i) Integrated GSM module which could control the start/stop and run operation of the robot.

(ii) SMS based system to start and stop the service.

(iii) Preprogrammed GUI based navigation system.

(iv) Android interface to navigate the robot.

(v) Programming based on crop type and amount

9. REFERENCES

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