

AN INTELLIGENT ROBOT SYSTEM FOR SPRAYING PESTICIDES

¹ SHEDBALE TAMANNA RAFIQUE, ² LOKARE MAHESH SANJAY,
³ BHOSALE AJAY SUNIL

^{1, 2} Department of Electronics & Telecommunication Engineering,
Shivnagar Vidya Prasarak Mandals College of Engineering
Malegaon(BK),Baramati, Pune,India

¹tamanna7385@gmail.com, ²mlokare722@gmail.com, ³ajjubhai12896@gmail.com

ABSTRACT :

The main aim of this paper is to illustrate the technology used in spraying system. In order to reduce pesticides in agricultural production caused by direct contact with the human body injury, and improve the efficiency of agricultural spraying operations, this paper proposes the design of intelligent RF module wireless controlled spraying pesticides robots. This paper presents the development process of spraying pesticides, implemented using a PIC16F877A microcontroller. Simulation for the system's circuits is done with the aid of Proteus software. The hardware circuits, which are built on printed circuit boards (PCB), are interfaced with motor drivers and sensors. The C programming language is used for programming the microcontroller.

KEY WORDS : Robot, wireless controller, spraying.

1. Introduction

The use of pesticides in agricultural farm is mainly to kill the insects, avoid the injurious diseases of plants. Now a days plants are get affected by various type of diseases that affects on the production rate and production quality.

The pesticides plays main role to give safety and increase production rate and quality. 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. The pesticides are sprayed on the agricultural farm or the plants which are affected. The spraying is done by using hand pump by a farmer manually. Traditional manual pesticide spraying operations is full of direct exposure to the pesticide liquid work environment, great harm to human body.

Spray robot can effectively isolate the drug in direct contact with the human body in pesticide spraying process and it is very harmful to man whose body is in contact with that pesticides, but because of the constraints of large agricultural robot delicate and complex nature of the job objects, the complexity of the operating environment and the operation target price particularity and development issues such as slow. It is done by using tractors and drum of pesticides and it is sprayed all over in the farm. It is so

much slow and complex process. Wireless control is a great solution on such type of processes. Wireless control spray robot can find a breakthrough on these issues. Wireless control applications in real life appear more and more, especially in agriculture. Industry plays a vital role. In wireless system the wi-fi based and bluetooth based robot are already developed but they covers short distance of operation. RF (radio frequency) with its high transmission speed, flexibility. Intelligent design using RF wireless control spraying robot. It spray pesticides by using sprays. Its height also adjusted as our requirement. We operate the spraying robot by using the remote. The sprayer also controlled by that remote. The remote has four keys to operate robot, one key to start and stop the spray and another one key to adjust height.

The robot consist two separate batteries, one is for remote and other is for the robot. It has a level indicator, if the level of pesticide inside that tank will goes below that indicated level then there is a buzzer alarm for informing us that pesticide inside that tank is over and fill it again.

OBJECTIVE OF PROJECT:

1. To Avoid the farmer being exposed to toxic pesticide vapours produced during spraying.
2. Reduce the workload on the farmer

2. SYSTEM BLOCK DIAGRAM

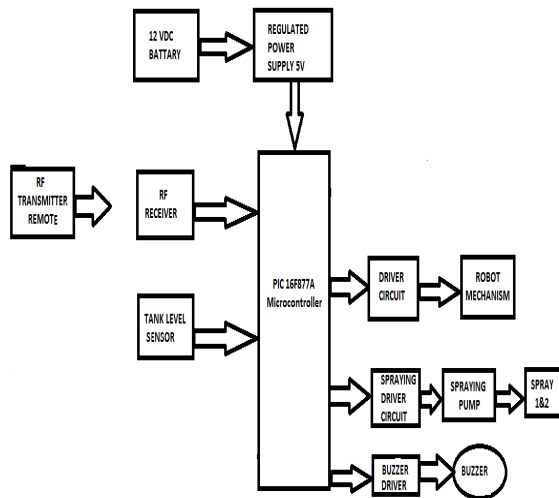


Fig1: System block diagram.

3. SYSTEM DESIGN

3.1. System control section

Micro controller (PIC16F877A):-

In this project we use the PIC16F877A. It is 40 or 44 pins, we use 40 pin PIC in these project. It has 5 I/O ports (A,B,C,D,E). This powerful yet easy to program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller packs microchip's powerful pic architecture into an 40- or 44-pin package and is upwards compatible with the PIC16C5X, PIC12CXXX and PIC16C7X devices. The PIC16F877A features 256 bytes of EEPROM data memory, self-programming 8 channels of 10-bit Analog-Digital converter.

3.2 Driver Modules

In electronics, a driver is an electrical circuit or other electronic component used to control another circuit or component, such as a high-power transistor, liquid crystal display and numerous others. They are usually used to regulate current flowing through a circuit or to control other factors such as other components, some devices in the circuit. Microcontroller output is 5 volts and DC motor requires 12 volts supply. Motor driver IC (L293D) is used to convert 5v to 12v, which is required to drive the motor.

3.3 RF Module

An RF module (radio frequency module) is a small electronics device used to transmit or receive radio signals between two devices. In an embedded system it is often desirable to communication may be

accomplished through optical communication or through radio frequency communication. For many applications the medium of choice is RF since it does not require line of sight. RF communication incorporate a transmitter or receiver.

By using RF module we can handle the robot through remote by wireless. Here we use the the RF pair of 433MHz.

3.4 Level Sensor

Level sensor detects the level of liquids and other fluids. The level measurement can be either continuous or point values. Continuous level sensor measure within a specified range and determine the exact amount of substance in a certain place, while point-level sensors only indicates whether the substance is above or below the sensing point. Generally the latter detect levels that are excessively high or low. when the pesticides is goes on below to particular level then buzzer will be on . It indicates the pesticides quantity.

3.4 Spray Modules

Spray module consists of a spray head, pumps, relays, Servos, screw fixation rod and DC machine. In the back of the car create a lifting device, using an ordinary DC motor using L293D high-power motor drive circuit. Spray the screw nut and platform are secured together, the other end of the platform can be sprayed on the other a vertical rod fixed to the slide, driven by the DC motor to rotate the screw may be moved up and down to control the spray platform.

4. WORKING

In these project the mechatronics and electronics system are combined and making a robot with spraying system. The robot & sprinkler operated wirelessly.

The aim of our project is spray pesticides on the plants who are affected by diseases and other organisms. For that purpose we are making the wireless operated robot with sprayer and it is operated by using RF module. The transmitter section of RF module is on user side that is remote section and receiver section is mounted on robot. The remote contains seven keys for forward, backward, right turn, left turn these keys used for robot control and the up & down key used for adjusting the height of sprinkler, one other key start and stop the spraying system. The power supply for the robot is comes through a 9V battery.

The PIC microcontroller is used to the operate many operations like move robot, spray pesticides, adjusting height at one time for that we selected the PIC microcontroller (PIC16F877A) because it specifies our requirements and also of low cost. Another thing is battery that is of 12V rechargeable is

used & regulated power supply is used to give the supply for microcontroller and for the motors. The power supply gives to motors through motor driver circuit(L293D IC).

Here we use the level sensor to detect the level of the pesticides and alarm us when the level of pesticides goes below that level sensor, when the level goes below to the level sensor then buzzer will be ON and we know that pesticides tank is empty. We use the two sprayer to spray pesticides on two sides at a time. When robot is running the sprayer spray pesticides on both sides of robot

5 FLOWCHART

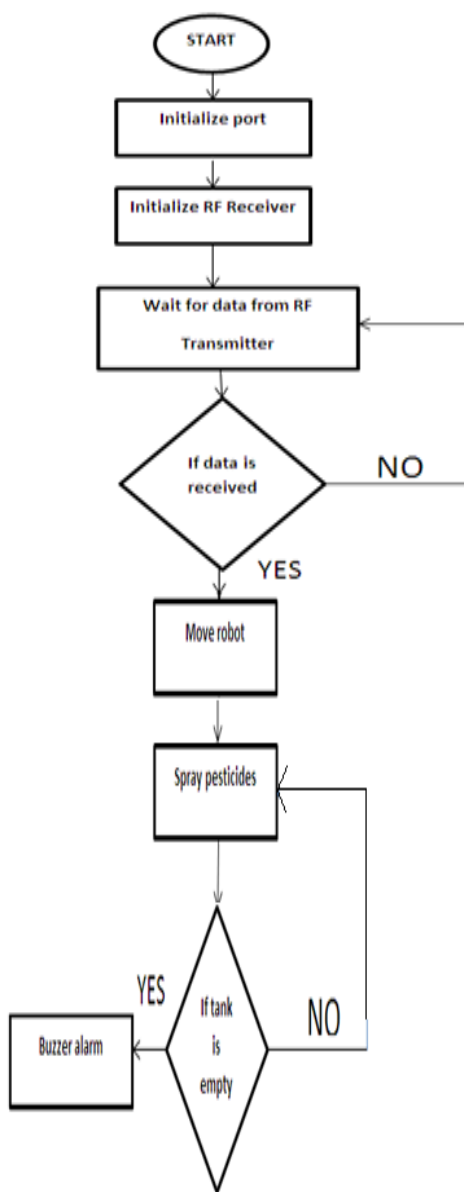


Fig2: Flowchart

6 RESULT

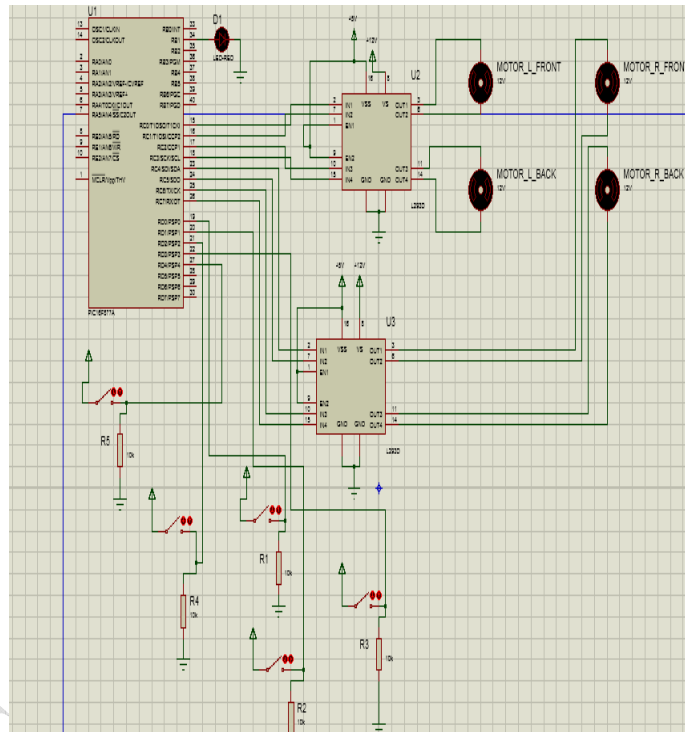


Fig3: Simulation Result

Our project is depend on wireless robot so in these simulation we cannot show the wireless operated robot in proteus software. That's way here we use the motors and switches to show the particular operations. In these simulation we connect the motors to port C & switches to port D. we are using the four motors because our robot heaving a four wheels and here four switches are present.

When switch one press then all motors rotate the clockwise direction means when you press the switch one then our robot moves forward direction, switch two press the motors are rotate to anticlockwise direction means robot moves to backward.

When switch three will press then robot turn to right means right sides motors are rotates anticlockwise and left side motors are rotate clockwise and when switch four press then operations is vice versa means robot turn to left. Our main aim is to spray the pesticides and here in these simulation instead of sprinkler we indicate the one LED for that, when switch five is press then LED will be ON means robot starting to spray the pesticides. When robot is in move condition at that time we press the key five then that time our robot spray the pesticides,

means our robot do the both operation at a time.
These is the main simulation result of our project.

7.CONCLUSION

We implemented a wireless spraying robot system to reduce the manpower & the diseases related to human body. The robot spray pesticides on both sides and height of the sprinkler adjusted.

8.REFERENCE

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