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# ARM- Based Pesticide Spraying Robot

Snehal M. Deshmukh
Electronics -VLSI
BVDUCOE
PUNE, INDIA
deshmukhsnehal05@rediffmail.com

Dr.S.R.Gengaje
Head and Professor
Dept' of Electronics
WIT COE
SOLAPUR, INDIA
srgengaje@rediffmail.com

**ABSTRACT-** In agriculture robots are deployed for agricultural purposes. The main use of robots in agriculture is for harvesting , Fruit picking , driverless tractor or sprayer are design to supersede human labor. Main aim is to avoid manual spraying of pesticides at actual farm. It will achieve by replacing human by a robot, through transmission of video of crop to central station. Then central station will control movements of the robot and spraying of the pesticides, using processor in real time. This will reduce the excessive use of pesticide for plant.

**KEYWORDS--** Robotics, Agro-technology, Agricultural terms, Mechanical assembly, ARM-LPC2148, Pesticide

## I. INTRODUCTION

The main businesses of Indian people is agriculture and the economy of the nation is decided by agriculture .The agriculture production is being stimulated by various environmental parameters like temperature, rain and other weather parameters in factors such as quality and quantity that are beyond control. The productivity of the crop is affected by other major biological parameters such as pests, disease and these parameters can be controlled by human beings for improvising the production of crop.

The purpose of agricultural robotics is not only to apply robotics technologies on the field of agriculture but withal to utilize the agricultural challenges to develop incipient techniques and systems. Robots are taking over more and more functions from humans where precision and repeatability in routine tasks are needed and where human workers are exposed to peril. One such task is cultivation of crops in fields and greenhouses where human operators still manually perform most operations on the crop albeit they are often highly perpetual and sometime even perilous.

Autonomous mobile robots and their systems are relegated as a component of the Precision Agriculture, which aims to optimize agricultural field management fixating on the enhancement of crop cognizance, environmental auspice and economics Researches on utilizing autonomous mobile robots for sundry tasks in greenhouse environment are being performed for over several decades, but only recent advances in embedded control systems, optical plant apperception and localization methods sanctioned develop individual robots and cooperative robot systems (colonies of robots) yare for in-field tasks. Wherewith topics such as design of grippers, sprayers, weed control and other plant harvesting and of the area under surveillance can be captured with camera.

## II. PROPOSED SYSTEM

This paper introduces implementation of a robot for agricultural predicated, here robot perpetually scan the crop. Wireless Camera mounted on robot which take the video of the crops and send video to the central station. The person seated in the central station is deciding the action of robot. When the utilizer found that the crop is defected then it will give command to robot and according to that robot's kineticism will done and it will spray the pesticides over the crop. This transmission will do by RF transceiver.

## III. ROBOTICS

**A robot** is a programmable machine which does certain tasks .we can be reprogrammed as per utilizer requisite. Fundamentally it is an electromechanical system.

**Agricultural robotics:** this technology uses sundry automation techniques in bio-systems such as agriculture, forestry and fisheries.

Different types of robots:

**Autonomous robots:** these robots work entirely under the control of computer program. Sundry sensors are habituated to amass the data about their circumventions.

**Tele-controlled robots:** these robots work under the guidance of either computer programs or humans. [6].

**Remote-controlled** robots can be controlled by users with a controller such as joystick, TV remote or other hand-held contrivance.

**Robots used in Agriculture field:**

- **Demeter (for harvesting):** it is a robot utilized for cutting crops. It looks akin to a mundane harvester, but it drive itself without any human supervision.[6].
- **Weed controller**: it does the task of weed abstracting.[6].
- **Forester Robot:** it is a particular type of robot utilized for cutting up of wood.[6].
- **Fruit picking robot:** The fruit picking robots need to pick ripe fruit without damaging the branches or leaves of the tree. The robots must be able to access all areas of the tree being harvested. The robot can distinguish between fruit and leaves by utilizing video image capturing.[6].

## IV. BLOCK DIAGRAM

The main objective of this paper is to develop "Pesticide spraying robot using ARM- LPC2148", which helps to avoid manual spraying in farm. This will help to minimize the excessive pests over the crop in an agricultural field. The proposed system work can be divided into two units- One Robot section and other is Central Station.

**Robot section:** The robot module consists of ARM-LPC2148, spraying machine, motor driver IC, DC motors, Zigbee and wireless camera.

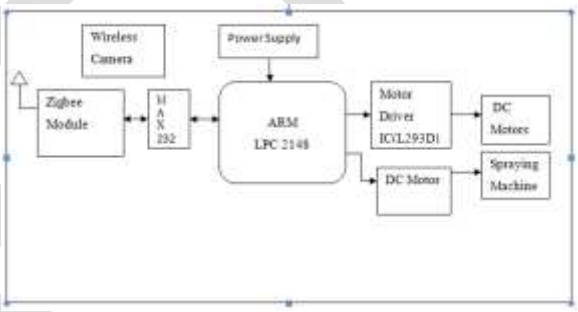


**Fig. IV .1 Robot section block diagram**

Robot continuously monitors the field of farm and sends the video to central station by camera. Camera will consistently capture the video and send it to central station using Zigbee. Robot consists of different module such as ARM LPC2148, RF transceiver-Zigbee, DC motors. LPC2148 will control the angle of rotation of DC Motors to position the cannon aiming at the intruding object. At last cannon will get fired. DC motor which used for moving the robot left, right, forward, backward direction. The speed of the Motor is controlled by the help of relay. The motor is used here to rotate the wheels. Actually a set of 2 DC motors are require to move in different directions.

**Central Station:** This section includes PC, Zigbee Module.

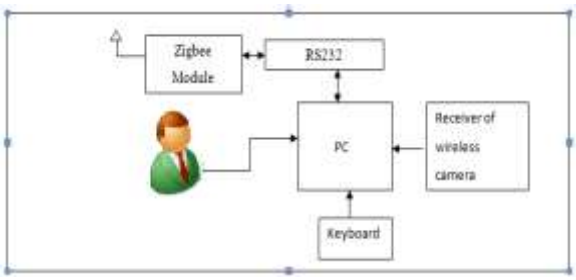


**Fig. IV.2 Central station block diagram**

As the central station gets the image input from camera, it will start next process. Person whose is setting in central station will continuously monitor the video on PC. If the image shows the leaf is affected by disease, person will send commands to robot. This will be received by robot through wireless module on it. ARM LPC2148 is programmed in such a way that, if it receives commands, it will move accordingly and spray the pesticide on affected part of leaf. If the image will not show any diseased part, it will move forward and not spray the pesticide. Process continues until the triggering of image capture is in process.

**ARM LPC 2148:** The LPC2148 micro-controllers are based on a 32/16 bit ARM7TDMI-S CPU core. They have real-time emulation and embedded trace support; it has flash memory of 512 kB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate.

**Zigbee:**

Zigbee standard is IEEE 802.14.5. This standard provide both physical and medium access control layer for low rate wireless sensor network. The Physical layer three frequency band with different data rates 2,450MHZ, 915MHZ, 868MHZ. Zigbee support both physical and application layer. Zigbee used in low data rate application that require high battery power and secure system. Zigbee range is up to 300meter and rate of data transmission and reception is around 225kbps. Application of Zigbee is in wireless light switches, traffic management system. Other application in agriculture and food demand. It is used for RF transceiver purpose.

**DC Motors:** It is used for robot movement and for spraying action.

**Wireless camera:** It captures the crop video and sends it to the central station.

**Spraying Machine:** It is used for spraying pesticide.

## V. RESULTS

**Fig. V.1. Assembly of system**


**Fig. V. 2. GUI of Robot Movement**

**Fig. V.3 . video captured by wireless camera**

## VI. CONCLUSION

These system most commonly used for agriculture application to reduce the man power. It is possible to implement the real time system by using ARM LPC2148. The system has the advantage of high speed, high quality and processing precision and low cost.

The future scope of this system will be design the system by using smartness of robot.

As per area of the farm increase the capacity of the pesticide's tank.

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