Automated Pesticide Spraying, Bird Repellent and Watering System for Agriculture

B.Aishwarya[1], S.Dilip Kumar[2]

U.G. Student, Department of Instrumentation and Control Engineering, Sri Krishna College of Technology,

Kovaipudur, Coimbatore, India[1]

Assistant Professor, Department of Instrumentation and Control Engineering, Sri Krishna College of Technology,

Kovaipudur, Coimbatore, India[2]

ABSTRACT: Agriculture is the back bone of Indian economy. A proper usage of irrigation system is very necessary because the main reason is the lack of land reserved water due to inadequate rain, spontaneous use of water as a result large amounts of water get wasted. When the moisture level in the soil is lesser than the required amount then the motor will be turned on. The moisture level is measured using soil moisture sensor. To avoid crop productivity pest should be controlled in a proper manner. Not only watermelon and fruit vegetables are damaged by crows, and seeds are also often eaten by them. Ripe fruits and seeds are damaged by various birds. This reduces crop production. The ultrasonic sensor is used to detect the birds and to make the buzzer on. This autonomous system helps farmers to increase the crop productivity.

KEYWORDS: Soil moisture sensor, ultrasonic sensor, automated watering and spraying system, buzzer and Arduino microcontroller.

I. INTRODUCTION

Agriculture plays a major role in the Indian economy. India's gross domestic product (GDP) depends mostly on the agricultural sector and it accounts 18 percentage. And it provides employment to half of the countries workforce. India produces various types of spices and pulses. Comparing to other microcontroller Arduino boards are relatively inexpensive. Arduino module is cheap, and the least expensive version can be assembled by hand. The Arduino software is an open-source tool and, it can be used by everyone. This paper is based on developing an autonomous system to control pesticide spraying, birds and watering system using Arduino microcontroller. It mainly aims to help the farmers with an autonomous system for farming. Chemical pesticides are causing health problems, so neem pesticide can be used.Neem contains some kind of substance known as liminoid which is used to destroy pesticides, fungicides and insecticides. Ultrasonic sensors are used to detect the bird at a range of 300 cm and when the bird is detected buzzer is ON to repel away the birds. In this work shooting of birds can be avoided.

II. LITERATURE SURVEY

This paper is based on developing an autonomous system for agriculture. Soil moisture [5] sensor is used for measuring the moisture level in the soil. Mini water pump [3] is used for pesticide spraying and watering system. In paper [2] PIC microcontroller is used for controlling the process. In this paper we are using Arduino microcontroller [3] which is inexpensive and user friendly. There are various processes used to control birds as mentioned in paper [1]. Here we are using the ultrasonic sensor instead of PIR sensor [8]. The ultrasonic sensor can detect birds at a range of 0-400 cm. In the system code is adjusted to detect up to 100cm near the field, and the buzzer is used instead of ultrasonic frequency [8].

III. PROPOSED METHODOLOGY

Power supply is switched ON. The 230-12 v transformer converts 230 v AC to12v AC. A bridge rectifier connected with the capacitor is used to convert the 12 v AC into DC source. DC power is given to the microcontroller. Microcontroller will be turned ON. Moisture sensor senses the moisture level. When the moisture level is less than the set point, NPN transistor gets operated and the relay coil gets energized. The coil makes the contact to close and the circuit becomes closed. Mini 12 v water pump is connected with a 12v battery. After the circuit is closed, the two motorstarts to operate. The circuit is connected with two water pumps. One is used for pesticide spraying and other for water flow. An ultrasonic sensor is used to detect the birds. Coding is done to detect the birds at a range of 100cm if the bird is detected buzzer will be turned on to repel away the birds.
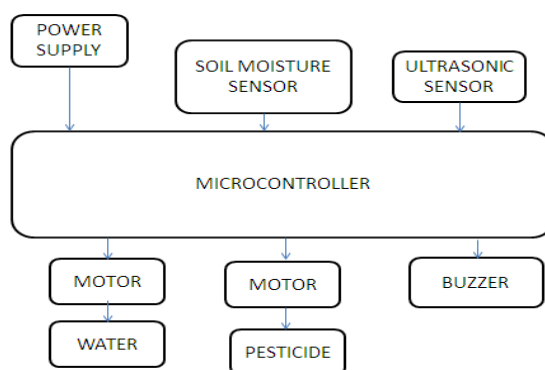

Fig.1. Block Diagram

A. *Arduino UNO*

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328p microcontroller.

Fig.2. Arduino UNO

B. *Soil moisture sensor:*

The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value.
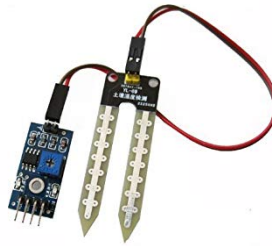
Fig.3. Soil moisture sensor

C. *Mini water pump*

Small Dc submersible water pump. Water Pump is used to perform a specific task of artificial pumping.

Fig.4. Mini water pump

D. *Ultrasonic sensor*

The ultrasonic sensor sends and receives the waves reflected back from the object. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception.
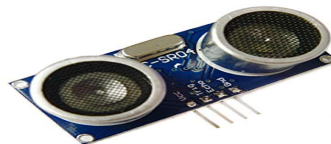
Fig.5. Ultrasonic sensor

E. *Buzzer*

Buzzer is an electronic device commonly used to produce sound. Light weight, simple construction and low price. A 12V piezo electric buzzer is used to repel away the birds.

Fig.6. Buzzer

F. *Arduino IDE software*

The Arduino integrated development (IDE) can be used in various platform. Windows and Linux are some of the platforms used by the software. It is written in Java code. Code can be written using IDE software and uploaded to Arduino board.The Arduino IDE can be coded using the languages C and C++.

IV. **TABLE, FIGURE AND RESULT**

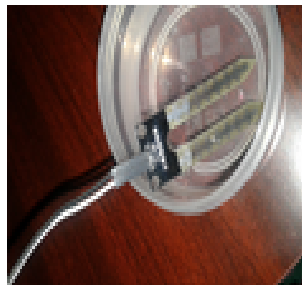Fig.7.Soil moisture sensor in open space   in water
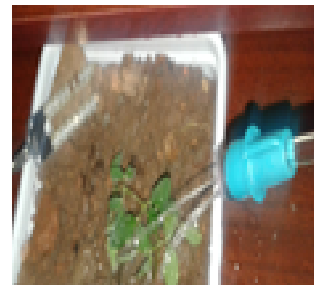

Fig.8.Soil moisture sensor

Fig.9.spraying process

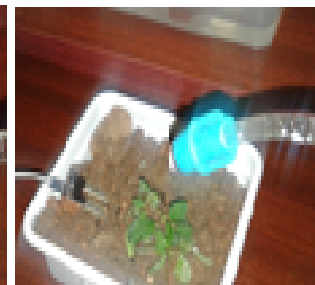

Fig.10.spraying stops

Fig.11. Watering process

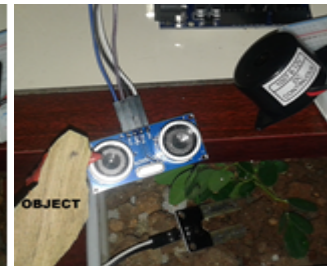Fig.12. Watering stops

Fig.13.Buzzer is off when Object is far

Fig.14.Buzzer is on when object is near
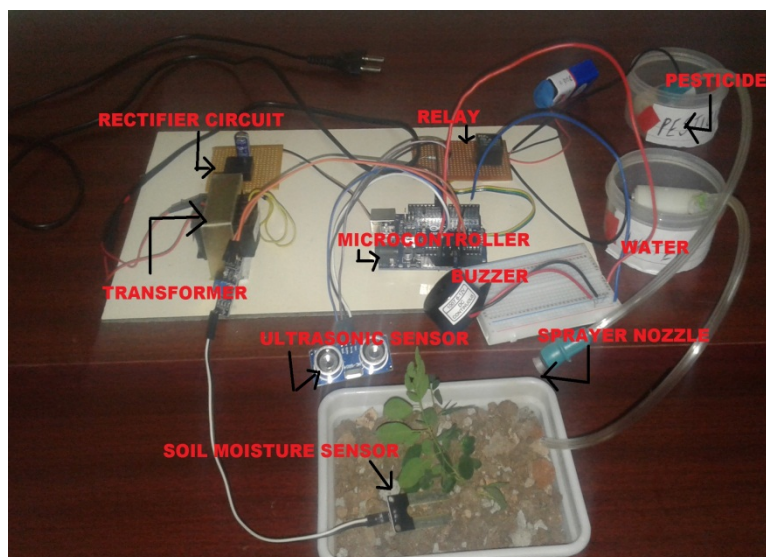

Fig.15. System setup

S.No	MOISTURE SENSOR PLACEMENT	SERIAL MONITOR VALUE	MOISTURE LEVEL	MOTOR ON/OFF
1.	Sensor in open space	1	Very low	On
2.	Sensor in water	56	High	Off
3.	Sensor placed in less moisture level	8	Low	On
4.	Sensor placed in high moisture soil	62	Very high	Off

I.   Table

From Table I, we can conclude that water level is controlled according to the moisture level. When the moisture level is less than 50 then the motor will be turned on.

S.NO	DISTANCE (cm)	BUZZER ON/OFF
1.	7	ON
2.	50	ON
3.	16	ON
4.	68	ON
5.	160	OFF
6.	120	OFF
7.	146	OFF
8.	166	OFF

II.   Table

From Table II buzzer is operated when the bird is detected at a range between 0 to100cm. When the birds are far away from the field buzzer will be turned off.

V. CONCLUSION AND FUTURE WORKS

In this project we have used Arduino microcontroller to control the system. According to the moisture level in the soil, watering and pesticide spraying is controlled and the buzzer is used to repel the birds in the field. Other parameters such as timer settings and app development can also be included. When the moisture level is less than the set value then the motor starts to run and plant gets required amount of water. Set point of moisture level can also be changed using code condition. Detection of birds can be adjusted to 400cm according to code condition.

REFERENCES

1.   Abd El-AleemSaadSolimanDesoky, "Damage caused by birds and rodent in field crops and their control", Journal of *Global Innovations* in *Agricultural* and *Social* Sciences (JGIASS) ,ISSN (online): 2311-3839, 2014
2.   Aishwarya.B.V, Archana.G and C.Umayal, "Agriculture Robotic Vehicle Based Pesticide Sprayer with Efficiency Optimization", International Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2015), IEEE, 2015.
3.   DrashtiDivani,PallaviPatil and Sunil K.Punjabi, "Automated Plant Watering System" International Conference on Computation of Power, Energy Information and Communication (ICCPEIC),IEEE,2016.
4.   N. Das, V. Khawas, N. Maske and S K Chaudhary, " Agricultural fertilizers and pesticides sprayers -A Rewiew", International Journal for Innovative Research in Science & Technology, Volume 1, Issue11, April 2015 ISSN (online): 2349-6010.
5.   SanjuKumar and R.V,Krishnaiah, "Advance Technique for Soil Moisture Content Based Automatic Motor Pumping for Agriculture Land Purpose"International Journal of VLSI and Embedded Systems(IJVES), Vol 04, Article 09149, 2013.

6. Shubhangi B. Londhe and K. Sujata, "Remotely Operated Pesticide Sprayer Robot in Agricultural Field", International Journal of Computer Applications, Volume 167 – No.3, June 2017.
7. S.Darshna, T.Sangavi and Sheena Mohan, "Smart Irrigation System", Journal of Electronics and Communication Engineering (IOSR-JECE), Volume 10, Issue 3, 2015.
8. YahotSiahaan, BhetaAgusWardijono and YulisdinMukhlis, "Design of Birds Detector and Repellent Using Frequency based Arduino Uno with Android System" International Conferences on Information Technology, Information systems and Electrical Engineering (ICITISEE) , IEEE,2017.