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AUTOMATIC FERTILIZER SPRAY FOR INFECTEDLEAVES

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Abstract – In this paper we build an automated fertilizer spray for the infected leaves. Spraying fertilizers for the crops is one of the important work in crop maintaining, proper care require for the crops at the correct time is very important. By using open CV image processing technique the infected leaves are identified,once infected leaves are identified , by using arduino the relay on the fertilizer and the fertilizer starts spraying automatically on the infected leaves. We have also attached sensors like temperature sensor,humidity sensor to check the moisture content of the soil.suppose if the crops are under dry condition due to lack of water ,immediately the motor on and pump water to the field automatically.

Keywords: **Infection identification, Arduino,Relay,Motor,sensor Automatic fertilizer spray.**

INTRODUCTION

In our project, we have attached the automatic fertilizer sprayed technique Open CV is used for the image processing technique And Robotic prototype which is used for the automatic movement Internet of things concept was used to send the immediate alert to the particular person.

Our working step in four modules

- Arduino UNO
- Relay
- Automatic fertilizer spray
- Motor

ARDUINO - MICRO CONTROLLER

A micro-controller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/ output peripherals The important part for us is that amicro-controller contains the processor (which all computers have) and memory, and some input/output pins that you can control. (often called GPIO - General Purpose Input Output Pins).

We will be using the Arduino Uno board. This combines a micro-controller along with all of the extras to make it easy for you to build and debug your projects. The Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset

button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again."Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

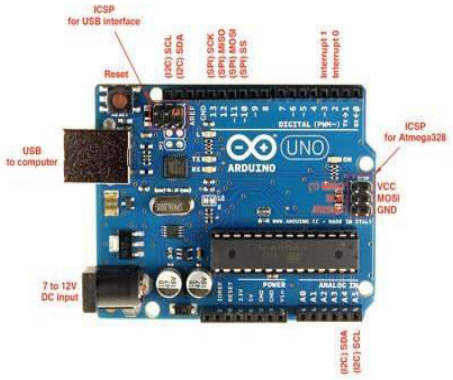

Fig 1. Arduino UNO

TEMPERATURE SENSOR - LM35

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature.

Features

- Calibrated directly in ° Celsius (Centigrade)
- Linear + 10.0 mV/°C scale factor
- 0.5°C accuracy guarantee able (at +25°C)
- Rated for full −55° to +150°C range
- Suitable for remote applications
- Low cost due to wafer-level trimming

Fig 2.Temperature sensor

SOIL MOISTURE SENSOR

Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity.

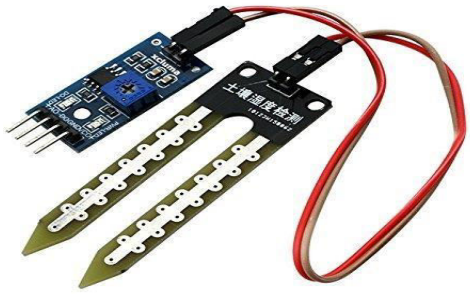

Fig3.Soil moisture sensor

RELAY

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover)switches.

Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits, the link ismagnetic and mechanical.

Relays are very simple devices. There are four major parts in every realy. They are

- Electromagnet
- Armature that can be attracted bythe electromagnet
- Spring
- Set of electrical contacts

WORKING

When a current flows through the coil, the resulting magnetic field attracts an armature that is mechanically linked to a moving contact. The movement eithermakes or breaks a connection with a fixed contact. When the current to the coil isswitched off, the armature is returned by a force approximately half as strong as the magnetic force to its relaxed position.

Usually this is a spring, but gravity is also used commonly in industrial motor starters. Most relays are manufactured to operate quickly. In a low voltage application, this is to reduce noise. In a high voltage or high current application, this is to reduce arcing.

Circuit symbol of relay

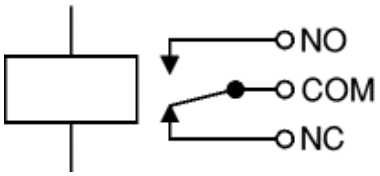

Fig 4.Relay symbol

MOTOR

A **DC motor** is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor.

Fig 5.DC motor

DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field

windings. Small DC motors are used in tools, toys, and appliances.

The universal motor can operate on direct current but is a lightweight motor used for portable power tools andappliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

ELECTROMAGNETIC MOTOR

A coil of wire with a current running through it generates an electromagnetic field aligned with thecenter of the coil. The direction and magnitude of the magnetic field produced by the coil can be changed with the direction and magnitude of the current flowing through it.

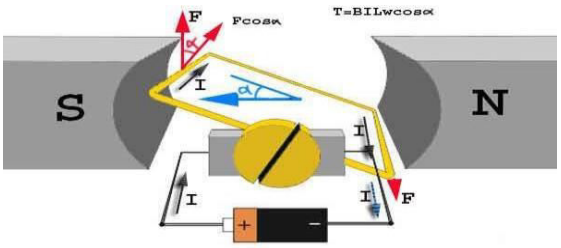

Fig 6.Electromagnetic motor

A simple DC motor has a stationary set of magnets in the stator and an armature with one or more windings of insulated wire wrapped around a soft iron core that concentrates the magnetic field. The windings usually have multiple turns around the core, and in large motors there can be several parallel current paths. The ends of the wire winding are connected to a commutator. The commutator allows each armature coil to be energized in turn and connects the rotating coils with the external power supply through brushes. (Brushless DC motors have electronics that switch the DC current to each coil on and off and have no brushes.)

The total amount of current sent to thecoil, the coil's size and what it's wrapped around dictate the strength of the electromagnetic field created.

Specification:

- Voltage: range 2.25~4.8V, nominal3.6V.
- No-load: 16500rpm, 0.68A (at3.6V).

FERTILIZER SPARY

After detecting the affected leaf the fertilizer is spayed automatically to the leaf. With foliar feeding, instead of watering your fertilizer into the soil, you spray it onto your vegetables' leaves, generally from a small spray-bottle available from any garden store. Foliar Spray helps make nutrient availability faster i.e quickly reverses nutrient deficiency. Amino acid present in our product, helps increasing chlorophyll concentration in plants, thus providing you lush green, shiny and healthy plants.

OUTPUT

Fig 7.Final output

FUTURE WORK

- In future we fix this project in a drone and make it work automatically.

- It will independently search and find the leaf infection and spray the specified fertilizer.
- We can also detect which type of disease it is affected and spray a particular spray.

RESULT AND CONCLUSION

Agricultural productivity is something on which economy highly depends. This is the one of the reasons that disease detection in plants plays an important role in agriculture field, ashaving disease in plants are quite natural. If proper care is not taken in this area then it causes serious effects on plants and due to which respective product quality, quantity or productivity is affected.

Detection of plant disease through some automatic technique is beneficial asit reduces a large work of monitoring in big farms of crops, and at very early stage itself it detects the diseases i.e. when they appear on plant leaves.This paper presents an algorithm for image processing technique which is used for automatic detection and classification of plant leaf diseases. It also covers survey on different diseases classification techniques that can be used for plant leaf disease detection and its sprayed the respective fertilizer on the leaves.

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