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Design and Development of Colour Decoding Agri-Robot

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Abstract **–** There are many types of pesticides sprayer are available in India. But mostly used sprayer is backpack type sprayer which is used by farmers because it is cheaper, easy to use by it requires lot of time. Also, the farmer which is spraying pesticides is affected by it as it is harmful to human health and human also affected by the lumber pain due to weight of equipment. Thus, this project vigorously describes the design and construction of a robot featuring plant spraying mechanism for pesticides with varying spray. To realize this work, we provide a compact, portable and a well-founded platform that can that can survey the farmland automatically. This approach will help farmers using fundamentals principles of sensor's technology.

The main aim of our project is to design and develop pesticide spray with varying the timing machine. The 3D model is drawn. All the parts are manufactured and then assembled together and then the testing of model is carried out.

Key Words: Pesticide sprayer, Spraying mechanism, varying spray, Sensor technology.

1. INTRODUCTION

In agribusiness cultivate, nursery, ranchers need to endure numerous issues while cultivating like perils human wellbeing, creepy crawlies eat their yields, breathing issues. Creepy crawlies are reason for some horticulture issues as they eat and harm the leaves and products of ranch. Some of sickness and their answer:

Fungicides: Robots can be utilized to battle plant sicknesses that make a great deal of harm harvests. Parasites are the most widely recognized reasons for product misfortune in the whole world. To murder a parasitic ailment, you require a fungicide, a sort of pesticide. Parasitic maladies meddle with the development and advancement of a harvest.

Pesticide: Pesticides are utilized to control creepy crawlies that can be destructive to crops. They are compelling however many reactions for nature have. Creepy crawlies additionally adjust to the poison in a pesticide and the survivors breed and pass the safe characteristic on to the cutting edge making more grounded bugs that are harder to execute. Robots could settle this by expelling vermin from the harvests without utilizing chemicals. They may suck them up with a vacuum. A roar base air framework makes a vacuum that doesn't require the huge measure of energy of standard Vacuum frameworks. There are approaches to execute the creepy crawlies without chemicals. The robot could submerge them in a compartment with water or into one shut everything down deliver outrageous warmth in the sun. Microbial energy units could be utilized to lessen the bugs to electrical power with microscopic organisms. Pesticides execute everything. Robots could be modified to free specific nuisances and not hurt whatever else.

1.1 OBJECTIVES

1) To design and fabricate automatic spray pesticides with spray pesticides according to colour.

2) The purpose is to reduce the human efforts, operating cost and maintenance cost.

3) Spray pesticides on plant with appropriate quantity.

4) This machine keeps the environment clean and healthy.

1.2 COMPONENTS

1) Arduino 2) Colour sensor 3) Relay 4) Water motor 5) DC motor 6) Motor drives 7) Pipe 8) Nozzle 9) Storage tank 10) wheels 11) L Clamps 12) Frame (Plywood) 13) Battery

2. COMPONENT DISCRIPTION

1) Colour Sensor: - Colour Sensor, based on TCS3200, is a complete colour detector capable of detecting static colour. The output of the sensor is a square wave with frequency directly proportional to incident light intensity. It also supports fill light by on board LEDs. It includes a TAOS TCS3200 RGB sensor chip and 4 white LEDs. The TCS3200 can detect and measure a nearly limitless range of visible colours. Applications include test strip reading, sorting by colour, ambient light sensing and calibration, and colour matching, to name just a few.

2) Arduino Mega: - The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, 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.

3) Relay: - The relay is the device that open or closes the contacts to cause the operation of the other electric control. It detects the intolerable or undesirable condition with an assigned area and gives the commands to the circuit breaker to disconnect the affected area. Thus, protects the system from damage.

4) Nozzles: - Nozzle is a device designed to control the direction or characteristics of a fluid flow (specially to increase velocity) as it exits (or enters) an enclosed chamber or pipe. A nozzle is often a pipe or tube of varying cross-sectional area and it can be used to direct or modify the flow of a fluid (liquid or gas). Nozzles are frequently used to control the rate of flow, speed, direction, mass, shape, and/or the pressure of the stream that emerges from them. In a nozzle, the velocity of fluid increases at the expense of its pressure energy.

5) Electric motor: - An electric motor s an electrical machine that converts electric energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and winding currents to generate force in the form of rotation. Electric motors can be powered by direct current (DC) sources, such as from batteries, motor vehicles or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators. An electric generator is mechanically identical to an electric motor, but operates in the reverse direction, accepting mechanical energy (such as from flowing water) and converting this mechanical energy into electrical energy. Electric motors may be classified by considerations such as power source type, internal construction, application and type of motion output. In addition to AC versus DC types, motors may be brushed or brushless, may be of various phase (see single-phase, two-phase, or three-phase), and may be either air-cooled or liquid-cooled. General-purpose motors with standard dimensions and characteristics provide convenient mechanical power for industrial use. The largest electric motors are used for ship propulsion, pipeline compression and pumped-storage applications with ratings reaching 100 megawatts. Electric motors are found in industrial fans, blowers and pumps, machine tools, household appliances, power tools and disk drives. Small motors may be found in electric watches.

6) L Clamp: - Clamps are used to hold components like batteries, motors and other elements rigidly. Hear we had taken a standard available L-clamp in market of thickness 3mm. Material = Aluminium (here we have considered weight optimization, as we can also adopt steel material but its mass density is more compared)

3. MANUFACTURING PROCESS

3.1) ARC WELDING : Arc welding is a welding process that is used to join metal to metal by using electricity to create enough heat to melt metal, and the melted metals when cool result in a binding of the metals.

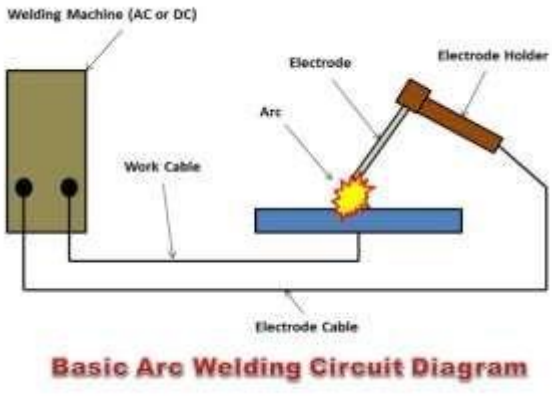


Fig -1: Arc Welding

It is a type of welding that uses a welding power supply to create an electric arc between a metal stick ("electrode") and the base material to melt the metals at the point-of-contact. Arc welders can use either direct (DC) or alternating (AC) current, and consumable or non-consumable electrodes.

3.2) DRILLING:

Drilling is a cutting process that uses a drill bit to cut a hole of circular cross-section in solid materials. The drill bit is usually a rotary cutting tool, often multi-point. The bit is pressed against the work-piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work-piece, cutting off chips from the hole as it is drilled.

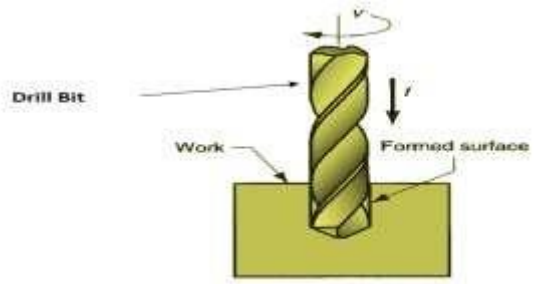


Fig -2: Drilling Operation

3.3) METAL CUTTING : Cutting is the separation or opening of a physical object, into two or more portions, through the application of an acutely directed force.

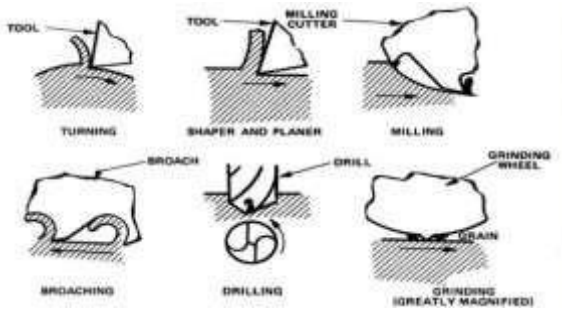


Fig -3: Metal Cutting

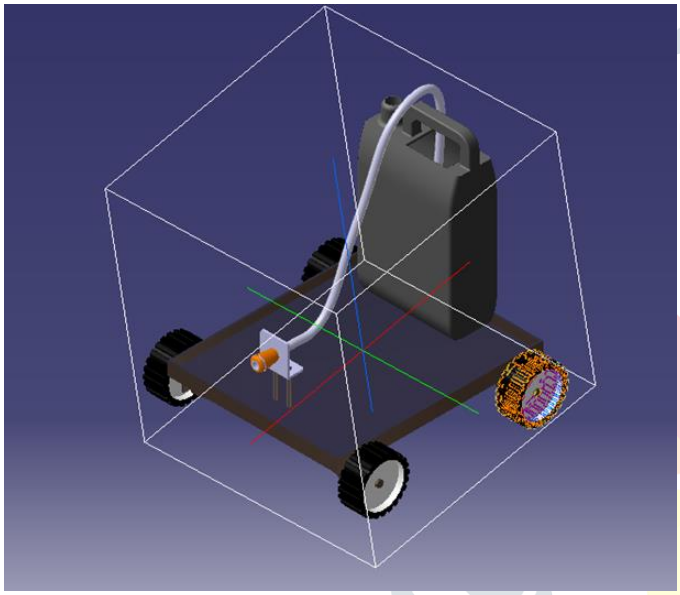
4) WORKING PRINCIPLE

Colour sensor recognizes the colour of a sapling and sends the signal to the Arduino mega (which acts as a main controller) through relay. As the Arduino mega receives the signal, it drives the water motor in the tank & pumps water through the pipe from which the fluid is sprayed to the sapling with the help of nozzle. Here, time taken for water fertilization is controlled depending upon the colour of a sapling. The delay is given in the water motor upon sensing particular colour of plant as mentioned below. For an example

A. Green colour = Less water = 5 sec

B. Yellow colour = Medium water = 10 sec

C. Brown colour = More water = 15 sec



4.1) ADVANTAGES: -

- Efficiently grows the shed leaf's as per its tendency.
- Reduces time & cost
- Simple in construction
- Fully atomized & controllable.
- more reliable than manual spraying

4.2) DISADVANTAGES: -

Not suitable for large scale farming.

4.3) APPLICATIONS :-

- It is a renewable energy source.
- Solar agro sprayer is not a new invention and this technology finds suitable application in the farming community of India.
- Street trees
- Garden plants
- Solar water heater
- Hotels, hostels and house hold applications
- Offices
- Industries

5. CONCLUSIONS

- Until now we have studied several literatures surveys & estimated the components & other software requirement for this project.
- We have done analytically calculate the components sizes and requirement of dimensions according to the cost reduction procedure.
- Create a 3D model upon CATIA v5 Software.
- Developed the model according to the created 3D model.
- Finally test and observe.

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