

Smart Weeder with Feeding Android App for Face Detection

M. Logesh¹, U. Monish Kumar², Nandhakumar. K³, Nareendhiran⁴, S. Sevegan⁵

Students, Department of Electronics and Communication Engineering (ECE)^{1,2,3,4}

Professor, Department of Electronics and Communication Engineering (ECE)⁵

SRM Valliammai Engineering College, Chennai, India

Abstract: The "smart weeder with feeding" Agriculture-related research is being conducted in the modern period. India's population is growing daily, and to meet the country's growing food needs, agricultural sectors must be modernized. Mechanization increases productivity while requiring less input. Farmers continue to employ tried-and-true techniques. One of the main crops farmed in India is paddy. The lack of workers, low productivity rate, and increased physical labor needed for weeding and fertilizer feeding are the issues with paddy farming. Due to the feeding and weeding processes for fertilizer, paddy farming takes extra time. A paddy weeder with a fertilizer feeder was designed and made to help with these issues. A weeder with a fertilizer feeder is a piece of agricultural equipment that is helpful to farmers. This machine was initially created in Solid Edge before being constructed. Weeds between two rows will be eliminated by the weeder. Many weeds may be eliminated quickly, and fertilizer is uniformly applied to each crop using dispensers, allowing for the simultaneous completion of two tasks. As a result, it saves time, money, and manpower.

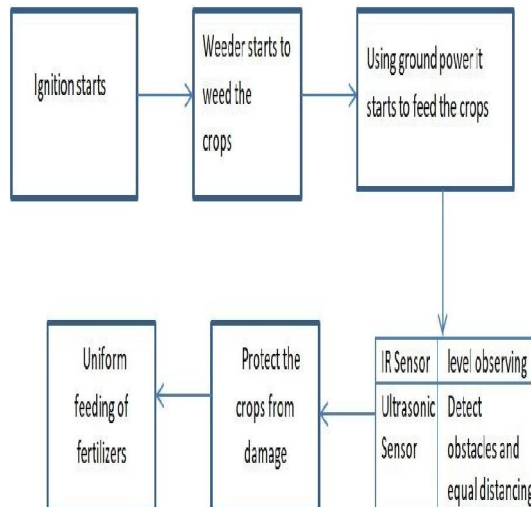
Keywords: Agriculture, Paddy, Weeder, Feeder, Fertilizer

I. INTRODUCTION

One of the main crops farmed in India is paddy. The lack of workers, low output rate, and increased physical labor needed for weeding and fertilizer feeding are the major issues in paddy cultivation. Due to feeding and weeding operations for fertilizer, paddy farming takes extra time. A paddy weeder with a fertilizer feeder was designed and made to help with these issues. The weeder with feeding is a dual-process mechanism that can do both tasks simultaneously with little effort and in a short amount of time. The engine is operated by petroleum, and the weeder will clear the space between two rows of crops of weeds. This fertilizer is consistently administered to each crop by dispensers using ground power, thus two procedures are finished at once, removing numerous weeds in less time. It takes approximately 30-45 minutes to cover an acre using, and two brakes are added for a detour. Totalling two sensors—an IR sensor and an ultrasonic sensor—the IR sensor used to monitor the level of fertilizers in the tank, and the ultrasonic sensor is used to protect the crops from external machine damage and to ensure equal spacing. During a left turn, the left breaks are applied so that the right wheel will be in the rotation and turn to the left similar to a right turn; Each breaks has a different connection. In addition to using it for the feeding process, we can effectively be sowing the seed using the same method without any sort of waste and in a consistent manner without any collapse. This can save man power, money, and time.

II. BLOCK DIAGRAM

First the ignition will start and the weeder starts to weed the crops and using ground power it starts to feed the crops there are two sensors IR and ultrasonic sensor, IR is used for observing the fertilizer level in the fertilizer tank and ultrasonic sensor are used to detect obstacles and equal distancing, it protect the crops from damages and helps for uniform feeding of fertilizers



III. PROPOSED SYSTEMS

3.1 Arduino Uno

A compact micro-controller board called the Arduino Mini is based on the ATmega328P microprocessor. Its functionality is comparable to that of the Arduino Uno, although it is considerably smaller and has a few different capabilities. The Arduino board is attached to an LED indicator, a buzzer, and two sensors: an IR sensor and an ultrasonic sensor. The ultrasonic sensor is used to avoid crop damage and ensure that each crop is spaced equally while the IR sensor monitors the quantity of fertiliser in the tank.

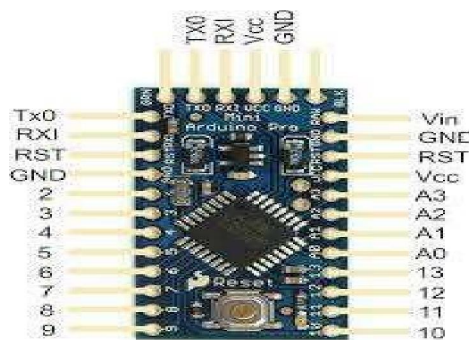


Fig 1.Arduino

3.2 Ultrasonic Sensor

A gadget called an ultrasonic sensor measures the separation between objects using sound waves. Here, the function of an ultrasonic sensor is to ensure that each crop is spaced equally apart and to identify any obstacles. To guard from external harm



Fig 2.Ultrasonic Sensor

3.3 IR Sensor

An IR (infrared) sensor is a device that detects infrared radiation. IR sensors work by detecting the quantity of fertilizers contained in the tank and once it over it gives a signal and it has been filled through it

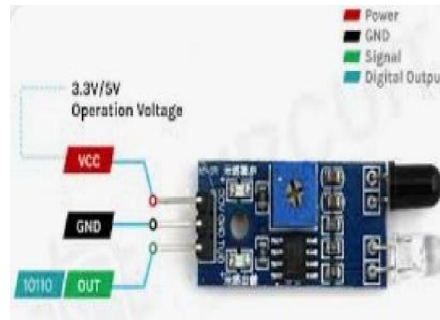


Fig 3.IR Sensor

3.4 Buzzer

A buzzer is an electronic device that produces a buzzing or beeping sound when an electrical current is passed through it. Here the buzzers are used when there are any obstacles approach the machine by indicating through a beep sound



Fig 4.Buzzer

3.5 Engine

An engine is a machine designed to convert fuel into mechanical energy to perform work. Here, we employ a 9 HP, 50 CC, 80 RPM petrol engine.



Fig 5.Engine

3.6 Seed Drill

A seed drill is a machine that is used in agriculture to sow seeds uniformly and accurately in rows at a specific depth and spacing. Here, we're utilizing it to provide fertilizer with consistent distribution over the field and prevent fertilizer waste.



Fig 6.Seed Drill

3.7 Fertilizer Tank

A fertilizer tank is a container or vessel that is used for storing, mixing, and dispensing fertilizers in agriculture. Fertilizer tanks can come in various shapes and sizes, ranging from small portable tanks to large stationary tanks that can hold thousands of gallons of fertilizer.

3.8 Cage Wheel and Spoke Wheel

A cage wheel is a type of agricultural implement used in farm equipment, such as tractors and combines, to reduce soil compaction and improve traction in wet or soft soil conditions. To move the equipment in the paddy field, we are employing this cage wheel here.



Fig 7. Cage wheel and spoke wheel

With the aid of sharp steel edges, a spoke wheel is a form of wheel that is constructed of thick metal rods that extend forth from the hub and connect to the rim.

3.9 LED Indicator

A compact, low-power electrical gadget called an LED (light-emitting diode) indicator produces light when an electric current is applied. To move the machine away from the crops and prevent damage, LED indicators are utilized to communicate to them to the right or left in whatever direction the crops are approaching.

Calculations

Container Calculation

Container dimensions are, Length $L = 0.200\text{m}$, Width, $B = 0.30\text{m}$ Height, $H = 0.10\text{m}$

$$\begin{aligned} \text{Volume of the container} &= L \times B \times H \\ &= 0.200 \times 0.30 \times 0.10 \\ &= 6 \times 10^{-3} \text{ m}^3 \end{aligned}$$

Weeder Wheel Calculation

This made up of 2 strong steel plate of 2 mm thickness being cut and turned to make diameter as The wheel is of 400 mm diameter.

$$\begin{aligned} \text{Travel distance per rotation of wheel} \\ &= 2\pi r \\ &= 2 \times \pi \times 200 = 1256 \text{ mm} \end{aligned}$$

Gear Ratio

As we need drive sprocket to be bigger than driven sprocket,

No. teeth in drive sprocket (bigger) = 50 teeth

No. teeth in driven sprocket (smaller) = 18 teeth

Therefore, gear ratio of these two sprockets = $50/18$ Gear ratio = 2.777

IV. RESULT AND DISCUSSIONS



Fig 8. complete Assembly of Model

Parameters	Manual method	Through this machine	Percentage time saved
Time taken for weed removal per person	20 hours	1 hour 15 minutes	94.25%
Time taken for fertilizer distribution per person	30 minutes		100%

Parameters	Standard (grams)	Using machine (grams)	Difference (grams)
Amount of fertilizer fed cent	900	400	500

In traditional method of weed removal process for a person per acre it takes around 20 to be automated hours and for fertilization it takes another 1 hour. In our machine it takes around 1 hours 15 minutes to complete the weeding of an acre land and it completely saves time for fertilizer spreading. This machine ensures the uniform feeding of fertilizers to each crop that is 400 grams to a cent and it can be adjustable as for our requirement. It is time saving and economical machine as it performs two tasks at same time.

V. APPLICATION

With less effort, this mechanization increases production. It is employed in paddy fields to get rid of weeds without endangering the crops. Using this method, the need for fertilizers can be reduced. To prevent plant damage and ensure fertilizers are applied evenly, IR and ultrasonic sensors are employed.

VI. CONCLUSION

The results of this research are as follows. The smart weeder with feeding aims to complete the operation simultaneously with cost effectiveness, shorter length, and little input to achieve maximum output. In paddy farming, the only step that requires human labour is the wedding; if this were, paddy farming as a whole would be made simpler. Moreover, weeding paddy with a cage wheel and uses less fertilizer. The fertilizers are supplied to the plants through the help of ground power. Analyze the fertilizer flow check with the help of IR sensor, and are used to detect the fertilizer level contains in the fertilizer tank and ultrasonic sensors ensures equal spacing and protects crops from mechanical harm.

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