Design and Fabrication of Battery Operated Paddy Transplanting Machine

Sangamesh Sirsgi, Anoopkumar Elia, NandKishore Rao, Sanjay Patil

GURU NANAK DEV ENGINEERING COLLEGE BIDAR 585 403

ABSTRACT: *Comfort coupled with safety and simplicity is what man strives for. Our project has been to bring about both .The culmination of our effort has resulted in development of new "**PADDY TRANSPLANTER MACHINE".** The project present a basic as well as very professional treatment of thesubject in a very comprehensive, based on learning effort and understanding capability of today as per their levels. The device is simple and comfortable. Basic calculation, drawing, designing is included in the project The salient features of our machine can be listed as the mechanism used is very simple, easy for operation; no skill is required to operate the machine.*

INTRODUCTION

In India agriculture has been facing serious challenges like scarcity of agricultural labour, not only in peak working seasons but also in normal time. This is mainly for increased non-farm job opportunities having higher wage, migration of labour force to cities and low status of agricultural labours in the society. On the other hand cultivable land is decreasing due to urbanization. Agricultural mechanization is one way to overcome this problem. Fortunately, there are many opportunities to move forward with

OBJECTIVES & SCOPE OF STUDY

To obtain uniform spacing and optimum plant density.

To achieve higher productivity (0.5-0.7t/ha) compared to traditional methods where plant spacing and density may not always be consistent.

To lower stress drudgery and health risks for farm labours.

To create better employment opportunities for rural youth through the development of custom

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

service business.

To increase farmers net income.

To lessen transplanting shock, early seeding vigor and uniforn crop stand.

LITERATURE SURVEY

Paddy is the most important and extensively grown food crop in the World.It is the staple food of more than 60 percent of the world population. Rice is mainly produced and consumed in the

Asian region. India has the largest area under paddy in the world and ranks second in the production after China. Countryhas also emerged as a major rice consumer.

In the country like India where the main source of income is agriculture. Needs to concentrate in some aspects like how to increase productivity and profit, how to reduce cost and how to solve and ease the problems of workers. To overcome this a new manually operated cutter is fabricated for cutting of multiple types of crop during harvesting and named as „Multi Crop Cutter". It possesses four criterion ease in manufacturing, ease in handling, low cost and light weight.

There are some procedures involved in fabrication of this device such as fabricating prototypes, material & component selection, etc.
Today, India ranks second among other countries across the globe in farm output. Agriculture and allied sectors like forestry and fisheries accounted for 13.7% of the GDP in 2013, about 50% of the workforce. The economic contribution of agriculture to India's GDP is steadily decreasing with the country's broad-based economic growth. Still, agriculture is a demographically broad economic sector and plays a important role in the overall socio-economic fabric of India. According to WHO, Slow agricultural growth is a interest for policymakers as two-thirds of India"s people depend on rural employment for a living. The agricultural practices which are currently employed are neither economically nor environmentally sustainable and India's yields for many agricultural material are comparatively low. Improperly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible. Farmers' access to markets is hampered by poor roads, rudimentary market infrastructure, and excessive regulation. Any project will start with literature survey. To do literature survey for this project it is necessary to visit some farmers, who having some machines related to this project. After discussing with farmers it found that, some problem exists in the presently used machines.
So, focusing on those problems and trying to

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

minimize those problems.

In world, the usage of agriculture equipment is increasing. In the usage of agriculture equipments, India contributes only 10% as shown in Fig., as conducted survey in year 2006

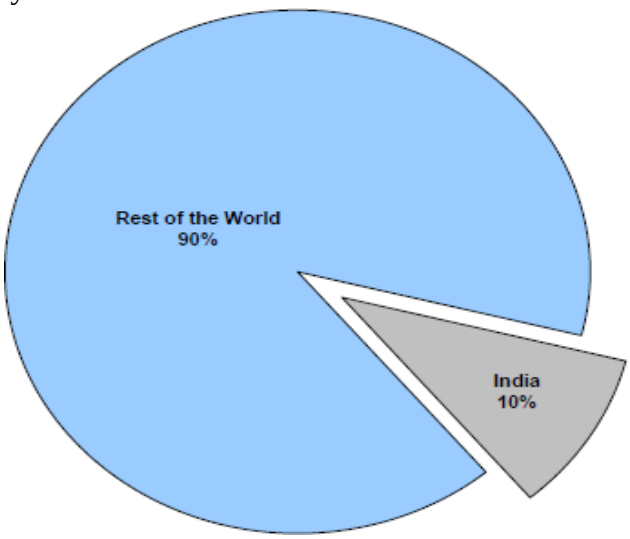
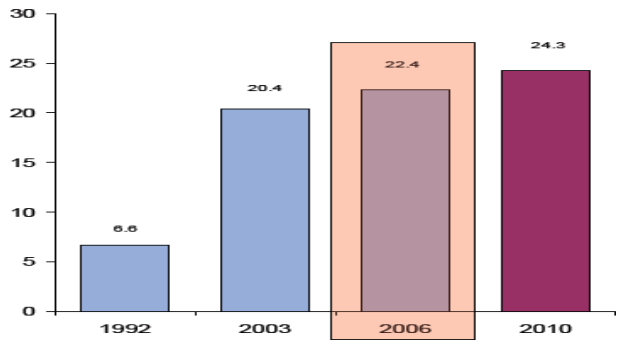


Fig. World Agriculture Equipment Market (2006)

Over the few years Indian agricultural equipment market has been widely exposed to international trade. Numbers of foreign companies are making entry in Indian agriculture equipment market. The total number of agriculture equipments used in India is increasing. The Fig. shows that increasing rate of agriculture equipments during 1992-2006 and expected to 24.3 % in 2010.



Total Number of Agriculture Equipments usage in India (1992-2010), (y axis values are in millions and x axis years)

BACKGROUND INFORMATION

The major sector in Sri Lanka is Agriculture sector. Paddy is the main crop in Agriculture sector. The net extent harvested in 2010 Yala season was 376,024 hectares and the total production was 1,671,054 MT and the net extent harvested in 2010/2011Maha season was 525,017 hectares and the total production was 1,993,014 MT. The agriculture contribution to the national GDP was 11.9 in 2010. About 1.8 million farm families are engaged in paddy cultivation is land wide. The per capita consumption of rice fluctuate around 100kg per year. Rice demand will increase at 1.1% per year and to meet that requirement rice production must grow at the rate of 2.9% per year (www.statistics.gov.lk). According to the Department of Agriculture, Government of Sri Lanka(2010) the distribution of the methods of establishment of rice in 2000 Yala season had been Broadcasting (85.5%), Row seeding (0.1%), Transplanting in rows (1.4%),and Random Transplanting (12.6%). The method of establishment of ricedepends on

Age of the variety Availability of moisture Climatic conditions
Availability of inputs and labor

Among these reasons, availability of inputs and labor play a huge role on deciding the method of establishment of rice.

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

METHODS OF ESTABLISHMENT

There are two methods practices in establishment of paddy in Sri Lanka. Those are Direct sowing / seeding and Transplanting

Direct sowing / seeding

There are two types

- Wet seeding
- Dry seeding

I. Wet seeding

Pre germinated seeds are broadcasted into puddled and leveled fields which are free from standing water. At the time of puddling basal fertilizer should be mixed. Irrigation should be done when seedlings are of about 5cm tall. The stand establishment by this method varies with the quality of land preparation, weed competition, water management and rainfall during the initial period after sowing

II. Dry seeding

Ungerminated dry seeds are sown to dry soil either in rows or in random. Seed rate generally vary with the severity of the environment and the type of physical damages of the seeds. The seed rate varies from 150Kg/ha to 300Kg/ha depending on the level of weed infestation in dry seeded rice.

Direct sowing / seeding can be done in two ways by manually or mechanically and also be subdivided in to two categories:

a) Row seeding

This method follows a uniform spacing between plants. This will require planting guides to have uniform spacing. If use mechanical seeders un germinated seeds have to be used.

b) Random seeding

In this method seeding is done without a definite distance. It is also known as broadcasting. This is the highly practiced method in Sri Lanka

A rice transplanter is a specialized machine used to transplant rice seedlings in the field. A common rice transplanter comprises:

A seedling tray like a shed roof on which mat type rice nursery is set.

A seedling tray shifter that shifts the seedling tray like the carriage oftypewriters.

Plural pickup forks that pick seedlings up from mat type nursery on the seedling tray and put the seedlings into the earth, as if the seedling were taken between human fingers.

Machine transplanting using rice transplanters requires considerably less time and labor than manual transplanting. It increases the approximate area that a person can plant from 700 to 10,000 m2/day (en.wikipedia.org/). Transplanting of paddy seedlings can be categorized into three groups as fallows:

1. By hand (manual)
2. Manually operated machines (work by man power)
3. Mechanically operated machines (work by engine

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

power)

TRANSPLANTING BY HAND

This method is good for small fields and to fill patches.Manualtransplanting does not require costly machines and is most suited for labor-surplus areas and for small rice fields. Manual transplanting can be done in fields with less than optimal leveling and with varying water levels. Seedlings are raised in a wet, dry or modified matnursery.

Proper nursery management will produce healthy, vigorous seedlings.

Limitations:

Transplanting is tedious and time-consuming (up to 30 man days /ha) Planting laborers can suffer from back problems(health risk) Difficult to get enough labor at peak periods to planton time

Difficult to maintain optimum spacing and uniform plant density, especially with random transplanting and contract labor

Low plant density with contract transplanting on area basis lowers yields

RICE PLANTING

Rice crops can be either direct seeded or transplanted.

In direct seeding, seeds are sown directly in the field. While in transplanting, seedlings are first raised in seedbeds before they are planted in the field.

When choosing the suitable planting method, the

(1) Locality,

(2) type of soil,

(3) Rice ecosystem,

(4) Availability of inputs and labor, should be considered.

Choosing when to plant is crucial to establishing the crop in the field. Timely planting into a well prepared seedbed will help produce a fast growing, uniform crop that will have higher yields and better competition against weeds and other pests. The best time to plant depends on locality, variety, weather, water availability, and the best harvest time. Planting at the same time (or within a 2 week window) as the neighboring fields can help to minimize insect, disease, bird, and rat pressure on individual fields.

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

DIRECT SEEDING

Seed quality and selection

Seed is a living product that must be grown,

harvested, and processed correctly in order to realize the yield potential of any rice variety. Good quality seed can increase yields by 5-20%. Using good seed leads to lower seeding rates, higher crop emergence, reduced replanting, more uniform plant stands, and more vigorous early crop growth. Vigorous growth in early stages reduces weed problems and increases crop resistance to insect pests and diseases. All of these factors contribute to higher yields and more productive rice farms.

Good seed is pure (of the chosen variety), full and uniform in size, viable (more than 80%

germination with good seedling vigor), and free of weed seeds, seed- borne diseases, pathogens, insects, or other matter.

Choosing seed of a suitable variety of rice that suits the environment it will be grown in and ensuring the seed choosen of that variety is of the highest possible quality is the essential first step in rice production.

Land preparation

Before rice can be planted, the soil should be in the best physical condition for crop growth and the soil surface is level. Land preparation involves plowing andharrowing to ‘till’ or dig-up, mix and level the soil.

Tillage allows the seeds to be planted at the right depth, and also helps with weed control. Farmers can till the land themselves using hoes and other equipment or they can be assisted by draft animals, such as buffalo, or tractors and other machinery.

Next, the land is leveled to reduce the amount of water wasted by uneven pocketsof too-deep water or exposed soil. Effective land leveling allows the seedlings to become established more easily, reduces the amount of effort required to manage the crop, and increases both grain quality and yields.

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

Crop establishment

The two main practices of establishing rice plants are transplanting and direct seeding.

Transplanting is the most popular plant establishment technique across Asia. Pre-germinated seedlings are transferred from a seedbed to the wet field. It requires less seed and is an effective method to control weeds, but requires more labor. Seedlings may be transplanted by either machine or hand.

Direct seeding involves broadcasting dry seed or pre-germinated seeds and seedlings by hand or planting them by machine. In rainfed and deepwater ecosystems, dry seed is manually broadcast onto the soil surface and then incorporated either by ploughing or by harrowing while the soil is still dry. In irrigated areas, seed is normally pre- germinated prior to broadcasting.

Water use and management

Cultivated rice is extremely sensitive to water shortages. To ensure sufficient water, most rice farmers aim to maintain flooded conditions in their field. This isespecially true for lowland rice. Good water management in lowland rice focuses on practices that conserve water while ensuring sufficient water for the crop.

In rainfed environments when optimal amounts of water may not be available for rice production, a suite of options are available to help farmers cope with differentdegrees and forms of water scarcity. It includes sound land preparation and pre- planting activities followed by techniques such as saturated soil culture, alternatewetting and drying, raised beds, mulching, and use of aerobic rice that can cope with dryer conditions.

Nutrient management

At each growth stage, the rice plant has specific nutrient needs. This makes nutrient management a critical aspect of rice farming.

The unique properties of flooded soils make rice different from any other crop. Because of prolonged flooding in rice fields, farmers are able to conserve soil organic matter and also receive free input of nitrogen from biological sources,

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

which means they need little or no nitrogen fertilizer to retain yields. However, farmers can tailor nutrient management to the specific conditions of their field toincrease yields.

Crop health

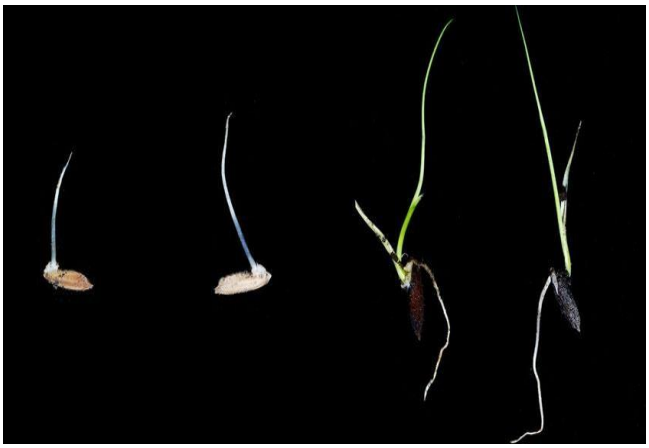
The rice plant has a wide array of 'enemies' in the field. These include rodents, harmful insects, viruses, diseases, and weeds. Farmers manage weeds through water management and land preparation, by hand weeding, and in some cases herbcide application. Understanding the interactions among pests, natural enemies, host plants, other organisms, and the environment allows farmers to determine what if any pest management may be necessary.

Avoiding conditions that allow pests to adapt and thrive in a particular ecosystem helps to identify weak links in the pests' life cycle and therefore what factors can be manipulated to manage them. Retaining natural ecosystems such that predators and natural enemies of pests and diseases are kept in abundance can also help keep pest numbers down.

Growth phases

Rice plants take around 3–6 months to grow from seeds to mature plants, depending on the variety and environmental conditions. They undergo three general growth phases: vegetative, reproductive, and ripening.

Rice varieties can be categorized into two groups: the short-duration varieties which mature in 105–120 days and the long-duration varieties which mature in 150 days. A 120-day variety, when planted in a tropical environment, spends about 60 days in the vegetative phase, 30 days in the reproductive phase, and 30 days in the ripening phase.



1. **Germination**

Germination in rice occurs when the first shoots and roots start to emerge from the seed and the rice plant begins to grow.

To germinate, rice seeds need to absorb a certain amount of water and be exposed to a temperature range of 10–40 °C. This breaks the dormancy stage ofthe seed.

When planted into flooded soil, the shoot is the first to emerge from the seed, with the roots developing when the first shoot has reached the air.

If the seed is planted in non-flooded soil, the root is the first to emerge from the seed and then the shoot.

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

2. Vegetative phase

The vegetative phase is characterized by the development of tillers and more leaves, and a gradual increase in plant height. The number of days the vegetative stage takes varies depending on the variety of rice, but is typicallybetween 55 and 85 days.

The early vegetative phase begins as soon as the seed germinates into a seedling and ends at tillering.

The seedling stage starts right after the first root and shoot emerge, and lasts until just before the first tiller appears. During this stage, seminal roots and upto five leaves develop.

As the seedling continues to grow, two more leaves develop. Leaves continueto develop at the rate of one every 3–4 days during the early stage.

The late vegetative phase starts when tillering begins, which extends from
the appearance of the first tiller until the maximum number of tillers is reached. This typically happens 40 days after sowing.

The stem begins to lengthen late in the tillering stage and stops growing in height just before panicle initiation about 52 days after sowing, which alsosignals the end of the vegetative phase.

3. Reproductive phase

The first sign that the rice plant is getting ready to enter its reproductive phase isa bulging of the leaf stem that conceals the developing panicle, called the ‘booting’ stage. Then the tip of the developing panicle emerges from the stem and continues to grow. Rice is said to be at the ‘heading’ stage when the panicleis fully visible. Flowering begins a day after heading has completed. As the flowers open they shed their pollen on each other so that pollination can occur. Flowering can continue for about 7 days

Ripening phase

The ripening phase starts at flowering and ends when the rain is mature and ready to be harvested. This stage usually takes 30 days. Rainy days or low temperatures may lengthen the ripening phase, while sunny and warm days may shorten it. The last three stages of growth make up the ripening phase.

Ripening follows fertilization and can be subdivided into milky, dough, yellow, ripe, and maturity stages. These terms are primarily based on the texture and color of the growing grains. The length of ripening varies among varieties from about 15 to 40 days. Ripening is also affected by temperature, with a range from about 30 days in the tropics to 65 days in cool temperate regions.

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

Harvest

Harvesting is the process of collecting the mature rice crop from the field. Depending on the variety, a rice crop usually reaches maturity at around 105–150days after crop establishment. Harvesting activities include cutting, stacking, handling, threshing, cleaning, and hauling. Good harvesting methods help maximize grain yield and minimize grain damage and deterioration.

Harvesting can be done manually or mechanically:

Manual harvesting is common across Asia It involves cutting the rice crop with simple hand tools like sickles and knives. Manual harvesting is very effective when a crop has lodged or fallen over, however it is labor intensive. Manual harvesting requires 40 to 80 hours per hectare and it takes additional labor to manually collect and haul the harvested crop.

Mechanical harvesting using reapers or combine harvesters is the other option, but not so common due to the availability and cost of machinery. Following cutting the rice must be threshed to separate the grain from the stalk and cleaned. These processes can also be done by hand or machine.

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

COMPONENTS

SL No	Particulars
1	Motor
2	Battery
3	Tube
4	Chain/ Sprocket
5	Plate
6	Wheel
7	Bush
8	Fasteners
9	Other attachments’
10	Sheet metal
11	Shaft
12	Wire

Battery

Features

- Multi-cell design for economy of installation and maintenance
- Individual valve for each cell
- High quality ABS case and cover
- Absorbent Glass Mat (AGM) technology for efficient gas recombination of

up to 99% and freedom from electrolyte maintenance

- Not restricted for air transport
- Not restricted for surface transport
- Long life
- Float/cycle use
- Low self-discharge rate
- Use in any position

Keep batteries at a comfortable temperature - between about 50 and 80 degrees Fahrenheit, and ideally around 75 degrees. Don't let batteries freeze, and keep them off cold concrete floors. If the batteries are kept in the home, they should be in a separate, sealed and well-ventilated space out of reach ofchildren. Promptly recharge partially drained batteries. Some watt-hour meters show the percentage of charge left in the battery (much like most laptop computers). A battery that is only

THEORY OF DC MOTOR SPEED CONTROL

The speed of a DC motor is directly proportional to the supply voltage, so if we reduce the supply voltage from 12 Volts to 6 Volts, the motor will run at half the speed. How can this be achieved when the battery is fixed at 12 Volts?

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

The speed controller works by varying the average voltage sent to the motor. It could do this by simply adjusting the voltage sent to the motor, but this is quite inefficient to do. A better way is to switch the motor's supply on and off very quickly. If the switching is fast enough, the motor doesn't notice it, it only notices the average effect. When you watch a film in the cinema, or the television, whatyou are actually seeing is a series of fixed pictures, which change rapidly enoughthat your eyes just see the average effect - movement. Your brain fills in the gaps to give an average effect. Now imagine a light bulb with a switch. When youclose the switch, the bulb goes on and is at full brightness, say 100 Watts. When you open the switch it goes off (0 Watts). Now if you close the switch for a fraction of a second, and then open it for the same amount of time, the filament won't have time to cool down and heat up, and you will just get an average glow of 50 Watts. This is how lamp dimmers work, and the same principle is used by speed controllers to drive a motor. When the switch is closed, the motor sees 12 Volts, and when it is open it sees 0 Volts. If the switch is open for the same amount of time as it is closed, the motor will see an average of 6 Volts, and will run more slowly accordingly. As the amount of time that the voltage is on increases compared with the amount of time that it is off, the average speed of the motor increases.

This on-off switching is performed by power MOSFETs. A MOSFET (Metal-Oxide-Semiconductor Field Effect Transistor) is a device that can turn very large currents on and off under the control of a low signal level voltage. For more detailed information, see the dedicated chapter on MOSFETs) The time that it takes a motor to speed up and slow down under switching conditions is dependent on the inertia of the rotor (basically how heavy it is), and how much friction and load torque there is. The graph below shows the speed of a motor that is being turned on and off fairly slowly:

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

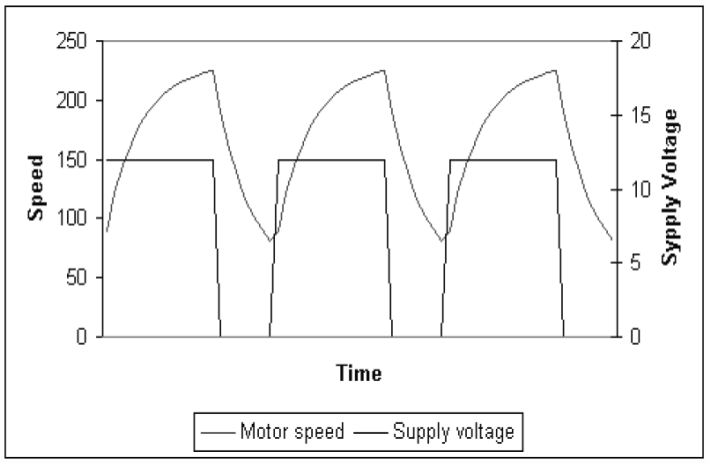


Figure Motor speed vs supply voltage

You can see that the average speed is around 150, although it varies quite a bit. Ifthe supply voltage is switched fast enough, it won't have time to change speed much, and the speed will be quite steady. This is the principle of switch mode speed control. Thus the speed is set by PWM – Pulse Width Modulation.

SPEEDCONTROL TECHNIQUES

We will start off with a very simple circuit (see the figure below). The inductances of the field windings and the armature windings have been lumped together and called La. The resistance of the windings and brushes is notimportant to this discussion, and so has not been drawn. Q1 is the MOSFET. When Q1 is on, current flows through the field and armature windings, and the motor rotates. When Q1 is turned off, the current through an inductor cannot immediately turn off, and so the inductor voltage drives a diminishing current inthe same direction, which will now flow through the armature, and back throughD1 as shown by the red arrow in the figure below. If D1 wasn't in place, a very large voltage would build up across Q1 and blow it up.

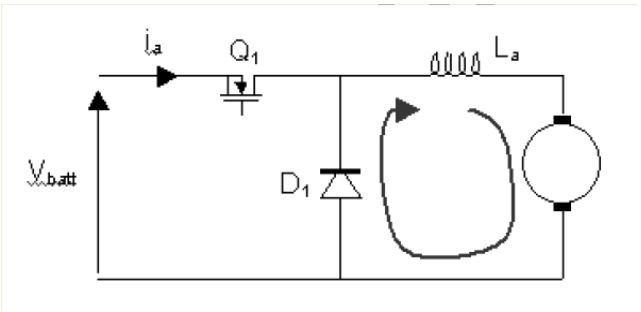


Figure Circuit diagram of speed control of D.C. Motor

SPEED CONTROL OF D.C. MOTOR:

The purpose of a motor speed controller is to take a signal representing the required speed, and to drive a motor at that speed. Motor speed can be controlledby controlling-

1. Armature voltage (Va)
2. Armature current (Ia)
3. It is obvious that the speed can be controlled by varying
4. Flux/pole, Ø(Flux Control)
5. Resistance R_a of armature circuit (Rheostatic Control)
6. Applied voltage V (Voltage Control)

The above methods have some demerits i.e.

1. A large amount of power is wasted in the controller resistance. Hence, efficiency is decreased.
2. It needs expensive arrangement for dissipation of heat produced in the

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

controller resistance.

3. It gives speeds below the normal speed.

ELECTRONIC SPEED CONTROL METHODS FOR D.C.MOTOR

Compared to the electric and electromechanical systems of speed control, the electronic methods have

1. higher accuracy
2. greater reliability
3. quick response
4. higher efficiency

MOTOR SELECTION

Using the results from above, we selected a 350Watt motor. Furthermore, we chose a Permanent magnet DC motor for the following reasons:

1. Easy to control
2. Good torque-Speed relationships
3. High-power – weight ratio
4. Ease of motor characterization (solving for torque constant, back-emf constant, voltage-speed constant

All of these reasons were critical for the project. Given the time constraint and the complexity of the other system components, a brushless DC Synchronousmotor was ideal for our application. It would deliver adequate torque and rotate at a sufficient. Another factor leading to our selecting this motor was its relative low costs and ease of availability, and the ease with which it could be integratedinto the system.

The next stage of the motor selection was to determine the voltage of the motor. This is important because the speed of the motor is a function of the system voltage. By choosing a higher voltage, the motor would also be capable of producing more power. By choosing an appropriate voltage we can limit the current draw of the motor. This is important for limiting heating but results in a loss of torque.

THROTTLE :

Figure : Throttle and Bake

The use of throttle actuation ensures that the engine only receives the correct amount of throttle opening for any give situation

PRINCIPLE

- The main principle is control of power by varying the duty cycle.
- Here the conduction time to the load is controlled.**Let**
- For a time t1, the input voltage appears across the load ie ON state.

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

- For t2 time the voltage across the load is zero.
- The average voltage at output is given by

$$Va = \frac{1}{T}\int vodt = \frac{t1}{T} Vs = ft1\, Vs = kVs$$

The average load current

$$Ia = Va/R = KVs/R$$

- Where T is the total time period =t1+t2
- k = t1/T is the duty cycle

The RMS value of output voltage is The output power and is given by

$$v02/R\ dt = kVs2/R\ v0idt = 1/T$$

- The duty cycle can be varied from 0 to 1 by varying t1, T or f. Therefore, the output voltage V0 can be varied from 0 to Vs by controlling k, and the power flow can be controlled.
- As the time t1 changes the width of pulse is varied and this type of controlis called pulse width modulation (PWM) control.

PULSE WIDTH MODULATION

BASIC CONCEPT:

The most efficient method of controlling the output voltage is to incorporate pulse width modulation control within the inverters. In this method, a fixed dc input voltage is supplied to the inverter and a controller ac output voltage is obtained by adjusting the on-off periods of the inverter devices. In phase angle control and symmetrical angle control schemes, the supply current consists of one pulse for half cycle and the lowest harmonic is the third. It is very difficult to filter out the lowest order harmonic current. The lowest order harmonics can be eliminated and reduce if the supply current has more than one pulse per half cycle. The switch is turned on and off several times during each half cycle, the width of the pulse is varied to change the output voltage. Pulse width modulation control works by switching the power supplied to the motor on and off very rapidly. The DC voltage is converted to a square-wave signal, alternating between fully on (nearly 24V) and zero, giving the motor a series of power “kicks”. If the switching frequency is high enough, the motor runs at a steady speed due to its fly-wheel momentum. By adjusting the duty cycle of the signal (modulating the width of the pulse, hence the „PWM“) i.e. the time fraction it is “on”, the average power can be varied and hence the motor speed. To control the speed of a D.C motor we need a variable voltage D.C power source. However if you take a 12V motor and switch on the power to it, the motor will start to speed up: motors do not respond immediately so it will take a small time to reach full speed. If we switch the poweroff sometime before the motor reaches full speed, then the

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

motor will start to slowdown. If we switch the power on and off quickly enough, the motor will run at some speed part way between zero and full speed. This is exactly what a PWM controller does: it switches the motor on in a series of pulses. To control the motor speed it varies (modulates) the width of the pulses - hence pulse width modulation.

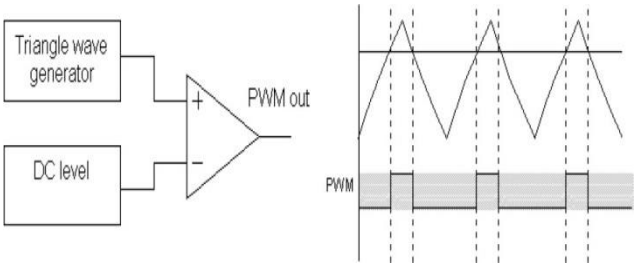
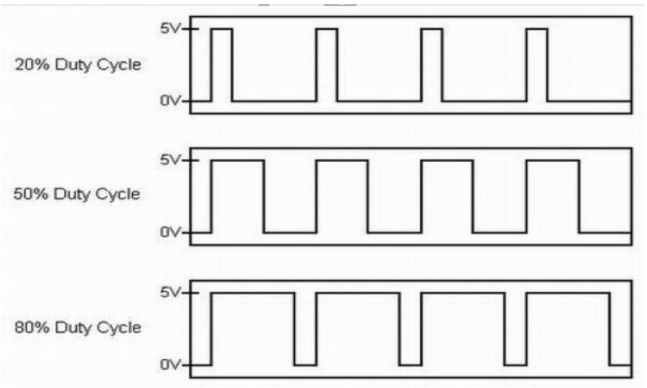


Figure Basic Block Diagram of PWM Technique

An oscillator is used to generate a triangle or saw tooth waveform. At low frequencies the motor speed tends to be jerky, at high frequencies the motor's inductance becomes significant and power is lost. Frequencies of 30-200Hz are commonly used. A potentiometer is used to set a steady reference voltage (dc level). A comparator compares the saw tooth voltage with the reference voltage. When the saw tooth voltage rises above the reference voltage, a power transistor is switched "on". As it falls below reference, it is switched "off". This give a square wave output to the fan motor. If the potentiometer is adjusted to give a high reference voltage (raising the dc level), the saw tooth never reaches it, so output is zero. With a



lo

gi

Figure Waveforms with various duty cycles

PWM is a way of digitally encoding analog signal levels. Through the use of high-resolution counters, the duty cycle of a square wave is modulated to encode a specific analog signal level. The PWM signal is still digital because, at any given instant of time, the full DC supply is either fully on or fully off. The voltage or current source is supplied to the analog load by means of a repeating series of on and off pulses. The on-time is the time during which the DC supply is applied to the load, and the off-time is the periods during which that supply is switched off. Given a sufficient bandwidth, any analog value can be encoded with PWM. Figure 5.5 shows three different PWM signals. Figure 5.5a) shows a PWM output at a 20% duty cycle. That is, the signal is on for 20% of the period and off the other 80%. Figures 5.5b) & 5.5c) shows PWM outputs at 50% and 80% duty cycles, respectively. These three PWM outputs encode three different analog signal values, at 20%,

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

50%, and 80% of the full strength. If, for example, the supply is 5V and the duty cycle is 20%, a 0.8V analog signal results.

BASIC BLOCK DIAGRAM

As shown in block diagram there are mainly three blocks: Astable Multivibrator, Monostable Multivibrator and Driving Circuit.

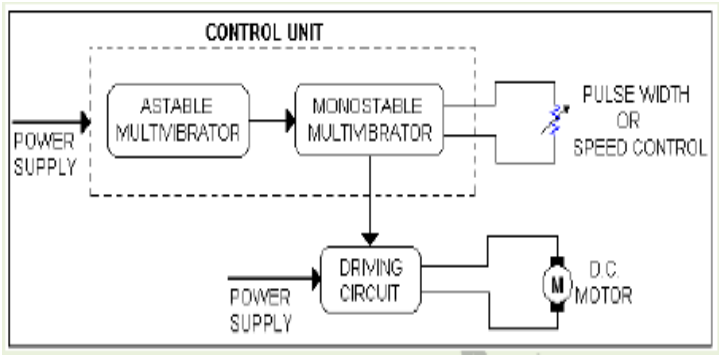


Figure Block Diagram

THE BASIC BLOCKS ARE EXPLAINED BELOW

ASTABLE MULTIVIBRATOR:

This block produce square pulses of same frequency according to time constant *RC.* These pulses are fed to next block as triggering pulses .

MONOSTABLE MULTIVIBRATOR:

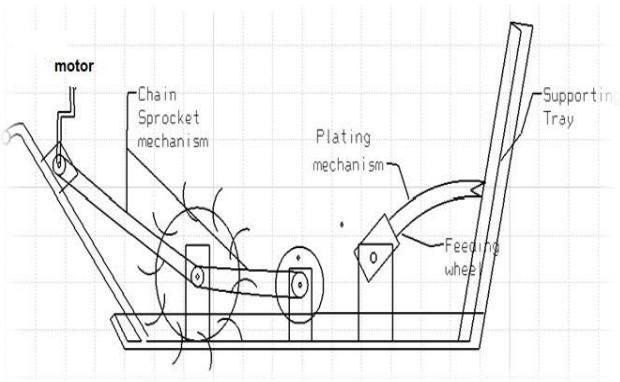
This block produces square pulses of variable frequencies. The frequency of output pulse can be varied by changing the value of resistor shown in figure. These pulses are fed to the driving circuit.

DRIVING CIRCUIT:

This block provides power required to drive the motor. As the frequency of output pulses of Monostable multivibrator changes, the average voltage supplied to motor changes. Hence, the speed of motor changes.

WORKING

As we have seen that manual work in agriculture increases the time and cost so in order to overcome this two problems of farmer we have done this equipment so that it will reduce the human efforts and in less time more work can be done as we have seen for as the mechanism used is very simple and can be used in agriculture the main components used are motor, battery, structure, bearings, shaft, fasteners the battery can be charge, the motor is mounted on the structure and the drive used is chain drive the power from the motor transformed to the chain drive from there to the crank which will convert rotate motion to oscillatingmotion and the paddy is placed on the sheet metal tray which the arms will pick and plug it to ground the wheel is attached so in order that device must move in forward direction



DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283

Applications

- Construction industry.
- Machinery manufacturing industry.
- Storage systems
- Transmission towers.
- Automotive industry.

CONCLUSION

We have taken up this project as real challenge, as we were not experience in the AGRICULTURE field. We started our work on this project facing new hurdles initially. After the completion of the project work we tried its working in our college machine shop and we were pleased to note that it does meet the requirements for what it is meant. The maneuverability of the device is quite good and the handling is quite simple. For commercial purpose one can improve the efficiency of the device effectively by increasing the size of the device.

ADVANTAGES

1) Compact size and portable
2) Easy to move from one place to another place
3) Operating principle is simple.
4) Non-skilled person also operate this machine
5) Easy in operation.
6) Low cost
7) Simple construction.
8) Adaptable.
9) High capacity.
10) Performance.
11) Manually operated.
12) Environmental friendly.
13) Automation can be implemented,
14) Easy to setup
15) Light weight.
16) Easy maintenance.
17) No skill operator required.
18) Power saving.
19) Multi operational.
20) Time saving.
21) Pure mechanical.

REFERENCES

1. www.rajkumaragromachines.com / rice-machines.html#hand-cranked-rice-transplanter Accessed on 21/6/2011.
2. www.statistics.gov.lk/agriculture/Paddy%20Statistics/PaddyStatsPages/2010Yala.pdf 2010. Accessed on 6/6/2011
3. www.tnau.ac.in/aecricbe/aetc/fm2-11.htm Accessed on 20/6/2011
4. http://en.wikipedia.org/wiki/planting
5. http://www.agriinfo.in/?page=topic&superid=1&topicid=337

DOI-10.18486/ IJCSNT.2021.10.02.03
ISSN:2053-6283