

Development Of Autonomous Machine For Rice Planting

V.Kumaresan, P.Tamilarasu, T.Gunasekar, P.Karthikeyan

Abstract: The most important sector of Indian Economy is Agriculture. It is the major backbone of Indian Economy. The major part of agriculture lies in paddy cultivation. In early times, Agriculture was the major sector where most people were employed but now a days, due to industrial growth and IT revolution, the employment in agriculture has become too less. The major part of economy which is vital for India's economic growth is now facing serious issues due to the manpower shortage. In this project, we have come up with a solution to meet out this issue by special mechanism with automation.

Index Terms: Agriculture, Automation, Economy, Manpower, Shortage paddy Cultivation, Special mechanism, Transplanting.

1. INTRODUCTION

Self sufficiency in agriculture production is the most essential part for any developing Economy. India has reached its goal of adequacy in food production through the introduction of green revolution in late 1960's. Increasing productivity by utilizing mechanization in agriculture was one of the missions of green revolution. Farm mechanization increases the productivity of food grains from 50.82 million tonnes in 1951 to 283.137 million tonnes in 2019. Rice is the major food grain grown in India to feed its largest population. Initial stage of paddy cultivation has three important process namely preparation of field, adding manure to the field, transplanting the seedlings from nursery to field. Transplanting by hand takes much time and also requires more labor work. This makes it difficult for large scale production. The first and foremost process in paddy cultivation is the growth of paddy seedlings. It takes about two to three weeks for the seedlings growth. They are grown in nurseries. After this, the seedlings are relocated to the farm field by the labors. This process requires about 240-340 man hours per hectare. Since the rapidly growing population requires fast production, it is impossible to produce the required amount of products to satisfy the growing demand by traditional or conventional methods. So, it has become highly essential to implement the technological innovations in agricultural field too. The Automated Rice Plant Planting Bot will reduce the dependency of more labors for transplanting paddy seedlings. Also it will reduce the cost for transplanting seedlings.

2 EXISTING SYSTEM

Transplanting by hand is the conventional method of transplanting the seedlings. This requires enormous manpower and it is suitable only in areas where manpower is sufficiently available. It is very tough to transplant the seedlings uniformly in the field and it is only suitable for small

and marginal farmers. This method of transplanting is difficult for large scale production and also for cultivation in large fields. Self Propelled Rice Transplanting Mechanism has a diesel engine coupled with a single wheel. The diesel engine is the source to drive the wheel coupled to it. It is a riding type machine which transplants seedlings. It transplants eight seedlings of a mat type in a single time. It consists of a V-belt, gear box and cone clutch. The power from the Diesel engine is transferred to the wheel through the V-belt, gear box and cone clutch. This mechanism is suitable for the farmers who have less amount of land.

3 OBJECTIVE

The main intention of our project is to design an automatic mechanism for transplanting the paddy seedlings by automated transplanting robot and test the performance of the mechanism in the field. This mechanism is to help the farmers to reduce their dependency for more manpower during monsoon period, reduce the time consumption to transplant the seedlings from nursery to field, and increase the yield by planting the seedlings in uniform spacing. The Automatic transplanting mechanism needs more skilled labors for operation and maintenance. This will generate more employment opportunities for skilled youth labors in the villages and increases the net income of farmers.

4 BLOCK DIAGRAM AND PROCESS

The seedlings are placed in a tray like stands called plant holder. Here, the four bar linkage mechanism plays the vital role while plant the seedlings to the main field.

- V.Kumaresan, Assistant Professor, Department of Electrical & Electronics Engineering, Kongu Engineering College, Perundurai, Erode – 638 060, Tamil Nadu, India. Email: rvksan@gmail.com
- P.Tamilarasu, Assistant Professor, Department of Electrical & Electronics Engineering, Kongu Engineering College, Perundurai, Erode – 638 060, Tamil Nadu, India. Email: tamilarasu.111@gmail.com
- Dr.T.Gunasekar, Assistant Professor, Department of Electrical & Electronics Engineering, Kongu Engineering College, Perundurai, Erode – 638 060, Tamil Nadu, India. Email: gunas.27@gmail.com
- P.Karthikeyan, Assistant Professor, Department of Electrical & Electronics Engineering, Kongu Engineering College, Perundurai, Erode – 638 060, Tamil Nadu, India. Email: pmanjukarthick@gmail.com

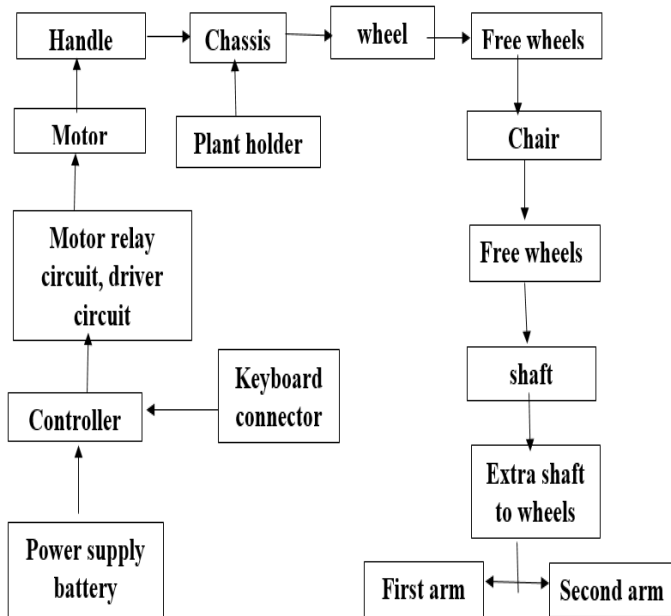


Figure 1: Block Diagram of the Process

The four bar connection mechanism is provided with a needle like structure at one end. This needle like structure picks the seedlings from the plant holder one by one. This orderly movement of four bar connection mechanism is similar to the train wheel operation. The four bar connection is driven by a separate wiper motor.

5 EXPERIMENTAL SET UP



Figure 2: Hardware Model of the Proposed Idea

6 CONSTRUCTION DETAILS

6.1 Ground wheel: The wheel which is placed on the ground. It moves by the help of wiper motor which is connected to the wheel by a chain. On the periphery of this wheel, blade is mounted to achieve a proper grip in the muddy field.

6.2 Sprockets: The sprockets function is to transmit torque which act like a pulling force through chain. There are two sprocket-one for the wheel movement and other for the bar linkage.

6.3 Planting finger: The planting finger plays an important and vital role in this project which is responsible for the planting of seedlings to the field. It has the specific shape which picks the seedlings from the tray and plants it in to the field.

7 WORKING

The existing method of paddy transplanting, the seedlings are transplanted by manual method. To avoid the manual seedling process, we have developed an automatic rice plant transplanting machine. The transplanting machine consists of the plant holder placed on the chassis. The plant holder is used as a storage tank for the seedlings. Usually in manual transplanting, the seedlings are placed by human hand and they will plant the seedlings in the main field. Here the seedlings are placed or stored in the tray. The needle like structure in the four bar linkage, arm picks the seedlings one by one and plants it successively as the bot moves. The four bar linkage is provided with a separate wiper motor powered by the battery. Separate wiper motor is used for the movement of the bot. The figure 3 shows the Bluetooth module HC-05 is used for the mobile automation. The whole control of the bot will be handled by the person who carries the mobile application called Bluetooth electronics. It controls such as bot wheel movement and four bar linkage.

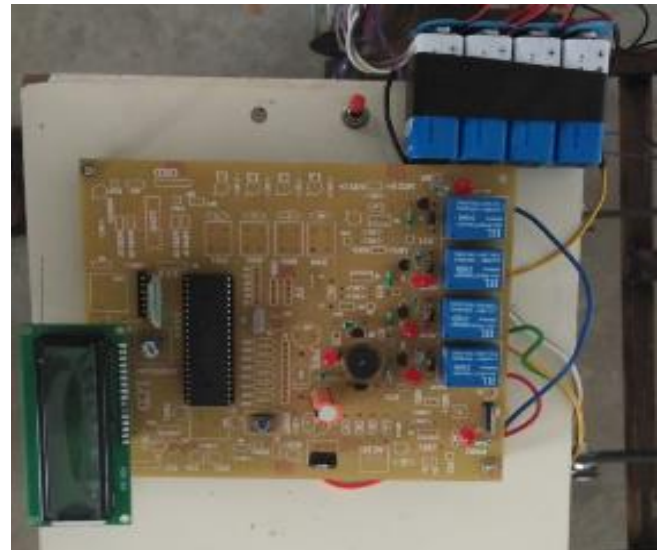


Figure 3: PIC controller setup

8 CONCLUSION

This machine helps the farmers to speed the transplanting process of paddy seedlings. Based on the overall performance of the machine we can definitely say that the project will satisfy the need of small farmers. The machine required less man power and less time compared to traditional methods, so if we manufacture it on a large scale its cost gets significantly reduce and we hope this will satisfy the partial thrust of Indian agriculture. So, in this way we solve the labor problem that is the need of today's farming in India. The machine can be used to plant the paddy seedlings. This Paper has investigated the design of a rice transplanting machine for the developing world and presented a novel solution to the problem. This design successfully utilizes a time taken for rice planting for the farmer and it also enabled the efficient use when compared to other rice planters.

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